Documents responsive to the October 20, 2011, request from Chairman Issa for documents regarding Drakes Bay Oyster Company

Volume: 00033002_Issa_002

	Document Name	Pages	Document Date	Document Type	Document Title
1	SOL-BIL-B01-00001-000001	35	20101222	EML	Fw: Reflections on a note from Peter Douglas
2	SOL-BIL-B01-00001-000002	22	20101201	EML	Fw: Thoughts about your investigation
3	SOL-BIL-B01-00001-000003	8	20101220	EML	FW: Lack of response by DOI Office of the Secretary to my FOIA request
4	SOL-BIL-B01-00001-000004	9	20110102	EML	Pattern document
5	SOL-BIL-B01-00001-000005	27	20101201	EML	Fw: Thoughts about your investigation
6	SOL-BIL-B01-00001-000006	20	20101201	EML	Thoughts about your investigation
7	SOL-BIL-B01-00001-000007	7	20110102	LET	Re: Analysis of May 5, 2009 NAS Report with Reference to What Sections Would Have Been Written Differently Had the Panel Members Known About the Photos and Logs
8	SOL-BIL-B01-00001-000008	2	20110117	EML	CCC cite (b) (6), (b) (7)(C) et al. 2009 paper as key reference
9	SOL-BIL-B01-00001-000009	9	20101221	EML	Reflections on a note from Peter Douglas
10	SOL-BIL-B01-00001-000010	10	20101222	EML	FW: Reflections on a note from Peter Douglas
11	SOL-BIL-B01-00001-000011	13	20100428	LET	RE: Harbor seal disturbance data: April 29, 2007 should be eliminated
12	SOL-BIL-B01-00001-000012	28	20090118	LET	RE: New Information Shows that the National Park Service Committed Scientific Misconduct in the Documents it Presented to Your Panel
13	SOL-BIL-B01-00001-000013	5	20100324	LET	RE: Harbor seal disturbance data
14	SOL-BIL-B01-00001-000014	5	20100325	LET	Re: Drakes Estero Seal Disturbance Notes
15	SOL-BIL-B01-00001-000015	9	20101123	LET	Re: Request the California Coastal Commission Stop Promoting False and Discredited Science Concerning Drakes Estero
16	SOL-BIL-B01-00001-000016	9	20101210	OTH	DBOC's Responses to the 2008 IG's Report - Scientific Misconduct 12/10/10

	Document Name	Pages	Document Date	Document Type	Document Title
17	SOL-BIL-B01-00001-000017	6	20090526	EML	Lunnyy Letter to Jarvis on Jarvis/NPS Response to NAS Report -- Jarvis Has Not Responded -- Request Your Assistance to Obtain Response
18	SOL-BIL-B01-00001-000018	4	20090511	LET	Letter from Drakes Bay Oyster Company regarding the May 5, 2009 NPS press release
19	SOL-BIL-B01-00001-000019	4	20101207	EML	Fw: Letter NAS Panel and Withheld Data Concern
20	SOL-BIL-B01-00001-000020	6	20110108	EML	Perpetuation of false science by NPS supporters
21	SOL-BIL-B01-00001-000021	4	20110103	EML	Fwd: EAC and NPCA letter to DOI and CCC regarding Drakes Estero EIS
22	SOL-BIL-B01-00001-000022	7	20101203	EML	Fw: Letter NAS Panel and withheld data concern
23	SOL-BIL-B01-00001-000023	45	20101210	EML	Requested Documents to Gavin Frost
24	SOL-BIL-B01-00001-000024	45	20101213	EML	Fw: Requested Documents - SFAN I&M Program Harbor Seal Monitoring
25	SOL-BIL-B01-00001-000025	6	20090505	ART	Park Service to Use National Academy of Sciences Report to Improve Management of Drakes Estero
26	SOL-BIL-B01-00001-000026	3	20090507	ART	Drakes Bay Oyster Company Scientists: Oyster company does not harm ecosystem
27	SOL-BIL-B01-00001-000027	4	20090506	ART	Scientists side with Drakes Bay oyster farmer
28	SOL-BIL-B01-00001-000028	3	20090507	ART	Ag interests, enviros spar over Calif. wilderness plan
29	SOL-BIL-B01-00001-000029	1	20090507	ART	Public Employees for Environmental Responsibility News Release (www.peer.org)
30	SOL-BIL-B01-00001-000030	2	20090507	ART	Park Service abuses data, apologizes
31	SOL-BIL-B01-00001-000031	2	20090507	ART	Feinstein backs extension of Drakes Bay oyster permit
32	SOL-BIL-B01-00001-000032	2	20090509	ART	Marin Independent Journal Cartoon and Online comments about the Pt. Reyes oyster farm debate
33	SOL-BIL-B01-00001-000033	1	20090514	ART	Report's findings overstated
34	SOL-BIL-B01-00001-000034	3	20090505	RPT	Current Level of Oyster Farming Unlikely to have Substantial Impact on Drakes Estero Ecosystem

	Document Name	Pages	Document Date	Document Type	Document Title
35	SOL-BIL-B01-00001-000035	48	20100206	RPT	Spatial use of Drakes Estero, California, by harbor seals correlated to anthropogenic disturbance and natural variation during 1982-2009
36	SOL-BIL-B01-00001-000036	18	20100428	RPT	DOI IG Evaluation Report - Interior Lacks a Scientific Integrity Policy, Report No. WR-EV-MOA-0014-2009
37	SOL-BIL-B01-00001-000037	34	20110128	OTH	DOI Departmental Manual - Chapter 3: Integrity of Scientific and Scholarly Activities
38	SOL-BIL-B01-00001-000038	4	20100831	NTI	Federal Register / Vol.75, No. 168/ August 31, 2010 / DOI Proposed Scientific Integrity Policy of the Department of the Interior
39	SOL-BIL-B01-00001-000039	2	20100831	ART	What's Missing from Interior's New Scientific Integrity Policy?
40	SOL-BIL-B01-00001-000040	17	20100907	ART	Proposed Scientfic Integrity Policy for the U.S. Interior Department - Comments submitted by PEER
41	SOL-BIL-B01-00001-000041	16	20080131	RPT	NPS Interim Guidance Document Governing Code of Conduct, Peer Review, and Information Quality Correction for NPS Cultural and Natural Resource Disciplines
42	SOL-BIL-B01-00001-000042	5	20001206	NTI	Federal Register/Vol. 65, No. 235 /December 6, 2000 /Office of Science and Technology Policy - Executive Office of the President; Federal Policy on Research Misconduct; Preamble for Research Misconduct Policy
43	SOL-BIL-B01-00001-000043	8	20021016	MEM	Director's Order # 11B: Ensuring Quality of Information Disseminated by the National Park Service
44	SOL-BIL-B01-00001-000044	1	20040316	OTH	The Code of Scientific Conduct
45	SOL-BIL-B01-00001-000045	2	20080423	RPT	DOI IG Investigative Activity Report, Information re: Departmental "Code of Scientific Conduct"
46	SOL-BIL-B01-00001-000046	18	20070918	RPT	National Park Service / Clarification of Law, Policy, and Science on Drakes Estero
47	SOL-BIL-B01-00001-000047	6	XXXXXXXX	OTH	Parking Request and Directions to Le Grand Parking Lot
48	SOL-BIL-B01-00001-000048	1	XXXXXXXX	NTE	Notes regarding the seals and oyster operations
49	SOL-BIL-B01-00001-000049	19	200901XX	RPT	Marine Mammal Science - Modeling the effects of El Nino, density-dependence, and disturbance on harbor seal (Phoca vitulina) counts in Drakes Estero, California: 1997-2007

	Document Name	Pages	Document Date	Document Type	Document Title
50	SOL-BIL-B01-00001-000050	13	20110113	LET	National Park Service Special Use Permit Application by Drakes Bay Oyster Company for Aquaculture Operations in Drakes Estero, Point Reyes National Seashore
51	SOL-BIL-B01-00001-000051	9	20101123	LET	Re: Request the California Coastal Commission Stop Promoting False and Discredited Science Concerning Drakes Estero
52	SOL-BIL-B01-00001-000052	2	XXXXXXXX	RPT	Program Overview of the California Coastal Commission
53	SOL-BIL-B01-00001-000053	2	20110218	LET	Letter to Gavin Frost from the President of National Academy of Sciences requesting a copy of the report or a fair summary
54	SOL-BIL-B01-00001-000054	28	20100930	LET	RE: Response to followup datapoint questions
55	SOL-BIL-B01-00001-000055	1	20101213	EML	Fw: Scanned datasheets - email 8 and final 2008 and 2009
56	SOL-BIL-B01-00001-000056	37	20080306	OTH	Point Reyes National Seashore Harbor Seal Disturbance Survey
57	SOL-BIL-B01-00001-000057	4	20090421	OTH	Point Reyes National Seashore Harbor Seal Disturbance Survey
58	SOL-BIL-B01-00001-000058	24	20101213	EML	Fw: Scanned datasheets - email 1 - disturbance 2005
59	SOL-BIL-B01-00001-000059	36	20101213	EML	Fw: Scanned datasheets - email 6 - disturbance 2010
60	SOL-BIL-B01-00001-000060	55	20101213	EML	Fw: Scanned datasheets - email 4 - disturbance 2008
61	SOL-BIL-B01-00001-000061	37	20101213	EML	Fw: Scanned datasheets -email 5 - disturbance 2009
62	SOL-BIL-B01-00001-000062	111	20111016	EML	NPS Science & Implication for the Oyster Farm EIS by Dr. Corey Goodman
63	SOL-BIL-B01-00001-000063	6	XXXXXXXX	MAP	Drake's Estero Camera Angles
64	SOL-BIL-B01-00001-000064	8	20090601	BRF	Briefing Statement: Little Archaeological Evidence of the Olympia Oyster (Ostrea Lurida) at Drakes Estero, Point Reyes National Seashore, California
65	SOL-BIL-B01-00001-000065	27	20090609	RPT	Critical Review: A Historical Perspective on the National Research Council's Report "Shellfish Mariculture in Drakes Estero"
66	SOL-BIL-B01-00001-000066	27	XXXXXXXX	LET	U.S. DOI, NPS Special Use Permit for Drakes Bay Oyster Company
67	SOL-BIL-B01-00001-000067	2	XXXXXXXX	STA	Statement of Principles Regarding NEPA evaluation for Special Use Permit for Drakes Bay Oyster Company
68	SOL-BIL-B01-00001-000068	54	20080721	RPT	Report of Investigation - Point Reyes National Seashore

	Document Name	Pages	Document Date	Document Type	Document Title
69	SOL-BIL-B01-00001-000069	6	XXXXXXXX	OTH	EXHIBIT C
70	SOL-BIL-B01-00001-000070	4	XXXXXXXX	LET	U.S. DOI, NPS Special Use Permit for Johnson Oyster Co.
71	SOL-BIL-B01-00001-000071	30	20060818	RPT	12-Year Sanitary Survey Report: Shellfish growing area classification for Drakes Estero, California
72	SOL-BIL-B01-00001-000072	1	XXXXXXXX	MAP	Drake's Estero Oysers / Aquaculture Lease & Seal Haulout Areas
73	SOL-BIL-B01-00001-000073	1	XXXXXXXX	MAP	Drake's Estero Aquaculture and Seal Habitat
74	SOL-BIL-B01-00001-000074	1	XXXXXXXX	MAP	Drake's Estero Camera Angles
75	SOL-BIL-B01-00001-000075	2	20070426	RPT	Trip Report - Drakes Estero by Sarah Allen, Science Advisor
76	SOL-BIL-B01-00001-000076	9	XXXXXXXX	OTH	Drakes Bay Oyster Company Timecards and Cost Codes
77	SOL-BIL-B01-00001-000077	20	XXXXXXXX	OTH	Timecards
78	SOL-BIL-B01-00001-000078	1	XXXXXXXX	MAP	Map
79	SOL-BIL-B01-00001-000079	3	20090203	LET	Letter from Drakes Bay Oyster Company to the National Academy of Sciences Re: Drakes Estero Seal Haulout Maps
80	SOL-BIL-B01-00001-000080	3	20090210	LET	Letter from Drakes Bay Oyster Company to the National Academy of Sciences Re: Seal haulout areas of Drakes Estero
81	SOL-BIL-B01-00001-000081	5	19920515	LET	Letter to Superintendent of Point Reyes National Seashore from the Department of Fish and Game - State of California
82	SOL-BIL-B01-00001-000082	1	XXXXXXXX	MAP	Drake's Estero Oysters / Aquaculture Lease & Seal Haulout Areas
83	SOL-BIL-B01-00001-000083	1	XXXXXXXX	MAP	Drake's Estero Aquaculture and Seal Habitat
84	SOL-BIL-B01-00001-000084	1	XXXXXXXX	MAP	Map
85	SOL-BIL-B01-00001-000085	1	XXXXXXXX	MAP	Drake's Bay Oyster Company / Figure 2: Harbor Seal Protection Area
86	SOL-BIL-B01-00001-000086	1	XXXXXXXX	MAP	Drake's Bay Oyster Company / Figure 1 : Harbor Seal Protection Area
87	SOL-BIL-B01-00001-000087	1	XXXXXXXX	MAP	Harbor Seal Protection Area
88	SOL-BIL-B01-00001-000088	1	2009XXXX	MAP	Figure 1. Oyster bag areas (mapped in spring of 2007), oyster racks, and the eight seal haul out subsites in Drakes Estero

	Document Name	Pages	Document Date	Document Type	Document Title
89	SOL-BIL-B01-00001-000089	1	XXXXXXXX	MAP	Drake's Estero Camera Angles
90	SOL-BIL-B01-00001-000090	4	20090203	LET	Letter from Drakes Bay Oyster Company to the National Academy of Sciences Re: Drakes Estero, Becker Report II
91	SOL-BIL-B01-00001-000091	48	XXXXXXXX	RPT	Modeling the effects of El Nino, density-dependence, and disturbance on harbor seal (Phoca vitulina) counts in Drakes Estero, California: 1997-2007. Prepage Proofs - Not Final Copy
92	SOL-BIL-B01-00001-000092	4	20070615	ART	Park service to close historic oyster farm
93	SOL-BIL-B01-00001-000093	1	XXXXXXXX	RPT	2007 - 2008 Annual Sanitary Survey Update Report - Drakes Estero, California. Figure 1. Primary and Secondary Water Quality Stations in Drakes Estero.
94	SOL-BIL-B01-00001-000094	70	20101228	EML	Info for fact finding
	Total Pages:	**1,269**			

Viswanathan, Ariana

From:	Frost, Gavin
Sent:	Wednesday, December 22, 2010 9:00 AM
To:	Viswanathan, Ariana
Subject:	Fw: reflections on a note from Peter Douglas
Attachments:	CSG to Salazar.11_22_10.pdf; ATT00001..htm; CSG to Douglas.11_23_10.pdf; ATT00002..htm

Delivered by SOL Blackberry Services

From: Corey Goodman <corey.goodman@me.com>
To: Frost, Gavin
Sent: Tue Dec 21 20:52:20 2010
Subject: reflections on a note from Peter Douglas

December 21, 2010

Dear Gavin,

Please find enclosed the reply from Peter Douglas (Executive Director of the California Coastal Commission) to my November 23, 2010 request that he retract his letter to NOAA that is based on false science concerning the oyster farm at Drakes Estero. In his November 10, 2010 letter to NOAA, Mr. Douglas failed to reference (amongst 51 citations) the National Academy of Sciences report from May 5, 2009, a report that refuted most of his scientific claims. In my November 23 letter, I also asked Mr. Douglas to investigate why CCC continues to propagate false science – scientific claims that in several instances the National Park Service either retracted several years ago, or corrected and retracted more recently.

On December 20, 2010, I wrote to Mr. Douglas:

> *"Even though I asked you to "please respond to this request", I have not heard back from you since my November 23 letter to you. Unless I hear otherwise from you, I infer from your month-long silence that you agree with my criticism that you relied on false science when you wrote to NOAA Acting Director Donna Wieting, OCRM, and failed to cite the National Academy of Sciences report from May 5, 2009 that largely dismissed many of your arguments."*

In his reply to my letter on December 21, 2010, Mr. Douglas wrote:

> *"I do not intend to waste taxpayer money, including scarce staff time, on a personal response to your spurious and irresponsible accusations. A discussion of these baseless allegations will be contained in the Commission's letter to NOAA that will soon be forthcoming in answer to a letter we received from the DBOC (to which your letter was attached). I don't know what you think you will accomplish by pursuing your bullying tactics. As I made clear at the Commission's meeting in San Francisco last week when one of your fellow travelers made similar sham charges, we will not tolerate tactics of intimidation, demonization of public employees, or the reprehensible politics of personal destruction. I witnessed the appalling spectacle you helped orchestrate last year against professionals who have dedicated their lives to public service and whose integrity is beyond reproach. It was shameful! We will not allow a similar witch hunt to be mounted against the Commission or its staff. We take great pride in our integrity, professionalism, objectivity, and the high quality of our work applying the law to the facts. One thing is certain, in your unrelenting zeal to attack, defame and destroy the credibility of dedicated public servants you and your fellow pecksniffians have cost American taxpayers an inordinate amount of squandered public treasure."*

Revealing my background as a scientist and not as a literary scholar, I admit learning a new word from Mr. Douglas' reply: "pecksniffian". It is from the 1850's and based on a character – Seth Pecksniff -- in a Dickens' novel. It means *"hypocritically and unctuously affecting benevolence or high moral principles."* It is a word popularized by Bill O'Reilly a few years ago. It is worth considering who if anyone is being Pecksniffian here.

Three and a half years ago, on August 28, 2007, Marin County Supervisor Steve Kinsey asked me to look at National Park Service science concerning the impacts of Drakes Bay Oyster Company (DBOC) on Drakes Estero, and to come report on that science at a Marin County hearing on May 8, 2007. Kinsey knew my local residence, scientific background and integrity, and deep commitment to the role of good science informing public policy. At the time I was a biology professor at U.C. Berkeley, a biotech entrepreneur, an elected member of the National Academy of Sciences, and former chair of the National Research Council's Board on Life Sciences.

I accepted Kinsey's request out of my dedication to public service. At the Marin

County hearing, in my testimony I wrote:

> *"I believe that public policy decisions can and should be informed by quality science. But this must be science conducted rigorously, without agendas or conflicts-of-interest. The political process can be dangerously misled by bad or misused science. One of my greatest concerns when I see science being invoked in public policy debates is to make sure that it is good science and not pseudo-science or … a blatant misuse of science."*
>
> *"My only hesitation in coming forward to testify today is the realization that openly expressing my views as a scientist may cause me to come under personal attack by local groups that are determined to remove Lunny's operation from the PRNS. Nevertheless I feel compelled to speak out for good science instructing public policy."*

Mr. Douglas and others have attacked the messenger because they apparently cannot deal with the message – that NPS has been guilty of scientific misconduct in its claims that DBOC is causing harm to the harbor seals. Mr. Douglas has repeatedly accused me of demonizing NPS employees and engaging in the *"politics of personal destruction."*

The NPS harbor seal database does not support the claim that NPS Superintendent [redacted] made to Supervisor Kinsey on April 5, 2007, when he told him that NPS had overwhelming data of harm to the harbor seals by DBOC. The NPS database shows that [redacted] had no such data. [redacted] false claim to Kinsey started this controversy.

The alleged scientific misconduct by the NPS goes much deeper than that. As of the past seven months, we now know that the NPS has withheld – i.e. suppressed – two additional NPS databases that conclusively show that DBOC has not been disturbing the harbor seals in Drakes Estero.

The NAS, in their May 5, 2009 report, had specifically suggested that time and date-stamped photographs could resolve the controversy over whether the oyster farm was or was not harming the harbor seals. The NPS concealed from the NAS, just as it concealed from the Inspector General and the Marine Mammal Commission, the existence of over three and a half years of just such time and date-stamped photographs.

Starting two years before the NAS report, on May 5, 2007, NPS had two secret cameras, over 250,000 time and date-stamped photographs (taken every minute from dawn to dusk during the several-month pupping season), and detailed minute-to-minute logs of those photos. Those photos showed that Park visitors in kayaks, and not DBOC boats and workers, have been the occasional source of disturbances to the seals. The withheld NPS data contradicted the public NPS claims. This is scientific misconduct.

President Obama, in his speech on April 27, 2009 to the NAS, sent a powerful message about the integrity of science. The President said:

> *"And we have watched as scientific integrity has been undermined and scientific research politicized in an effort to advance predetermined ideological agendas."*
>
> *"... we are restoring science to its rightful place."*

From the moment Kinsey called me on April 28, 2007, my motivation has been to ensure scientific integrity – that policy is driven by good science.

If Douglas' harsh words make you question my intentions, please listen to and read my words. I gave a keynote talk on this issue to the California Council on Science and Technology on October 18, 2010. You can listen to that talk, and watch the accompanying slides, on YouTube at: www.youtube.com/coreysgoodman

You can also read my words in my November 22, 2010 letter to Interior Secretary Salazar (enclosed) and my November 23, 2010 letter to CCC Executive Director Douglas (enclosed). The letter to Secretary Salazar alleging scientific misconduct by NPS officials and scientists has triggered an investigation by the Department of Interior. Rather than calling me names, the CCC needs to take these allegations seriously and undertake a parallel investigation into their misuse of the same science.

I stand by the intent and integrity of my words, have repeatedly over the past three years tried to engage the California Coastal Commission in a substantive conversation,

and thus am saddened by Douglas' repeated personal attacks on me. It is time for the CCC to focus on the message instead of attacking the messenger.

Thus, Mr. Douglas' reply to my recent request is a personal attack on the external whistleblower. We might write it off due to his illness were it not for the appearance of very similar words, and very similar tone and attitude, in emails I received from Douglas in December 2007 and January 2008 when I first asked him, and his staff scientist Dr. John Dixon, if they would look at the NPS harbor seal database with me. Dr. Dixon had admitted not knowing about the NPS database, and having relied on a single controversial data point – the NPS April 26, 2007 Trip Report – in making his September 11, 2007 report to the CCC.

In an email to me on December 23, 2007, Mr. Douglas accused me of being out to "*demonize*" Park employees. He accused me of *"fueling this mission with vitriolic rhetoric, spurious charges and personal defamatory accusation."* This was written to me after I asked Mr. Douglas, and Dr. Dixon, if they would review the NPS harbor seal data and compare it to the NPS and CCC reports about the impact of the oyster farm on the harbor seals.

I wrote back to Mr. Douglas on December 24, 2007 suggesting it was:

> *" the right time for the two of us to sit down and talk about these issues."*

He wrote back to me on December 25, 2007:

> *"I also see no justification for spending any more time at public expense on what is obviously a misguided and spurious investigation ...."*

I wrote to Mr. Douglas on January 6, 2008:

> *"You asked me how and why I view this differently from you, but then when I offered to get together to answer your questions, you did not respond. You seem puzzled by my claims of scientific misconduct on the part of NPS. I am fully prepared to discuss this*

with you. But I am equally puzzled by your claims that the California Coastal Commission has its own data of disturbances of harbor seals that is independent of the NPS, and that validates the NPS claims, and I hope you too will discuss that with me. In fact, I was hoping that you would send me your independent data prior to our meeting so that I might be able to take a look at it. If I am wrong and you do indeed have independent harbor seal disturbance data for Drakes Estero, then I will stand corrected and will say so."

On January 11, 2008, Mr. Douglas wrote back to me:

"Nor do I see the value in spending time for a meeting on the issues you have raised nor do I think it is a good use of John's time."

In a parallel exchange with Dr. John Dixon on December 24, 2007, I wrote:

"In the process of reviewing the science, I naturally read your report of September 11 [Dr. Dixon's report on the oyster farm to the CCC] with great interest. I am under the impression that you did not collect your own independent harbor seal data, and that you did not do your own independent analysis of the NPS harbor seal database. Rather, my understanding is that you relied upon information provided to you by the NPS including in particular the April 26 Trip Report that you cited, and the map that accompanies it. Could you please let me know if that is indeed correct. If you do have your own independent harbor seal data, could you please send it to me. Thanks very much. I want to make sure that I am fully informed and do not want to misrepresent your sources of harbor seal data. I would appreciate the opportunity to discuss this with you."

On January 11, 2008, Dr. Dixon wrote back to me:

"I perused [your submissions] *briefly and will review them carefully if my agency decides that is a good use of my time. Similarly, if there is an agency reason to do so, I would be happy to analyze any of the NPS data. However, this would not be a trivial undertaking and would require a significant commitment of time. Given budget constraints and the Coastal Commission's mandate, I think it is unlikely that I will be asked to pursue such analyses. Short of a directive from my agency, I will not participate in any discussions regarding Drake's Estero and the associated oyster mariculture."*

Mr. Douglas repeated the same false harbor seal claims in his recent November 10, 2010 letter to NOAA Director Wieting. Mr. Douglas wrote:

> *"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water."*

As the basis for this statement, Douglas cited the Becker, Press, and Allen 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should inform CCC that the NPS claims were incorrect, that the photos and logs refute those claims, and that the Becker et al. 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal). In my letter to Douglas on November 23, 2010, I informed him that the Becker et al., 2009 was flawed.

Thus, in December 2007 just as in December 2010, CCC Mr. Douglas refused to consider the scientific facts, and instead engaged in the "politics of personal destruction". Maybe Pecksniffian is indeed an appropriate word here. We deserve better from the California Coastal Commission.

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

corey.goodman@me.com

415 663-9495

Begin forwarded message:

From: Peter Douglas <pdouglas@coastal.ca.gov>
Date: December 21, 2010 9:45:21 AM PST
To: Corey Goodman <corey.goodman@me.com>
Subject: RE: CCC Douglas letter to NOAA Wieting contains knowingly false science

Corey – I do not intend to waste taxpayer money, including scarce staff time, on a personal response to your spurious and irresponsible accusations. A discussion of these baseless allegations will be contained in the Commission's letter to NOAA that will soon be forthcoming in answer to a letter we received from the DBOC (to which your letter was attached). I don't know what you think you will accomplish by pursuing your bullying tactics. As I made clear at the Commission's meeting in San Francisco last week when one of your fellow travelers made similar sham charges, we will not tolerate tactics of intimidation, demonization of public employees, or the reprehensible politics of personal destruction. I witnessed the appalling spectacle you helped orchestrate last year against professionals who have dedicated their lives to public service and whose integrity is beyond reproach. It was shameful! We will not allow a similar witch hunt to be mounted against the Commission or its staff. We take great pride in our integrity, professionalism, objectivity, and the high quality of our work applying the law to the facts. One thing is certain, in your unrelenting zeal to attack, defame and destroy the credibility of dedicated public servants you and your fellow pecksniffians have cost American taxpayers an inordinate amount of squandered public treasure. Peter douglas

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From: Corey Goodman [mailto:corey.goodman@me.com]
Sent: Monday, December 20, 2010 10:52 AM
To: Peter Douglas
Cc: donna.wieting@noaa.gov
Subject: Fwd: CCC Douglas letter to NOAA Wieting contains knowingly false science

Dear Peter,

Even though I asked you to "please respond to this request", I have not heard back from you since my November 23 letter to you. Unless I hear otherwise from you, I infer from your month-long silence that you agree with my criticism that you relied on false science when you wrote to NOAA Acting Director Donna Wieting, OCRM, and failed to cite the National Academy of Sciences report from May 5, 2009 that largely dismissed many of your arguments.

Did you give my email and letters to the CCC Commissioners as I requested? What action have they taken?

I wrote to you:

"You are charged by the people of California with conducting your "*affairs in an open, objective, and impartial manner free of undue influence and the abuse of power and authority.*" It appears as if your use of science – or in this case misuse of science -- concerning DBOC and Drakes Estero has not been objective and has not been impartial. I request that you investigate these allegations. If you are not capable of having an "*open, objective, and impartial*" investigation of your own conduct, then I request that you hand such an investigation over to another impartial State agency. Two elected members of the National Academy of Science – Dr. Peter Gleick and I – have warned you repeatedly of your repeated use of false science. It certainly needs to be investigated why you have repeatedly ignored a detailed report by the most prestigious scientific body in our country – the National Academy of Sciences – and why you continue to quote National Park Service documents that have been discredited and retracted. Only an open and transparent investigation will help clear the air. Please respond to this request for a retraction and an investigation in a timely fashion. Kindly provide me with information on whether you plan to retract your letter, investigate your use of science, how you plan to proceed, who will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public."

Have you begun such an investigation into the CCC misuse of science? Is your organization capable of investigating itself? Should you and/or I turn to some other State agency to request such an investigation of scientific misconduct by the CCC?

I look forward to hearing from you.

Sincerely yours,

Corey

Corey Goodman, Ph.D.

Begin forwarded message:

From: Corey Goodman <corey.goodman@me.com>
Date: November 23, 2010 5:54:32 PM PST
To: Peter Douglas <pdouglas@coastal.ca.gov>
Subject: CCC Douglas letter to NOAA Wieting contains knowingly false science

Dear Peter,

On November 10, 2010, you wrote a letter to NOAA Acting Director Donna Wieting, OCRM, concerning scientific claims of harm by Drakes Bay Oyster Company to the ecology of Drakes Estero, Point Reyes National Seashore, California. That letter contained false scientific claims. Please find enclosed a letter from me to you in which I describe why those scientific claims are false, why you knew or should have known that those claims were false and had been both retracted and discredited, and why you should retract your letter, retract any similar letters or documents, and refrain from making similar false statements. Please read my letter to learn the details of his false claims.

I would be happy to discuss this with you. Please contact me if you would like any additional information, or if I can answer any questions (corey.goodman@me.com).

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

November 22, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Secretary Ken Salazar, Department of the Interior

Re: REQUEST FOR DEPARTMENT OF THE INTERIOR TO INVESTIGATE SCIENTIFIC MISCONDUCT BY NATIONAL PARK SERVICE EMPLOYEES

Dear Secretary Salazar:

This letter is a request for an investigation by the Department of the Interior (DOI) based on allegations that officials and scientists in the National Park Service (NPS) violated a series of federal government rules, regulations, and codes, and in so doing committed scientific misconduct as defined by (see Appendix 4), but not limited to, the:

(a) 2000 Federal Policy on Research Misconduct,

(b) January 2008 NPS Code of Scientific and Scholarly Conduct,

(c) NPS Director's Order #11B,

(d) Data Quality Act, and

(e) Criminal Code Title 18, Section 1001.

At the Point Reyes National Seashore (PRNS) under the jurisdiction and oversight of the Pacific West Regional office, it is alleged that:

(1) Key NPS data in the form of over 250,000 digital photos from secret cameras, and detailed logs of those photos (see Appendix 2), were suppressed.

(2) NPS logs of those photographs in large part contradict NPS claims presented to a series of investigations, inquiries, and reviews over more than three years.

(3) NPS failed to disclose the key data (photos and logs) to the DOI Inspector General (IG), National Academy of Sciences (NAS), Marine Mammal Commission (MMC), elected officials (including the Marin County Board of Supervisors, Senator Dianne Feinstein, and Representative Lynn Woolsey), Marine Mammal Science journal, public, and press.

(4) The suppressed data would have been crucial to these investigations, inquiries, and reviews. The NAS and MMC review panels said that such photographic data would help resolve the controversy, yet NPS officials remained silent as to their

existence.

(5) The false NPS claims -- i.e., those refuted by suppressed NPS photos and logs -- were made by officials and scientists associated with PRNS or the Regional office in presentations, testimony, and publications during the period 2007-2010.

(6) The NPS employees who made or reviewed the false claims include the PRNS Superintendent, various PRNS scientists, the Pacific West Regional Director, and the Pacific West Regional Chief Scientist. Many of these same officials and scientists knew of the photos and logs, but remained silent.

(7) On July 21, 2007, at Senator Feinstein's Olema meeting, then NPS Director Mary Bomar assigned then Pacific West Regional Director Jon Jarvis to be in charge of all matters concerning Drakes Bay Oyster Company (DBOC) and Drakes Estero. Since much of the suppression of key data occurred under Jarvis' watch (July 2007 – September 2009), and because Jarvis is now NPS Director, this investigation should be handled by the Department of the Interior.

(8) The Secretary of Interior should determine which:

a. NPS employees knew of the cameras, photos, and logs,

b. NPS employees failed to disclose the photos and logs, and

c. NPS employees violated federal rules, regulations, and codes.

(9) If the Secretary concludes that NPS employees did indeed commit scientific misconduct, then the Secretary should take the appropriate action, consistent with the Secretary's policy as issued in his September 27, 2010 Secretarial Order, to ensure that scientific integrity is restored at NPS, and in the words of President Obama, to "*restore science to its rightful place.*"

BRIEF SUMMARY

The issue concerns the NPS claims over the past three and a half years that NPS data shows that Drakes Bay Oyster Company (DBOC) boats and workers have been disturbing the harbor seals and pups in Drakes Estero in PRNS. These claims were based on a weak (and now known to be flawed) body of NPS data: a volunteer harbor seal monitoring database. That database was never intended for this regulatory purpose. The NPS failed to tell a series of investigations, inquiries, and reviews that it had a second and more reliable (and verifiable) body of NPS data: minute-by-minute, dawn-to-dusk photographs from hidden cameras focused on oyster farm operations and certain harbor seal haul-out sites. Moreover, the conclusions from this more reliable body of NPS data in large part contradicted the conclusions NPS officials and scientists had been making from the less reliable (and flawed) body of data.

The NPS failed to tell the following people and groups about the existence of the secret

cameras, photographs, and logs: elected officials (e.g., Marin County Supervisors, Senator Feinstein, Representative Woolsey), the DOI Inspector General, the National Academy of Sciences, the Marine Mammal Commission, the press, the public, the editor of the Marine Mammal Science journal, and the owners of DBOC.

These allegations of scientific misconduct are based upon the fact that multiple NPS officials and scientists knew of the secret cameras, photographs, and logs, and yet all of them failed to disclose their existence to multiple investigations, inquiries, and reviews.

NPS CLAIMS: THE SEALS AT DRAKES ESTERO ARE DISTURBED BY DBOC

1. NPS has data showing DBOC is disturbing the harbor seals at Drakes Estero.
2. NPS Superintendent (b) (6), (b) (7)(C) tells Marin County Supervisor Steve Kinsey (April 5, 2007) that NPS has overwhelming data of harm to seals by DBOC.
3. NPS tells the IG that DBOC disturbances to the seals increased dramatically in 2007 as DBOC increased oyster operation.
4. DBOC is specifically disturbing the seals at subsite OB at Drakes Estero.
5. DBOC is the only source of disturbances to the seals at subsite OB.
6. The number of seals has decreased at OB as a result of DBOC disturbances.
7. DBOC disturbances are leading to a decrease in seals, and this decline in a protected marine mammal is of national importance.

NPS DATA: WHAT THE PHOTOS SHOW ABOUT SEAL DISTURBANCES

1. NPS had a secret camera program, established on or before May 5, 2007, that for 3 ½ years photographed DBOC boats and workers and seals at subsite OB.
2. NPS has more than 250,000 photos, minute-by-minute, hour-by-hour, day-by-day, dawn to dusk, during pupping season.
3. NPS has analyzed the photographs and generated minute-by-minute logs.
4. NPS photographs reveal NPS claims are not correct: DBOC is not disturbing the seals at subsite OB.
5. NPS officials and scientists know that the NPS claims are refuted by the photos.
6. NPS never disclosed the secret cameras, photos, and logs for 3 ½ years.
7. NPS photographs show DBOC has not disturbed seals at subsite OB for over 3

½ years.

8. There is not a single bona fide mass flushing of seals into the water by DBOC.

9. NPS photographs show kayaks, not DBOC boats, are the source of the infrequent disturbances to seals at OB; kayakers have occasionally caused mass flushing of seals into the water.

10. NPS has known all of this at least since June 6, 2008 when the first detailed log with analysis of 2008 photographs was submitted to the NPS scientist in charge.

NPS PHOTOS: WHO KNEW WHAT AND WHEN DID THEY KNOW IT?

1. The NPS Drakes Estero camera program was established on May 5, 2007 by [redacted] and [redacted] Who else knew from the outset is not known.

2. NPS detailed logs on the analysis of the photos for 2008 and 2009 were submitted to [redacted] on June 4, 2008 and November 9, 2009 respectively.

3. NPS documents obtained by FOIA reveal that at a minimum, the following NPS employees knew of the cameras and photos (others may have known as well):
   a. PRNS Superintendent [redacted]
   b. scientists [redacted] and
   c. Pacific West Regional Chief Scientist Dr. [redacted]

4. The May 1, 2009 Briefing Statement, written by [redacted] and reviewed by [redacted] as revealed by documents obtained under FOIA), was sent to then Pacific West Regional Director Jon Jarvis. This document contains information on the photos and cameras (in the Appendix), and is how I discovered their existence on June 6, 2010.

5. Although then NPS Director Bomar made Jarvis responsible for the oyster farm and Drakes Estero on July 21, 2007, it is unclear when Jarvis first learned of the cameras. Nevertheless, the Briefing Statement was sent to him on May 1, 2009, and much of the failure to disclose the key data occurred during his watch from July 2007 until September 2009.

NPS FAILED TO TELL THE DOI INSPECTOR GENERAL, NATIONAL ACADEMY OF SCIENCES, AND MARINE MAMMAL COMMISSION ABOUT THE PHOTOS & LOGS

The first NPS camera began filming on May 5, 2007. The Department of Interior Inspector General began its investigation in May 2007 and published its report in July 2008. The IG had no idea that the cameras and photos existed.

The Ocean Studies Board of the National Research Council (National Academy of Sciences) initiated the convening of a panel in April 2008, as commissioned by NPS, to

review all of the data concerning the impact of DBOC and Drakes Estero, to compare them to the NPS document titled *Drakes Estero: A Sheltered Wilderness Estuary*, and to report on whether the NPS had drawn the correct conclusions from these data and studies and presented them correctly. The NAS panel, like the MMC panel that followed them, asked the NPS to provide the harbor seal disturbance data. The NAS report, titled *Shellfish Mariculture in Drakes Estero* and issued on May 5, 2009, concluded that:

> *The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, overinterpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects.*

The NAS panel went on to write that:

> *… It is not possible for the committee to resolve the controversy over individual survey sheets, but the focus on these observations highlights how this type of* [volunteer] *monitoring program is best utilized to indicate potential disturbance problems (that might result in decreased use of a haul-out habitat) rather than to quantify them definitively.* ***The latter would require a data collection system that could be independently verified, such as time and date stamped photographs.*** *This verification is especially important in circumstances where there is an indication of a source of disturbance that could lead to a regulatory action, as was the case with disturbances attributed to DBOC.* [emphasis added]

Thus, the NAS panel formally recommended in their May 5, 2009 report that time-and-date stamped photographs would provide independent verification of disturbance records and help resolve the controversy over oyster farm disturbances in Drakes Estero. Marine Mammal Commission panel members made the same suggestion at their meeting on February 21-24, 2010. Yet in front of both review panels, NPS officials and scientists – including the Pacific West Regional Director, PRNS Superintendent, and various scientists -- remained silent, knowing the whole time that they had just such a camera system fully operational. The NPS photographs and their detailed analyses clearly showed no *bona fide* major DBOC harbor seal disturbances. Indeed, the photos and logs not only contained no data which would confirm the NPS claims but, quite the opposite, served to refute these claims.

The 2008 detailed log, including a minute-by-minute analysis of DBOC boats and oyster workers, was submitted to (b) (6), (b) (7)(C) on June 6, 2008. The NAS panel had its meeting a few months later, on September 4, 2008. The NPS said nothing of the cameras, photos, or detailed analyses in the 2008 log, but rather submitted (b) (6), (b) (7)(C) paper (b) (6), (b) (7)(C) 2009) which maintained the fiction that DBOC was disturbing the seals in the face of by now overwhelming NPS photographic evidence to the contrary. In attendance at the NAS panel meeting that day were Pacific West Regional Director Jarvis, Superintendent (b) (6), (b) (7)(C) and scientists Drs. (b) (6), (b) (7)(C) among others. They made presentations and gave interviews to the press, but all remained silent about the cameras, photos, and logs.

The 2009 detailed log and detailed analyses were submitted to (b) (6), (b) (7)(C) on November

9, 2009. The Marine Mammal Commission panel had its meeting a few months later on February 21-24, 2010. By that time, NPS had two and a half years of photographs and analyses. Nevertheless, NPS officials and scientists said nothing to the MMC panel about the cameras, photos, analysis, etc. Instead, they submitted [redacted] next paper, based upon faulty volunteer records, which again asserted that DBOC was disturbing the seals. In attendance at the MMC panel meeting that day were Superintendent [redacted] and scientists [redacted] among others. They made presentations and gave interviews to the press, but all remained silent about the cameras, photos, and logs.

Overall, NPS deceived the IG, NAS, and MMC, in addition to the public, its elected officials, and DBOC, over a three and a half year period. The NPS had cameras taking photographs every minute of every day from dawn to dusk, and had complete minute-by-minute analyses of most of those 250,000+ photographs. The NAS and MMC panel members suggested that a camera program would help resolve the controversy, but NPS officials and scientists remained silent, not disclosing that they already had such a system, along with detailed catalogues of over a quarter of a million photographs.

In the end, the facts suggest a hypothesis regarding NPS behavior: NPS did not disclose the cameras and photos because they invalidated the volunteer records of DBOC disturbance events. The photos and logs did not show a single *bona fide* major DBOC disturbance of seals at subsite OB in Drakes Estero over three and a half years. Every boat trip was photographed and analyzed, and not a single bona fide major disturbance of the seals was observed. The photos showed -- and NPS officials and scientists knew all along -- that DBOC was not disturbing the seals. The only disturbances to OB seals as revealed by the photos were from occasional kayakers who got well within 100 yards of the seals (the mandated exclusion for DBOC boats; kayakers are altogether banned during pupping season).

BRIEF HISTORY LEADING UP TO THIS REQUEST FOR AN INVESTIGATION

I first learned of the cameras and photos on June 6, 2010. I learned of the detailed NPS logs of those photos later in September. On June 7, I asked NPS officials and scientists, including current PRNS Superintendent [redacted] and Pacific West Regional Chief Scientist [redacted] about the cameras and photos, and they provided explanations (see Appendix 1) that were subsequently refuted by their own documents and the photos themselves.

At least four times over the summer, I asked to meet with Superintendent Muldoon to discuss the photos, and each time she declined my request. Most recently, she told a colleague that she was under instructions not to meet with me. Marine Mammal Commission Executive Director Tim Ragen met with me on August 27 and spent six hours going over the photos. National Park Service Deputy Director Dan Wenk and Superintendent [redacted] both were invited, both initially indicated their willingness to attend, but ultimately both declined the invitation.

On October 18, I gave an invited lecture to the California Council on Science and

Technology titled *The Federal Scientific Integrity Policy Doesn't Work: A Case Study of Government Misuse and Abuse of Science.* In my talk I presented much of the material summarized in this case for scientific misconduct. The next day, I sent the audio recording and a deck of 96 slides to (b) (6), (b) (7) (C) Wenk, Jarvis, Interior Secretary Chief of Staff Tom Strickland, Interior Deputy Assistant Secretary Will Shafroth, NPS Science Advisor Dr. Gary Machlis, Interior Department Science Advisor Dr. Marcia McNutt, and others. I found it difficult to engage anyone at NPS or DOI about this matter. No one responded concerning the substance of the allegations. Ultimately, I had an email and phone exchange with Dr. McNutt, who passed me to Strickland, who passed me to Shafroth.

Shafroth ultimately told me on November 9 that DOI would undertake an unidentified process, but he refused to provide a single detail of the scope, breadth, timetable, or even the subject matter of this process. I told Shafroth that I thought this was a mistake, and that these allegations of misconduct should be investigated with openness and transparency. Shafroth declined to even commit as to whether I would be interviewed or ever contacted again about the process. It was my concern about the secret nature of this process, and the lack of commitment to conduct a proper investigation, that triggered me to file this submission.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED TO EIS PROCESS

The NPS misconduct is continuing unabated and is having serious impact on policy at Point Reyes, particularly on the Environmental Impact Statement (EIS) process currently being conducted by NPS. To my knowledge, the photos and logs have not been disclosed as part of the EIS process for the DBOC lease renewal. Rather, the same false claims, including the 2009 NPS paper in the journal Marine Mammal Science, were submitted for the EIS process, but not the photos and logs that refute them. This failure also and independently constitutes scientific misconduct and suggests that the ongoing EIS process has been damaged, possibly fatally. There are many other reasons outside the allegations presented here why the ongoing EIS process is seriously flawed.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED BY OTHER AGENCIES

The NPS misconduct is also being spread unabated by other agencies that continue to propagate the NPS false claims. For example, on November 10, 2010, California Coastal Commission (CCC) Executive Director Peter Douglas wrote a letter to National Oceanic & Atmospheric Administration Oceans Program Director Donna Wieting in which he repeated the NPS claims that DBOC is disturbing the harbor seals in Drakes Estero. Douglas wrote:

> *"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized*

watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water." (citation #49)

As the basis for this statement, Douglas cited (#49) th[redacted] 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should inform CCC that the NPS claims were incorrect, that the photos and logs, presumably never shared with CCC, refute those claims, and that the[redacted] 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal).

CONCLUSIONS

In summary, NPS officials and scientists knew of the cameras, photos, and logs, and yet failed to disclose their existence to a series of investigations, inquiries, and reviews. While suppressing the key data, these same NPS officials and scientists knowingly continued to make public presentations, give testimony, and publish a variety of booklets and scientific publications making false claims – i.e. claims refuted by the photos and logs.

This request to the Department of the Interior Secretary is to determine which:

a. **NPS employees knew of the cameras, photos, and logs,**

b. **NPS employees failed to disclose the photos and logs, and**

c. **NPS employees violated federal rules, regulations, and codes.**

If you find that NPS officials and scientists did indeed commit scientific misconduct, then I ask you to take appropriate actions to right this wrong, clear the air, heal our community, and re-establish scientific integrity within NPS.

Please respond to this request for an investigation in a timely fashion. Kindly provide me with information on whether you plan to investigate, how you plan to proceed, who will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public. Time is of the essence, since the EIS process is using the same false science. I look forward to hearing from you. Do not hesitate to contact me if you have any questions or want further information.

Sincerely yours,

Corey S. Goodman, Ph.D

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Enclosures:

Appendix 1: NPS Secret Cameras: NPS Explanation vs. NPS Documents (attached)
Appendix 2: NPS Secret Cameras: NPS Logs and NPS Documents (separate PDF)
Appendix 3: How I Got Involved in This Issue
Appendix 4: Rules, Regulations, and Codes Defining Scientific Misconduct

cc: DOI Secretary Chief of Staff Tom Strickland
DOI Deputy Assistant Secretary Will Shafroth
DOI Science Advisor Dr. Marcia McNutt
NPS Director Jon Jarvis
NPS Deputy Director Dan Wenk
NPS Science Advisor Dr. Gary Machlis
NPS PRNS Superintenden[redacted]
NPS Yosemite Superintenden[redacted]
NPS Pacific West Regional Chief Scientist Dr.[redacted]
DOI Acting Inspector General Mary Kendall
DOI Assistant Inspector General John Dupuy
Senator Dianne Feinstein
Representative Lynn Woolsey
Marin County Supervisor Steve Kinsey
Presidential Science Advisor Dr. John Holdren
NAS President Dr. Ralph Cicerone
Marine Mammal Commission Executive Director Dr. Tim Ragen
Marine Mammal Science journal editor Dr. Daryl Boness
Drakes Bay Oyster Company owners Kevin and Nancy Lunny

APPENDIX 1: NPS Secret Cameras: NPS Explanation vs. NPS Documents

NPS SECRET CAMERAS: NPS EXPLANATION OF PURPOSE AND ANALYSES

1. June 7, 2010: at the MMC meeting to resolve disputed disturbance data, Dr. Corey Goodman and DBOC owner Kevin Lunny told MMC Executive Director Dr. Tim Ragen about the hidden cameras, and asked NPS scientists [redacted] and Pacific West Regional Chief Scientis [redacted] to explain why the cameras had never been disclosed, and what had been learned from them. NPS officials and scientists provided little information that day and responded:
    a. NPS said the camera was to film wildlife.
    b. NPS said the camera was no different from other wildlife cameras.
    c. NPS denied that the camera was a spy camera.
    d. NPS only acknowledged a single camera.
    e. NPS did not specify how long the camera had been up.
    f. NPS said that the photographs had not been analyzed in any depth.
    g. NPS said that the photographs were not used to compare to the volunteer disturbance observations.
2. June 10, 2010: Pacific West Regional Chief Scientist [redacted] told the West Marin Citizen newspaper that NPS actually had two cameras, not one, filming Drakes Estero.
3. June 14, 2010: PRNS Superintendent [redacted] (former Superintendent [redacted] had moved to Yosemite in spring 2010) revealed that the cameras had been up for three years: 2008-2010.
4. June 22, 2010 [redacted] revealed that the first camera began in 2007.
5. June 24, 2010 [redacted] revealed that the first camera started in May 2007.
6. June 30, 2010 [redacted] revealed that the camera started on May 5, 2007, three days before the Marin County Board of Supervisors hearing.
7. June 16, 2010: in an email from [redacted] to NPS Deputy Director Dan Wenk, obtained by a FOIA request, [redacted] wrote that the:
    a. *"wildlife observation cameras are not new to Point Reyes"*
    b. Drakes Estero cameras were for photographing wildlife (i.e., harbor seal behavior) and not focused on DBOC boat and workers
    c. *"Drakes Estero cameras were put out to understand why there was a drop in harbor seal numbers at the OB site, and to document if there were disturbances that might help explain the drop in numbers"*
    d. *"cameras … are camouflaged to protect against vandalism, theft"*
    e. *"2010: there is one camera at Drakes Estero right now, being used by a student from SF State on her masters thesis focused on harbor seals and disturbance."*
    f. *"2007: there was one camera focused on the OB site"*
    g. *"The allegations that these cameras were not focused on haul out sites is false – the images have seal haul out sites in the foreground; they can show, when present, boats in the background – any boat would show up, kayak, oyster boat, or whatever is out there."*
    h. *"cameras -- when functioning -- would pick up any disturbance"*
    i. *"cameras were active during the breeding season"*

j. *"images from the cameras have not yet been analyzed in any depth"*
k. *"the briefing statement, which references the cameras, has been posted since at least February on the publicly accessible Marine Mammal Commission web site."*

8. PRNS Superintenden[redacted] explanation of the cameras to NPS Deputy Director Dan Wenk was virtually identical to another document obtained via FOIA: *"FOR INTERNAL USE ONLY * NOT FOR PUBLIC RELEASE. Major points on the use of wildlife cameras at Point Reyes National Seashore."* These assertions about the cameras appear to be the PRNS talking points given both internally (i.e., to Dan Wenk) and externally.

NPS SECRET CAMERAS: INTERNAL DOCUMENTS REFUTE NPS EXPLANATION

9. Internal NPS documents released under FOIA reveal that the NPS' public explanations about the purpose of the cameras and analysis of the photographs were incorrect.
    a. The purpose of the secret NPS cameras was indeed to track DBOC boats and workers and to catch them disturbing the seals. The 250,000 photographs have been analyzed in great detail with minute-by-minute logs of every time a DBOC boat or oyster worker came or went in the lateral channel, UEN, and OB.
10. What is the history of cameras at Point Reyes?
    a. NPS explanation: *"wildlife observation cameras are not new to Point Reyes"*
    b. There is no reason to doubt this answer, but it is not relevant to the purpose of the Drakes Estero cameras.
11. What was the purpose of the cameras at Drakes Estero?
    a. NPS explanation: Drakes Estero cameras were for photographing wildlife (i.e., harbor seal behavior) and not focused on DBOC boats and workers.
    b. Incorrect – the camera angle maximized the view of the lateral channel and DBOC boats and oyster workers, and not seal haul-out sites (the photographs sometimes did not even include the OB haul-out site). Moreover every image from every minute of every day has been analyzed by volunteers and/or students with careful logs focused on one main topic – precisely when DBOC boats and workers came and went, and whether seals were flushed, with records about kayaks as well, and these detailed minute-by-minute logs of DBOC boats and workers were sent annually to [redacted] The logs contain no analysis of seal behavior except for when boats caused them to flush into the water.
12. Why were the cameras put out at Drakes Estero?
    a. NPS explanation: *"Drakes Estero cameras were put out to understand why there was a drop in harbor seal numbers at the OB site, and to document if there were disturbances that might help explain the drop in numbers"*
    b. Misleading – According to the NPS harbor seal database, the drop in the number of seals at OB largely occurred between 2004 and 2005, several years before the cameras were put out, and this drop was seen up and down the PRNS coast. In fact, there was no major drop in 2007 compared

to 2006 or 2005 – the major drop occurred between 2004 and 2005. The seals at OB rebounded in 2008, yet the cameras persisted up until the week in June 2010 after they were discovered by Goodman and Lunny. The cameras were put out three days before the May 8, 2007 hearing by the Marin County Board of Supervisors. [redacted] had told the Supervisors that he had overwhelming data that DBOC was disturbing the seals. In fact, on the day he made that statement (April 5, 2007), he had no data. [redacted] confirmed this several weeks later on April 24, 2007 when she wrote to Joe Cordaro of NOAA that NPS had *"no direct observations"* of DBOC disturbing the seals. The cameras appear to have been put out to get the data that [redacted] had already asserted he had – to catch DBOC disturbing the seals.

13. Why were the cameras hidden and camouflaged?
    a. NPS explanation: *"cameras … are camouflaged to protect against vandalism, theft",*
    b. This is a reasonable statement, but it doesn't explain why NPS never told DBOC, the Marin County Supervisors, DOI IG, NAS, MMC, Senator Feinstein, other elected officials, the press, or the public of their existence. Why was the existence of the cameras hidden for 3 ½ years? Why weren't the photographs brought into the discussion of disturbances? NPS had minute-by-minute photographs, and detailed analysis of every time DBOC boats and workers came and went from subsites UEN and OB. Why was this detailed analysis, sent to [redacted] never disclosed and provided to the DOI IG, NAS, MMC, elected officials, or DBOC?
14. What was the purpose of the camera in 2010?
    a. NPS explanation: *"2010: there is one camera at Drakes Estero right now, being used by a student from SF State on her masters thesis focused on harbor seals and disturbance."*
    b. In contrast to how NPS has described the purpose of the cameras to the public – namely, to study seals and seal behavior, this masters thesis shows the true intent – to focus on DBOC boat and workers and DBOC disturbances. On March 12, 2010, NPS [redacted] wrote to [redacted] that: [redacted] *is working with a Master's student from SFSU on the drakes estero/oyster farm issue …"* The student's proposal was based entirely on the false conclusions of the [redacted] 2009 paper, namely that *"seal disturbance rates increased with increases in oyster harvest, and that haul-out site choice can be best explained by mariculture activities."* These conclusions are incorrect. There are no DBOC bona fide major disturbances of seals, and it appears that NPS knew that. In other words, they let the student propose a masters thesis based on a false conclusion that the photographs from the 2 ½ previous years revealed was wrong. The student in her proposal also incorrectly thought that the "recovery" at OB in 2008 was due to a change in the DBOC protocol, something [redacted] wrote in his original paper but later retracted and corrected in the Marine Mammal Science journal, and was notified was wrong by the time the student wrote her proposal.

15. Where was the camera pointed in 2007?
    a. NPS explanation: *"2007: there was one camera focused on the OB site"*
    b. Correct – I originally concluded, based on NPS errors and omissions concerning camera locations and angles (see maps on pages 9 and 10 in Appendix 2), that the 2007 camera was aimed at UEF. On November 4, 2010, one day after being told by a newspaper reporter that NPS acknowledged having given us false information (i.e., certain maps, emails, and a June 22, 2010 email from [redacted] to [redacted], I re-examined the photographs, discovered a different camera location and angle, and concluded that indeed the 2007 was focused on the OB site. This error in the identity of the site has no bearing on the conclusions from the photographs.
16. Were the cameras primarily focused on haul out sites?
    a. NPS explanation: *"The allegations that these cameras were not focused on haul out sites is false – the images have seal haul out sites in the foreground; they can show, when present, boats in the background – any boat would show up, kayak, oyster boat, or whatever is out there."*
    b. The "OB" camera was primarily focused down the lateral channel, and towards the oyster bags at UEN and OB. Sometimes it included the seals at OB, and other times it did not include any seal haul-out sites.
17. Would the cameras pick up any disturbance?
    a. NPS explanation: *"cameras -- when functioning -- would pick up any disturbance"*
    b. This is correct, so long as the cameras were pointed at seal haul-out sites, but sometimes they were not, but rather sometimes the camera angle maximized the view of the lateral channel and the oyster boats and workers.
18. When were the cameras active?
    a. NPS explanation: *"cameras were active during the breeding season"*
    b. Correct – the cameras took photographs every minute of every day from dawn to dusk during pupping season.
19. Have the images from the cameras been analyzed in any depth?
    a. NPS explanation: *"images from the cameras have not yet been analyzed in any depth"*
    b. **Incorrect – this is perhaps the most serious false statement made by NPS officials and scientists.** As shown in NPS documents released under FOIA, volunteers and/or students analyzed every single photograph, and made detailed logs of every time a DBOC boat or oyster worker came or went from the lateral channel or from Home Bay. They also noted when kayaks ventured into the lateral channel. These detailed minute-by-minute logs with cover letters were sent to [redacted] every year. The 17-page 2008 log was sent to [redacted] on June 6, 2008 with a cover letter telling her which photographs of DBOC boats to examine. The 7-page 2009 log was sent to [redacted] on November 9, 2009, also with a cover letter highlighting DBOC boats.
20. Has the existence of the cameras been publicly disclosed?
    a. NPS explanation: *"the briefing statement, which references the cameras, has been posted since at least February on the publicly accessible Marine*

Mammal Commission web site."

b. This is a very misleading statement.
    i. The cameras and photographs were never disclosed to the Marin County Supervisors, the DOI IG, NAS, MMC, elected officials, or DBOC.
    ii. The 33-page NPS Briefing Statement was written two years after the first camera.
    iii. The NPS Briefing Statement cites a few photographs in the text, but describes the camera system in the Appendix. The cameras and photographs are not mentioned in the title or the summary.
    iv. The Briefing Statement was not sent to Goodman or Lunny or NRC.
    v. Nothing about the cameras or photographs was publicly disclosed.
    vi. The May 1, 2009 Briefing Statement was sent to the MMC nearly one year after it was prepared.
    vii. On the MMC web site for the Drakes Estero study, the Briefing Statement is not included in the 22 primary (key) documents. Rather, it is document #110 out of 153 supplemental documents in the complete list.
    viii. On the MMC web site, the Briefing Statement is titled: "Letter: National Park Service response to Dr. Goodman letter of 18 January 2009 to NRC."
    ix. (b) (6), (b) (7) (C) and the NPS are now claiming that it is legitimate public disclosure for them to mention the cameras and photographs in the Appendix of a document two years after they started the secret program, and then one year later to post that document among 153 documents on a Marine Mammal Commission web site. This is a poor attempt to claim that they disclosed something that they never did. This is neither transparent nor open.
    x. Neither the MMC Executive Director and his staff nor his six panel members knew of the cameras, photos, and logs.

21. Conclusions:
    a. NPS incorrectly characterized the cameras as being for wildlife when they were for tracking DBOC boats, workers, and disturbances.
    b. After 3 ½ years of photographs, there are no NPS reports on seal behavior. Instead, there are detailed logs of DBOC boats and workers.
    c. NPS incorrectly characterized that NPS had not analyzed the photographs, when they had been analyzed minute-by-minute, photo-by-photo, and reports on those analyses were filed annually with NPS scientist (b) (6), (b) (7)(C)
    d. NPS incorrectly said that they had publicly disclosed the cameras, when they had not done so in a transparent and open fashion.

APPENDIX 2: see PDF as separate download:
http://www.yousendit.com/download/dklvNHAzcHZTSUJFQlE9PQ

APPENDIX 3: How I Got Involved in This Issue

Three and a half years ago, on August 28, 2007, Marin County Supervisor Steve Kinsey first asked me to look at National Park Service science concerning the impacts of DBOC on Drakes Estero, and to come report on that science at a Marin County hearing on May 8, 2007. At that hearing, I made three particularly relevant statements in my testimony:

> *"I believe that public policy decisions can and should be informed by quality science. But this must be science conducted rigorously, without agendas or conflicts-of-interest. The political process can be dangerously misled by bad or misused science. One of my greatest concerns when I see science being invoked in public policy debates is to make sure that it is good science and not pseudo-science or ... a blatant misuse of science."*
>
> *"My only hesitation in coming forward to testify today is the realization that openly expressing my views as a scientist may cause me to come under personal attack by local groups that are determined to remove Lunny's operation from the PRNS. Nevertheless I feel compelled to speak out for good science instructing public policy."*
>
> *I end with a note of caution. Beware of sudden claims of "new" data that refute what I have laid out here today and in my more detailed written testimony. If such claims are made, insist on seeing the complete database, check for bias, and seek independent review."*

Brief Biosketch

Dr. Corey S. Goodman is a scientist, educator, and biotech entrepreneur. With a B.S. from Stanford and Ph.D. from Berkeley, he spent 25 years as a biology professor at Stanford and the University of California Berkeley. Goodman is currently on the faculty of U.C. San Francisco. He was elected a member of the National Academy of Sciences (NAS), American Academy of Arts and Sciences, and American Philosophical Society. He won numerous scientific awards (e.g., Alan T. Waterman Award from the National Science Board, Canada Gairdner International Award in Medical Sciences, March-of-Dimes Prize in Developmental Biology), was a Howard Hughes Medical Institute Investigator, Evan Rauch Chair of Neuroscience, and co-founded the Wills Neuroscience Institute.

Goodman moved into biotech to apply biomedical discoveries to human and environmental health. He co-founded Exelixis, Renovis, and PhyloTech, was CEO of Renovis, and President of Pfizer's Biotherapeutics and Bioinnovation Center. Today Goodman is Managing Director and co-founder of venBio, Board Chair of six biotech companies, and Board member of two others.

Amongst his many public policy roles, Goodman is on the Board of the California Council on Science and Technology, Pacific Institute, Bay Area Science and Innovation Consortium, and is former Chair of the National Research Council's (NAS) Board on Life Sciences.

Appendix 4: Rules, Regulations, and Codes Defining Scientific Misconduct

On December 6, 2000, the White House Office of Science & Technology Policy entered into the Federal Register the *Federal policy on research misconduct* that states:

> *Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.*
> *•Fabrication is making up data or results and recording or reporting them.*
> *•Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. ...*
> *•Research misconduct does not include honest error or differences of opinion.*

On January 31, 2008, NPS established a *Code of Scientific and Scholarly Conduct* that states:

> *To enhance their contribution to quality, objectivity, utility, and integrity of such information, all NPS employees working with scientific and scholarly information will, in performing their duties: ...*
> *• conduct, process data from, and communicate the results of scientific and scholarly activities honestly, objectively, thoroughly, and expeditiously; ...*
> *• be responsible for the quality of collected data and interpretations, and for the integrity of conclusions drawn in the course of scientific and scholarly activities;*
> *• place integrity, utility, and objectivity of scientific and scholarly activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations.*

Much of what is described here took place after January 31, 2008. The IG was writing its report, the NAS had not yet begun its deliberations (published on May 5, 2009), and the MMC was not on the horizon. Since January 2008, the NPS has continued it's false claims of DBOC disturbances to the harbor seals based upon their volunteer harbor seal monitoring database, while the whole time they had the NPS photos and detailed logs that did not support these claims, and that they did not disclose to the IG, NAS, or MMC.

In addition, there were other relevant laws and rules that were in effect prior to 2007, including US Criminal Code, Title 18, Section 1001; the Data Quality Act; and NPS Director's Order #11B. For example, US Criminal Code, Title 18, Section 1001 states:

> *"(a) Except as otherwise provided in this section, whoever, in any matter within the jurisdiction of the executive, legislative, or judicial branch of the Government of the United States, knowingly and willfully—*
> *(1) falsifies, conceals, or covers up by any trick, scheme, or device a material fact;*
> *(2) makes any materially false, fictitious, or fraudulent statement or representation; or*
> *(3) makes or uses any false writing or document knowing the same to contain any materially false, fictitious, or fraudulent statement or entry;*

Thus, title 18, U.S.C., Section 1001 clearly applied throughout this period.

November 23, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Executive Director Peter Douglas, California Coastal Commission

Re: REQUEST THE CALIFORNIA COASTAL COMMISSION STOP PROMOTING FALSE AND DISCREDITED SCIENCE CONCERNING DRAKES ESTERO

Dear Executive Director Douglas:

In your letter of November 10 to Donna Wieting, Acting Director, Office of Ocean and Coastal Resource Management (OCRM), National Oceanic & Atmospheric Administration (NOAA), you assert that Drakes Bay Oyster Company (DBOC) is having a negative impact on the ecology of Drakes Estero at Point Reyes National Seashore. However, your letter to Wieting contains numerous false scientific claims that were refuted over one year ago by the National Academy of Sciences (NAS) report of May 5, 2009. I write to request that you retract your letter, retract other letters or documents with similar claims, and refrain from making similar false claims in the future.

Your letter to Wieting repeats false scientific claims that have their origins in the NPS May 2007 Drakes Estero Report (*Drakes Estero: A Sheltered Wilderness Estuary*). Most of those same claims were repeated by Dr. John Dixon, California Coastal Commission (CCC) scientist, in his September 2007 report to the CCC. In your letter to Wieting, you cite both documents. The parallel claims in both documents were retracted by the NPS in 2007 and subsequently refuted by the NAS report in 2009. This could have been cleared up years ago, but you will remember that back in December 2007, you refused my request when I asked to meet with Dr. Dixon to go over the science.

(1) Are you aware that most of those scientific claims have been discredited?

(2) Are you aware that NPS retracted most of those scientific claims in 2007?

(3) Are you aware that the NAS May 5, 2009 report refuted those scientific claims?

NPS RETRACTED MOST OF THEIR FALSE CLAIMS IN TWO DOCUMENTS IN 2007

First, the NPS retracted many of these scientific claims against DBOC in their secret, non-public July 2007 version of the Drakes Estero Report. For example, in the July 27 version, NPS deleted the claims concerning impacts of DBOC on sediments, fish communities, and harbor seals.

Second, the NPS made more extensive retractions a few months later in their September 18, 2007 Clarification document. I encourage you to read both documents

and consider the implications to the credibility and integrity of the CCC as you continue to repeat false scientific claims that even the NPS retracted three years ago.

In the September 18, 2007 Clarification document, NPS retracted most major claims against DBOC. Concerning oyster feces in the sediments, the NPS document stated:

> *"The NPS incorrectly interpreted the report by Dr. Roberto Anima ..."*
>
> *"The Elliott-Fisk et al. (2005) report notes oyster feces are not a problem..."*

Concerning the impact of DBOC on eelgrass, NPS stated:

> *"The current level of impact to eelgrass beds by the oyster operation may or may not be significant to the overall persistence of eelgrass within Drakes Estero."*

Concerning the impact of DBOC on the harbor seals, NPS stated:

> "*More focused analyses are required to determine if oyster operations are affecting seal distribution and productivity within Drakes Estero."*

Finally, concerning the overall impact of DBOC on Drakes Estero, NPS concluded:

> *"Scientific studies to date are inconclusive as to the extent to which oyster farming is altering natural resources within the Estero..."*

In a letter to you on October 30, 2007, Dr. Peter Gleick, a fellow member of the NAS, MacArthur Fellow, President and co-founder of the Pacific Institute, and world-renown environmentalist and water expert, wrote about the September 18, 2007 NPS Clarification document and NPS retractions of their false claims. Dr. Gleick wrote:

> *... the memo of September 18 by the National Park Service ... essentially acknowledges the many errors and misrepresentations of the NPS ...*

Concerning the NPS Clarification document, Dr. Gleick wrote to the Sierra Club (as provided to you and your staff in multiple documents over the past few years):

> *... this NPS 'rebuttal' ... acknowledges very clearly that the NPS was wrong ... over and over and over again, but couched in language that pretends the opposite.*
>
> *The NPS errors were NOT minor, but major and misleading, and now, given the responses, pretty obviously intentional.*

I had hoped that Dr. Gleick's letters to you and the Sierra Club in the fall of 2007 would have encouraged you to correct your misuse of the NPS false science. Evidently they have not. I once again encourage you to read these NPS documents and Gleick letters.

NAS 2009 PANEL REPORT REFUTED THE NPS 2007 FALSE CLAIMS

While the NPS retracted many of their false claims against DBOC in 2007 – including most of the claims that you repeat in your letter to Wieting, the National Academy of Sciences (NAS) report of May 5, 2009 went much further in criticizing the NPS false science. The NAS stated that NPS misrepresented their own scientific studies in the Drakes Estero Report. It is thus difficult to reconcile the history of NPS retractions and NAS repudiation of the NPS false claims with the letter you recently sent Wieting.

Several key members of your CCC staff were present on July 21, 2007 at Senator Feinstein's Olema meeting during which allegations of NPS scientific misconduct were raised concerning NPS claims that scientific data showed that DBOC was harming the ecology Drakes Estero. During the Olema meeting, your staff heard Senator Feinstein ask, and NPS Director Mary Bomar agree, that NPS should request that the NAS conduct a study to determine if the NPS had correctly represented the scientific data concerning DBOC and Drakes Estero.

It is important to note that four days after the July 21,2007 Olema meeting, NPS Superintendent (b) (6), (b) (7)(C) issued his "*acknowledgement of corrections*" in which he retracted two major claims against DBOC concerning oyster feces in the sediments and impacts on fish communities. Two days later (b) (6), (b) (7)(C) and others completed their July 27, 2007 non-public version of the Drakes Estero Report (discussed above) in which they deleted many of the major claims against DBOC.

The NPS formerly asked the Ocean Studies Board of the National Research Council (NAS) on October 24, 2007 to review the scientific claims in the NPS Drakes Estero Report and other NPS public presentations. The NPS asked the NAS to examine:

> *the scientific basis for the National Park Service (NPS) presentations and the report (including revisions), "Drakes Estero: A Sheltered Wilderness Estuary," on the ecological effects of the Drakes Bay Oyster Company operations on Drakes Estero…*

The resulting May 5, 2009 NAS report by the Ocean Studies Board, *Shellfish Mariculture in Drakes Estero*, concluded:

> *The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, overinterpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects.*

The 2009 NAS report repudiated nearly every one of the scientific claims made by the NPS in their 2007 Drakes Estero Report, and thus nearly all of the scientific claims made by Dr. Dixon in his 2007 report to the CCC, and nearly all of the claims that you recently made to NOAA's Wieting in your November 10, 2010 letter. None of those claims remains standing. Do you not know that your claims were refuted by the NAS?

Although your letter to Wieting contains 51 citations, the NAS report never made it onto

your list. Why did you ignore the report by our country's most prestigious scientific body that refuted nearly all of the NPS scientific claims that you repeated? The NAS charged the NPS with misrepresenting their own science. Why do you keep repeating the same false claims? I encourage you to retract your letter in light of the NAS report.

Let me give you just one example from the NAS report: the impact of DBOC on eelgrass. This is an issue that you consider in some detail in your letter to Wieting. I use this example as an illustration to demonstrate that you are repeating false science that was refuted by the NAS report in 2009. The NAS report concluded:

> *The absence of eelgrass directly under oyster culture racks represents a small-scale and localized impact on the biogenic habitat. Numerous boat propeller scars in the eelgrass beds, partially affecting a total area of about 50 acres, are also evident and attributable to oyster culturists because they are the only ones allowed to use motorized vessels in the estero. Nevertheless, the total percentage of eelgrass area lost (1%) or partially degraded by propeller scars (7%) and thus attributable to oyster mariculture represents about 8% of all eelgrass habitat in Drakes Estero as of 2007. Eelgrass has approximately doubled in areal cover in Drakes Estero from 1991 to 2007, implying little systemic threat from the existing intensity of oyster culturing activities. Oysters have the potential to benefit eelgrass because their filtering activity improves local water clarity (and hence light penetration) and because they release biodeposits and ammonium (plant nutrients).*

That is quite a different conclusion than is made in your letter to Wieting. I encourage you to read the NAS report and modify your assertions accordingly. You will discover that most of your summary claims in your letter to Wieting are incorrect.

NPS RESPONSE TO THE MAY 5, 2009 NAS PANEL REPORT

When the NAS report was released on May 5, 2009, NPS issued a press release from the office of then Pacific West Regional Director Jon Jarvis in which the NPS stated:

> *Certainly, we apologize for the errors in our original document and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report.*

By "original document", Jarvis was citing the May 2007 version of the Drakes Estero Report, the one reviewed by the NAS report, and the one that you cite in your letter to Wieting. Jarvis apparently was citing both the July 2007 secret non-public version of the Drakes Estero Report and the September 2007 Clarification document when he wrote of the "final, corrected version of the report." Both of those documents retract most of the claims made in the original Drakes Estero Report. Since Jarvis, currently the Director of the NPS, openly acknowledged in 2009 the many errors and mistakes in the Drakes Estero Report, why in 2010 do you keep citing it and repeating these false claims?

NPS HARBOR SEAL CLAIMS REFUTED BY NPS PHOTOS AND DETAILED LOGS

I include here a letter I sent yesterday to Interior Secretary Ken Salazar, alleging that officials and scientists in the NPS violated a series of federal government rules, regulations, and codes, and in so doing committed scientific misconduct. Please carefully read this document and it's four appendices. It involves some of the same scientific claims that you repeat concerning disturbances to the harbor seals by DBOC boats and workers, NPS claims that are refuted by NPS secret cameras, photographs, and detailed logs. The revelations from the NPS photos and logs should encourage you to retract the letter you sent to Wieting, retract letters and documents with similar false claims, and refrain from making similar false claims in the future.

The issue concerns the NPS claims over the past three and a half years that NPS data shows that DBOC boats and workers have been disturbing the harbor seals and pups in Drakes Estero in PRNS. These claims were based on a weak (and now known to be flawed) body of NPS data: a volunteer harbor seal monitoring database. The NPS failed to tell a series of investigations, inquiries, and reviews that it had a second and more reliable (and verifiable) body of NPS data: minute-by-minute, dawn-to-dusk photographs from hidden cameras focused on oyster farm operations and certain harbor seal haul-out sites. Moreover, the conclusions from this more reliable body of NPS data in large part contradicted the conclusions NPS officials and scientists had been making from the less reliable (and flawed) body of data.

The NPS failed to tell the following people and groups about the existence of the secret cameras, photographs, and logs: elected officials (e.g., Marin County Supervisors, Senator Feinstein, Representative Woolsey), the DOI Inspector General, the National Academy of Sciences, the Marine Mammal Commission, the press, the public, the editor of the Marine Mammal Science journal, and the owners of DBOC.

Given what you wrote in your letter to Wieting, it appears as if NPS also failed to tell you and others at the CCC about the secret cameras, photos, and logs. In case you were unaware of them, by sending you this letter, I am informing you of the photos and logs, and the fact that they lead to the opposite conclusion from what has been claimed by both the NPS and CCC. If you would like more detail, please download and examine Appendix 2 that accompanies the letter to Secretary Salazar.

I ask you to stop making these false claims that DBOC is disturbing the harbor seals. According to the NPS photographic data, DBOC is not. The photos clearly show that the occasional disturbances to seals come from kayakers, not oyster boats or workers.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED TO EIS PROCESS

The NPS misconduct is continuing unabated and is having serious impact on policy decisions at Point Reyes, particularly on the Environmental Impact Statement (EIS) process currently being conducted by NPS. To my knowledge, the NPS photos and

logs have not been disclosed as part of the EIS process for the DBOC lease renewal. Rather, the same false claims, including the flawed 2009 NPS paper by [redacted] in the journal *Marine Mammal Science*, were submitted for the EIS process, but not the NPS photos and logs that refute those claims and that paper. This failure also and independently constitutes scientific misconduct and suggests that the ongoing EIS process has been damaged, possibly fatally.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED BY THE CCC

The NPS false science is also being spread by your organization, the California Coastal Commission, as you appear to be using the false science to negatively influence the EIS process. For example, in your November 10 letter to Wieting, you wrote:

> *"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water." (citation #49)*

As the basis for this statement, you cited (#49) the [redacted] 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should have informed the CCC that the NPS harbor seal claims were incorrect, that the photos and logs, presumably never shared with CCC, refute those claims, and that the Becker et al. 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal). By including here the material I sent yesterday to Secretary Salazar, I am informing you that [redacted] et al., 2009, your citation #49, is seriously flawed.

Please read my letter to Salazar, carefully read the four appendices with it, and then in accordance with the conclusions from the NPS photos and detailed logs, retract your letter to Wieting.

CONCLUSIONS

I request that you and the California Coastal Commission immediately:

(1) retract your Nov. 10 letter to Donna Wieting, Acting Director, OCRM, NOAA,

(2) retract other letters or documents containing similarly false scientific claims that you have submitted as part of the EIS process for DBOC and Drakes Estero,

(3) refrain from submitting additional letters or documents containing similarly false scientific claims concerning DBOC and Drakes Estero,

(4) refrain from repeating and promoting this false science, and

(5) begin an open and transparent investigation to determine why false science continues to be repeated in letters and documents emanating from the CCC.

It is imperative that you begin an investigation into the use of science – or in this case the misuse of science -- by the CCC. Your organization has been making these false claims for over three years now, and it is worrisome that the CCC appears to be letting a predetermined political agenda drive the misuse of science.

You are charged by the people of California with conducting your "*affairs in an open, objective, and impartial manner free of undue influence and the abuse of power and authority.*" It appears as if your use of science – or in this case misuse of science -- concerning DBOC and Drakes Estero has not been objective and has not been impartial. I request that you investigate these allegations. If you are not capable of having an "*open, objective, and impartial*" investigation of your own conduct, then I request that you hand such an investigation over to another impartial State agency.

Two elected members of the National Academy of Science – Dr. Peter Gleick and I – have warned you repeatedly of your repeated use of false science. It certainly needs to be investigated why you have repeatedly ignored a detailed report by the most prestigious scientific body in our country – the National Academy of Sciences – and why you continue to quote National Park Service documents that have been discredited and retracted. Only an open and transparent investigation will help clear the air.

Please respond to this request for a retraction and an investigation in a timely fashion. Kindly provide me with information on whether you plan to retract your letter, investigate your use of science, how you plan to proceed, who will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public.

Time is of the essence, since the EIS is underway, and you have weighed in on the EIS process with this false science. I ask you to retract this false science from the EIS.

Please distribute this letter to the six CCC Commissioners, the one North Coast representative, and the appropriate Commission staff.

I look forward to hearing from you. Do not hesitate to contact me if you have any questions or want further information.

Sincerely yours,

Corey S. Goodman, Ph.D

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

cc: Acting Director Donna Wieting, OCRM, NOAA
David Kaiser, Senior Policy Analyst, OCRM, NOAA
John McCamman, Director, CA Department of Fish & Game
Secretary Lester Snow, CA Resources Agency
Assemblymember Jared Huffman, CA State Assembly, 6th District
Senator Mark Leno, CA State Senate, 3rd District
Senator Dianne Feinstein, US Senate
Representative Lynn Woolsey, US House
Marin County Supervisor Steve Kinsey
PRNS Superintenden[redacted] NPS
Yosemite Superintenden[redacted] NPS
Drakes Bay Oyster Company owners Kevin and Nancy Lunny

APPENDIX: How I Got Involved in This Issue

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> *"My only hesitation in coming forward to testify today is the realization that openly expressing my views as a scientist may cause me to come under personal attack by local groups that are determined to remove Lunny's operation from the PRNS. Nevertheless I feel compelled to speak out for good science instructing public policy."*
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> *I end with a note of caution. Beware of sudden claims of "new" data that refute what I have laid out here today and in my more detailed written testimony. If such claims are made, insist on seeing the complete database, check for bias, and seek independent review."*

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Goodman moved into biotech to apply biomedical discoveries to human and environmental health. He co-founded Exelixis, Renovis, and PhyloTech, was CEO of Renovis, and President of Pfizer's Biotherapeutics and Bioinnovation Center. Today Goodman is Managing Director and co-founder of venBio, Board Chair of six biotech companies, and Board member of two others.

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Graeber, Rita

From: Frost, Gavin
Sent: Wednesday, December 01, 2010 5:26 PM
To: Graeber, Rita
Subject: Fw: thoughts about your investigation
Attachments: CSG to Frost.12_01_10.pdf; ATT00001..htm; upconf_2T.jpg; ATT00002..htm; upconf_2L.jpg; ATT00003..htm; upconf_file_icon.jpg; ATT00004..htm; b_view_file_110x31.jpg; ATT00005..htm; upconf_2R.jpg; ATT00006..htm; upconf_2B.jpg; ATT00007..htm; upconf_3B.jpg; ATT00008..htm

Delivered by SOL Blackberry Services

From: Corey Goodman <corey.goodman@me.com>
To: Frost, Gavin
Sent: Wed Dec 01 17:45:16 2010
Subject: thoughts about your investigation

Dear Gavin,

I just returned from a business trip to Japan and leave tomorrow morning for the Galapagos with my wife and friends, back Sunday night December 12. I include here a letter to you that I wrote on the plane. It contains some further thoughts, some questions to consider, and some additional information that might provide you with a broader perspective. I hope you find it useful.

A suggestion: another prestigious scientist who has looked at much of the NPS data and commented on it over the past few years is Dr. Peter Gleick. He is also an elected member of the National Academy of Sciences, a MacArthur Fellow, and founder and President of the Pacific Institute. His Ph.D. advisor was John Holdren, the President's science advisor. Peter is a world-renowned environmentalist and the world water expert who gives the annual water report to the US Congress and to the UN. He is very highly respected around the world. He knows much about this case. He lives in Berkeley, works in Oakland, and can be reached at: (b) (6) [redacted] mobile (b) (6) [redacted] You would find Dr. Gleick a valuable interview.

I look forward to seeing you on Wednesday December 15.

Best wishes,

Corey

December 1, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Gavin M. Frost, Attorney, Field Solicitor, Department of the Interior, Billings, MT

Dear Gavin,

Thanks very much for taking the time to speak with me last Friday about your pending investigation. I appreciated the clarity and transparency with which you described your process. From what you indicated, your investigation is centered on scientific misconduct with attention largely and appropriately focused on the allegations in my November 22 letter to Secretary Salazar. In the end, you said you would report on facts, conclusions, and recommendations.

The allegations against NPS officials and scientists are very serious and arise from the discovery in the summer of 2010 of NPS secret cameras, photos, and detailed logs. These photos and logs were suppressed, never disclosed to the DOI IG, NAS, MMC, and others, and lead to conclusions that largely contradict those made publicly by NPS officials and scientists over the past three and a half years. The existence of the cameras, photos, and logs should have been disclosed, but were not, and should have led to different conclusions, but did not. This appears to be a violation of a variety of federal rules, regulations, and codes.

The big picture revolves around whether NPS does (as they claim) or does not have conclusive evidence showing that Drakes Bay Oyster Company (DBOC) boats and workers have been disturbing the harbor seals in Drakes Estero for the past three and a half years. Starting back on April 5, 2007, then Superintendent [redacted] (b) (6), (b) (7)(C) and since multiple other NPS officials and scientists, have claimed that NPS has conclusive data. The NAS and MMC review panels have been skeptical of that claim, and skeptical of the quality and reliability of the data in the volunteer harbor seal monitoring database.

Nevertheless, the issue of DBOC harbor seal disturbances has been perpetuated for three and a half years by repeated NPS claims, coupled with blanket NPS rejections of DBOC electronic time clock and payroll records. Clearly all of this could have been resolved had the NPS photos and logs been made public. Time-and-date stamped photos and logs, as the NAS panel recommended in their May 5, 2009 report and MMC panel members verbally recommended at their meeting in February 2010, would have helped to swiftly resolve this controversy. The NPS officials and scientists had such photos and logs for over two years, but never told the NAS or MMC panels.

The NPS officials and scientists have said over and over again that they have conclusive data. The NPS photos and logs belie the NPS public claims and tell a very different story, one never shared with investigators and reviewers.

Why did so many NPS officials and scientists suppress the key data? The questions are: who knew, when did they know, and why didn't they disclose the existence of the cameras, photos, and logs? On the one hand, who knew about the cameras and photos? The answer to that question is likely to be a list of multiple NPS officials and scientists.

The related question is how many of them knew about the logs and the detailed minute-to-minute analysis of those photos? Who knew of their existence? Who had seen the logs? Who reviewed them? Who wrote in their margins and corrected the descriptions such as the word "SUNDAY" in two places in the margin, the hand-written correction on the logs that one set of Sunday photos was of a bird and not a boat, or notations of which are good photos of disturbances (caused by kayaks, not DBOC boats)?

Who picked the photos for the May 1, 2009 Briefing Statement? Who picked the photos to send to Superintenden(b) (6), (b) (7)(C) How many NPS officials and scientists knew of the logs? How many had copies of the logs? The logs were sent t(b) (6), (b) (7)(C) but clearly others knew of them. How many people knew and remained silent?

From that perspective, the case appears fairly straightforward – a matter of determining who knew about the cameras, photos, and logs, when they knew, and why they didn't disclose them to a variety of investigators and reviewers. I presume that(b) (6), (b) (7)(C) (b) (6), (b) (7)(C) knew. (b) (6), (b) (7)(C) certainly knew as well. After all, according to NPS emails obtained through the FOIA process(b) (6), (b) (7)(C) wrote the Briefing Statement, and(b) (6), (b) (7)(C) reviewed it. That document cited the photos and cameras. Thus(b) (6), (b) (7)(C) had knowledge of the camera system and photos. It is unclear if he was aware of the detailed logs and analysis.

Did Jarvis know about the cameras, photos, and logs? According to the emails obtained by FOIA, Jarvis received the Briefing Statement. Did he read it? Did he look at the photos in it? Had he already known about the cameras or photos, or was he surprised when he saw them in the Briefing Statement? Did he ask anyone about it? How abou(b) (6), (b) (7)(C) Del Osso, Turnbull, or Wenk? Was each official and scientist who knew acting alone in failing to disclose? Or did they discuss their decision and act as a group?

Did NPS disclose the existence of the cameras, photos, or logs to anyone outside of NPS? For example, did the volunteers involved in the harbor seal monitoring program know about the cameras and photos? Moreover, historically, NPS has often provided certain local environmental supporters (e.g., Gordon Bennett of the Sierra Club West Group Marin, just to name one) with information that has not been publicly disclosed. Did they tell any of these local groups or others about the cameras, photos, or logs?

Did any of the NPS officials or scientists object to the secrecy and think the photos and logs should be disclosed? Did any of them say to the others that they really needed to disclose the photos and logs, but get vetoed? Who called the shots?

Finally, given the conclusions from the detailed logs (i.e., no bona fide major

disturbances of the seals by DBOC boats and workers, with the occasional disturbances coming from kayakers), why did NPS officials and scientists continue to tell various investigations, reviews, elected officials, press, and public just the opposite – that they had data showing DBOC harming the harbor seals? Which of these NPS officials and scientists knew the truth from the photos and logs, and yet said the opposite publicly?

The November 24 letter from Chris Lehnertz to me, copied to you, describes the camera system *"...as part of the harbor seal monitoring program."* That was the first time anyone at NPS has publicly made such a statement using those words. Up until that email, we have been told that the cameras had nothing to do with the harbor seal monitoring program, but were simply to observe wildlife. This would, I imagine, enlarge the number of people who presumably were not told – and should have been – to include the leaders of the monitoring program at Fort Collins.

If the photos were part of the harbor seal monitoring program, then why did (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) all deny that on June 7, 2010 at the MMC meeting with Tim Ragen when I asked them and they all said the photos had nothing to do with the harbor seal monitoring program? Several of them bristled at my suggestion that the photos should have been included in their assessment of harbor seal disturbances. Thus, Lehnertz is the first NPS official to publicly say what I believe to be the truth, namely that the cameras were for monitoring disturbances of seals and thus were part of the harbor seal monitoring program – a very important disclosure.

Did someone from above – such as (b) (6), (b) (7)(C) or Jarvis -- give the staff orders not to disclose the photos and logs? When Jarvis, (b) (6), (b) (7)(C) others?) appeared at the NAS panel meeting on September 4, 2008, did they know of the cameras? When (b) (6), (b) (7)(C) (others?) appeared at the MMC panel meeting in February 2010, did they know? What knowledge did (b) (6), (b) (7)(C) have? How high and broad did the knowledge go, and who made the decisions? Was someone calling the shots from Point Reyes, Oakland, or Washington?

While the case seems simple, there are further layers of details and complexity and historical perspective that provide richness, in some cases provides further clarity, and also shows how broad were the implications of the misconduct. After all, if it was not for the Jarvis nomination to be NPS Director, we might not have the May 1, 2009 Briefing Statement, and in all likelihood, we might have no idea about the cameras, photos, and logs and there would be no investigation. The Briefing Statement was never shared with NAS or me – according to NPS documents obtained via FOIA, it went straight to Jarvis and possibly then others in Washington.

Who submitted the Briefing Statement to Jarvis? Did it come from Oakland or Point Reyes? Was it only sent to Jarvis or was it sent to others in Washington? Did Jarvis distribute it more broadly? Was it sent to members of the Senate Energy Committee? Was it given to members of the Senate or House, or their staff? The Briefing Statement contained false citations to photos in an attempt to blunt the criticism of the NPS scientific claims. How broadly did NPS distribute this document containing false science?

The authors of the Briefing Statement [redacted] possibly under the guidance of [redacted] thought it necessary to disclose a few photos and the very existence of one camera in order to blunt certain criticisms that had been sent to Salazar from me, either directly or via the NAS. Without that decision to put citations concerning a few photos, a few actual photos, and an appendix describing one camera, in that document, we would not be here today. And of course, that document was shown to folks in Washington who presumably did not appreciate the implications, but it was not shared with me, Lunny, or panel members from the NAS or MMC in a transparent fashion. Moreover, the cameras had gone up two years earlier, and the 2008 log had long since been in hand, before the Briefing Statement was written.

Until June 6, 2010, no one outside NPS understood the implications of the cameras and photos. I hope you agree that putting the document on the MMC web site nearly three years after the camera program started as document #110 out of 153, with no sense in its title of what was in its appendix, does not constitute appropriate and timely public disclosure. The proof of that lack of disclosure was the surprised look on Tim Ragen's face when, at his meeting, I asked NPS officials and scientists about the camera (the document only disclosed one) and photos on June 7, 2010. Ragen knew nothing about the camera program and was as surprised as I had been the day before.

From my perspective, the story of misconduct began on April 5, 2007. On that day, Superintendent [redacted] told Marin County Supervisor Steve Kinsey that he had overwhelming data of harm to the harbor seals by DBOC. We now know that he had no such data. The first data emerged under suspicious circumstances several weeks later -- during the two weeks leading up to the Marin County Board of Supervisors hearing on May 8, 2007. Certainly, the veracity of the disturbance records in the two weeks before the hearing are in question and easily disputed by verifiable DBOC electronic records.

Let's briefly look at events that took place in 2009, during which time the name of Jon Jarvis was initially floated by Salazar (April 2009), ultimately nominated by the President (July 2009), and finally confirmed by the Senate (September 2009) as the next Director of NPS. All of this happened with the black cloud of allegations of scientific misconduct hanging over Jarvis' head (see the end of my CCST talk for a brief history of how NPS and DOI responded to allegations of scientific misconduct).

How did NPS and DOI maneuver around these allegations without ever properly investigating them? They certainly never interviewed me, the person who brought the allegations forward. How did they blunt the message and discredit the messenger? I only got a glimpse of the answers to those questions one year later when two key documents surfaced, one of which (the May 1, 2009 Briefing Statement) led to my discovery of the secret cameras, photos, and detailed logs, and thus ultimately became the trigger for your investigation. The other was a key email on May 19, 2009 from Prof. Charles "Pete" Peterson, the chair of the NAS panel on Drakes Estero, to Jon Jarvis.

The key documents used by NPS to blunt my criticisms in spring of 2009 were never shared with me. I was in the dark. Regardless of all of the documents I sent to Salazar and his team, no one contacted me (except for one brief "how is the weather out there?" phone call to check off the box). One year later, on January 21 and June 6, 2010,

respectively, I became aware of two key documents. Perhaps there are more.

(1) On January 21, 2010, I read an editorial in *The West Marin Citizen*, one of two local West Marin newspapers, which included quotes from a May 19, 2009 email from Dr. Charles "Pete" Peterson, the chair of the NAS panel (that had distributed their final report on May 5, 2009) to Jon Jarvis saying that "... *those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong.*"

Peterson's comment was surprising and stunning. I have included in the appendix Peterson's email and other relevant emails and documents surrounding his email to Jarvis. The timing of the leak of Peterson's email eight months later was non-random, since I was scheduled in a few weeks to make a presentation to the Marine Mammal Commission panel on February 21, and the leaked email (which originated from NPS scienti(b) (6), (b) (7)(C)) was clearly published as a way of discrediting me before I testified. That email, and further emails obtained by FOIA, lead to some interesting insights into what was happening behind the scenes.

Jarvis sent Peterson's email straight up to Will Shafroth and Tom Strickland (see appendix 1). To whom did they send it? How widely was it distributed to blunt the allegations of scientific misconduct and assure the successful nomination and confirmation of Jarvis with no investigation? Interior has repeatedly refused to provide emails and documents requested last April by FOIA (see appendix 2).

(2) On June 6, 2010, in preparation for my meeting the next day to discuss DBOC harbor seal disturbances with Marine Mammal Commission Executive Director Tim Ragen along with NPS officials and scientists and Kevin Lunny, I read a document that had been emailed to me several days earlier by a colleague in Washington. That document, the anonymous May 1, 2009 Briefing Statement, was written to refute the January 18, 2009 document I had given the NAS panel (and that they had sent up to Secretary Salazar on February 3, 2009) alleging that the Sunday April 29, 2007 harbor seal disturbance could not possibly have taken place as described based upon DBOC payroll and time clock records for that day and historical records.

Most of the 33-page Briefing Statement is irrelevant, but there is one key paragraph that NPS used to blunt my criticism (page 3, titled "*Assumption that DBOC does not operate on Sundays*") when they claimed to have date and time-stamped photographs of a DBOC boat on the estero on a particular Sunday. No photos of the DBOC boat were shown in the document. On page 12 of the document (page 2 of appendix A) I read with amazement about a remote camera taking pictures of Drakes Estero every minute of every day from dawn to dusk: "*The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM.*" I eventually received digital copies of those photographs and discovered that they are not of a DBOC motor boat, but rather are of two UFO's (unidentified floating objects), most likely kayaks but possibly canoes. Thus, a false citation of the NPS photos was sent to Washington to blunt my allegations.

NPS is not the only agency that suppresses key data or documents. Interior has suppressed documents that should have been provided by FOIA. Interior still has not

answered my FOIA request of April 30, 2010. As you will see in appendix 1, the May 19, 2009 email from Pete Peterson to Jon Jarvis was quickly sent to Will Shafroth and Tom Strickland in Salazar's office. My FOIA request was a simple one – I asked for emails from Shafroth and Strickland to others further distributing Peterson's email. I have never been sent a response. I have called and emailed many times. I was told by phone in July that a response would be forthcoming shortly. I even emailed the FOIA officer in the Secretary's office and copied John Dupuy from the IG's office, hoping that might encourage a response, but only silence. Below in appendix 2 you can see the history. Clearly, when Interior doesn't want information made public, they stonewall FOIA requests. This runs contrary to rules, regulations, and codes, and runs contrary to President Obama's directives to his administration on transparency. It would be enlightening to find out what happened to Peterson's email, and what they wrote about it. I infer that there is something they want to hide.

I look forward to seeing you on December 15th. My wife may have changed the gate code by then, and if she does, I'll email you a new code so that you can get in.

Best wishes,

Corey

Corey S. Goodman, Ph.D
corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Enclosure:

APPENDIX 1: Dr. Charles "Pete" Peterson's May 19, 2009 email to Jon Jarvis and other related emails obtained through the FOIA process.

APPENDIX 2: Emails concern lack of responsiveness to Mr. Ray McInerney, DOI Office of the Secretary FOIA officer

APPENDIX 3: (separate PDF sent by "yousendit") Brief history of how NPS and DOI has handled scientific misconduct charges

APPENDIX 1: Dr. Charles "Pete" Peterson's May 19, 2009 email to Jon Jarvis and other related emails obtained through the FOIA process.

1) January 9, 2009: Dr. Charles "Pete" Peterson, Chair of the Ocean Studies Board (OSB) (National Research Council, part of the National Academy of Sciences) panel investigating Drakes Bay Oyster Farm (DBOC) at Drakes Estero (Professor, University of North Carolina), emailed Drs. Paul Thompson (panel member, Professor, Univ. of Aberdeen) and Dr. Susan Roberts (Director, OSB) concerning their proposal to delete the word "misrepresentation" from the draft report. Peterson wrote:

> *"I understand this issue about the implication of the word misrepresentation. I agree that it implies intent.* ***I personally have no doubt that there was intent****, based upon the directional bias of the putative impacts of the oyster farm reported by NPS. However, I would agree that it may not serve our charge or the good of the process to be so judgmental."* [emphasis added]

"Intentional misrepresentation" forms the basis of the federal definition of scientific misconduct. Peterson's words on January 9 (in which he believed there was intent by NPS to misrepresent data) are in contrast with what he wrote to Jarvis on May 19 when he cleared NPS of scientific misconduct (#15 below).

2) January 18, 2009: Dr. Corey Goodman, NAS member, submitted a 28-page report to Roberts and Peterson alleging that NPS committed scientific misconduct in the documents and presentations NPS gave to the NRC/NAS panel (available upon request). Goodman alleged a pattern of intentional misrepresentations.

3) February 3, 2009: Dr. Roberts sent a letter to Interior Secretary Salazar, forwarding Goodman's case for scientific misconduct and another letter claiming misconduct by DBOC owner Kevin Lunny. Neither Goodman nor Lunny ever heard from Salazar or anyone in his office about these serious allegations.

> *Dear Secretary Salazar-*
> *We recently received the attached letters as part of the National Research Council study on Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drake's Estero, Point Reyes National Seashore, California, which is being carried out for the National Park Service. The National Research Council is not in a position to evaluate the charges contained in this letter. We are therefore forwarding it to you as the cabinet officer responsible for the Park Service for such action as you think appropriate.*
> *Sincerely,*
> *Susan Roberts, Ph.D.*
> *Director*
> *Ocean Studies Board*

4) March 19, 2009: William Colglazier (Executive Officer, NAS) issued a press release concerning the Drakes Estero panel report that stated:

> *"This study was never intended to be an inquiry of potential scientific misconduct, and will make no such determination."*

When the NRC panel report on Drakes Estero was issued on May 5, 2009, Peterson and Roberts made clear in press interviews: they had not studied scientific misconduct and thus would not comment on it.

5) April 27, 2009: Goodman sent Secretary Salazar a letter describing part of the case for scientific misconduct against then West Regional Director Jon Jarvis and opposing his pending nomination as NPS Director (available upon request).

6) May 5, 2009: The NRC/NAS released the NRC report on Drakes Estero. The report came about as close as it could to the definition of scientific misconduct without actually saying "scientific misconduct" when they wrote that the National Park Service *"selectively presented, over-interpreted, or misrepresented the available scientific"* data. They wrote:

> *... The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects."*

7) May 5 and 6, 2009: In his press release and subsequent press interviews, Jarvis made a series of misleading public statements.

In his May 5 press release, Jarvis wrote: *"We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report."* The most recent public version of the Drakes Estero report was on May 11, 2007, and that was the version that the NRC panel had criticized as misrepresenting the scientific data.

Jarvis told the San Francisco Chronicle: *"They didn't say our research was wrong. They just said it was incomplete."* To the Marin Independent Journal he said: *"We agree with some conclusions, disagree with some and say we need more research, too."* To the Point Reyes Light he said: *"There was some overreaching."*

8) On or about May 8, 2009: Dr. John Holdren, President Obama's science advisor and Director of the Office of Science and Technology Policy, had a phone conversation with Peterson. On February 1, 2010, Holdren emailed Goodman concerning his recollection of that conversation when he wrote:

> ***"My recollection of my one brief phone conversation with Pete Peterson is that he said his committee didn't address the question of whether there was misconduct."***

That is of course quite different from what Peterson told Jarvis by email (#15 below), but consistent with what Peterson told Goodman when questioned about his phone call with Holdren (#22 below). What Peterson told Goodman was completely consistent with what Holdren told Goodman. The inconsistent story is what Peterson told Jarvis in his May 19, 2009 email.

9) May 10, 2009: Goodman sent Secretary Salazar a second letter describing further details of the case for scientific misconduct against Jarvis, focusing in particular on Jarvis' response to the NRC/NAS report on May 5 (available upon request).

10) May 14, 2009: Holdren asked Goodman to send him the specific case for scientific misconduct against Jarvis.

11) May 16, 2009: Two days later, Goodman emailed Holdren a 21-point case for scientific misconduct against Jarvis (11 pages; available upon request). This report is detailed, factual, and identifies which rules, regulations, and laws appeared to have been violated.

12) May 17, 2009: Jarvis sent his reply to Goodman's case to Secretary Salazar on the 17th. Salazar then forwarded Jarvis' reply to Holdren. Holdren then sent the Jarvis response to Goodman and asked for his analysis. Jarvis responded to only seven of Goodman's 21-points, and most of those rebuttals were either straw-man arguments or were directly contradicted by his own testimony to the Inspector General. Goodman asked Holdren how much detail he wanted. He answered:

> *"I think if he's demonstrably not telling the truth in one or two more instances that would be very important. He's already on thin ice for his characterizations of the NAS findings, although some of those are quotes that he can say are not accurate even though the reporters insist they are."*

13) May 18, 2009: Jon Jarvis must have realized how strong was Goodman's 21-point case against him, and how weak was his 7-point reply he sent the day before to Salazar. It was only a matter of time before his reply would be scrutinized. Jarvis emailed to Roberts, copying (b) (6), (b) (7)(C) citing the 21-point case from Goodman to Salazar accusing Jarvis of scientific misconduct, told her that his nomination as NPS Director "hangs in the balance", and asked Roberts to provide Peterson with this information so that Peterson could convey "the panel's position to Dr. John Holdren and Assistant Secretary Tom Strickland regarding their findings." The key is that Jarvis asked Peterson to represent the panel's position. Thus, Jarvis asked Roberts to ask Peterson, as representing the NRC panel, to come to his rescue by telling Holdren and Strickland that Jarvis did not commit scientific misconduct.

From: *Jon Jarvis*
To: *Susan Roberts*
Bcc: (b) (6), (b) (7)(C)
Sent: *May 18, 2009 9:06 AM PST*
Subject: *Goodman*

Dr. Roberts:
Below you will find two versions of a letter from Corey Goodman to the Secretary of Interior, sent through the Assistant Secretary/Chief of Staff Tom Strickland accusing me of Scientific Misconduct in the Drakes Estero issue. ***This is very serious as my nomination to the Directorship of the NPS hangs in the balance. I would appreciate your providing this information to Dr. Pete Peterson for conveying of the panel's position to Dr. John Holdren and Assistant Secretary Tom Strickland***

regarding their findings. *As a particular example of Goodman's incorrect views, note number #18 as how he characterizes the research and publication b*[redacted] (b) (6), (b) (7)(C)
Thank you.
Jonathan B. Jarvis [emphasis added]

14) May 19, 2009: Goodman emailed Holdren with a written critique of Jarvis' reply to Goodman's 21-point case for scientific misconduct, pointing out in graphic form how Jarvis had not responded to 14 of the 21 points. Moreover, Jarvis' rebuttal to 7 points was very weak and easy to dismiss as largely irrelevant answers. Jarvis had no defense of Goodman's 21-point case. Holdren replied:

"Corey-- Thanks for this further input. I am sharing it with Senator Feinstein's staff people who are continuing to look at the matter. I think that it would be preferable for you to re-address your response to me, since I was the one who asked for your responses to the points made by Mr Jarvis. I will then also share it with Secretary Salazar and his chief of staff Tom Strickland, making clear that I was the one who supplied you with Jarvis's points and asked for your responses. Best,
John"

15) May 19, 2009, 7:27 AM PST: Dr. Peterson wrote an email on the morning of the 19th to Jon Jarvis that fulfilled the request Jarvis had made of Roberts just the day before. Jarvis certainly distributed it widely over the coming hours. Peterson wrote:

"Dear Jon-
I wanted to thank you for your honest reactions to our NRC report and wish you well personally. I spoke at length to John Holdren expressing my own support of your candidacy for NPS Head based on the professionalism and strong commitment to science that you have demonstrated in various ways that have become evident to me. I also expressed my opinion that those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."

I write, however, for an entirely different reason. I am presently engaged in preparing a draft space-based management plan for North Carolina that identifies the best (and worst) sites for locating wind farms over water (Pamlico and Albemarle Sounds and the coastal ocean out to 30 m water depth). An important NPS issue arises in this process. How would unacceptable negative visual impacts be defined for National Seashores? For Cape Hatteras and Cape Lookout National Seashores, this involves both ocean and sound vistas, for which the answer may differ. I wondered if you might be able to direct me to an appropriate person in the Park Service who could begin to answer that question.
Thanks sincerely,
Pete Peterson [emphasis added]

In his first paragraph, Peterson thanked Jarvis for his honest reactions to the NRC report. That statement seems inconsistent with the twisted and convoluted press release and interviews Jarvis gave after the NRC report was released (#7 above).

Peterson next told Jarvis that he had told Holdren that he supported Jarvis' candidacy for NPS Director. Finally, he told Jarvis that he had told Holdren that the claims of scientific misconduct against NPS "are simply wrong."

That statement is inconsistent with what Peterson wrote to his fellow panel members on January 9, 2009 (#1 above), inconsistent with the charge to the panel (#4 above), and inconsistent with the panel's findings (#6 above). However, most people throughout the government and the community interpreted Peterson's comments as if he was speaking on behalf of the NRC/NAS as Chair of the panel that had just released its investigation of these issues. He was not. But that is why Jarvis made the request the day before – he wanted Peterson to represent the "panel's position" and he got what he wanted.

In his second paragraph, having given Jarvis what he wanted (i.e., "clearing" him of scientific misconduct), Peterson immediately went on to ask Jarvis for his help with a proposed wind farm project in North Carolina that required NPS support since it might have negative impacts on two national seashores. Was this a conflict of interest? This certainly has the appearance of a conflict of interest, and looks like it violates the NAS policy. Peterson did Jarvis a favor in paragraph one (including misrepresenting what he told Holdren), and then he asked for a favor in return in paragraph two. This seems pretty straight forward as meeting the appearance of a conflict.

In his email, Peterson personally cleared Jarvis of charges of scientific misconduct, even though he told the White House just days earlier (#8 above) that he had never reviewed such charges and was unqualified to make a determination of scientific misconduct. When on January 25, 2010, Goodman questioned him about this topic (#22 below), Peterson answered that he did not know the federal laws about scientific misconduct, that he had never read Goodman's 21-point case for scientific misconduct, and that neither he nor his panel had ever investigated scientific misconduct. Moreover, Peterson admitted that he had indeed been asked because he was Chair of the panel. When asked if he was contacted because he was Chair, he answered: *"That's why I had been contacted."* When asked by Goodman if the January 21, 2010 article in the *West Marin Citizen* (#22 below) had correctly quoted him as chair of the committee as having said that the allegations of misconduct against NPS "are simply wrong", Peterson answered: *"I didn't, and I don't – that is something that lies outside the purview of my committee and is not something that we did or I did."* At the time Goodman interviewed Peterson, he had apparently forgotten about the details of what he wrote in his email to Jarvis. Once that email was sent to him, he would no longer answer Goodman's calls or emails.

16) May 19, 2009, 8:03 AM PST: Thirty-six minutes after Peterson hit the "send" button, Jon Jarvis forwarded Peterson's email to Will Shafroth (Deputy Assistant Secretary) and Tom Strickland (Assistant Secretary) in Salazar's office with the following cover note:

> ***"See note below. Dr. Peterson chaired the panel of the National Academy of Sciences which studied the Drakes Estero oyster issue and presented the results to all parties. I hope this puts the issue behind us. I will follow up with his other request."***

Jarvis knew the implications of Peterson's email, and immediately sent it to Shafroth and Strickland, saying that he hoped this put the issue – namely the dark cloud of scientific misconduct hanging over his head – behind him.

17) May 19, 2009, 8:45 AM PST: Jarvis next replied to Peterson and copied Bert Frost (NPS Associate Director for Natural Resources), thanking Peterson for the call to Holdren, and asking Bert Frost to follow up on Peterson's wind farm request.

18) May 19, 2009, 8:54 AM PST: Jarvis forwarded Peterson's note t[redacted] (PRNS Superintendent and also charged with scientific misconduct concerning Drakes Estero), George Tunbull, an[redacted] with the following cover note:

> ***"Good note from Peterson."***

19) May 19, 2009, 3:18 PM PST: Jarvis forwarded Peterson's note to Craig Obey (Senior Vice President, NPCA), a stronger support of the Jarvis nomination, and wrote: *"See below. Peterson chaired the NAS panel."*

Obey replied one hour later: ***"Terrific! That should send a pretty strong message."***

20) May 21, 2009: Carol McCoy (NPS Branch Chief, Denver), wrote to Peterson, and copied Bert Frost, following up in a very positive fashion about the North Carolina wind farm study and location options, started by saying *"attached is the contact information I promised you"*, and concluded by writing *"I am looking forward to working with you."* This email begins a favorable interaction of NPS with Peterson's wind farm project in North Carolina.

21) January 21, 2010: In the run up to the Marine Mammal Commission panel hearing in February, someone leaked Peterson's email to the *West Marin Citizen*, a local newspaper in the West Marin community. The leaked version came from NPS scientist[redacted] who had received it from Superintenden[redacted] On January 21, 2010, the *Citizen* published part of Peterson's May 19, 2009 email to Jarvis – quotes from the first paragraph but no mention of the "ask" in the second paragraph. Editor Jim Kravets wrote:

> *"… Goodman repeatedly pursued misconduct charges against then director of the Park Service Pacific West Region, John Jarvis, but the allegations so far haven't stuck. Jarvis's confirmation as Park Service director was even bolstered by Pete Peterson, chairman of the National Academy of Sciences panel in charge of reviewing the park's science relating to Drakes Bay Oyster Company. Writing in a May 2009 email, Peterson tells Jarvis that he expressed support for Jarvis' candidacy for NPS Head to John Holden, director of the White House Office of Science and Technology Policy and Obama's top science adviser, "based on your professionalism and strong commitment to science that you have demonstrated." Peterson said he also told Holden that in his opinion, "those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."*

22) January 25, 2010: Goodman got a copy of Peterson's email from the *Citizen* over the weekend. Monday morning, he telephoned Pete Peterson at work (8:10 AM PT) and took extensive notes of their conversation. Here are excerpts of what Peterson said to Goodman in that lengthy conversation: [emphasis added]

> *Goodman* *Last Thursday an article came out in the West Marin Citizen that contains quotes in two emails, one that you wrote to Jon Jarvis last May and one to John Holdren last May.*

Peterson *I did contact both of them, but not sure what kind of FOIA had released those letters to the newspaper.*

Goodman *I was quite surprised by your quotes in this article. I would like to see if you're quoted correctly here. Your emails were released and were quoted as criticizing me and what I was doing. For transparency…*

Peterson *I don't understand how it criticizes you…*

Goodman ***It quotes you as concluding: "those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong"***

Peterson ***I don't think I said that.***

Goodman *Did you just send your emails to Jarvis and Holdren, or did you provide them to others?*

Peterson *I don't know how the newspaper got them. You're backing me into history and challenging my recollection [chuckle]… let me think…. I copied no one, absolutely no one. If I'm responding to someone, I don't send it to the world. After our committee delivered the Drakes Estero report to the sponsor, NPS and I was in DC to do that service for the Academy and for the committee members, I was then contacted by Holdren and he asked if I would give him my impressions of Mr. Jarvis in that he was being considered for an appointment in the Obama administration. I think I responded to that by an email. How did Jarvis get into this… [pause]… at some point, and I can't remember now the circumstance, but at some point Mr. Jarvis contacted me as well and I can't recall the circumstances, and its possible that he asked me to send him the same thing, that is to say, my feelings about what the committee had concluded relative to his role and to aspects of what we put in our report. But I can't, I'm not being evasive here, but I can't remember the circumstances whereby…*

Goodman *You can see why it'd be nice for me to be able to fact check what you were quoted as, quoting you as chair of the committee that all allegations of misconduct against NPS are simply wrong.* ***I've got to ask you, by what criteria did you dismiss all of the allegations of misconduct? Did you go through all the documents and data I submitted? Scientific misconduct has legal definitions, rules, regulations, and public law…***

Peterson ***I didn't, and I don't – that is something that lies outside the purview of my committee, and is not something that we did or I did.***

Goodman *What did you tell John Holdren about Jon Jarvis and the issue of misconduct?*

Peterson *I told him that misconduct was outside the purview of our committee, and that we did not look at it and did not come to any conclusion concerning misconduct. Instead, I gave my personal impressions of Mr. Jarvis from my limited interactions with him.*

Goodman	*When you were approached by Holdren or Jarvis, did they ever give you the 21-point misconduct case I sent to Salazar?*
Peterson	*My scope of info about Mr Jarvis was quite limited and I said that to both Holdren and Jarvis. That didn't include anything in the way of any complete analysis of misconduct, or Drakes Estero - just my minimal interactions with Jarvis as a committee member.*
Goodman	*When you sent those emails to Jarvis and Holdren, did the Academy know?*
Peterson	*The Academy knew I was being contacted by Holdren about Jarvis on this issue.*
Goodman	*Did they know you emailed to Jarvis?*
Peterson	*I don't know, but they knew I was in contact with Holdren.*
Goodman	*Do you believe they ever saw what you sent to Holdren?*
Peterson	*I doubt it. I had been asked relative to myself as an individual, not relative to the panel…*
Goodman	***You only knew these things as the chair of the panel though.***
Peterson	***That's why I had been contacted.***
Goodman	*Thank you. I think you'll see when you see this article why I was taken aback – you'll see how your words have been used.*
Peterson	***I might misspeak, but I don't think I would miswrite. I don't think I would've written it this way.*** *You've piqued my interest.*

In summary, Peterson was consistent with how Holdren described their conversation, and consistent with how the NRC/NAS, including Roberts and Peterson, described the panel's findings to the public. However, he completely contradicted his May 19, 2009 email to Jarvis. He did not have the email in front of him, and he apparently could not remember what he wrote. Caught off guard, he denied ever having cleared Jarvis of scientific misconduct. When asked if he did in fact comment on scientific misconduct, he responded: *"I didn't, and I don't – that is something that lies outside the purview of my committee, and is not something that we did or I did."* When asked about what he might have written, he said: *"I might misspeak, but I don't think I would miswrite. I don't think I would've written it this way."* But he did.

APPENDIX 2: Emails concern lack of responsiveness to Mr. Ray McInerney, DOI Office of the Secretary FOIA officer

From: corey.goodman@me.com
Subject: Fwd: update concerning FOIA request -- OS-2010-00253
Date: October 9, 2010 3:21:06 PM PDT
To: osfoia@nbc.gov
Cc: john_dupuy@doioig.gov

Dear Mr. McInerney,

I am puzzled.

I submitted a FOIA request to you on April 30, 2010.

After the normal time period had elapsed, I sent subsequent email notes to you, and you never responded.

I reached you on the phone on July 28, and asked about my 3-month old FOIA request, and you said it was now in process, and I would get the material "shortly". You agreed that my request did not look "voluminous" (your word).

Yet nothing has arrived. On August 30, I wrote to you again (see below), and once again you did not answer.

It is now October 9, over 5 months since I submitted my FOIA request. I have copied this note to the IG office. Perhaps they can encourage you to provide me with an update on my request, and a timely response. Your lack of responsiveness does not appear to be consistent with the President's directives on FOIA transparency.

I look forward to hearing from you, and receiving the requested materials ASAP.

Thank you.

Corey Goodman
corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: August 30, 2010 11:59:27 AM PDT
To: osfoia@nbc.gov
Subject: Re: update concerning FOIA request

Dear Mr. McInerney,

We spoke on the phone over one month ago. I made my request for some emails in April. When will I be getting these materials?
Thanks very much.

Corey Goodman

On Jul 22, 2010, at 6:04 AM, Corey Goodman wrote:
Dear Ray McInerney,

It is now July 22 and you have not responded to my FOIA request of April 30. My request was made 59 working days ago (nearly three months ago). Please let me know when and how you will respond to my request for these documents. You have also failed to respond to my notes from June 5 and June 25 asking about my April 30 FOIA.
Thanks very much.

Corey Goodman

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: June 25, 2010 7:15:47 AM PDT
To: osfoia@nbc.gov
Subject: Fwd: update concerning FOIA request

Dear Mr. McInerney,
It is now June 25 and you have not responded to my FOIA of April 30. Please let me know when and how you will respond to my request for these documents.
Thanks very much.
Corey Goodman

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: June 5, 2010 3:23:10 PM PDT
To: osfoia@nbc.gov
Subject: update concerning FOIA request

Dear Mr. McInerney,
I was hoping to get an update from you as to when I will be receiving the emails and other documents requested below on April 30, 2010. Thanks very much.
Corey Goodman

corey.goodman@me.com
415 663-9495
PO Box 803, Marshall, CA 94940

April 30, 2010

To: Ray McInerney, FOIA Officer, Department of Interior Office of the Secretary, osfoia@nbc.gov

From: Dr. Corey Goodman, corey.goodman@me.com

Re: FOIA request for emails and other documents, letters, and reports

Dear FOIA Officer McInerney,

Pursuant to Title 5 of US Code Section 552, I am requesting the following report, emails and documents.

1) All emails and other documents, letters, and reports **to or from Will Shafroth** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

2) All emails and other documents, letters, and reports **to or from Thomas (Tom) Strickland** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

3) All emails and other documents, letters, and reports **to or from Kit Batten** between

May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

Thank you very much. Please don't hesitate to contact me if you want any additional information pertaining to this request.

Sincerely yours,

[signature on file]

Dr. Corey S. Goodman

Email: corey.goodman@me.com

Mailing address: PO Box 803, Marshall, CA 94940

Phone: 415 663-9495

Mobile phone: 650 922-1431

Appendix 3: please download the five page PDF from the following yousendit link.

Appendix 3: please download the five page PDF from the following yousendit link.

Gary, Art

From: Russell, Lisa
Sent: Monday, December 20, 2010 4:29 PM
To: Gary, Art
Subject: FW: lack of response by DOI Office of the Secretary to my FOIA request

From: Strickland, Thomas
Sent: Monday, December 20, 2010 4:15 PM
To: Russell, Lisa; Shafroth, William
Subject: Fw: lack of response by DOI Office of the Secretary to my FOIA request

Pls handle as appropriate. Thanks

From: Corey Goodman <corey.goodman@me.com>
To: Strickland, Thomas
Cc: Shafroth, William; Dupuy, John
Sent: Mon Dec 20 16:03:38 2010
Subject: lack of response by DOI Office of the Secretary to my FOIA request

Dear Tom,

I hope you can quickly resolve an outstanding FOIA request to your office -- and answer another parallel request -- so that I don't have to pursue a remedy outside your office. My FOIA request was made seven and one half months ago. The case number is: OS-2010-00253. I should have received the documents within 20 working days. It has now been around 170 working days since I made my request, and I have not received a single response. Is this typical of how your office handles FOIA requests? Is this lack of responsiveness consistent with federal regulations? Is this lack of responsiveness consistent with President Obama's memorandum to your Department?

President Obama wrote to your Department on January 21, 2009:

"A democracy requires accountability, and accountability requires transparency. As Justice Louis Brandeis wrote, "sunlight is said to be the best of disinfectants." In our democracy, the Freedom of Information Act (FOIA), which encourages accountability through transparency, is the most prominent expression of a profound national commitment to ensuring an open Government. At the heart of that commitment is the idea that accountability is in the interest of the Government and the citizenry alike.

The Freedom of Information Act should be administered with a clear presumption: In the face of doubt, openness prevails. The Government should not keep information confidential merely because public officials might be embarrassed by disclosure, because errors and failures might be revealed, or because of speculative or abstract fears. Nondisclosure should never be based on an effort to protect the personal interests of Government officials at the expense of those they are supposed to serve. ...

All agencies should adopt a presumption in favor of disclosure, in order to renew their commitment to the principles embodied in FOIA, and to usher in a new era of open Government. The presumption of disclosure should be applied to all decisions involving FOIA.

The presumption of disclosure also means that agencies should take affirmative steps to make information public. They should not wait for specific requests from the public. All agencies should use modern technology to inform citizens about what is known and done by their Government. Disclosure should be timely."

In the spirit of President Obama's memorandum to your Department on January 21, 2009, I request that you make sure I receive the requested information before the New Year. Below is a timeline, and then some information on my FOIA request, and another parallel request. In both cases I am asking for emails and correspondence concerning the distribution and response to

two documents that appear to have blunted my request in 2009 for an investigation of scientific misconduct: Dr. Pete Peterson's May 19, 2009 email to Jon Jarvis, and the NPS scientists' anonymous May 1, 2009 Briefing Statement also sent to Jon Jarvis.

Timeline

On **April 30, 2010**, I filed a FOIA request with Ray McInerney, your FOIA officer (see below). Mr. McInerney never replied.

On **June 5, 2010**, I wrote to Mr. McInerney, informed him my request was past due, and asked him when I would receive the requested documents. Mr. McInerney never responded.

On **June 25, 2010**, I wrote to Mr. McInerney and asked when I would receive the requested documents. Mr. McInerney never responded.

On **July 22, 2010**, I wrote to Mr. McInerney and asked when I would receive the requested documents. Mr. McInerney never responded.

On **July 28, 2010**, I telephoned Ray McInerney. He answered. I asked about my FOIA request that was by that time three months old. He asked for the control number. I said I never received one (he found it and gave me the number). In fact, I had sent him emails three times (nearly every month) since making my request, and he (Mr. McInerney) had never answered. I asked him what was happening? He said nothing. He typed away for 20-30 seconds. Then silence. After presumably looking at his computer screen for a minute or so, he said "can you hold on, I'll be right back." Again, silence. He went away for another three to four minutes or so. When he came back, he said he had talked to the person processing my request, that it was in process, and I would get it shortly. I asked him to be more precise, and he said he could not. I asked if shortly meant a day, a week, a month, or another three months. He said it did not look very voluminous, and that it would probably take two to three weeks, unless portions had to be redacted, in which case it would then be sent to lawyers. He was completely unapologetic for never responding in writing, never responding to my many emails, and for why it had taken so many months, particularly since by his own account, it is not very voluminous.

Needless to say, it has now been another four and one half months, and he still has not responded.

On **August 30, 2010**, I wrote to Mr. McInerney again, reminded him of our phone call, and asked when I would receive the requested documents. Mr. McInerney never responded.

On **October 9, 2010**, I wrote to Mr. McInerney yet again, reminded him of our phone call, and asked when I would receive the requested documents. I copied DOI Assistant Inspector General John Dupuy of that email, as I have done here, in the hope that perhaps involvement of the IG's office might encourage him to respond to my FOIA request. Mr. McInerney never responded.

Thus, I hope you agree that for me to submit another FOIA request at this time to your office appears pointless. In the spirit of President Obama's memorandum to your Department on January 21, 2009, and with the Secretary's desire to "clean up the mess" concerning the oyster farm and Drakes Estero, I request that you respond to my two requests below in a timely fashion.

FOIA Request: distribution of Pete Peterson's May 19, 2009 email to Jon Jarvis

As you are aware, four documents authored by me were sent to Secretary Salazar in the first half of 2009, each alleging that the National Park Service had committed scientific misconduct concerning the oyster farm and Drakes Estero in Point Reyes National Seashore (CA). One of those documents had been submitted by me to the National Academy of Sciences on January 18, 2009 and was forwarded by the NAS to Secretary Salazar on February 3, 2009. The other three were sent directly from me to the Secretary on April 27, May 10, and May 16, respectively. Those three documents sent directly to the Secretary alleged that then Pacific West Regional Director Jon Jarvis had overseen and participated in scientific misconduct and thus needed to be investigated. To my knowledge, no such investigation of the allegations of scientific misconduct ever took place in 2009, and Jon Jarvis was confirmed as NPS Director in September of that year. I found it puzzling that such serious allegations of

scientific misconduct would have been ignored by your office, and I wondered what you and others had used to blunt my critique.

My first insight into that question came on January 21, 2010, when the then editor of the West Marin Citizen newspaper published quotes from a leaked email dating back to May 19, 2009, from Dr. Charles "Pete" Peterson [Chair of the Ocean Studies Board (OSB) (National Research Council, part of the National Academy of Sciences) panel investigating Drakes Bay Oyster Farm (DBOC) at Drakes Estero (Professor, University of North Carolina)] to Jon Jarvis. Dr. Peterson wrote (first paragraph only quoted below):

> *"Dear Jon- I wanted to thank you for your honest reactions to our NRC report and wish you well personally. I spoke at length to John Holdren expressing my own support of your candidacy for NPS Head based on the professionalism and strong commitment to science that you have demonstrated in various ways that have become evident to me. I also expressed my opinion that those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."*

In that first paragraph, Peterson told Jarvis that he had told Dr. John Holdren (the President's science advisor) that he supported Jarvis' candidacy for NPS Director. Finally, he told Jarvis that he told Holdren that the claims of scientific misconduct against NPS "are simply wrong." That statement is inconsistent with what Peterson wrote to his fellow panel members on January 9, 2009, inconsistent with the charge to the NAS panel, and inconsistent with the panel's findings. However, many people interpreted Peterson's comments as if he was speaking on behalf of the NRC/NAS as Chair of the panel that had just released its investigation of these issues. He was not.

In his email, Peterson personally cleared Jarvis of charges of scientific misconduct, even though he told the White House just days earlier that he had never reviewed such charges and was unqualified to make a determination of scientific misconduct.

FOIA requests submitted to the NPS were answered, and provided information on what Jarvis did with the Peterson email. Thirty-six minutes after Peterson hit the "send" button, Jon Jarvis forwarded Peterson's email to you and Will Shafroth in Salazar's office with the following cover note:

> *"See note below. Dr. Peterson chaired the panel of the National Academy of Sciences which studied the Drakes Estero oyster issue and presented the results to all parties. I hope this puts the issue behind us. I will follow up with his other request."*

Jarvis knew the implications of Peterson's email, and immediately sent it to you, saying that he hoped this put the issue – namely the dark cloud of scientific misconduct hanging over his head – behind him.

In my April 30, 2010 FOIA request submitted to your office, I asked for all emails and correspondence in which you, Will Shafroth, and/or Kit Batten had distributed the Peterson email, what you had written, what replies you had received, and for other emails and documents concerning my allegations of scientific misconduct. To this date, your office has not responded.

FOIA Request: distribution of PRNS anonymous May 1, 2009 Briefing Statement sent to Jon Jarvis

On June 6, 2010, I read for the first time another secret document that was used to blunt my criticism of Jon Jarvis and allegations of scientific misconduct: the May 1, 2009 anonymous Briefing Statement. We now know that it was written by PRNS scientists (b) (6) [redacted] reviewed by Pacific West Regional Chief Scientist (b) (6) [redacted] (b) (6) [redacted] and requested and overseen by then PRNS Superintendent (b) (6), (b) (7)(C) [redacted] It was sent to Jon Jarvis on May 1, 2009. The Briefing Statement was never sent to me or the NAS, even though it claimed to refute my January 18, 2009 document to the NAS.

Concerning my January 18, 2009 document to the NAS (and subsequently forwarded by the NAS to the Secretary), the Briefing Statement claims to "refute the accusations with sound data and scientific analyses." However, we now know that the May 1, 2009 Briefing Statement did nothing of the kind -- it too used false scientific claims and the authors of that document are guilty of scientific misconduct. I had alleged that the April 29, 2007 harbor seal disturbance could not be valid because the Drakes Bay Oyster Company workers do not work on Sundays, and certainly, according to time clock and payroll records, had not been working on that Sunday. The PRNS scientists countered in the Briefing Statement by claiming (without showing the photos) that they had time and date stamped photographs of DBOC workers in a motorboat on a Sunday (March 23, 2008), thus showing that my statement had been false. That is how I discovered the secret cameras and photos -- by reading about them in the Briefing Statement. Once I read the secret document this past June, I requested and received the photographs cited in the Briefing Statement as showing a DBOC motor boat on the estero on a Sunday. In fact, the photos do not show a motor boat but rather two UFO's -- unidentified floating objects -- possibly kayaks. The NPS scientists have since admitted that the photographs do not show a DBOC motor boat. In fact, three and one half years of photographs show that oyster farm motor boats have never been on the estero on Sundays during those years. Thus, the Briefing Statement DOES NOT refute my January 18, 2009 document, and DOES NOT use sound data and scientific analyses, as claimed. It is a document containing false science.

I now ask you: to whom in DOI did Jarvis send the Briefing Statement? Did you get a copy? Shafroth? Salazar? Others? To whom did he or you or your colleagues distribute this document throughout the federal government? The Senate committee that confirmed Jarvis? Feinstein's office? Holdren? Where did it go?

This document used knowingly false science to claim to refute my statements. I deserve to know, and request that you tell me, precisely to whom it was distributed. I could certainly make this request by a formal FOIA request, but since your office has not responded to my April 30, 2010 FOIA request, making another such parallel request seems pointless. In the spirit of President Obama's memorandum to your office on January 21, 2009, I ask that you provide me with emails and cover letters and responses concerning the distribution of the Briefing Statement throughout the various branches of the federal government and to other non-government parties.

I look forward to getting your reply to these requests in the near future.

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

April 30, 2010

To: Ray McInerney, FOIA Officer, Department of Interior Office of the Secretary, osfoia@nbc.gov

From: Dr. Corey Goodman, corey.goodman@me.com

Re: FOIA request for emails and other documents, letters, and reports

Dear FOIA Officer McInerney,

Pursuant to Title 5 of US Code Section 552, I am requesting the following report, emails and documents.

1) All emails and other documents, letters, and reports **to or from Will Shafroth** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

2) All emails and other documents, letters, and reports **to or from Thomas (Tom) Strickland** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

3) All emails and other documents, letters, and reports **to or from Kit Batten** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

Thank you very much. Please don't hesitate to contact me if you want any additional information pertaining to this request.

Sincerely yours,

[signature on file]

Dr. Corey S. Goodman

Email: corey.goodman@me.com

Mailing address: PO Box 803, Marshall, CA 94940

Phone: 415 663-9495

Mobile phone: 650 922-1431

Frost, Gavin

From: Corey Goodman [corey.goodman@me.com]
Sent: Sunday, January 02, 2011 9:50 AM
To: Frost, Gavin
Subject: pattern
Attachments: NPS EOM's Drakes Estero harbor seals.10_26_08.PDF; ATT00001..txt

Gavin,

I came across this document I generated on October 26, 2008, a little less than two months after NPS, and in particular [redacted] made their presentation to the National Academy of Sciences panel on September 4, 2008, and publicly presented the [redacted] manuscript (the first version of what became the published [redacted] et al., 2009 paper). I titled the document EOM's for Errors, Omissions, and Misrepresentations. Each individual entry is not as important as the overall pattern. Many of the examples will be familiar to you. Some (particularly specifics on his paper) will be new. But it is the pattern that is important. Lots of EOM's, all working against DBOC and in support of NPS pre-determined agenda. The mistakes were not random, but rather always biased against DBOC. Thus, when I wrote that the letter to you from [redacted] on December 21, 2010 was a metaphor for the misrepresentations over the past three and a half years, I was indeed citing a very real pattern. I could find many other documents I produced over the three and a half years. This one from October 26, 2008 simply shows it quite graphically.

Best,

Corey

NPS Errors (E), Omissions (O), & Misrepresentations (M) by NPS Scientist Dr. Ben Becker to Ocean Studies Board (Natl. Res. Coun., NAS) on Sept 4 2008 in presentation: *"Models for Harbor Seal Counts in Drakes Estero"* based upon Becker, Press, & Allen paper in press in journal Marine Mammal Science: *"Modeling the Effect of El Nino, Density-Dependence and Disturbance of Harbor Seals in Drakes Estero, California, 1997-2007"*

EOM#	Becker presentation to OSB, NRC, NAS and Becker et al. paper in press MMS journal	E	O	M
1	**Title of Becker's presentation and paper.** Title states "Drakes Estero". This is not accurate. Does not model the seal counts for Drakes Estero. Becker restricted analysis to a few subsites.		X	X
2	**Title of Becker's paper.** Title states "1997-2007". This is not accurate. Becker restricted analysis to 2002-2004 vs. 2005-2007 to artificially focus on decline from 2004 to 2005 at subsite OB. Becker made it appear as if decline occurred during DBOC years, but DBOC began in 2005.		X	X
3	**Scope of Becker's presentation and paper.** Becker failed to include data on all 8 subsites in Drakes Estero. Becker restricted analysis to three of eight subsites (UEB, OB, UEF), the only ones with oyster bags. Thus he had no control sites without oyster operations for comparison.		X	X
4	**2008 data available but not included.** Becker failed to include 2008 data on harbor seals (peak season Apr 15-May 15) and oyster production. Becker had 2008 data, or access to it, for over 3 months. Becker claimed his model is predictive. 2008 data contradict his model: seals at OB went up while oyster production went up. In fact, seals at OB did not go down from 2005-2008.		X	X
5	**Oyster production.** Becker's presentation & paper used the wrong number. Shellfish production in Drakes Estero overstated for 2007 by 63%, and 2007 vs. 2006 overstated by 267%. Data was available from California Dept. of Fish & Game. Becker failed to get correct numbers from CDFG.	X		X
6	**Oyster production.** Becker's presentation & paper used oyster production number for all of Drakes Estero, and falsely assumed it was representation of changes at subsites UEN, OB, and UEF, which it was not. Failed to get shellfish production data on specific subsites from DBOC.	X	X	X
7	**Oyster production.** Becker's presentation & paper falsely assumed that as oyster production in all of Drakes Estero increased, oyster operation activity at specific subsites (e.g., OB) increased proportionally, which it did not. Becker wrote: "*The oyster harvest factor is assumed related to boat traffic, human activity, and oyster bag placement that may displace or disturb seals".* This assumption was wrong. Becker failed to get subsite data on boat activity and bags from DBOC.	X		X
8	**Oyster production.** Becker's presentation & paper falsely assumed that oysters reside in oyster bags on sandbar islands (UEN, OB, UEF) for 18 months. They do not. Oysters are "finished" for three to four months in oyster bags at these subsites. Failed to get information from DBOC.	X	X	X

1

EOM#	Becker presentation to OSB, NRC, NAS and Becker et al. paper in press MMS journal	E	O	M
9	**Oyster production vs. harbor seals.** Because Becker presentation & paper falsely assumed that oysters reside in oyster bags on sandbar islands (UEN, OB, UEF) for 18 months, which they do not, he falsely assumed that oyster production in given year should be compared to harbor seal numbers from the previous year, during which time the oysters and seals had the greatest overlap. This was a false assumption. Becker failed to get oyster production information from DBOC. Becker's statistics were based upon this false assumption and thus they are all invalid.	X	X	X
10	**Oyster production vs. harbor seals.** Becker presentation & paper made false conclusions by only comparing oyster production vs. harbor seals for 2002-2004 vs. 2005-2007 and ignoring prior and subsequent year. The relationship is weak at best, and disappears when one compares data from 2000-2008. For 2000-2008, there is no relationship. Data were available to Becker.		X	X
11	**Oyster production vs. harbor seals**. Becker, Press, & Allen had access to harbor seal data going back to 1991 (they published numbers in May 2007), and via Allen's previous employer, Pt. Reyes Bird Observatory, to data back into the 1970's. Becker failed to compare relationship of oyster production vs. harbor seals for past 25 or more years. Data were available to Becker.		X	X
12	**Oyster production vs. harbor seals.** Becker presentation & paper made false conclusions by only comparing oyster production in all of Drakes Estero vs. harbor seals at subsites UEN, OB, and UEF. Failed to examine relationship to other subsites, to Drakes Estero population, and to combined Pt. Reyes National Seashore (PORE) populations. Data were available to Becker.		X	X
13	**Oyster production vs. harbor seals.** Becker presentation & paper made false conclusions by only comparing oyster production in Drakes Estero vs. harbor seals at subsite OB. Sandbar A had higher relationship to oyster production than subsite OB, even though there was no oyster operation at sandbar A. Harbor seal population in Drakes Estero and across Northern California declined from 2004 to 2007 similarly to subsite OB. DBOC had nothing to do with decline.		X	X
14	**Harbor seals at subsite OB.** Becker presentation & paper falsely concluded that as oyster production increased in Drakes Estero, harbor seals at subsite OB decreased. Becker failed to point out that mean number of seals at OB from 1997 to 2007 was 75 and that mean from 2005-2007 was 75. The mean did not change. 2008 mean was 97, higher than the eleven-year mean.		X	X
15	**Harbor seals at subsite OB.** Becker presentation & paper falsely concluded that as oyster production increased in Drakes Estero, harbor seals at subsite OB decreased. Failure to point out that mean number of seals at OB in 2004 was the high point of past 12 years (1997-2008). Statistical relationship was falsely driven by narrow number of years, and decline from high of 183 seals in 2004 back down to 75 seals in 2005, right back to the eleven year mean (1997-2007).		X	X

2

EOM#	Becker presentation to OSB, NRC, NAS and Becker et al. paper in press MMS journal	E	O	M
16	**Harbor seal disturbances.** Becker presentation & paper stated that questionable disturbance data was excluded (i.e., quality assured/quality controlled or QA/QC). In his talk, Becker said he looked at data *"disturbance event by disturbance event"*. However, each of four oyster farm-related disturbances for 2006 & 2007 violated those criteria and should have been excluded.	X		X
17	**Harbor seal oyster-related disturbance event #1.** Becker presentation & paper violated QA/QC by including March 26 '06 event as a valid oyster-related disturbance. In NPS database, it is not listed as oyster-related disturbance, but rather as *"blue-yellow motorboat"*. DBOC does not own such a boat. In "comments", it is listed as *"possibly oyster related"*. Failed to meet QA criteria.	X		X
18	**Harbor seal oyster-related disturbance event #2.** Becker presentation & paper violated QA/QC by including the April 26 '07 event as a valid oyster-related disturbance. This is Allen's Apr 26 Trip Report. Data were not entered onto proper forms. Data were not entered into NPS database in timely fashion. Data is suspicious at best. According to DBOC time cards and payroll records reported to NPS in Sept 2007, the DBOC boat was not operational that day since its engine was being repaired. Moreover, the workers had clocked out and gone home when the key observations occurred. Entry was not in August 13, 2007 QA/QC version of database, but was only entered nine months after the fact into January 16, 2008 database in violation of data management protocols. Edit log does not provide justification for this data entry. Entry into database in January 2008 was several weeks before Becker paper submitted to journal MMS.	X		X
19	**Harbor seal oyster-related disturbance event #3.** Becker presentation & paper violated QA/QC by including April 29 '07 event as a valid oyster-related disturbance. The NPS database contains a disturbance entry for April 29 that is not possible. April 29 was a Sunday. DBOC workers rarely work on Sundays, and this Sunday was no exception. This is validated by DBOC time clock and payroll records. Analysis of tide tables shows that seals were "flushed" when tide was high and islands UEN and OB would have been under water; DBOC workers don't work at such high tides.	X		X
20	**Harbor seal oyster-related disturbance event #4.** Becker presentation & paper violated QA/QC by including May 8, 2007 event as a valid oyster-related disturbance. This was date of Marin Co. Board of Supervisors hearing. Observed claimed same boat flushed seals at three different subsites at precisely the same time. The three islands are over 1 mile apart. This seems unlikely.	X		X
21	**Harbor seal disturbances.** Becker presentation & paper made false conclusion that human disturbances increased at subsite OB in 2007 vs. 2006 because they only referred to number of days of observed disturbance events. Becker failed to disclose that number of observation days during pupping season was 48 in 2007 vs. 24 in 2006. Rate of disturbances actually went down.	X	X	X

3

EOM#	Becker presentation to OSB, NRC, NAS and Becker et al. paper in press MMS journal	E	O	M
22	**Harbor seal disturbances.** Becker presentation & paper focused on human disturbances at only three of eight subsites in Drakes Estero. The most serious disturbance is a seal getting flushed into the water (FW). During pupping season from 2005 to 2007, there were 2,864 FW's recorded in NPS harbor seal database as of August 13, 2007. Park visitors accounted for 38.8% of FW's, aircraft for 25.9%, birds for 16.8%, and predators for 5.7%. The oyster farm, by stringent QA/QC criteria, accounted for none. If we accept controversial April 29, 2007 claimed disturbance, then DBOC accounted for 0.2% or 1/500th of the FW's over three year period 2005-2007. If we include controversial May 8 claimed disturbance, then DBOC accounted for 4.1% of FW's. Interestingly, 96% of recorded FW's attributed to DBOC occurred on day of Marin County hearing. Coincidence or suspicious? Becker and colleagues failed to consider all seal disturbances in Drakes Estero.		X	X
23	**Statistical model.** Becker focused on statistical correlation between oyster production in Drakes Estero and number of seals (in previous year) at subsite OB. Grey Pendleton in presentation to NRC panel made point that *"under a newly developed NOAA harbor seal monitoring protocol in Alaska, Drakes Estero would almost certainly be considered a single monitoring site".* Seals move back and forth between sites. Drakes Estero population should be considered as a whole.	X		X
24	**Becker's conclusions.** *"Analysis objectives. 1. Determine if mariculture-related human disturbance events are changing over time."* Answer: *"yes, increase".* This was an invalid conclusion. Four oyster-related human disturbances (1 in '06; 3 '07) did not meet QA/QC criteria.	X		X
25	**Becker's conclusions.** *"Analysis objectives. 2. Test competing hypotheses (natural and anthropogenic) that may be driving harbor seal counts during the peak pupping season (April 15 - May 15) at sandbars in upper Drakes Estero."* Becker concluded: *"+ENSO and -Oyster harvest explain seal counts very well at OB and UEF, and marginally at UEN."* This was an invalid conclusion. Becker tested a very narrow hypothesis. The oyster harvest correlated with sandbar A (with no oyster operation), the whole of Drakes Estero, and the whole of the northern California seal populations just as well if not better than with subsite OB.		X	X
26	**Becker's conclusions.** *"Conclusions: Counts of adults (-57%) and pups (-54%) significantly declined at OB after 2004, and at UEF after 2005."* This was a misleading conclusion. The decline at OB was between 2004 and 2005, not during the DBOC years 2005-2007.		X	X
27	**Becker's conclusions.** *"Both adult and pup counts (during peak pupping season) at OB declined after ENSO effects tapered off and oyster harvest effects kicked in."* Becker compared 2002-2004 vs. 2005-2007 for adults and pups at OB. Becker claimed cause and effect. This conclusion was invalid. Decline was from 2004-2005. If we include prior years, or 2008, relationship disappears.	X	X	X

4

EOM#	Becker presentation to OSB, NRC, NAS and Becker et al. paper in press MMS journal	E	O	M
28	**A priori hypotheses.** Becker's paper stated: *"Here we present an analysis of the seal population at three of eight subsites in Drakes Estero that were exposed to varying levels of human related disturbances associated with an oyster lease. We tested four a priori hypotheses that could explain trends in seal counts:"* The fourth hypothesis was *"the level of mariculture operations in the estuary as measured by the magnitude of annual oyster harvesting."* But there was no evidence for human-related disturbances at those three subsites. Moreover, they did not test hypothesis #4, but rather examined seals at subsite OB vs. annual oyster harvesting in the previous year, a false assumption. Thus, Becker created a false analysis based on controversial disturbance data, and then used a false assumption to test a different hypothesis than he stated.	X		X
29	**FOIA request for 2007 PRNS Annual Harbor Seal Report denied and Report hidden.** In a June 13, 2007 letter to Dr. Goodman, NPS Regional Director Jon Jarvis said the 2007 PRNS harbor seal data *"...will be prepared as a final annual report by December 2007."* On July 31, 2008, Dr. Goodman sought the 2007 PRNS Harbor Seal Report by a Freedom of Information Act (FOIA) request. On August 25, 2008, NPS Jarvis' office denied the FOIA request, stating: *"the 2007 Harbor Seal Report is undergoing peer review and is, as a result, withheld ..."* However, the 2007 Harbor Seal Report (authored by Truchinski, Flynn, Press, Roberts, and Allen, two of the same authors as the Becker paper)) was dated June 2008 and was already posted on the I&M web site. Dr. Goodman was unable to find that Report because the web site contains an instruction -- manually applied -- that prohibited the 2007 PRNS Harbor Seal Report from being located and retrieved by common search engines such as Google or Yahoo.	X	X	X
30	**Two reports; two different conclusions.** Becker's paper concluded that the harbor seals were down from 2002-2004 vs. 2005-2007 by ~55% subsite OB, and that the oyster operation and resulting disturbances were largely responsible for this decline. As described above, these conclusions were wrong and misleading. In contrast, the 2007 PRNS Harbor Seal Report makes little mention of oyster operation disturbances. The word "oyster" appears only three times in the 40 page Report. The Report (authored by two out of three authors from the Becker paper) states that at Drakes Estero,:*"...most of the disturbances were from human sources and this included hikers, anglers, swimmers, horseback riders, and recreational clammers."* They go on to write: *"In addition, activities associated with the oyster operation in Drakes Estero at times disturbed harbor seals at the upper estero subsites."* No numbers were provided; no conclusions were drawn. The Report concluded that for all of the Marin County: *"the 2007 maximum pup count fell below one standard deviation from the mean maximum pup count from 2000-2007 ..."* and went on to conclude: *"The greatest number of pups was born at Drakes Estero ..."* Thus, the number of pups went down along Marin County from '04 to '07, but Drakes Estero had the greatest number.		X	X

5

EOM#	Becker presentation to OSB, NRC, NAS and Becker et al. paper in press MMS journal	E	O	M
31	**Disturbance datasheets.** In writing about *"data quality standards"*, the 2007 PRNS Harbor Seal Report stated: *"All count and disturbance datasheets completed during harbor seal surveys were entered into a relational Microsoft Access database during the course of the field season."* However, Dr. Allen's Apr 26 (2007) Trip Report was not recorded on the appropriate datasheet, and was not entered into the database during the course of the field season. Nevertheless, it was entered into the database 9 months later and formed a key data entry for Becker's paper.	X	X	X
32	**Rate of disturbance per hour at Drakes Estero.** The 2007 PRNS Harbor Seal Report shows that the rate of disturbance per hour at Drakes Estero was essentially unchanged from 2004-2007, while some other Marin County locations (e.g., Bolinas Lagoon, Point Bonita, Tomales Bay) had significant year-to-year differences. There is nothing remarkable about Drakes Estero in 2007. This is a different view of the 2007 Drakes Estero harbor seal population than provided in the Becker et al. paper which claimed a significant increase in oyster-related disturbances and a resulting decrease in seals.		X	X

NPS Errors (E), Omissions (O), & Misrepresentations (M) concerning impact of DBOC on harbor seals in Drakes Estero by NPS Superintendent (b) (6), (b) (7)(C) and Scientist [redacted] in (i) testimony to Marin County Board of Supervisors on May 8, 2007, and (ii) different versions of NPS Drakes Estero Report (*Drakes Estero: A Sheltered Wilderness Estuary*) on Sept 8 & 11, 2007
as explained by NPS Scientist Benjamin Becker's presentation to Ocean Studies Board (National Research Council, NAS) on Sept 4, 2008 and [redacted] document to press and public on Sept 9, 2008

EOM#	Becker presentation to OSB, NRC on Sept 4, 2008 & [redacted] document on Sept 9, 2008	E	O	M
1	[redacted] **May 8, 2007 testimony.** *"The harm* [from the oyster farm] *is resulting in abandonment of one area where more than 250 seals, including 100 pups two years ago occurred in that spot. This year chronic disturbance and placement of bags on the nursery area has caused an 80% reduction in the seals dropping to around 35 this last Saturday."* On Sept 4 & 9, 2008, NPS Becker and Superintendent [redacted] (verbally and in writing, respectively) claimed Allen cited subsite OB and referred to three years ago (2004 vs. 2007) and meant ~55% decline. NPS database shows [redacted] unambiguously cited sandbar A which contains no oyster operations.	X		X
2	***"Two years ago."*** Superintendent [redacted] May 8 & May 11, 2007 Drakes Estero Report, and [redacted] May 8 testimony, explicitly referred to a single subsite in which seals had declined by 80% in 2007 compared to two years ago (2005). In Becker's Sept 4, 2008 presentation to NRC panel, and [redacted] Sept 9, 2008 NPS document, they claimed [redacted] cited 2004 vs. 2007 and a decline at subsite OB. This was false claim. Moreover, it had nothing to do with DBOC. Decline at OB was from 2004 to 2005, not 2005-2007 (DBOC ownership started in 2005). Mean number of seals at subsite OB from 2005-2007 was at eleven-year mean.	X	X	X
3	***"80% decline."*** [redacted] May 11, 2007 Drakes Estero Report, and [redacted] May 8 testimony, explicitly referred to a single subsite at which seals declined by 80% in 2007 compared to two years ago. In Becker's Sept 4, 2008 presentation to NRC panel, he claimed [redacted] cited subsite OB which had a 55% decline from 2004 (not 2005) to 2007. [redacted] Sept 9, 2008 NPS document claimed [redacted] cited only data up until May 3, 2007, while maximum for year was on May 4, 2007. On September 4, 2008, Becker explicitly told NRC panel that [redacted] cited May 4, 2007 data from subsite OB which was season high. On September 9, 2008, [redacted] told a different story. Both were false. In May 2007, [redacted] cited data from sandbar A, not subsite OB.	X		X

EOM#	Becker presentation to OSB, NRC on Sept 4, 2008 & [redacted] document on Sept 9, 2008	E	O	M
4	***"... around 35 this last Saturday."*** This quote comes from [redacted] May 8, 2007 testimony to the Marin County Board of Supervisors. The last Saturday before the hearing was Saturday May 5. *"around 35"* seals is very close to the maximum number of seals observed that day at sandbar A (33) , and far different from the maximum number of seals obserbed at subsite OB (82). Becker on September 4, 2008, and [redacted] on September 9, 2008, claimed that [redacted] was citing subsite OB in her May 8, 2007 testimony. Both were making false claims. She cited sandbar A.	X		X
5	***"...around 50 total seals including around 25 pups in 2007 ..."*** Superintendent Neubacher's May 8 & May 11, 2007 Drakes Estero Report states: *"One area where 250 seals nursed more than 100 pups two years ago have around 50 total seals including around 25 pups in 2007, an 80% decline."* On Sept 4, 2008 and on Sept 9, 2008, [redacted] and [redacted] (respectively) said NPS had referred to subsite OB in May of 2007. These were false statements. OB had 82 seals on May 4 '07. Neubacher's numbers correspond precisely to sandbar A and not subsite OB.	X		X
6	***"middle sandbars"*** Sierra Club's Gordon Bennett's May 1, 2007 article in the Coastal Post stated: *"In the past, as many as 300-500 seal pups were born annually in the Estero, 100-200 of which use the middle sandbars. Now that oyster operations have expanded and oyster bags are placed in seal nursery areas, baby seal numbers on the middle sandbars have been reduced to about fifty in 2006 and less than 10 pups so far in 2007."* On Sept 4, 2008 and on Sept 9, 2008, [redacted] (respectively) said that NPS had referred to subsite OB in May of 2007. [redacted] made the same claims in May of 2007. Thus we can also conclude that [redacted] were also claiming in Sept 2008 that Bennett had referred to subsite OB in May of 2007. These were false statements. Bennett clearly cited sandbar A. In the Department of Interior Inspector General's report of July 21, 2008, Bennett is quoted as saying that he got this unpublished information from [redacted] Bennett's numbers precisely described sandbar A and not subsite OB. Bennett referred to the *"middle sandbars"*. In slide #4 in Becker's presentation to the NRC panel on Sept 4, 2008, he graphically defined subsites UEF, OB, & UEN as the "*upper*" subsites, subsites DBS, DEM, & L as the "*lower*" subsites, and subsites A & A1 as the "*middle*" subsites. In his verbal presentation, he called sandbars A and A1 the middle sandbars. Bennett cited the middle sandbars. His numbers were precisely middle sandbar A.	X		X

Graeber, Rita

From: Frost, Gavin
Sent: Wednesday, December 01, 2010 5:26 PM
To: Graeber, Rita
Subject: Fw: thoughts about your investigation
Attachments: CSG to Frost.12_01_10.pdf; ATT00001..htm; upconf_2T.jpg; ATT00002..htm; upconf_2L.jpg; ATT00003..htm; upconf_file_icon.jpg; ATT00004..htm; b_view_file_110x31.jpg; ATT00005..htm; upconf_2R.jpg; ATT00006..htm; upconf_2B.jpg; ATT00007..htm; upconf_3B.jpg; ATT00008..htm

Delivered by SOL Blackberry Services

From: Corey Goodman <corey.goodman@me.com>
To: Frost, Gavin
Sent: Wed Dec 01 17:45:16 2010
Subject: thoughts about your investigation

Dear Gavin,

I just returned from a business trip to Japan and leave tomorrow morning for the Galapagos with my wife and friends, back Sunday night December 12. I include here a letter to you that I wrote on the plane. It contains some further thoughts, some questions to consider, and some additional information that might provide you with a broader perspective. I hope you find it useful.

A suggestion: another prestigious scientist who has looked at much of the NPS data and commented on it over the past few years is Dr. Peter Gleick. He is also an elected member of the National Academy of Sciences, a MacArthur Fellow, and founder and President of the Pacific Institute. His Ph.D. advisor was John Holdren, the President's science advisor. Peter is a world-renowned environmentalist and the world water expert who gives the annual water report to the US Congress and to the UN. He is very highly respected around the world. He knows much about this case. He lives in Berkeley, works in Oakland, and can be reached a[(b) (6) redacted]; mobil[(b) (6) redacted]. You would find Dr. Gleick a valuable interview.

I look forward to seeing you on Wednesday December 15.

Best wishes,

Corey

December 1, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Gavin M. Frost, Attorney, Field Solicitor, Department of the Interior, Billings, MT

Dear Gavin,

Thanks very much for taking the time to speak with me last Friday about your pending investigation. I appreciated the clarity and transparency with which you described your process. From what you indicated, your investigation is centered on scientific misconduct with attention largely and appropriately focused on the allegations in my November 22 letter to Secretary Salazar. In the end, you said you would report on facts, conclusions, and recommendations.

The allegations against NPS officials and scientists are very serious and arise from the discovery in the summer of 2010 of NPS secret cameras, photos, and detailed logs. These photos and logs were suppressed, never disclosed to the DOI IG, NAS, MMC, and others, and lead to conclusions that largely contradict those made publicly by NPS officials and scientists over the past three and a half years. The existence of the cameras, photos, and logs should have been disclosed, but were not, and should have led to different conclusions, but did not. This appears to be a violation of a variety of federal rules, regulations, and codes.

The big picture revolves around whether NPS does (as they claim) or does not have conclusive evidence showing that Drakes Bay Oyster Company (DBOC) boats and workers have been disturbing the harbor seals in Drakes Estero for the past three and a half years. Starting back on April 5, 2007, then Superintendent (b) (6), (b) (7)(C) and since multiple other NPS officials and scientists, have claimed that NPS has conclusive data. The NAS and MMC review panels have been skeptical of that claim, and skeptical of the quality and reliability of the data in the volunteer harbor seal monitoring database.

Nevertheless, the issue of DBOC harbor seal disturbances has been perpetuated for three and a half years by repeated NPS claims, coupled with blanket NPS rejections of DBOC electronic time clock and payroll records. Clearly all of this could have been resolved had the NPS photos and logs been made public. Time-and-date stamped photos and logs, as the NAS panel recommended in their May 5, 2009 report and MMC panel members verbally recommended at their meeting in February 2010, would have helped to swiftly resolve this controversy. The NPS officials and scientists had such photos and logs for over two years, but never told the NAS or MMC panels.

The NPS officials and scientists have said over and over again that they have conclusive data. The NPS photos and logs belie the NPS public claims and tell a very different story, one never shared with investigators and reviewers.

Why did so many NPS officials and scientists suppress the key data? The questions are: who knew, when did they know, and why didn't they disclose the existence of the cameras, photos, and logs? On the one hand, who knew about the cameras and photos? The answer to that question is likely to be a list of multiple NPS officials and scientists.

The related question is how many of them knew about the logs and the detailed minute-to-minute analysis of those photos? Who knew of their existence? Who had seen the logs? Who reviewed them? Who wrote in their margins and corrected the descriptions such as the word "SUNDAY" in two places in the margin, the hand-written correction on the logs that one set of Sunday photos was of a bird and not a boat, or notations of which are good photos of disturbances (caused by kayaks, not DBOC boats)?

Who picked the photos for the May 1, 2009 Briefing Statement? Who picked the photos to send to Superintendent (b) (6), (b) (7)(C) How many NPS officials and scientists knew of the logs? How many had copies of the logs? The logs were sent to (b) (6), (b) (7)(C) but clearly others knew of them. How many people knew and remained silent?

From that perspective, the case appears fairly straightforward – a matter of determining who knew about the cameras, photos, and logs, when they knew, and why they didn't disclose them to a variety of investigators and reviewers. I presume tha (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) knew. (b) (6), (b) (7)(C) certainly knew as well. After all, according to NPS emails obtained through the FOIA process (b) (6), (b) (7)(C) wrote the Briefing Statement, and (b) (6), (b) (7)(C) reviewed it. That document cited the photos and cameras. Thus (b) (6), (b) (7)(C) had knowledge of the camera system and photos. It is unclear if he was aware of the detailed logs and analysis.

Did Jarvis know about the cameras, photos, and logs? According to the emails obtained by FOIA, Jarvis received the Briefing Statement. Did he read it? Did he look at the photos in it? Had he already known about the cameras or photos, or was he surprised when he saw them in the Briefing Statement? Did he ask anyone about it? How abou (b) (6), (b) (7)(C) Del Osso, Turnbull, or Wenk? Was each official and scientist who knew acting alone in failing to disclose? Or did they discuss their decision and act as a group?

Did NPS disclose the existence of the cameras, photos, or logs to anyone outside of NPS? For example, did the volunteers involved in the harbor seal monitoring program know about the cameras and photos? Moreover, historically, NPS has often provided certain local environmental supporters (e.g., Gordon Bennett of the Sierra Club West Group Marin, just to name one) with information that has not been publicly disclosed. Did they tell any of these local groups or others about the cameras, photos, or logs?

Did any of the NPS officials or scientists object to the secrecy and think the photos and logs should be disclosed? Did any of them say to the others that they really needed to disclose the photos and logs, but get vetoed? Who called the shots?

Finally, given the conclusions from the detailed logs (i.e., no bona fide major

disturbances of the seals by DBOC boats and workers, with the occasional disturbances coming from kayakers), why did NPS officials and scientists continue to tell various investigations, reviews, elected officials, press, and public just the opposite – that they had data showing DBOC harming the harbor seals? Which of these NPS officials and scientists knew the truth from the photos and logs, and yet said the opposite publicly?

The November 24 letter from Chris Lehnertz to me, copied to you, describes the camera system *"...as part of the harbor seal monitoring program."* That was the first time anyone at NPS has publicly made such a statement using those words. Up until that email, we have been told that the cameras had nothing to do with the harbor seal monitoring program, but were simply to observe wildlife. This would, I imagine, enlarge the number of people who presumably were not told – and should have been – to include the leaders of the monitoring program at Fort Collins.

If the photos were part of the harbor seal monitoring program, then why did (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) all deny that on June 7, 2010 at the MMC meeting with Tim Ragen when I asked them and they all said the photos had nothing to do with the harbor seal monitoring program? Several of them bristled at my suggestion that the photos should have been included in their assessment of harbor seal disturbances. Thus, Lehnertz is the first NPS official to publicly say what I believe to be the truth, namely that the cameras were for monitoring disturbances of seals and thus were part of the harbor seal monitoring program – a very important disclosure.

Did someone from above – such as (b) (6), (b) (7)(C) or Jarvis -- give the staff orders not to disclose the photos and logs? When (b) (6), (b) (7)(C) others?) appeared at the NAS panel meeting on September 4, 2008, did they know of the cameras? When (b) (6), (b) (7)(C) (others?) appeared at the MMC panel meeting in February 2010, did they know? What knowledge did (b) (6), (b) (7)(C) have? How high and broad did the knowledge go, and who made the decisions? Was someone calling the shots from Point Reyes, Oakland, or Washington?

While the case seems simple, there are further layers of details and complexity and historical perspective that provide richness, in some cases provides further clarity, and also shows how broad were the implications of the misconduct. After all, if it was not for the Jarvis nomination to be NPS Director, we might not have the May 1, 2009 Briefing Statement, and in all likelihood, we might have no idea about the cameras, photos, and logs and there would be no investigation. The Briefing Statement was never shared with NAS or me – according to NPS documents obtained via FOIA, it went straight to Jarvis and possibly then others in Washington.

Who submitted the Briefing Statement to Jarvis? Did it come from Oakland or Point Reyes? Was it only sent to Jarvis or was it sent to others in Washington? Did Jarvis distribute it more broadly? Was it sent to members of the Senate Energy Committee? Was it given to members of the Senate or House, or their staff? The Briefing Statement contained false citations to photos in an attempt to blunt the criticism of the NPS scientific claims. How broadly did NPS distribute this document containing false science?

The authors of the Briefing Statement (b) (6), (b) (7)(C) possibly under the guidance of (b) (6), (b) (7)(C) thought it necessary to disclose a few photos and the very existence of one camera in order to blunt certain criticisms that had been sent to Salazar from me, either directly or via the NAS. Without that decision to put citations concerning a few photos, a few actual photos, and an appendix describing one camera, in that document, we would not be here today. And of course, that document was shown to folks in Washington who presumably did not appreciate the implications, but it was not shared with me, Lunny, or panel members from the NAS or MMC in a transparent fashion. Moreover, the cameras had gone up two years earlier, and the 2008 log had long since been in hand, before the Briefing Statement was written.

Until June 6, 2010, no one outside NPS understood the implications of the cameras and photos. I hope you agree that putting the document on the MMC web site nearly three years after the camera program started as document #110 out of 153, with no sense in its title of what was in its appendix, does not constitute appropriate and timely public disclosure. The proof of that lack of disclosure was the surprised look on Tim Ragen's face when, at his meeting, I asked NPS officials and scientists about the camera (the document only disclosed one) and photos on June 7, 2010. Ragen knew nothing about the camera program and was as surprised as I had been the day before.

From my perspective, the story of misconduct began on April 5, 2007. On that day, Superintender (b) (6), (b) (7)(C) told Marin County Supervisor Steve Kinsey that he had overwhelming data of harm to the harbor seals by DBOC. We now know that he had no such data. The first data emerged under suspicious circumstances several weeks later -- during the two weeks leading up to the Marin County Board of Supervisors hearing on May 8, 2007. Certainly, the veracity of the disturbance records in the two weeks before the hearing are in question and easily disputed by verifiable DBOC electronic records.

Let's briefly look at events that took place in 2009, during which time the name of Jon Jarvis was initially floated by Salazar (April 2009), ultimately nominated by the President (July 2009), and finally confirmed by the Senate (September 2009) as the next Director of NPS. All of this happened with the black cloud of allegations of scientific misconduct hanging over Jarvis' head (see the end of my CCST talk for a brief history of how NPS and DOI responded to allegations of scientific misconduct).

How did NPS and DOI maneuver around these allegations without ever properly investigating them? They certainly never interviewed me, the person who brought the allegations forward. How did they blunt the message and discredit the messenger? I only got a glimpse of the answers to those questions one year later when two key documents surfaced, one of which (the May 1, 2009 Briefing Statement) led to my discovery of the secret cameras, photos, and detailed logs, and thus ultimately became the trigger for your investigation. The other was a key email on May 19, 2009 from Prof. Charles "Pete" Peterson, the chair of the NAS panel on Drakes Estero, to Jon Jarvis.

The key documents used by NPS to blunt my criticisms in spring of 2009 were never shared with me. I was in the dark. Regardless of all of the documents I sent to Salazar and his team, no one contacted me (except for one brief "how is the weather out there?" phone call to check off the box). One year later, on January 21 and June 6, 2010,

respectively, I became aware of two key documents. Perhaps there are more.

(1) On January 21, 2010, I read an editorial in *The West Marin Citizen*, one of two local West Marin newspapers, which included quotes from a May 19, 2009 email from Dr. Charles "Pete" Peterson, the chair of the NAS panel (that had distributed their final report on May 5, 2009) to Jon Jarvis saying that "... *those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong.*"

Peterson's comment was surprising and stunning. I have included in the appendix Peterson's email and other relevant emails and documents surrounding his email to Jarvis. The timing of the leak of Peterson's email eight months later was non-random, since I was scheduled in a few weeks to make a presentation to the Marine Mammal Commission panel on February 21, and the leaked email (which originated from NPS scientis[redacted] (b) (6), (b) (7)(C)) was clearly published as a way of discrediting me before I testified. That email, and further emails obtained by FOIA, lead to some interesting insights into what was happening behind the scenes.

Jarvis sent Peterson's email straight up to Will Shafroth and Tom Strickland (see appendix 1). To whom did they send it? How widely was it distributed to blunt the allegations of scientific misconduct and assure the successful nomination and confirmation of Jarvis with no investigation? Interior has repeatedly refused to provide emails and documents requested last April by FOIA (see appendix 2).

(2) On June 6, 2010, in preparation for my meeting the next day to discuss DBOC harbor seal disturbances with Marine Mammal Commission Executive Director Tim Ragen along with NPS officials and scientists and Kevin Lunny, I read a document that had been emailed to me several days earlier by a colleague in Washington. That document, the anonymous May 1, 2009 Briefing Statement, was written to refute the January 18, 2009 document I had given the NAS panel (and that they had sent up to Secretary Salazar on February 3, 2009) alleging that the Sunday April 29, 2007 harbor seal disturbance could not possibly have taken place as described based upon DBOC payroll and time clock records for that day and historical records.

Most of the 33-page Briefing Statement is irrelevant, but there is one key paragraph that NPS used to blunt my criticism (page 3, titled "*Assumption that DBOC does not operate on Sundays*") when they claimed to have date and time-stamped photographs of a DBOC boat on the estero on a particular Sunday. No photos of the DBOC boat were shown in the document. On page 12 of the document (page 2 of appendix A) I read with amazement about a remote camera taking pictures of Drakes Estero every minute of every day from dawn to dusk: "*The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM.*" I eventually received digital copies of those photographs and discovered that they are not of a DBOC motor boat, but rather are of two UFO's (unidentified floating objects), most likely kayaks but possibly canoes. Thus, a false citation of the NPS photos was sent to Washington to blunt my allegations.

NPS is not the only agency that suppresses key data or documents. Interior has suppressed documents that should have been provided by FOIA. Interior still has not

answered my FOIA request of April 30, 2010. As you will see in appendix 1, the May 19, 2009 email from Pete Peterson to Jon Jarvis was quickly sent to Will Shafroth and Tom Strickland in Salazar's office. My FOIA request was a simple one – I asked for emails from Shafroth and Strickland to others further distributing Peterson's email. I have never been sent a response. I have called and emailed many times. I was told by phone in July that a response would be forthcoming shortly. I even emailed the FOIA officer in the Secretary's office and copied John Dupuy from the IG's office, hoping that might encourage a response, but only silence. Below in appendix 2 you can see the history. Clearly, when Interior doesn't want information made public, they stonewall FOIA requests. This runs contrary to rules, regulations, and codes, and runs contrary to President Obama's directives to his administration on transparency. It would be enlightening to find out what happened to Peterson's email, and what they wrote about it. I infer that there is something they want to hide.

I look forward to seeing you on December 15th. My wife may have changed the gate code by then, and if she does, I'll email you a new code so that you can get in.

Best wishes,

Corey

Corey S. Goodman, Ph.D
corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Enclosure:

APPENDIX 1: Dr. Charles "Pete" Peterson's May 19, 2009 email to Jon Jarvis and other related emails obtained through the FOIA process.

APPENDIX 2: Emails concern lack of responsiveness to Mr. Ray McInerney, DOI Office of the Secretary FOIA officer

APPENDIX 3: (separate PDF sent by "yousendit") Brief history of how NPS and DOI has handled scientific misconduct charges

APPENDIX 1: Dr. Charles "Pete" Peterson's May 19, 2009 email to Jon Jarvis and other related emails obtained through the FOIA process.

1) January 9, 2009: Dr. Charles "Pete" Peterson, Chair of the Ocean Studies Board (OSB) (National Research Council, part of the National Academy of Sciences) panel investigating Drakes Bay Oyster Farm (DBOC) at Drakes Estero (Professor, University of North Carolina), emailed Drs. Paul Thompson (panel member, Professor, Univ. of Aberdeen) and Dr. Susan Roberts (Director, OSB) concerning their proposal to delete the word "misrepresentation" from the draft report. Peterson wrote:

> *"I understand this issue about the implication of the word misrepresentation. I agree that it implies intent.* ***I personally have no doubt that there was intent,*** *based upon the directional bias of the putative impacts of the oyster farm reported by NPS. However, I would agree that it may not serve our charge or the good of the process to be so judgmental."* [emphasis added]

"Intentional misrepresentation" forms the basis of the federal definition of scientific misconduct. Peterson's words on January 9 (in which he believed there was intent by NPS to misrepresent data) are in contrast with what he wrote to Jarvis on May 19 when he cleared NPS of scientific misconduct (#15 below).

2) January 18, 2009: Dr. Corey Goodman, NAS member, submitted a 28-page report to Roberts and Peterson alleging that NPS committed scientific misconduct in the documents and presentations NPS gave to the NRC/NAS panel (available upon request). Goodman alleged a pattern of intentional misrepresentations.

3) February 3, 2009: Dr. Roberts sent a letter to Interior Secretary Salazar, forwarding Goodman's case for scientific misconduct and another letter claiming misconduct by DBOC owner Kevin Lunny. Neither Goodman nor Lunny ever heard from Salazar or anyone in his office about these serious allegations.

> *Dear Secretary Salazar-*
> *We recently received the attached letters as part of the National Research Council study on Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drake's Estero, Point Reyes National Seashore, California, which is being carried out for the National Park Service. The National Research Council is not in a position to evaluate the charges contained in this letter. We are therefore forwarding it to you as the cabinet officer responsible for the Park Service for such action as you think appropriate.*
> *Sincerely,*
> *Susan Roberts, Ph.D.*
> *Director*
> *Ocean Studies Board*

4) March 19, 2009: William Colglazier (Executive Officer, NAS) issued a press release concerning the Drakes Estero panel report that stated:

> *"This study was never intended to be an inquiry of potential scientific misconduct, and will make no such determination."*

When the NRC panel report on Drakes Estero was issued on May 5, 2009, Peterson and Roberts made clear in press interviews: they had not studied scientific misconduct and thus would not comment on it.

5) April 27, 2009: Goodman sent Secretary Salazar a letter describing part of the case for scientific misconduct against then West Regional Director Jon Jarvis and opposing his pending nomination as NPS Director (available upon request).

6) May 5, 2009: The NRC/NAS released the NRC report on Drakes Estero. The report came about as close as it could to the definition of scientific misconduct without actually saying "scientific misconduct" when they wrote that the National Park Service *"selectively presented, over-interpreted, or misrepresented the available scientific"* data. They wrote:

> *... The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects."*

7) May 5 and 6, 2009: In his press release and subsequent press interviews, Jarvis made a series of misleading public statements.

In his May 5 press release, Jarvis wrote: *"We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report."* The most recent public version of the Drakes Estero report was on May 11, 2007, and that was the version that the NRC panel had criticized as misrepresenting the scientific data.

Jarvis told the San Francisco Chronicle: *"They didn't say our research was wrong. They just said it was incomplete."* To the Marin Independent Journal he said: *"We agree with some conclusions, disagree with some and say we need more research, too."* To the Point Reyes Light he said: *"There was some overreaching."*

8) On or about May 8, 2009: Dr. John Holdren, President Obama's science advisor and Director of the Office of Science and Technology Policy, had a phone conversation with Peterson. On February 1, 2010, Holdren emailed Goodman concerning his recollection of that conversation when he wrote:

> ***"My recollection of my one brief phone conversation with Pete Peterson is that he said his committee didn't address the question of whether there was misconduct."***

That is of course quite different from what Peterson told Jarvis by email (#15 below), but consistent with what Peterson told Goodman when questioned about his phone call with Holdren (#22 below). What Peterson told Goodman was completely consistent with what Holdren told Goodman. The inconsistent story is what Peterson told Jarvis in his May 19, 2009 email.

9) May 10, 2009: Goodman sent Secretary Salazar a second letter describing further details of the case for scientific misconduct against Jarvis, focusing in particular on Jarvis' response to the NRC/NAS report on May 5 (available upon request).

10) May 14, 2009: Holdren asked Goodman to send him the specific case for scientific misconduct against Jarvis.

11) May 16, 2009: Two days later, Goodman emailed Holdren a 21-point case for scientific misconduct against Jarvis (11 pages; available upon request). This report is detailed, factual, and identifies which rules, regulations, and laws appeared to have been violated.

12) May 17, 2009: Jarvis sent his reply to Goodman's case to Secretary Salazar on the 17th. Salazar then forwarded Jarvis' reply to Holdren. Holdren then sent the Jarvis response to Goodman and asked for his analysis. Jarvis responded to only seven of Goodman's 21-points, and most of those rebuttals were either straw-man arguments or were directly contradicted by his own testimony to the Inspector General. Goodman asked Holdren how much detail he wanted. He answered:

> *"I think if he's demonstrably not telling the truth in one or two more instances that would be very important. He's already on thin ice for his characterizations of the NAS findings, although some of those are quotes that he can say are not accurate even though the reporters insist they are."*

13) May 18, 2009: Jon Jarvis must have realized how strong was Goodman's 21-point case against him, and how weak was his 7-point reply he sent the day before to Salazar. It was only a matter of time before his reply would be scrutinized. Jarvis emailed to Roberts, copying (b) (6), (b) (7)(C) citing the 21-point case from Goodman to Salazar accusing Jarvis of scientific misconduct, told her that his nomination as NPS Director "hangs in the balance", and asked Roberts to provide Peterson with this information so that Peterson could convey "the panel's position to Dr. John Holdren and Assistant Secretary Tom Strickland regarding their findings." The key is that Jarvis asked Peterson to represent the panel's position. Thus, Jarvis asked Roberts to ask Peterson, as representing the NRC panel, to come to his rescue by telling Holdren and Strickland that Jarvis did not commit scientific misconduct.

From: *Jon Jarvis*
To: *Susan Roberts*
Bcc: (b) (6), (b) (7)(C)
Sent: *May 18, 2009 9:06 AM PST*
Subject: *Goodman*

Dr. Roberts:
Below you will find two versions of a letter from Corey Goodman to the Secretary of Interior, sent through the Assistant Secretary/Chief of Staff Tom Strickland accusing me of Scientific Misconduct in the Drakes Estero issue. ***This is very serious as my nomination to the Directorship of the NPS hangs in the balance. I would appreciate your providing this information to Dr. Pete Peterson for conveying of the panel's position to Dr. John Holdren and Assistant Secretary Tom Strickland***

regarding their findings. *As a particular example of Goodman's incorrect views, note number #18 as how he characterizes the research and publication by* (b) (6), (b) (7)(C) *Thank you.*
Jonathan B. Jarvis [emphasis added]

14) May 19, 2009: Goodman emailed Holdren with a written critique of Jarvis' reply to Goodman's 21-point case for scientific misconduct, pointing out in graphic form how Jarvis had not responded to 14 of the 21 points. Moreover, Jarvis' rebuttal to 7 points was very weak and easy to dismiss as largely irrelevant answers. Jarvis had no defense of Goodman's 21-point case. Holdren replied:

"Corey-- Thanks for this further input. I am sharing it with Senator Feinstein's staff people who are continuing to look at the matter. I think that it would be preferable for you to re-address your response to me, since I was the one who asked for your responses to the points made by Mr Jarvis. I will then also share it with Secretary Salazar and his chief of staff Tom Strickland, making clear that I was the one who supplied you with Jarvis's points and asked for your responses. Best,
John"

15) May 19, 2009, 7:27 AM PST: Dr. Peterson wrote an email on the morning of the 19th to Jon Jarvis that fulfilled the request Jarvis had made of Roberts just the day before. Jarvis certainly distributed it widely over the coming hours. Peterson wrote:

"Dear Jon-
I wanted to thank you for your honest reactions to our NRC report and wish you well personally. I spoke at length to John Holdren expressing my own support of your candidacy for NPS Head based on the professionalism and strong commitment to science that you have demonstrated in various ways that have become evident to me. I also expressed my opinion that those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."

I write, however, for an entirely different reason. I am presently engaged in preparing a draft space-based management plan for North Carolina that identifies the best (and worst) sites for locating wind farms over water (Pamlico and Albemarle Sounds and the coastal ocean out to 30 m water depth). An important NPS issue arises in this process. How would unacceptable negative visual impacts be defined for National Seashores? For Cape Hatteras and Cape Lookout National Seashores, this involves both ocean and sound vistas, for which the answer may differ. I wondered if you might be able to direct me to an appropriate person in the Park Service who could begin to answer that question.
Thanks sincerely,
Pete Peterson [emphasis added]

In his first paragraph, Peterson thanked Jarvis for his honest reactions to the NRC report. That statement seems inconsistent with the twisted and convoluted press release and interviews Jarvis gave after the NRC report was released (#7 above).

Peterson next told Jarvis that he had told Holdren that he supported Jarvis' candidacy for NPS Director. Finally, he told Jarvis that he had told Holdren that the claims of scientific misconduct against NPS "are simply wrong."

That statement is inconsistent with what Peterson wrote to his fellow panel members on January 9, 2009 (#1 above), inconsistent with the charge to the panel (#4 above), and inconsistent with the panel's findings (#6 above). However, most people throughout the government and the community interpreted Peterson's comments as if he was speaking on behalf of the NRC/NAS as Chair of the panel that had just released its investigation of these issues. He was not. But that is why Jarvis made the request the day before – he wanted Peterson to represent the "panel's position" and he got what he wanted.

In his second paragraph, having given Jarvis what he wanted (i.e., "clearing" him of scientific misconduct), Peterson immediately went on to ask Jarvis for his help with a proposed wind farm project in North Carolina that required NPS support since it might have negative impacts on two national seashores. Was this a conflict of interest? This certainly has the appearance of a conflict of interest, and looks like it violates the NAS policy. Peterson did Jarvis a favor in paragraph one (including misrepresenting what he told Holdren), and then he asked for a favor in return in paragraph two. This seems pretty straight forward as meeting the appearance of a conflict.

In his email, Peterson personally cleared Jarvis of charges of scientific misconduct, even though he told the White House just days earlier (#8 above) that he had never reviewed such charges and was unqualified to make a determination of scientific misconduct. When on January 25, 2010, Goodman questioned him about this topic (#22 below), Peterson answered that he did not know the federal laws about scientific misconduct, that he had never read Goodman's 21-point case for scientific misconduct, and that neither he nor his panel had ever investigated scientific misconduct. Moreover, Peterson admitted that he had indeed been asked because he was Chair of the panel. When asked if he was contacted because he was Chair, he answered: *"That's why I had been contacted."* When asked by Goodman if the January 21, 2010 article in the *West Marin Citizen* (#22 below) had correctly quoted him as chair of the committee as having said that the allegations of misconduct against NPS "are simply wrong", Peterson answered: *"I didn't, and I don't – that is something that lies outside the purview of my committee and is not something that we did or I did."* At the time Goodman interviewed Peterson, he had apparently forgotten about the details of what he wrote in his email to Jarvis. Once that email was sent to him, he would no longer answer Goodman's calls or emails.

16) May 19, 2009, 8:03 AM PST: Thirty-six minutes after Peterson hit the "send" button, Jon Jarvis forwarded Peterson's email to Will Shafroth (Deputy Assistant Secretary) and Tom Strickland (Assistant Secretary) in Salazar's office with the following cover note:

> ***"See note below. Dr. Peterson chaired the panel of the National Academy of Sciences which studied the Drakes Estero oyster issue and presented the results to all parties. I hope this puts the issue behind us. I will follow up with his other request."***

Jarvis knew the implications of Peterson's email, and immediately sent it to Shafroth and Strickland, saying that he hoped this put the issue – namely the dark cloud of scientific misconduct hanging over his head – behind him.

17) May 19, 2009, 8:45 AM PST: Jarvis next replied to Peterson and copied Bert Frost (NPS Associate Director for Natural Resources), thanking Peterson for the call to Holdren, and asking Bert Frost to follow up on Peterson's wind farm request.

18) May 19, 2009, 8:54 AM PST: Jarvis forwarded Peterson's note to (b) (6), (b) (7)(C) (PRNS Superintendent and also charged with scientific misconduct concerning Drakes Estero), George Tunbull, and (b) (6), (b) (7)(C) with the following cover note:

> *"Good note from Peterson."*

19) May 19, 2009, 3:18 PM PST: Jarvis forwarded Peterson's note to Craig Obey (Senior Vice President, NPCA), a stronger support of the Jarvis nomination, and wrote: *"See below. Peterson chaired the NAS panel."*

Obey replied one hour later: ***"Terrific! That should send a pretty strong message."***

20) May 21, 2009: Carol McCoy (NPS Branch Chief, Denver), wrote to Peterson, and copied Bert Frost, following up in a very positive fashion about the North Carolina wind farm study and location options, started by saying *"attached is the contact information I promised you"*, and concluded by writing *"I am looking forward to working with you."* This email begins a favorable interaction of NPS with Peterson's wind farm project in North Carolina.

21) January 21, 2010: In the run up to the Marine Mammal Commission panel hearing in February, someone leaked Peterson's email to the *West Marin Citizen*, a local newspaper in the West Marin community. The leaked version came from NPS scientist (b) (6), (b) (7)(C) who had received it from Superintendent (b) (6), (b) (7)(C) On January 21, 2010, the *Citizen* published part of Peterson's May 19, 2009 email to Jarvis – quotes from the first paragraph but no mention of the "ask" in the second paragraph. Editor Jim Kravets wrote:

> *"… Goodman repeatedly pursued misconduct charges against then director of the Park Service Pacific West Region, John Jarvis, but the allegations so far haven't stuck. Jarvis's confirmation as Park Service director was even bolstered by Pete Peterson, chairman of the National Academy of Sciences panel in charge of reviewing the park's science relating to Drakes Bay Oyster Company. Writing in a May 2009 email, Peterson tells Jarvis that he expressed support for Jarvis' candidacy for NPS Head to John Holden, director of the White House Office of Science and Technology Policy and Obama's top science adviser, "based on your professionalism and strong commitment to science that you have demonstrated." Peterson said he also told Holden that in his opinion, "those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."*

22) January 25, 2010: Goodman got a copy of Peterson's email from the *Citizen* over the weekend. Monday morning, he telephoned Pete Peterson at work (8:10 AM PT) and took extensive notes of their conversation. Here are excerpts of what Peterson said to Goodman in that lengthy conversation: [emphasis added]

Goodman	*Last Thursday an article came out in the West Marin Citizen that contains quotes in two emails, one that you wrote to Jon Jarvis last May and one to John Holdren last May.*

Peterson *I did contact both of them, but not sure what kind of FOIA had released those letters to the newspaper.*

Goodman *I was quite surprised by your quotes in this article. I would like to see if you're quoted correctly here. Your emails were released and were quoted as criticizing me and what I was doing. For transparency…*

Peterson *I don't understand how it criticizes you…*

Goodman ***It quotes you as concluding: "those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong"***

Peterson ***I don't think I said that.***

Goodman *Did you just send your emails to Jarvis and Holdren, or did you provide them to others?*

Peterson *I don't know how the newspaper got them. You're backing me into history and challenging my recollection [chuckle]… let me think…. I copied no one, absolutely no one. If I'm responding to someone, I don't send it to the world. After our committee delivered the Drakes Estero report to the sponsor, NPS and I was in DC to do that service for the Academy and for the committee members, I was then contacted by Holdren and he asked if I would give him my impressions of Mr. Jarvis in that he was being considered for an appointment in the Obama administration. I think I responded to that by an email. How did Jarvis get into this… [pause]… at some point, and I can't remember now the circumstance, but at some point Mr. Jarvis contacted me as well and I can't recall the circumstances, and its possible that he asked me to send him the same thing, that is to say, my feelings about what the committee had concluded relative to his role and to aspects of what we put in our report. But I can't, I'm not being evasive here, but I can't remember the circumstances whereby…*

Goodman *You can see why it'd be nice for me to be able to fact check what you were quoted as, quoting you as chair of the committee that all allegations of misconduct against NPS are simply wrong.* ***I've got to ask you, by what criteria did you dismiss all of the allegations of misconduct? Did you go through all the documents and data I submitted? Scientific misconduct has legal definitions, rules, regulations, and public law…***

Peterson ***I didn't, and I don't – that is something that lies outside the purview of my committee, and is not something that we did or I did.***

Goodman *What did you tell John Holdren about Jon Jarvis and the issue of misconduct?*

Peterson *I told him that misconduct was outside the purview of our committee, and that we did not look at it and did not come to any conclusion concerning misconduct. Instead, I gave my personal impressions of Mr. Jarvis from my limited interactions with him.*

Goodman	*When you were approached by Holdren or Jarvis, did they ever give you the 21-point misconduct case I sent to Salazar?*
Peterson	*My scope of info about Mr Jarvis was quite limited and I said that to both Holdren and Jarvis. That didn't include anything in the way of any complete analysis of misconduct, or Drakes Estero - just my minimal interactions with Jarvis as a committee member.*
Goodman	*When you sent those emails to Jarvis and Holdren, did the Academy know?*
Peterson	*The Academy knew I was being contacted by Holdren about Jarvis on this issue.*
Goodman	*Did they know you emailed to Jarvis?*
Peterson	*I don't know, but they knew I was in contact with Holdren.*
Goodman	*Do you believe they ever saw what you sent to Holdren?*
Peterson	*I doubt it. I had been asked relative to myself as an individual, not relative to the panel…*
Goodman	***You only knew these things as the chair of the panel though.***
Peterson	***That's why I had been contacted.***
Goodman	*Thank you. I think you'll see when you see this article why I was taken aback – you'll see how your words have been used.*
Peterson	***I might misspeak, but I don't think I would miswrite. I don't think I would've written it this way.*** *You've piqued my interest.*

In summary, Peterson was consistent with how Holdren described their conversation, and consistent with how the NRC/NAS, including Roberts and Peterson, described the panel's findings to the public. However, he completely contradicted his May 19, 2009 email to Jarvis. He did not have the email in front of him, and he apparently could not remember what he wrote. Caught off guard, he denied ever having cleared Jarvis of scientific misconduct. When asked if he did in fact comment on scientific misconduct, he responded: *"I didn't, and I don't – that is something that lies outside the purview of my committee, and is not something that we did or I did."* When asked about what he might have written, he said: *"I might misspeak, but I don't think I would miswrite. I don't think I would've written it this way."* But he did.

APPENDIX 2: Emails concern lack of responsiveness to Mr. Ray McInerney, DOI Office of the Secretary FOIA officer

From: corey.goodman@me.com
Subject: Fwd: update concerning FOIA request -- OS-2010-00253
Date: October 9, 2010 3:21:06 PM PDT
To: osfoia@nbc.gov
Cc: john_dupuy@doioig.gov

Dear Mr. McInerney,

I am puzzled.

I submitted a FOIA request to you on April 30, 2010.

After the normal time period had elapsed, I sent subsequent email notes to you, and you never responded.

I reached you on the phone on July 28, and asked about my 3-month old FOIA request, and you said it was now in process, and I would get the material "shortly". You agreed that my request did not look "voluminous" (your word).

Yet nothing has arrived. On August 30, I wrote to you again (see below), and once again you did not answer.

It is now October 9, over 5 months since I submitted my FOIA request. I have copied this note to the IG office. Perhaps they can encourage you to provide me with an update on my request, and a timely response. Your lack of responsiveness does not appear to be consistent with the President's directives on FOIA transparency.

I look forward to hearing from you, and receiving the requested materials ASAP.

Thank you.

Corey Goodman
corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: August 30, 2010 11:59:27 AM PDT
To: osfoia@nbc.gov
Subject: Re: update concerning FOIA request

Dear Mr. McInerney,

We spoke on the phone over one month ago. I made my request for some emails in April. When will I be getting these materials?
Thanks very much.

Corey Goodman

On Jul 22, 2010, at 6:04 AM, Corey Goodman wrote:
Dear Ray McInerney,

It is now July 22 and you have not responded to my FOIA request of April 30. My request was made 59 working days ago (nearly three months ago). Please let me know when and how you will respond to my request for these documents. You have also failed to respond to my notes from June 5 and June 25 asking about my April 30 FOIA.
Thanks very much.

Corey Goodman

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: June 25, 2010 7:15:47 AM PDT
To: osfoia@nbc.gov
Subject: Fwd: update concerning FOIA request

Dear Mr. McInerney,
It is now June 25 and you have not responded to my FOIA of April 30. Please let me know when and how you will respond to my request for these documents.
Thanks very much.
Corey Goodman

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: June 5, 2010 3:23:10 PM PDT
To: osfoia@nbc.gov
Subject: update concerning FOIA request

Dear Mr. McInerney,
I was hoping to get an update from you as to when I will be receiving the emails and other documents requested below on April 30, 2010. Thanks very much.
Corey Goodman

corey.goodman@me.com
415 663-9495
PO Box 803, Marshall, CA 94940

April 30, 2010

To: Ray McInerney, FOIA Officer, Department of Interior Office of the Secretary, osfoia@nbc.gov

From: Dr. Corey Goodman, corey.goodman@me.com

Re: FOIA request for emails and other documents, letters, and reports

Dear FOIA Officer McInerney,

Pursuant to Title 5 of US Code Section 552, I am requesting the following report, emails and documents.

1) All emails and other documents, letters, and reports **to or from Will Shafroth** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

2) All emails and other documents, letters, and reports **to or from Thomas (Tom) Strickland** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

3) All emails and other documents, letters, and reports **to or from Kit Batten** between

May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

Thank you very much. Please don't hesitate to contact me if you want any additional information pertaining to this request.

Sincerely yours,

[signature on file]

Dr. Corey S. Goodman

Email: corey.goodman@me.com

Mailing address: PO Box 803, Marshall, CA 94940

Phone: 415 663-9495

Mobile phone: 650 922-1431

Appendix 3: please download the five page PDF from the following yousendit link.

United States Department of the Interior

OFFICE OF THE SOLICITOR
316 N. 26th Street, Room 3005
Billings, Montana 59107-1394
Telephone (406) 247-7583
Telefax (406) 247-7587

FAX COVER SHEET

FACSIMILE TRANSMITTED TO: 510-419-0193

To: Lavin Frost

From: Rita

Client/Matter:

Date: 12/1/10

Number of Pages: - 6 - (*including cover sheet*)

DOCUMENTS			NUMBER OF PAGES

COMMENTS:

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2007-2010: allegations of scientific misconduct have not been investigated for 3 ½ years by NPS, Interior, or IG

- July 21, 2007: case for scientific misconduct submitted to NPS Regional Director Jon Jarvis and Interior Solicitor Molly Ross
  - NPS never responded
- November 11, 2007: case for scientific misconduct submitted to DOI Inspector General
  - IG responded that they did not have scientists, could not consider scientific misconduct, hoped NRC/NAS would do so
  - IG Report: *"We did not, however, analyze the science involved"*
- December 18, 2007: 72-page case for scientific misconduct, cover-up, and failure to investigate, submitted to NPS Director Mary Bomar
  - NPS never responded
- December 18, 2007: at request of NRC, same case submitted to NRC/NAS
  - NRC/NAS responded that their panel would not comment on scientific misconduct, was outside the scope of their study
  - NAS Report: *"This study was never intended to be an inquiry of potential scientific misconduct, and will make no such determination."*

12/01/2010 16:43 4062477587 SOLICITORS OFFICE PAGE 02/05
12/01/2010 WED 16:47 [TX/RX NO 8745] 002

2007-2010: allegations of scientific misconduct have not been investigated for 3 ½ years by NPS, Interior, or IG

- January 18, 2009: 28-page case for scientific misconduct submitted to NRC/NAS panel alleging NPS committed misconduct in documents and presentations NPS gave to NRC/NAS
  - February 3, 2009: NRC forwarded letter to Interior Secretary Salazar
  - Salazar never responded
  - May 1, 2009: anonymous Briefing Statement "NPS Response to Goodman's January 18, 2009 Letter to NRC", provided to NPS Regional Director Jon Jarvis; neither provided to Goodman nor NRC
- April 27 & May 10, 2009: letters alleging scientific misconduct by NPS Regional Director Jon Jarvis submitted to DOI Secretary Ken Salazar
  - Salazar never responded

12/01/2010 16:43 4052477587 SOLICITORS OFFICE PAGE 03/06
12/01/2010 WED 16:47 [TX/RX NO 8745] 003
00033002 SOL-BIL-B01-00001-000005 Page 24 of 27

2007-2010: allegations of scientific misconduct have not been investigated for 3 ½ years by NPS, Interior, or IG

- May 14, 2009: White House Science Advisor John Holdren asked Goodman to send him detailed case of scientific misconduct against Regional Director Jon Jarvis (who was being considered for NPS Director)
- May 16, 2009: 21-point misconduct case submitted to Secretary Salazar
  - Salazar never responded; sent Goodman's case to Jarvis
  - May 17: Jarvis responded to only 7 of 21 points; arguments were either straw-man or directly contradicted by his own testimony to IG
  - May 17-19: Goodman sent Jarvis response by WH Science Advisor Holdren; Goodman responded that Jarvis answers inadequate
  - May 18: Jarvis wrote to NRC, said nomination (NPS Director) *"hangs in the balance"*, asked for help from NRC panel chair Pete Peterson
  - May 19: NRC panel had neither studied nor considered misconduct. Nevertheless, NRC panel chair Peterson wrote to Jarvis: *"...my opinion that those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."*
  - Within minutes, Peterson email to Jarvis was in Salazar's office with note from Jarvis: *"I hope this puts the issue behind us."*

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12/01/2010 16:43 4062477587 SOLICITORS OFFICE PAGE 05/06

2007-2010: allegations of scientific misconduct have not been investigated for 3 ½ years by NPS, Interior, or IG

- July 8, 2009: 20-page case for scientific misconduct submitted to DOI IG; case contained 13 specific allegations, included the 21-point case previously submitted to (and unanswered by) Secretary Salazar, with citations to rules, laws, and regulations that appeared to have been violated
  - July 24: Letter from Assistant IG John Dupuy to Salazar's office, reported that it received complaint one week earlier on July 15. IG focused only on first of 13 specific allegations – that Jarvis was involved in secret non-public July 27, 2007 version of the Drakes Estero Report – and concluded *"We have completed an inquiry into this allegation and we have found no evidence to support this complaint."*
  - July 28: Senate Committee on Energy and Natural Resources Chairman Senator Bingaman, opened hearing on Jarvis nomination, and stated: ""*Let me note that committee is aware of an allegation of that was made against Mr. Jarvis relating to operation of an oyster farm at Point Reyes National Seashore. The Department of Interior's Office of Inspector General has completed an inquiry into that allegation and has reported that it has found no evidence to support the allegation."*

12/01/2010 WED 16:47 [TX/RX NO 8745] 006

2007-2010: allegations of scientific misconduct have not been investigated for 3 ½ years by NPS, Interior, or IG

- July 8, 2009 (continued): 20-page case for scientific misconduct submitted to DOI IG; case contained 13 specific allegations, included the 21-point case previously submitted to (and unanswered by) Secretary Salazar
  - August 24, 2009: Assistant IG John Dupuy told Goodman that they only investigated one narrow procedural issue – could they prove whether Jarvis had authored or approved the secret non-public July 27, 2007 version of the Drakes Estero Report? The IG was unable to prove that Jarvis authored that revised report. Thus, the IG investigated a single technical issue, and when unable to confirm it, stopped the review, and never examined the detailed list of scientific misconduct allegations.
  - When asked about the bulk of the misconduct claims in the Goodman complaint, Dupuy reaffirmed that the IG doesn't have scientists and doesn't investigate scientific misconduct – i.e., they never looked at the scientific issues in the scientific misconduct case.
  - Dupuy was asked: who investigates scientific misconduct?
  - He said not NPS, not DOI, not IG, not NAS, not MMC.
  - Dupuy suggested that Interior needed a scientific integrity policy.

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12/01/2010 WED 16:47 [TX/RX NO 8745] 006

Frost, Gavin

From: Corey Goodman [corey.goodman@me.com]
Sent: Wednesday, December 01, 2010 3:45 PM
To: Frost, Gavin
Subject: thoughts about your investigation
Attachments: CSG to Frost.12_01_10.pdf; ATT00001..htm; upconf_2T.jpg; ATT00002..htm; upconf_2L.jpg; ATT00003..htm; upconf_file_icon.jpg; ATT00004..htm; b_view_file_110x31.jpg; ATT00005..htm; upconf_2R.jpg; ATT00006..htm; upconf_2B.jpg; ATT00007..htm; upconf_3B.jpg; ATT00008..htm

Dear Gavin,

I just returned from a business trip to Japan and leave tomorrow morning for the Galapagos with my wife and friends, back Sunday night December 12. I include here a letter to you that I wrote on the plane. It contains some further thoughts, some questions to consider, and some additional information that might provide you with a broader perspective. I hope you find it useful.

A suggestion: another prestigious scientist who has looked at much of the NPS data and commented on it over the past few years is Dr. Peter Gleick. He is also an elected member of the National Academy of Sciences, a MacArthur Fellow, and founder and President of the Pacific Institute. His Ph.D. advisor was John Holdren, the President's science advisor. Peter is a world-renowned environmentalist and the world water expert who gives the annual water report to the US Congress and to the UN. He is very highly respected around the world. He knows much about this case. He lives in Berkeley, works in Oakland, and can be reached a[(b) (6) [redacted]]; mobile[(b) (6) [redacted]]. You would find Dr. Gleick a valuable interview.

I look forward to seeing you on Wednesday December 15.

Best wishes,

Corey

December 1, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Gavin M. Frost, Attorney, Field Solicitor, Department of the Interior, Billings, MT

Dear Gavin,

Thanks very much for taking the time to speak with me last Friday about your pending investigation. I appreciated the clarity and transparency with which you described your process. From what you indicated, your investigation is centered on scientific misconduct with attention largely and appropriately focused on the allegations in my November 22 letter to Secretary Salazar. In the end, you said you would report on facts, conclusions, and recommendations.

The allegations against NPS officials and scientists are very serious and arise from the discovery in the summer of 2010 of NPS secret cameras, photos, and detailed logs. These photos and logs were suppressed, never disclosed to the DOI IG, NAS, MMC, and others, and lead to conclusions that largely contradict those made publicly by NPS officials and scientists over the past three and a half years. The existence of the cameras, photos, and logs should have been disclosed, but were not, and should have led to different conclusions, but did not. This appears to be a violation of a variety of federal rules, regulations, and codes.

The big picture revolves around whether NPS does (as they claim) or does not have conclusive evidence showing that Drakes Bay Oyster Company (DBOC) boats and workers have been disturbing the harbor seals in Drakes Estero for the past three and a half years. Starting back on April 5, 2007, then Superintendent (b) (6), (b) (7)(C) and since multiple other NPS officials and scientists, have claimed that NPS has conclusive data. The NAS and MMC review panels have been skeptical of that claim, and skeptical of the quality and reliability of the data in the volunteer harbor seal monitoring database.

Nevertheless, the issue of DBOC harbor seal disturbances has been perpetuated for three and a half years by repeated NPS claims, coupled with blanket NPS rejections of DBOC electronic time clock and payroll records. Clearly all of this could have been resolved had the NPS photos and logs been made public. Time-and-date stamped photos and logs, as the NAS panel recommended in their May 5, 2009 report and MMC panel members verbally recommended at their meeting in February 2010, would have helped to swiftly resolve this controversy. The NPS officials and scientists had such photos and logs for over two years, but never told the NAS or MMC panels.

The NPS officials and scientists have said over and over again that they have conclusive data. The NPS photos and logs belie the NPS public claims and tell a very different story, one never shared with investigators and reviewers.

Why did so many NPS officials and scientists suppress the key data? The questions are: who knew, when did they know, and why didn't they disclose the existence of the cameras, photos, and logs? On the one hand, who knew about the cameras and photos? The answer to that question is likely to be a list of multiple NPS officials and scientists.

The related question is how many of them knew about the logs and the detailed minute-to-minute analysis of those photos? Who knew of their existence? Who had seen the logs? Who reviewed them? Who wrote in their margins and corrected the descriptions such as the word "SUNDAY" in two places in the margin, the hand-written correction on the logs that one set of Sunday photos was of a bird and not a boat, or notations of which are good photos of disturbances (caused by kayaks, not DBOC boats)?

Who picked the photos for the May 1, 2009 Briefing Statement? Who picked the photos to send to Superintendent (b) (6), (b) (7)(C) How many NPS officials and scientists knew of the logs? How many had copies of the logs? The logs were sent to (b) (6), (b) (7)(C) but clearly others knew of them. How many people knew and remained silent?

From that perspective, the case appears fairly straightforward – a matter of determining who knew about the cameras, photos, and logs, when they knew, and why they didn't disclose them to a variety of investigators and reviewers. I presume that (b) (6), (b) (7)(C) (b) (6), (b) (7)(C) knew (b) (6), (b) (7)(C) certainly knew as well. After all, according to NPS emails obtained through the FOIA process (b) (6), (b) (7)(C) wrote the Briefing Statement, and (b) (6), (b) (7)(C) reviewed it. That document cited the photos and cameras. Thus (b) (6), (b) (7)(C) had knowledge of the camera system and photos. It is unclear if he was aware of the detailed logs and analysis.

Did Jarvis know about the cameras, photos, and logs? According to the emails obtained by FOIA, Jarvis received the Briefing Statement. Did he read it? Did he look at the photos in it? Had he already known about the cameras or photos, or was he surprised when he saw them in the Briefing Statement? Did he ask anyone about it? How about (b) (6), (b) (7)(C) Del Osso, Turnbull, or Wenk? Was each official and scientist who knew acting alone in failing to disclose? Or did they discuss their decision and act as a group?

Did NPS disclose the existence of the cameras, photos, or logs to anyone outside of NPS? For example, did the volunteers involved in the harbor seal monitoring program know about the cameras and photos? Moreover, historically, NPS has often provided certain local environmental supporters (e.g., Gordon Bennett of the Sierra Club West Group Marin, just to name one) with information that has not been publicly disclosed. Did they tell any of these local groups or others about the cameras, photos, or logs?

Did any of the NPS officials or scientists object to the secrecy and think the photos and logs should be disclosed? Did any of them say to the others that they really needed to disclose the photos and logs, but get vetoed? Who called the shots?

Finally, given the conclusions from the detailed logs (i.e., no bona fide major

disturbances of the seals by DBOC boats and workers, with the occasional disturbances coming from kayakers), why did NPS officials and scientists continue to tell various investigations, reviews, elected officials, press, and public just the opposite – that they had data showing DBOC harming the harbor seals? Which of these NPS officials and scientists knew the truth from the photos and logs, and yet said the opposite publicly?

The November 24 letter from Chris Lehnertz to me, copied to you, describes the camera system *"...as part of the harbor seal monitoring program."* That was the first time anyone at NPS has publicly made such a statement using those words. Up until that email, we have been told that the cameras had nothing to do with the harbor seal monitoring program, but were simply to observe wildlife. This would, I imagine, enlarge the number of people who presumably were not told – and should have been – to include the leaders of the monitoring program at Fort Collins.

If the photos were part of the harbor seal monitoring program, then why did [redacted] all deny that on June 7, 2010 at the MMC meeting with Tim Hagen when I asked them and they all said the photos had nothing to do with the harbor seal monitoring program? Several of them bristled at my suggestion that the photos should have been included in their assessment of harbor seal disturbances. Thus, Lehnertz is the first NPS official to publicly say what I believe to be the truth, namely that the cameras were for monitoring disturbances of seals and thus were part of the harbor seal monitoring program – a very important disclosure.

Did someone from above – such as [redacted] or Jarvis -- give the staff orders not to disclose the photos and logs? When Jarvis, [redacted] others?) appeared at the NAS panel meeting on September 4, 2008, did they know of the cameras? When [redacted] (others?) appeared at the MMC panel meeting in February 2010, did they know? What knowledge di[redacted] have? How high and broad did the knowledge go, and who made the decisions? Was someone calling the shots from Point Reyes, Oakland, or Washington?

While the case seems simple, there are further layers of details and complexity and historical perspective that provide richness, in some cases provides further clarity, and also shows how broad were the implications of the misconduct. After all, if it was not for the Jarvis nomination to be NPS Director, we might not have the May 1, 2009 Briefing Statement, and in all likelihood, we might have no idea about the cameras, photos, and logs and there would be no investigation. The Briefing Statement was never shared with NAS or me – according to NPS documents obtained via FOIA, it went straight to Jarvis and possibly then others in Washington.

Who submitted the Briefing Statement to Jarvis? Did it come from Oakland or Point Reyes? Was it only sent to Jarvis or was it sent to others in Washington? Did Jarvis distribute it more broadly? Was it sent to members of the Senate Energy Committee? Was it given to members of the Senate or House, or their staff? The Briefing Statement contained false citations to photos in an attempt to blunt the criticism of the NPS scientific claims. How broadly did NPS distribute this document containing false science?

The authors of the Briefing Statement [redacted] possibly under the guidance of [redacted] thought it necessary to disclose a few photos and the very existence of one camera in order to blunt certain criticisms that had been sent to Salazar from me, either directly or via the NAS. Without that decision to put citations concerning a few photos, a few actual photos, and an appendix describing one camera, in that document, we would not be here today. And of course, that document was shown to folks in Washington who presumably did not appreciate the implications, but it was not shared with me, Lunny, or panel members from the NAS or MMC in a transparent fashion. Moreover, the cameras had gone up two years earlier, and the 2008 log had long since been in hand, before the Briefing Statement was written.

Until June 6, 2010, no one outside NPS understood the implications of the cameras and photos. I hope you agree that putting the document on the MMC web site nearly three years after the camera program started as document #110 out of 153, with no sense in its title of what was in its appendix, does not constitute appropriate and timely public disclosure. The proof of that lack of disclosure was the surprised look on Tim Ragen's face when, at his meeting, I asked NPS officials and scientists about the camera (the document only disclosed one) and photos on June 7, 2010. Ragen knew nothing about the camera program and was as surprised as I had been the day before.

From my perspective, the story of misconduct began on April 5, 2007. On that day, Superintendent [redacted] told Marin County Supervisor Steve Kinsey that he had overwhelming data of harm to the harbor seals by DBOC. We now know that he had no such data. The first data emerged under suspicious circumstances several weeks later -- during the two weeks leading up to the Marin County Board of Supervisors hearing on May 8, 2007. Certainly, the veracity of the disturbance records in the two weeks before the hearing are in question and easily disputed by verifiable DBOC electronic records.

Let's briefly look at events that took place in 2009, during which time the name of Jon Jarvis was initially floated by Salazar (April 2009), ultimately nominated by the President (July 2009), and finally confirmed by the Senate (September 2009) as the next Director of NPS. All of this happened with the black cloud of allegations of scientific misconduct hanging over Jarvis' head (see the end of my CCST talk for a brief history of how NPS and DOI responded to allegations of scientific misconduct).

How did NPS and DOI maneuver around these allegations without ever properly investigating them? They certainly never interviewed me, the person who brought the allegations forward. How did they blunt the message and discredit the messenger? I only got a glimpse of the answers to those questions one year later when two key documents surfaced, one of which (the May 1, 2009 Briefing Statement) led to my discovery of the secret cameras, photos, and detailed logs, and thus ultimately became the trigger for your investigation. The other was a key email on May 19, 2009 from Prof. Charles "Pete" Peterson, the chair of the NAS panel on Drakes Estero, to Jon Jarvis.

The key documents used by NPS to blunt my criticisms in spring of 2009 were never shared with me. I was in the dark. Regardless of all of the documents I sent to Salazar and his team, no one contacted me (except for one brief "how is the weather out there?" phone call to check off the box). One year later, on January 21 and June 6, 2010,

respectively, I became aware of two key documents. Perhaps there are more.

(1) On January 21, 2010, I read an editorial in *The West Marin Citizen*, one of two local West Marin newspapers, which included quotes from a May 19, 2009 email from Dr. Charles "Pete" Peterson, the chair of the NAS panel (that had distributed their final report on May 5, 2009) to Jon Jarvis saying that "... *those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong.*"

Peterson's comment was surprising and stunning. I have included in the appendix Peterson's email and other relevant emails and documents surrounding his email to Jarvis. The timing of the leak of Peterson's email eight months later was non-random, since I was scheduled in a few weeks to make a presentation to the Marine Mammal Commission panel on February 21, and the leaked email (which originated from NPS scientis[redacted] was clearly published as a way of discrediting me before I testified. That email, and further emails obtained by FOIA, lead to some interesting insights into what was happening behind the scenes.

Jarvis sent Peterson's email straight up to Will Shafroth and Tom Strickland (see appendix 1). To whom did they send it? How widely was it distributed to blunt the allegations of scientific misconduct and assure the successful nomination and confirmation of Jarvis with no investigation? Interior has repeatedly refused to provide emails and documents requested last April by FOIA (see appendix 2).

(2) On June 6, 2010, in preparation for my meeting the next day to discuss DBOC harbor seal disturbances with Marine Mammal Commission Executive Director Tim Ragen along with NPS officials and scientists and Kevin Lunny, I read a document that had been emailed to me several days earlier by a colleague in Washington. That document, the anonymous May 1, 2009 Briefing Statement, was written to refute the January 18, 2009 document I had given the NAS panel (and that they had sent up to Secretary Salazar on February 3, 2009) alleging that the Sunday April 29, 2007 harbor seal disturbance could not possibly have taken place as described based upon DBOC payroll and time clock records for that day and historical records.

Most of the 33-page Briefing Statement is irrelevant, but there is one key paragraph that NPS used to blunt my criticism (page 3, titled "*Assumption that DBOC does not operate on Sundays*") when they claimed to have date and time-stamped photographs of a DBOC boat on the estero on a particular Sunday. No photos of the DBOC boat were shown in the document. On page 12 of the document (page 2 of appendix A) I read with amazement about a remote camera taking pictures of Drakes Estero every minute of every day from dawn to dusk: "*The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM.*" I eventually received digital copies of those photographs and discovered that they are not of a DBOC motor boat, but rather are of two UFO's (unidentified floating objects), most likely kayaks but possibly canoes. Thus, a false citation of the NPS photos was sent to Washington to blunt my allegations.

NPS is not the only agency that suppresses key data or documents. Interior has suppressed documents that should have been provided by FOIA. Interior still has not

answered my FOIA request of April 30, 2010. As you will see in appendix 1, the May 19, 2009 email from Pete Peterson to Jon Jarvis was quickly sent to Will Shafroth and Tom Strickland in Salazar's office. My FOIA request was a simple one – I asked for emails from Shafroth and Strickland to others further distributing Peterson's email. I have never been sent a response. I have called and emailed many times. I was told by phone in July that a response would be forthcoming shortly. I even emailed the FOIA officer in the Secretary's office and copied John Dupuy from the IG's office, hoping that might encourage a response, but only silence. Below in appendix 2 you can see the history. Clearly, when Interior doesn't want information made public, they stonewall FOIA requests. This runs contrary to rules, regulations, and codes, and runs contrary to President Obama's directives to his administration on transparency. It would be enlightening to find out what happened to Peterson's email, and what they wrote about it. I infer that there is something they want to hide.

I look forward to seeing you on December 15th. My wife may have changed the gate code by then, and if she does, I'll email you a new code so that you can get in.

Best wishes,

Corey

Corey S. Goodman, Ph.D
corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Enclosure:

APPENDIX 1: Dr. Charles "Pete" Peterson's May 19, 2009 email to Jon Jarvis and other related emails obtained through the FOIA process.

APPENDIX 2: Emails concern lack of responsiveness to Mr. Ray McInerney, DOI Office of the Secretary FOIA officer

APPENDIX 3: (separate PDF sent by "yousendit") Brief history of how NPS and DOI has handled scientific misconduct charges

APPENDIX 1: Dr. Charles "Pete" Peterson's May 19, 2009 email to Jon Jarvis and other related emails obtained through the FOIA process.

1) January 9, 2009: Dr. Charles "Pete" Peterson, Chair of the Ocean Studies Board (OSB) (National Research Council, part of the National Academy of Sciences) panel investigating Drakes Bay Oyster Farm (DBOC) at Drakes Estero (Professor, University of North Carolina), emailed Drs. Paul Thompson (panel member, Professor, Univ. of Aberdeen) and Dr. Susan Roberts (Director, OSB) concerning their proposal to delete the word "misrepresentation" from the draft report. Peterson wrote:

> *"I understand this issue about the implication of the word misrepresentation. I agree that it implies intent.* ***I personally have no doubt that there was intent****, based upon the directional bias of the putative impacts of the oyster farm reported by NPS. However, I would agree that it may not serve our charge or the good of the process to be so judgmental."* [emphasis added]

"Intentional misrepresentation" forms the basis of the federal definition of scientific misconduct. Peterson's words on January 9 (in which he believed there was intent by NPS to misrepresent data) are in contrast with what he wrote to Jarvis on May 19 when he cleared NPS of scientific misconduct (#15 below).

2) January 18, 2009: Dr. Corey Goodman, NAS member, submitted a 28-page report to Roberts and Peterson alleging that NPS committed scientific misconduct in the documents and presentations NPS gave to the NRC/NAS panel (available upon request). Goodman alleged a pattern of intentional misrepresentations.

3) February 3, 2009: Dr. Roberts sent a letter to Interior Secretary Salazar, forwarding Goodman's case for scientific misconduct and another letter claiming misconduct by DBOC owner Kevin Lunny. Neither Goodman nor Lunny ever heard from Salazar or anyone in his office about these serious allegations.

> *Dear Secretary Salazar-*
> *We recently received the attached letters as part of the National Research Council study on Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drake's Estero, Point Reyes National Seashore, California, which is being carried out for the National Park Service. The National Research Council is not in a position to evaluate the charges contained in this letter. We are therefore forwarding it to you as the cabinet officer responsible for the Park Service for such action as you think appropriate.*
> *Sincerely,*
> *Susan Roberts, Ph.D.*
> *Director*
> *Ocean Studies Board*

4) March 19, 2009: William Colglazier (Executive Officer, NAS) issued a press release concerning the Drakes Estero panel report that stated:

> *"This study was never intended to be an inquiry of potential scientific misconduct, and will make no such determination."*

When the NRC panel report on Drakes Estero was issued on May 5, 2009, Peterson and Roberts made clear in press interviews: they had not studied scientific misconduct and thus would not comment on it.

5) April 27, 2009: Goodman sent Secretary Salazar a letter describing part of the case for scientific misconduct against then West Regional Director Jon Jarvis and opposing his pending nomination as NPS Director (available upon request).

6) May 5, 2009: The NRC/NAS released the NRC report on Drakes Estero. The report came about as close as it could to the definition of scientific misconduct without actually saying "scientific misconduct" when they wrote that the National Park Service *"selectively presented, over-interpreted, or misrepresented the available scientific"* data. They wrote:

> *... The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects."*

7) May 5 and 6, 2009: In his press release and subsequent press interviews, Jarvis made a series of misleading public statements.

In his May 5 press release, Jarvis wrote: *"We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report."* The most recent public version of the Drakes Estero report was on May 11, 2007, and that was the version that the NRC panel had criticized as misrepresenting the scientific data.

Jarvis told the San Francisco Chronicle: *"They didn't say our research was wrong. They just said it was incomplete."* To the Marin Independent Journal he said: *"We agree with some conclusions, disagree with some and say we need more research, too."* To the Point Reyes Light he said: *"There was some overreaching."*

8) On or about May 8, 2009: Dr. John Holdren, President Obama's science advisor and Director of the Office of Science and Technology Policy, had a phone conversation with Peterson. On February 1, 2010, Holdren emailed Goodman concerning his recollection of that conversation when he wrote:

> ***"My recollection of my one brief phone conversation with Pete Peterson is that he said his committee didn't address the question of whether there was misconduct."***

That is of course quite different from what Peterson told Jarvis by email (#15 below), but consistent with what Peterson told Goodman when questioned about his phone call with Holdren (#22 below). What Peterson told Goodman was completely consistent with what Holdren told Goodman. The inconsistent story is what Peterson told Jarvis in his May 19, 2009 email.

9) May 10, 2009: Goodman sent Secretary Salazar a second letter describing further details of the case for scientific misconduct against Jarvis, focusing in particular on Jarvis' response to the NRC/NAS report on May 5 (available upon request).

10) May 14, 2009: Holdren asked Goodman to send him the specific case for scientific misconduct against Jarvis.

11) May 16, 2009: Two days later, Goodman emailed Holdren a 21-point case for scientific misconduct against Jarvis (11 pages; available upon request). This report is detailed, factual, and identifies which rules, regulations, and laws appeared to have been violated.

12) May 17, 2009: Jarvis sent his reply to Goodman's case to Secretary Salazar on the 17th. Salazar then forwarded Jarvis' reply to Holdren. Holdren then sent the Jarvis response to Goodman and asked for his analysis. Jarvis responded to only seven of Goodman's 21-points, and most of those rebuttals were either straw-man arguments or were directly contradicted by his own testimony to the Inspector General. Goodman asked Holdren how much detail he wanted. He answered:

> *"I think if he's demonstrably not telling the truth in one or two more instances that would be very important. He's already on thin ice for his characterizations of the NAS findings, although some of those are quotes that he can say are not accurate even though the reporters insist they are."*

13) May 18, 2009: Jon Jarvis must have realized how strong was Goodman's 21-point case against him, and how weak was his 7-point reply he sent the day before to Salazar. It was only a matter of time before his reply would be scrutinized. Jarvis emailed to Roberts, copying (b) (6), (b) (7)(C) citing the 21-point case from Goodman to Salazar accusing Jarvis of scientific misconduct, told her that his nomination as NPS Director "hangs in the balance", and asked Roberts to provide Peterson with this information so that Peterson could convey "the panel's position to Dr. John Holdren and Assistant Secretary Tom Strickland regarding their findings." The key is that Jarvis asked Peterson to represent the panel's position. Thus, Jarvis asked Roberts to ask Peterson, as representing the NRC panel, to come to his rescue by telling Holdren and Strickland that Jarvis did not commit scientific misconduct.

From: *Jon Jarvis*
To: *Susan Roberts*
Bcc: (b) (6), (b) (7)(C)
Sent: *May 18, 2009 9:06 AM PST*
Subject: *Goodman*

Dr. Roberts:
Below you will find two versions of a letter from Corey Goodman to the Secretary of Interior, sent through the Assistant Secretary/Chief of Staff Tom Strickland accusing me of Scientific Misconduct in the Drakes Estero issue. ***This is very serious as my nomination to the Directorship of the NPS hangs in the balance. I would appreciate your providing this information to Dr. Pete Peterson for conveying of the panel's position to Dr. John Holdren and Assistant Secretary Tom Strickland***

regarding their findings. *As a particular example of Goodman's incorrect views, note number #18 as how he characterizes the research and publication by* (b) (6), (b) (7)(C) *Thank you.*
Jonathan B. Jarvis [emphasis added]

14) May 19, 2009: Goodman emailed Holdren with a written critique of Jarvis' reply to Goodman's 21-point case for scientific misconduct, pointing out in graphic form how Jarvis had not responded to 14 of the 21 points. Moreover, Jarvis' rebuttal to 7 points was very weak and easy to dismiss as largely irrelevant answers. Jarvis had no defense of Goodman's 21-point case. Holdren replied:

"Corey-- Thanks for this further input. I am sharing it with Senator Feinstein's staff people who are continuing to look at the matter. I think that it would be preferable for you to re-address your response to me, since I was the one who asked for your responses to the points made by Mr Jarvis. I will then also share it with Secretary Salazar and his chief of staff Tom Strickland, making clear that I was the one who supplied you with Jarvis's points and asked for your responses. Best,
John"

15) May 19, 2009, 7:27 AM PST: Dr. Peterson wrote an email on the morning of the 19th to Jon Jarvis that fulfilled the request Jarvis had made of Roberts just the day before. Jarvis certainly distributed it widely over the coming hours. Peterson wrote:

"Dear Jon-
I wanted to thank you for your honest reactions to our NRC report and wish you well personally. I spoke at length to John Holdren expressing my own support of your candidacy for NPS Head based on the professionalism and strong commitment to science that you have demonstrated in various ways that have become evident to me. I also expressed my opinion that those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."

I write, however, for an entirely different reason. I am presently engaged in preparing a draft space-based management plan for North Carolina that identifies the best (and worst) sites for locating wind farms over water (Pamlico and Albemarle Sounds and the coastal ocean out to 30 m water depth). An important NPS issue arises in this process. How would unacceptable negative visual impacts be defined for National Seashores? For Cape Hatteras and Cape Lookout National Seashores, this involves both ocean and sound vistas, for which the answer may differ. I wondered if you might be able to direct me to an appropriate person in the Park Service who could begin to answer that question.
Thanks sincerely,
Pete Peterson [emphasis added]

In his first paragraph, Peterson thanked Jarvis for his honest reactions to the NRC report. That statement seems inconsistent with the twisted and convoluted press release and interviews Jarvis gave after the NRC report was released (#7 above).

Peterson next told Jarvis that he had told Holdren that he supported Jarvis' candidacy for NPS Director. Finally, he told Jarvis that he had told Holdren that the claims of scientific misconduct against NPS "are simply wrong."

That statement is inconsistent with what Peterson wrote to his fellow panel members on January 9, 2009 (#1 above), inconsistent with the charge to the panel (#4 above), and inconsistent with the panel's findings (#6 above). However, most people throughout the government and the community interpreted Peterson's comments as if he was speaking on behalf of the NRC/NAS as Chair of the panel that had just released its investigation of these issues. He was not. But that is why Jarvis made the request the day before – he wanted Peterson to represent the "panel's position" and he got what he wanted.

In his second paragraph, having given Jarvis what he wanted (i.e., "clearing" him of scientific misconduct), Peterson immediately went on to ask Jarvis for his help with a proposed wind farm project in North Carolina that required NPS support since it might have negative impacts on two national seashores. Was this a conflict of interest? This certainly has the appearance of a conflict of interest, and looks like it violates the NAS policy. Peterson did Jarvis a favor in paragraph one (including misrepresenting what he told Holdren), and then he asked for a favor in return in paragraph two. This seems pretty straight forward as meeting the appearance of a conflict.

In his email, Peterson personally cleared Jarvis of charges of scientific misconduct, even though he told the White House just days earlier (#8 above) that he had never reviewed such charges and was unqualified to make a determination of scientific misconduct. When on January 25, 2010, Goodman questioned him about this topic (#22 below), Peterson answered that he did not know the federal laws about scientific misconduct, that he had never read Goodman's 21-point case for scientific misconduct, and that neither he nor his panel had ever investigated scientific misconduct. Moreover, Peterson admitted that he had indeed been asked because he was Chair of the panel. When asked if he was contacted because he was Chair, he answered: *"That's why I had been contacted."* When asked by Goodman if the January 21, 2010 article in the *West Marin Citizen* (#22 below) had correctly quoted him as chair of the committee as having said that the allegations of misconduct against NPS "are simply wrong", Peterson answered: *"I didn't, and I don't – that is something that lies outside the purview of my committee and is not something that we did or I did."* At the time Goodman interviewed Peterson, he had apparently forgotten about the details of what he wrote in his email to Jarvis. Once that email was sent to him, he would no longer answer Goodman's calls or emails.

16) May 19, 2009, 8:03 AM PST: Thirty-six minutes after Peterson hit the "send" button, Jon Jarvis forwarded Peterson's email to Will Shafroth (Deputy Assistant Secretary) and Tom Strickland (Assistant Secretary) in Salazar's office with the following cover note:

> ***"See note below. Dr. Peterson chaired the panel of the National Academy of Sciences which studied the Drakes Estero oyster issue and presented the results to all parties. I hope this puts the issue behind us. I will follow up with his other request."***

Jarvis knew the implications of Peterson's email, and immediately sent it to Shafroth and Strickland, saying that he hoped this put the issue – namely the dark cloud of scientific misconduct hanging over his head – behind him.

17) May 19, 2009, 8:45 AM PST: Jarvis next replied to Peterson and copied Bert Frost (NPS Associate Director for Natural Resources), thanking Peterson for the call to Holdren, and asking Bert Frost to follow up on Peterson's wind farm request.

18) May 19, 2009, 8:54 AM PST: Jarvis forwarded Peterson's note to [redacted] (PRNS Superintendent and also charged with scientific misconduct concerning Drakes Estero), George Tunbull, and [redacted] with the following cover note:

> ***"Good note from Peterson."***

19) May 19, 2009, 3:18 PM PST: Jarvis forwarded Peterson's note to Craig Obey (Senior Vice President, NPCA), a stronger support of the Jarvis nomination, and wrote: *"See below. Peterson chaired the NAS panel."*

Obey replied one hour later: ***"Terrific! That should send a pretty strong message."***

20) May 21, 2009: Carol McCoy (NPS Branch Chief, Denver), wrote to Peterson, and copied Bert Frost, following up in a very positive fashion about the North Carolina wind farm study and location options, started by saying *"attached is the contact information I promised you"*, and concluded by writing *"I am looking forward to working with you."* This email begins a favorable interaction of NPS with Peterson's wind farm project in North Carolina.

21) January 21, 2010: In the run up to the Marine Mammal Commission panel hearing in February, someone leaked Peterson's email to the *West Marin Citizen*, a local newspaper in the West Marin community. The leaked version came from NPS scientist [redacted] who had received it from Superintendent [redacted] On January 21, 2010, the *Citizen* published part of Peterson's May 19, 2009 email to Jarvis – quotes from the first paragraph but no mention of the "ask" in the second paragraph. Editor Jim Kravets wrote:

> *"… Goodman repeatedly pursued misconduct charges against then director of the Park Service Pacific West Region, John Jarvis, but the allegations so far haven't stuck. Jarvis's confirmation as Park Service director was even bolstered by Pete Peterson, chairman of the National Academy of Sciences panel in charge of reviewing the park's science relating to Drakes Bay Oyster Company. Writing in a May 2009 email, Peterson tells Jarvis that he expressed support for Jarvis' candidacy for NPS Head to John Holden, director of the White House Office of Science and Technology Policy and Obama's top science adviser, "based on your professionalism and strong commitment to science that you have demonstrated." Peterson said he also told Holden that in his opinion, "those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong."*

22) January 25, 2010: Goodman got a copy of Peterson's email from the *Citizen* over the weekend. Monday morning, he telephoned Pete Peterson at work (8:10 AM PT) and took extensive notes of their conversation. Here are excerpts of what Peterson said to Goodman in that lengthy conversation: [emphasis added]

> *Goodman* — *Last Thursday an article came out in the West Marin Citizen that contains quotes in two emails, one that you wrote to Jon Jarvis last May and one to John Holdren last May.*

Peterson — *I did contact both of them, but not sure what kind of FOIA had released those letters to the newspaper.*

Goodman — *I was quite surprised by your quotes in this article. I would like to see if you're quoted correctly here. Your emails were released and were quoted as criticizing me and what I was doing. For transparency…*

Peterson — *I don't understand how it criticizes you…*

Goodman — ***It quotes you as concluding: "those claiming scientific fraud or misconduct by NPS in the Drakes Estero case are simply wrong"***

Peterson — ***I don't think I said that.***

Goodman — *Did you just send your emails to Jarvis and Holdren, or did you provide them to others?*

Peterson — *I don't know how the newspaper got them. You're backing me into history and challenging my recollection [chuckle]… let me think…. I copied no one, absolutely no one. If I'm responding to someone, I don't send it to the world. After our committee delivered the Drakes Estero report to the sponsor, NPS and I was in DC to do that service for the Academy and for the committee members, I was then contacted by Holdren and he asked if I would give him my impressions of Mr. Jarvis in that he was being considered for an appointment in the Obama administration. I think I responded to that by an email. How did Jarvis get into this… [pause]… at some point, and I can't remember now the circumstance, but at some point Mr. Jarvis contacted me as well and I can't recall the circumstances, and its possible that he asked me to send him the same thing, that is to say, my feelings about what the committee had concluded relative to his role and to aspects of what we put in our report. But I can't, I'm not being evasive here, but I can't remember the circumstances whereby…*

Goodman — *You can see why it'd be nice for me to be able to fact check what you were quoted as, quoting you as chair of the committee that all allegations of misconduct against NPS are simply wrong.* ***I've got to ask you, by what criteria did you dismiss all of the allegations of misconduct? Did you go through all the documents and data I submitted? Scientific misconduct has legal definitions, rules, regulations, and public law…***

Peterson — ***I didn't, and I don't – that is something that lies outside the purview of my committee, and is not something that we did or I did.***

Goodman — *What did you tell John Holdren about Jon Jarvis and the issue of misconduct?*

Peterson — *I told him that misconduct was outside the purview of our committee, and that we did not look at it and did not come to any conclusion concerning misconduct. Instead, I gave my personal impressions of Mr. Jarvis from my limited interactions with him.*

Goodman	*When you were approached by Holdren or Jarvis, did they ever give you the 21-point misconduct case I sent to Salazar?*
Peterson	*My scope of info about Mr Jarvis was quite limited and I said that to both Holdren and Jarvis. That didn't include anything in the way of any complete analysis of misconduct, or Drakes Estero - just my minimal interactions with Jarvis as a committee member.*
Goodman	*When you sent those emails to Jarvis and Holdren, did the Academy know?*
Peterson	*The Academy knew I was being contacted by Holdren about Jarvis on this issue.*
Goodman	*Did they know you emailed to Jarvis?*
Peterson	*I don't know, but they knew I was in contact with Holdren.*
Goodman	*Do you believe they ever saw what you sent to Holdren?*
Peterson	*I doubt it. I had been asked relative to myself as an individual, not relative to the panel...*
Goodman	***You only knew these things as the chair of the panel though.***
Peterson	***That's why I had been contacted.***
Goodman	*Thank you. I think you'll see when you see this article why I was taken aback – you'll see how your words have been used.*
Peterson	***I might misspeak, but I don't think I would miswrite. I don't think I would've written it this way.*** *You've piqued my interest.*

In summary, Peterson was consistent with how Holdren described their conversation, and consistent with how the NRC/NAS, including Roberts and Peterson, described the panel's findings to the public. However, he completely contradicted his May 19, 2009 email to Jarvis. He did not have the email in front of him, and he apparently could not remember what he wrote. Caught off guard, he denied ever having cleared Jarvis of scientific misconduct. When asked if he did in fact comment on scientific misconduct, he responded: *"I didn't, and I don't – that is something that lies outside the purview of my committee, and is not something that we did or I did."* When asked about what he might have written, he said: *"I might misspeak, but I don't think I would miswrite. I don't think I would've written it this way."* But he did.

APPENDIX 2: Emails concern lack of responsiveness to Mr. Ray McInerney, DOI Office of the Secretary FOIA officer

From: corey.goodman@me.com
Subject: Fwd: update concerning FOIA request -- OS-2010-00253
Date: October 9, 2010 3:21:06 PM PDT
To: osfoia@nbc.gov
Cc: john_dupuy@doioig.gov

Dear Mr. McInerney,

I am puzzled.

I submitted a FOIA request to you on April 30, 2010.

After the normal time period had elapsed, I sent subsequent email notes to you, and you never responded.

I reached you on the phone on July 28, and asked about my 3-month old FOIA request, and you said it was now in process, and I would get the material "shortly". You agreed that my request did not look "voluminous" (your word).

Yet nothing has arrived. On August 30, I wrote to you again (see below), and once again you did not answer.

It is now October 9, over 5 months since I submitted my FOIA request. I have copied this note to the IG office. Perhaps they can encourage you to provide me with an update on my request, and a timely response. Your lack of responsiveness does not appear to be consistent with the President's directives on FOIA transparency.

I look forward to hearing from you, and receiving the requested materials ASAP.

Thank you.

Corey Goodman
corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: August 30, 2010 11:59:27 AM PDT
To: osfoia@nbc.gov
Subject: Re: update concerning FOIA request

Dear Mr. McInerney,

We spoke on the phone over one month ago. I made my request for some emails in April. When will I be getting these materials?
Thanks very much.

Corey Goodman

On Jul 22, 2010, at 6:04 AM, Corey Goodman wrote:
Dear Ray McInerney,

It is now July 22 and you have not responded to my FOIA request of April 30. My request was made 59 working days ago (nearly three months ago). Please let me know when and how you will respond to my request for these documents. You have also failed to respond to my notes from June 5 and June 25 asking about my April 30 FOIA.
Thanks very much.

Corey Goodman

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: June 25, 2010 7:15:47 AM PDT
To: osfoia@nbc.gov
Subject: Fwd: update concerning FOIA request

Dear Mr. McInerney,
It is now June 25 and you have not responded to my FOIA of April 30. Please let me know when and how you will respond to my request for these documents.
Thanks very much.
Corey Goodman

Begin forwarded message:
From: Corey Goodman <corey.goodman@me.com>
Date: June 5, 2010 3:23:10 PM PDT
To: osfoia@nbc.gov
Subject: update concerning FOIA request

Dear Mr. McInerney,
I was hoping to get an update from you as to when I will be receiving the emails and other documents requested below on April 30, 2010. Thanks very much.
Corey Goodman

corey.goodman@me.com
415 663-9495
PO Box 803, Marshall, CA 94940

April 30, 2010

To: Ray McInerney, FOIA Officer, Department of Interior Office of the Secretary, osfoia@nbc.gov

From: Dr. Corey Goodman, corey.goodman@me.com

Re: FOIA request for emails and other documents, letters, and reports

Dear FOIA Officer McInerney,

Pursuant to Title 5 of US Code Section 552, I am requesting the following report, emails and documents.

1) All emails and other documents, letters, and reports **to or from Will Shafroth** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

2) All emails and other documents, letters, and reports **to or from Thomas (Tom) Strickland** between May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

3) All emails and other documents, letters, and reports **to or from Kit Batten** between

May 1, 2009 and July 31, 2009 which contain either in the "to" line, the "from" line, the "subject" line, or in the text, the words:

a) "Peterson"

b) "cpeters@email.unc.edu"

c) "Another issue altogether"

d) "Drakes Estero"

e) "NAS"

f) "National Academy of Sciences"

g) "NRC"

h) "Ocean Studies Board"

i) "Goodman"

j) "scientific fraud"

k) "misconduct"

l) "Holdren"

m) "Roberts"

Thank you very much. Please don't hesitate to contact me if you want any additional information pertaining to this request.

Sincerely yours,

[signature on file]

Dr. Corey S. Goodman

Email: corey.goodman@me.com

Mailing address: PO Box 803, Marshall, CA 94940

Phone: 415 663-9495

Mobile phone: 650 922-1431

January 2, 2011

To: Gavin Frost

From: Corey Goodman

Re: Analysis of May 5, 2009 NAS Report with Reference to What Sections Would Have Been Written Differently Had the Panel Members Known About the Photos and Logs

On page 1, in the Statement of Task (emphasis added), the NAS panel members write:

> *Box 1*
> *Statement of Task – Part 1§*
> *An ad hoc committee will be formed to produce two reports on shellfish mariculture in coastal areas. In the first report, the committee will assess the scientific basis for the National Park Service (NPS) presentations and the report (including revisions), "Drakes Estero: A Sheltered Wilderness Estuary," on the ecological effects of the Drakes Bay Oyster Company operations on Drakes Estero, Pt. Reyes National Seashore in California. In carrying out its task, the committee will address the following questions:*
>
> - ***What is the body of scientific studies on the impact of the oyster farm on Drakes Estero, and what have they shown?***
> - ***What effects can be directly demonstrated by research conducted in Drakes Estero itself?***
> - *What effects can reasonably be inferred from research conducted in similar ecosystems?*
> - ***What conclusions can be drawn from the body of scientific studies, and how do they compare with what the NPS presented to the public? Have these conclusions affected NPS decision making?***

Clearly, the NAS was misled because key data were withheld. NAS was tasked with studying the body of scientific studies on the impact of the oyster farm in Drakes Estero. They asked for and thought they received all of the harbor seal data. Yet the key harbor seal data – the > 250,000 photos and detailed logs – were withheld. That data would have led to stronger conclusions to question #2 (i.e., no impact of oyster farm), and thus would have led to strong conclusions (in the comparison to "what the NPS presented to the public") in question #4 (i.e., NPS misled the public when it claimed conclusive data showing impacts of oyster farm on harbor seals).

Below are eleven specific sections, summaries, and conclusions of the NAS report that would have been written differently had the NAS panel members been given the photos and logs. This list is not exhaustive, but represents a good sampling of sections of the NAS report that were impacted by the lack of data provided to the NAS panel.

1) Page 31: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *Harbor seal research and monitoring projects have been conducted within Drakes Estero over the last 30 years, but none of this research was designed specifically to assess the impacts of mariculture operations.*

Analysis: not true. The camera program was designed specifically to access the impacts of mariculture operations. The two secret cameras, the > 250,000 photos, and the detailed logs from 2008 and 2009 were all focused on DBOC boats and workers vs. the seals at the OB subsite.

2) Page 31: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *The data used to assess annual trends in abundance and distribution of harbor seals within Drakes Estero are from surveys made during the peak pupping season (March 15–June 1) and molting seasons (June 1–July 30) (Hester et al., 2004). During each two-hour survey, hauled-out seals were counted every 30 minutes.*

Analysis: NAS was misled because key databases and data withheld. The NAS panel only writes about the volunteer database in this section. They know nothing of the cameras, photos, and detailed logs. They also know nothing of the 3rd database, photos, and videos in 2008 produced by (b) (6), (b) (7)(C) and volunteers from a different vantage point on the east side of Drakes Estero. The NAS knew of only one of the three ongoing databases, and knew nothing of the cameras and photographs.

3) Page 32: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *In the paper (b) (6), (b) (7)(C) et al. (2009) acknowledge the marked deviation of the 2008 data from the previous 11 years. The authors attribute the departure from the previous pattern to new regulations issued by the California Coastal Commission which closed the lateral channel to the oyster farm's boats during the pupping season beginning in 2008 and further explain that this new restriction led to less disturbance of the seals and thus less displacement from their haul-out sites. However, this explanation is misleading because the previous owner of the oyster farm operated under a 1992 agreement to prohibit boat traffic in the main and lateral channels during the pupping season (DOI, 2008) and the current owners maintain that they have voluntarily complied with the 1992 agreement.*

Analysis: Here and in related passages in this section, the NAS panel analyzes the (b) (6), (b) (7)(C) et al. 2009 paper. They are quite critical, but not nearly as critical as they would have been had they known that the (b) (6), (b) (7)(C) paper was in contradiction with the photographic data that the (b) (6), (b) (7)(C) paper neglected to cite and that was withheld from the NAS panel. (b) (6), (b) (7)(C) and his NPS colleagues knew that the photographic data showed no disturbances by DBOC boats and workers to the OB seals, but rather the

occasional disturbances came from kayaks. Had the NAS panel members know about the photos and detailed logs, and the conclusions derived from those logs, they would have been much more critical of the [redacted] et al. 2009 paper.

4) Page 33: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *Second, surveys are conducted towards the middle of the day to capture the peak counts, and about half of the surveys occur during the weekends. This captures sources of disturbance that occur during these times (such as hikers on weekends); whereas other disturbances may occur more frequently on other days or at other times of day.*

Analysis: Here and in related passages in this section, the NAS panel assumes there is only one database from the volunteer monitoring program. They know nothing of the minute-to-minute, dawn-to dusk photographs. They criticize the seal monitoring program because the surveys are biased towards weekends and the middle of the day, and thus biased to find disturbances by Park visitors and not by DBOC. Had the NAS panel known about the cameras and photos, they would have noted that the photographic data does not have either of these biases, and thus presents a true picture of disturbances – all seven days per week, and every minute from dawn to dusk.

5) Page 33: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *For example, if seals are flushed into the water by a hiker on the beach, it is possible that any perceived risk is reduced or absent once the seals are in the water. In contrast, if seals are flushed into the water by a motor boat, underwater engine noise may result in a continued perception of risk and a stronger response by the seal. Second, the lack of definitive data on spatial and temporal variations in the precise location and behavior of the oyster farm boats prevents any scientific assessment of the authenticity of either the observations of disturbance during the seal surveys (see Box 3), or the counter-evidence provided by DBOC that the boats were absent at these times. For example, "it was not uncommon for DBOC employees to take boats out into the estero after hours to fish," according to Point Reyes National Seashore Chief Ranger Colin Smith as discussed in the Department of Interior Inspector General's report (DOI, 2008). If this statement is accurate, the work records of DBOC would not provide a complete accounting of motorboat activity that could cause seal disturbances.*

Analysis: This entire section would have been written differently had the NAS panel had the photographs and detailed logs. The First comment completely discredits the current NPS claim that May 15, 2008 is a bona fide DBOC disturbance. A few seals are swimming on the surface of the water. The NAS panel correctly points out that engine noise would lead the seals to take a "stronger response" – i.e., diving deep and staying away from the surface. But most important, the NAS panel writes about "the lack of definitive data on spatial and temporal variations in the precise location and behavior of the oyster farm boats …" In contrast, the photos provide very definitive data on the precise location and behavior of the DBOC boats. Finally, the NAS panel accepts the

statement by the PRNS Chief Ranger that DBOC workers sometimes take boats out into the ester after hours to fish. The photos show that if this occurs, it is extremely rare, since neither of the detailed logs from 2008 and 2009 show a single example of this, and no one has yet pointed out an example from the 2007 or 2010 photos as well. This statement was a red herring. The photos show that it is false.

6) Page 36 Box: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *Perhaps the most important confounding factor in any monitoring database, but especially one staffed by volunteers, is the potential for simple recording errors, such as date, time, or tide level. Such an error would generally have little or no effect on the overall trends identified in the database, but would make it difficult to reconstruct the exact events recorded during any individual survey. It is not possible for the committee to resolve the controversy over individual survey sheets, but the focus on these observations highlights how this type of monitoring program is best utilized to indicate potential disturbance problems (that might result in decreased use of a haul-out habitat) rather than to quantify them definitively. The latter would require a data collection system that could be independently verified, such as time and date stamped photographs. This verification is especially important in circumstances where there is an indication of a source of disturbance that could lead to a regulatory action, as was the case with disturbances attributed to DBOC.*

Analysis: This entire section would have been written differently had the NAS panel had the photographs and detailed logs. The NAS panel writes that "time and date stamped photographs" could have cleared up the controversy. In fact, the NPS failed to disclose just such time and date-stamped photographs to the NAS panel. The NPS had the June 6, 2008 log of the 2008 photos. That detailed log would have clear up the issue. It shows that DBOC boats stay approximately 800 yards away from the OB seals. It shows that the occasional disturbances to the OB seals come from kayakers getting less than 100 yards from the seals.

7) Page 36, summary: V. Harbor Seals; B. What is the Body of Scientific Studies on the Impact of the Oyster Farm on Drakes Estero?

> *The observations of disturbance recorded in the NPS database cannot be reliably used to infer impacts of mariculture, relative importance of different sources of disturbance, or impacts on seal fitness. The disturbance observations that have been collected as part of the monitoring program serve to demonstrate that there are multiple sources of human and natural disturbances to seals hauled-out on sand bars in Drakes Estero, but they do not permit rigorous determination of which sources of disturbance, if any, have greater population-level consequences.*

Analysis: This entire summary of the harbor seal section would have been written differently had the NAS panel had the photographs and detailed logs. Rather than volunteer observations, the minute-to-minute, time and date-stamped photographs and the detailed logs would have provided much more reliable data – just the sort of data

that the NAS panel wrote in the box on the top of this page could have cleared up the controversy. The NAS panel would have concluded from the photographs, as clearly detailed in the logs for the 2008 and 2009 photos, that kayaks and not oyster boats are the source of disturbance to the seals at OB.

8) Page 36: V. Harbor Seals; C. What Can Be Directly Demonstrated by Research Conducted in Drakes Estero Itself?

> *None of the scientific research projects within Drakes Estero was designed specifically to assess whether the oyster farm operations were impacting the local harbor seal population, and this constrains attempts to draw definitive conclusions about potential impacts. Analyses of monitoring data found a correlation between seal counts and years since the last ENSO event and oyster harvest levels at two haul-out sites within the upper estero (b) (6), (b) (7)(C) et al., 2009), but this cannot be used to infer cause and effect. Consequently, research that has been conducted within Drakes Estero cannot be used either to directly demonstrate any effects of the oyster farm on harbor seals or to demonstrate the absence of potential effects.*

Analysis: This entire section of the harbor seal section would have been written differently had the NAS panel had the photographs and detailed logs. They are citing the volunteer monitoring database when they write that the research project was not designed specifically to assess the impacts of the oyster farm on the harbor seals. In contrast, the camera project was in fact specifically designed to access the impacts of the oyster farm on the harbor seals. Those data showed no such impact. They were withheld from the NAS panel.

9) Page 51: SCIENTIFIC CONCLUSIONS THAT CAN BE DRAWN

> *(5) Drakes Estero represents an important site for harbor seals, supporting about 20% of the mainland California population. The design of the program to monitor harbor seal abundances and disturbance events at sub-sites within the estero does not permit explicit tests of the impacts of mariculture. Seal disturbance data have been collected during surveys designed primarily to monitor seal abundance trends, and observations of disturbance are not sufficiently representative to infer the proportionate contribution of mariculture-related disturbance relative to other sources of disturbance to hauled-out seals. In particular, critical information is lacking on potential disturbances from mariculture activities at higher tidal levels, which could inhibit hauling out and other important activities. There is a lack of information on how various sources of disturbance affect seals on an individual basis. Nonetheless, precautionary measures to reduce the likelihood of disturbance of seals are consistent with current management practices in the U.S. and in other countries.*

Analysis: This entire section of the impact of the oyster farm on the harbor seals would have been written differently had the NAS panel had the photographs and detailed logs. They write that the design of the program did not permit explicit tests of the impacts of mariculture. The camera program did in fact provide specific information of impacts, or

lack thereof. They write that the volunteer observations of disturbances are not sufficiently representative to infer relative contributions. The camera program did in fact provide representative data – minute-to-minute, dawn-to-dusk photos of the oyster boats and workers vs. the OB seals. They write that critical information is lacking, for example at higher tide levels. The camera program did in fact provide data at higher tide levels. They write that there is a lack of information on how various sources of disturbance affect seals. The camera program provides minute-to-minute photographs of seal behavior in response to specific disturbances.

10) Page 57: ACCURACY OF THE SCIENTIFIC CONCLUSIONS RELEASED BY NPS TO THE PUBLIC

> *The paper by* [redacted] *et al. (2009) improves on this simplistic description by analyzing the use of three haul-out subsites over a decade and relating it to local mariculture activities and changes in oceanic conditions from the 1998 ENSO climatic event. The conclusions reached by the authors of the paper are generally consistent with the results of the analysis, but the limitations of the analysis and hence tenuous nature of the conclusions may not be obvious to the non-expert. First, it is important to recognize that the analysis showing a relationship between mariculture activities and a decline in the mean seal attendance at two of three haul-out subsites in Drakes Estero does not demonstrate cause and effect. Second, the use of oyster production level as a proxy for mariculture activities that displace or disturb seals may be confounded by changes in culture methods or management practices. Third, demonstrating changes in mean attendance at seal haul-out subsites is not equivalent to demonstrating a decline in the seal population at Drakes Estero. The entire estero should be considered as one unit for population analyses for comparison to trends at other nearby locations occupied by harbor seals. For these reasons, the* [redacted] *et al. (2009) paper has limited value for understanding the long-term trends in seal counts in Drakes Estero.*

Analysis: This entire section of the [redacted] et al. 2009 paper would have been written differently had the NAS panel had the photographs and detailed logs. They write that the [redacted] et al., 2009 paper has limited value for understanding the long-term trends in seal counts in Drakes Estero. But had the NAS panel known about the cameras, photos, and detailed logs, and the conclusions that can be drawn from them, they would have been highly critical of the [redacted] et al., 2009 paper for (1) ignoring those data and (2) coming to conclusions that are contradicted by those data. The NAS panel would have been more critical of the analysis and conclusions in th[redacted] paper had they known about the key data that was withheld.

11) Page 57-58: ACCURACY OF THE SCIENTIFIC CONCLUSIONS RELEASED BY NPS TO THE PUBLIC

> *With regard to disturbance, we note that the 100 yd (91 m) buffer between mariculture activities and seal haul-out locations, while consistent with the National Marine Fisheries Service guidelines under the Marine Mammal Protection Act and* (b) (6), (b) (7)(C) *et al.'s (1984) observations of threshold disturbance distances for hauled-out seals in Bolinas Lagoon, is not as large as the 500–1,500 m buffers employed at two European locations to protect seals from human disturbance. Interpretation of the disturbance data is limited by the lack of critical information on how individual fitness and population consequences may vary with disturbance type. Hence, the disturbance monitoring conducted by NPS is inadequate for rigorous inferences on the impacts of mariculture on harbor seals.*

Analysis: This section of the impact of the oyster farm on the harbor seals would have been written differently had the NAS panel had the photographs and detailed logs. The photos show that the DBOC boats consistently stay around 800 yards, and certainly more than 500 yards, away from the seals, and that the kayaks cause seals to flush into the water when they get less than 100 yards, and more typically 50-75 yards, away from the seals. The photographic data suggests that the current guidelines and DBOC operations are indeed working and are sufficient to protect the harbor seals. They also would have concluded that the NPS needs to do a better job at keeping kayaks out of the estero during the harbor seal pupping season.

Frost, Gavin

From: Corey Goodman [corey.goodman@me.com]
Sent: Monday, January 17, 2011 10:31 PM
To: Frost, Gavin
Subject: CCC cites Becker et al. 2009 paper as key reference
Attachments: 20110113_CCC_ltr_to_NOAA_DBOC_and_PRNS.pdf; ATT00001..htm

Dear Gavin,

For some time now I have expressed my view that the [redacted] et al. 2009 paper needs to be retracted. It is flawed, particularly in light of the withheld data, and its main conclusion is not correct. My reasoning has been that it is now used as the main citation to show "proof", based upon a peer-reviewed scientific publication, that DBOC is harming the harbor seals in Drakes Estero. Of course the referees never knew the flaws of the NPS volunteer database, let alone the suppression of the two photographic databases. In short, the authors of this paper suppressed key data that contradicted their conclusions. The paper was weak to begin with, and was based upon a few suspicious (at best) disturbance events during the few years in which Lunny has owned DBOC. But we now know that [redacted] suppressed the key data -- the two parallel photographic databases -- that contradicted their findings. The two secret cameras, greater than 250,000 photos, and detailed logs for 2008 (and 2009) show that DBOC does not disturb the harbor seals, but rather occasional disturbances come from kayakers. Similarly, the additional [redacted] volunteer observation database, photos, and videos for 2008 shows the same -- no bona fide disturbances of the harbor seals by DBOC.

I have enclosed evidence that the flawed [redacted] et al. 2009 paper has taken on a life of its own. It is the main citation in letters from Peter Douglas, Executive Director of the California Coastal Commission, to NOAA to try to insert the CCC into the EIS process for the lease extension of DBOC. On November 23, 2010, I protested the original November 10 letter from Douglas to NOAS in which he asserted data showing harm to harbor seals by DBOC and cited of [redacted] et al. Now Douglas has responded on January 13 with the enclosed letter. See the relevant paragraph from page 5. Douglas claims that the [redacted] paper was peer-reviewed and published and thus any suggestion that it is flawed is incorrect. This is in fact the ONLY evidence that CCC presents to show harm to harbor seals.

In summary, the [redacted] et al. 2009 paper is seriously flawed; the three authors suppressed the key data. They should be reprimanded for misconduct, and the paper should be retracted. This flawed paper serves as the key document for those insisting that NPS has indeed gathered data showing that DBOC harms the harbor seals.

Please do your best to help get this paper purged from the literature so that it stops getting used as evidence to support this false conclusion. You now know that NPS has no such data. The secret cameras, photographs, and detailed logs contradict this conclusion and show that DBOC is not harming the harbor seals.

I'd be happy to discuss this with you in more detail.

Best wishes,

Corey

Peter Douglas, CCC, letter, page 5:

Goodman used these conclusions as examples to support his allegations of "false claims against DBOC" and "false science" that is being spread by the Commission. Clearly, these allegations are unwarranted and inappropriate, as the conclusions drawn by Commission staff are the same as those in the report on which Goodman relies. Goodman also went on to call into question the Commission staffs reference to [redacted] et al. (2009), alleging that [redacted] et al., 2009, your citation #49, is seriously flawed."!' Commission staff notes that [redacted] et al. (2009) has undergone both an internal and external peer review process as well as an extensive evaluation inthe NRC report,

none of which has suggested that this scientific publication is seriously flawed. Further, similar to the discussion included in our supplementary attachment to this letter regarding the NPS report, Drakes Estero: A Sheltered Wilderness Estuary, though aspects of [redacted] *et al. (2009) have been debated, none of this debate has focused on the aspect of this publication that is relevant to its citation by Commission staff, namely, the potential for human activities in close proximity to hauled-out marine mammals to result in disturbances to these animals.*

Frost, Gavin

From: Corey Goodman [corey.goodman@me.com]
Sent: Tuesday, December 21, 2010 6:52 PM
To: Frost, Gavin
Subject: reflections on a note from Peter Douglas
Attachments: CSG to Salazar.11_22_10.pdf; ATT00001..htm; CSG to Douglas.11_23_10.pdf; ATT00002..htm

December 21, 2010

Dear Gavin,

Please find enclosed the reply from Peter Douglas (Executive Director of the California Coastal Commission) to my November 23, 2010 request that he retract his letter to NOAA that is based on false science concerning the oyster farm at Drakes Estero. In his November 10, 2010 letter to NOAA, Mr. Douglas failed to reference (amongst 51 citations) the National Academy of Sciences report from May 5, 2009, a report that refuted most of his scientific claims. In my November 23 letter, I also asked Mr. Douglas to investigate why CCC continues to propagate false science – scientific claims that in several instances the National Park Service either retracted several years ago, or corrected and retracted more recently.

On December 20, 2010, I wrote to Mr. Douglas:

> *"Even though I asked you to "please respond to this request", I have not heard back from you since my November 23 letter to you. Unless I hear otherwise from you, I infer from your month-long silence that you agree with my criticism that you relied on false science when you wrote to NOAA Acting Director Donna Wieting, OCRM, and failed to cite the National Academy of Sciences report from May 5, 2009 that largely dismissed many of your arguments."*

In his reply to my letter on December 21, 2010, Mr. Douglas wrote:

> *"I do not intend to waste taxpayer money, including scarce staff time, on a personal response to your spurious and irresponsible accusations. A discussion of these baseless*

allegations will be contained in the Commission's letter to NOAA that will soon be forthcoming in answer to a letter we received from the DBOC (to which your letter was attached). I don't know what you think you will accomplish by pursuing your bullying tactics. As I made clear at the Commission's meeting in San Francisco last week when one of your fellow travelers made similar sham charges, we will not tolerate tactics of intimidation, demonization of public employees, or the reprehensible politics of personal destruction. I witnessed the appalling spectacle you helped orchestrate last year against professionals who have dedicated their lives to public service and whose integrity is beyond reproach. It was shameful! We will not allow a similar witch hunt to be mounted against the Commission or its staff. We take great pride in our integrity, professionalism, objectivity, and the high quality of our work applying the law to the facts. One thing is certain, in your unrelenting zeal to attack, defame and destroy the credibility of dedicated public servants you and your fellow pecksniffians have cost American taxpayers an inordinate amount of squandered public treasure."

Revealing my background as a scientist and not as a literary scholar, I admit learning a new word from Mr. Douglas' reply: "pecksniffian". It is from the 1850's and based on a character – Seth Pecksniff -- in a Dickens' novel. It means *"hypocritically and unctuously affecting benevolence or high moral principles."* It is a word popularized by Bill O'Reilly a few years ago. It is worth considering who if anyone is being Pecksniffian here.

Three and a half years ago, on August 28, 2007, Marin County Supervisor Steve Kinsey asked me to look at National Park Service science concerning the impacts of Drakes Bay Oyster Company (DBOC) on Drakes Estero, and to come report on that science at a Marin County hearing on May 8, 2007. Kinsey knew my local residence, scientific background and integrity, and deep commitment to the role of good science informing public policy. At the time I was a biology professor at U.C. Berkeley, a biotech entrepreneur, an elected member of the National Academy of Sciences, and former chair of the National Research Council's Board on Life Sciences.

I accepted Kinsey's request out of my dedication to public service. At the Marin County hearing, in my testimony I wrote:

"I believe that public policy decisions can and should be informed by quality science. But this must be science conducted rigorously, without agendas or conflicts-of-interest. The political process can be dangerously misled by bad or misused science. One of my greatest concerns when I see science being invoked in public policy debates is to make

sure that it is good science and not pseudo-science or … a blatant misuse of science."

"My only hesitation in coming forward to testify today is the realization that openly expressing my views as a scientist may cause me to come under personal attack by local groups that are determined to remove Lunny's operation from the PRNS. Nevertheless I feel compelled to speak out for good science instructing public policy."

Mr. Douglas and others have attacked the messenger because they apparently cannot deal with the message – that NPS has been guilty of scientific misconduct in its claims that DBOC is causing harm to the harbor seals. Mr. Douglas has repeatedly accused me of demonizing NPS employees and engaging in the *"politics of personal destruction."*

The NPS harbor seal database does not support the claim that NPS Superintendent (b) (6), (b) (7)(C) made to Supervisor Kinsey on April 5, 2007, when he told him that NPS had overwhelming data of harm to the harbor seals by DBOC. The NPS database shows tha(b) (6), (b) (7)(C) had no such data. (b) (6), (b) (7)(C) false claim to Kinsey started this controversy.

The alleged scientific misconduct by the NPS goes much deeper than that. As of the past seven months, we now know that the NPS has withheld – i.e. suppressed – two additional NPS databases that conclusively show that DBOC has not been disturbing the harbor seals in Drakes Estero.

The NAS, in their May 5, 2009 report, had specifically suggested that time and date-stamped photographs could resolve the controversy over whether the oyster farm was or was not harming the harbor seals. The NPS concealed from the NAS, just as it concealed from the Inspector General and the Marine Mammal Commission, the existence of over three and a half years of just such time and date-stamped photographs.

Starting two years before the NAS report, on May 5, 2007, NPS had two secret cameras, over 250,000 time and date-stamped photographs (taken every minute from dawn to dusk during the several-month pupping season), and detailed minute-to-minute logs of those photos. Those photos showed that Park visitors in kayaks, and not DBOC

boats and workers, have been the occasional source of disturbances to the seals. The withheld NPS data contradicted the public NPS claims. This is scientific misconduct.

President Obama, in his speech on April 27, 2009 to the NAS, sent a powerful message about the integrity of science. The President said:

> *"And we have watched as scientific integrity has been undermined and scientific research politicized in an effort to advance predetermined ideological agendas."*
>
> *"... we are restoring science to its rightful place."*

From the moment Kinsey called me on April 28, 2007, my motivation has been to ensure scientific integrity - that policy is driven by good science.

If Douglas' harsh words make you question my intentions, please listen to and read my words. I gave a keynote talk on this issue to the California Council on Science and Technology on October 18, 2010. You can listen to that talk, and watch the accompanying slides, on YouTube at: www.youtube.com/coreysgoodman

You can also read my words in my November 22, 2010 letter to Interior Secretary Salazar (enclosed) and my November 23, 2010 letter to CCC Executive Director Douglas (enclosed). The letter to Secretary Salazar alleging scientific misconduct by NPS officials and scientists has triggered an investigation by the Department of Interior. Rather than calling me names, the CCC needs to take these allegations seriously and undertake a parallel investigation into their misuse of the same science.

I stand by the intent and integrity of my words, have repeatedly over the past three years tried to engage the California Coastal Commission in a substantive conversation, and thus am saddened by Douglas' repeated personal attacks on me. It is time for the CCC to focus on the message instead of attacking the messenger.

Thus, Mr. Douglas' reply to my recent request is a personal attack on the external

whistleblower. We might write it off due to his illness were it not for the appearance of very similar words, and very similar tone and attitude, in emails I received from Douglas in December 2007 and January 2008 when I first asked him, and his staff scientist Dr. John Dixon, if they would look at the NPS harbor seal database with me. Dr. Dixon had admitted not knowing about the NPS database, and having relied on a single controversial data point – the NPS April 26, 2007 Trip Report – in making his September 11, 2007 report to the CCC.

In an email to me on December 23, 2007, Mr. Douglas accused me of being out to "*demonize*" Park employees. He accused me of "*fueling this mission with vitriolic rhetoric, spurious charges and personal defamatory accusation.*" This was written to me after I asked Mr. Douglas, and Dr. Dixon, if they would review the NPS harbor seal data and compare it to the NPS and CCC reports about the impact of the oyster farm on the harbor seals.

I wrote back to Mr. Douglas on December 24, 2007 suggesting it was:

> " *the right time for the two of us to sit down and talk about these issues.*"

He wrote back to me on December 25, 2007:

> "*I also see no justification for spending any more time at public expense on what is obviously a misguided and spurious investigation ....*"

I wrote to Mr. Douglas on January 6, 2008:

> "*You asked me how and why I view this differently from you, but then when I offered to get together to answer your questions, you did not respond. You seem puzzled by my claims of scientific misconduct on the part of NPS. I am fully prepared to discuss this with you. But I am equally puzzled by your claims that the California Coastal Commission has its own data of disturbances of harbor seals that is independent of the NPS, and that validates the NPS claims, and I hope you too will discuss that with me. In fact, I was hoping that you would send me your independent data prior to our meeting so that I might be able to take a look at it. If I am wrong and you do indeed have independent harbor seal disturbance data for Drakes Estero, then I will stand corrected*

and will say so."

On January 11, 2008, Mr. Douglas wrote back to me:

> *"Nor do I see the value in spending time for a meeting on the issues you have raised nor do I think it is a good use of John's time."*

In a parallel exchange with Dr. John Dixon on December 24, 2007, I wrote:

> *"In the process of reviewing the science, I naturally read your report of September 11 [Dr. Dixon's report on the oyster farm to the CCC] with great interest. I am under the impression that you did not collect your own independent harbor seal data, and that you did not do your own independent analysis of the NPS harbor seal database. Rather, my understanding is that you relied upon information provided to you by the NPS including in particular the April 26 Trip Report that you cited, and the map that accompanies it. Could you please let me know if that is indeed correct. If you do have your own independent harbor seal data, could you please send it to me. Thanks very much. I want to make sure that I am fully informed and do not want to misrepresent your sources of harbor seal data. I would appreciate the opportunity to discuss this with you."*

On January 11, 2008, Dr. Dixon wrote back to me:

> *"I perused* [your submissions] *briefly and will review them carefully if my agency decides that is a good use of my time. Similarly, if there is an agency reason to do so, I would be happy to analyze any of the NPS data. However, this would not be a trivial undertaking and would require a significant commitment of time. Given budget constraints and the Coastal Commission's mandate, I think it is unlikely that I will be asked to pursue such analyses. Short of a directive from my agency, I will not participate in any discussions regarding Drake's Estero and the associated oyster mariculture."*

Mr. Douglas repeated the same false harbor seal claims in his recent November 10, 2010 letter to NOAA Director Wieting. Mr. Douglas wrote:

> *"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within*

Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water."

As the basis for this statement, Douglas cited the Becker, Press, and Allen 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should inform CCC that the NPS claims were incorrect, that the photos and logs refute those claims, and that the Becker et al. 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal). In my letter to Douglas on November 23, 2010, I informed him that the Becker et al., 2009 was flawed.

Thus, in December 2007 just as in December 2010, CCC Mr. Douglas refused to consider the scientific facts, and instead engaged in the "politics of personal destruction". Maybe Pecksniffian is indeed an appropriate word here. We deserve better from the California Coastal Commission.

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

corey.goodman@me.com

415 663-9495

Begin forwarded message:

From: Peter Douglas <pdouglas@coastal.ca.gov>
Date: December 21, 2010 9:45:21 AM PST
To: Corey Goodman <corey.goodman@me.com>
Subject: RE: CCC Douglas letter to NOAA Wieting contains knowingly false science

Corey – I do not intend to waste taxpayer money, including scarce staff time, on a personal response to your spurious and irresponsible accusations. A discussion of these baseless allegations will be contained in the Commission's letter to NOAA that will soon be forthcoming in answer to a letter we received from the DBOC (to which your letter was attached). I don't know what you think you will accomplish by pursuing your bullying tactics. As I made clear at the Commission's meeting in San Francisco last week when one of your fellow travelers made similar sham charges, we will not tolerate tactics of intimidation, demonization of public employees, or the reprehensible politics of personal destruction. I witnessed the appalling spectacle you helped orchestrate last year against professionals who have dedicated their lives to public service and whose integrity is beyond reproach. It was shameful! We will not allow a similar witch hunt to be mounted against the Commission or its staff. We take great pride in our integrity, professionalism, objectivity, and the high quality of our work applying the law to the facts. One thing is certain, in your unrelenting zeal to attack, defame and destroy the credibility of dedicated public servants you and your fellow pecksniffians have cost American taxpayers an inordinate amount of squandered public treasure. Peter douglas

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From: Corey Goodman [mailto:corey.goodman@me.com]
Sent: Monday, December 20, 2010 10:52 AM
To: Peter Douglas
Cc: donna.wieting@noaa.gov
Subject: Fwd: CCC Douglas letter to NOAA Wieting contains knowingly false science

Dear Peter,

Even though I asked you to "please respond to this request", I have not heard back from you since my November 23 letter to you. Unless I hear otherwise from you, I infer from your month-long silence that you agree with my criticism that you relied on false science when you wrote to NOAA Acting Director Donna Wieting, OCRM, and failed to cite the National Academy of Sciences report from May 5, 2009 that largely dismissed many of your arguments.

Did you give my email and letters to the CCC Commissioners as I requested? What action have they taken?

I wrote to you:

"You are charged by the people of California with conducting your "*affairs in an open, objective, and impartial manner free of undue influence and the abuse of power and authority.*" It appears as if your use of science – or in this case misuse of science -- concerning DBOC and Drakes Estero has not been objective and has not been impartial. I request that you investigate these allegations. If you are not capable of having an "*open, objective, and impartial*" investigation of your own conduct, then I request that you hand such an investigation over to another impartial State agency. Two elected members of the National Academy of Science – Dr. Peter Gleick and I – have warned you repeatedly of your repeated use of false science. It certainly needs to be investigated why you have repeatedly ignored a detailed report by the most prestigious scientific body in our country – the National Academy of Sciences – and why you continue to quote National Park Service documents that have been discredited and retracted. Only an open and transparent investigation will help clear the air. Please respond to this request for a retraction and an investigation in a timely fashion. Kindly provide me with information on whether you plan to retract your letter, investigate your use of science, how you plan to proceed, who

will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public."

Have you begun such an investigation into the CCC misuse of science? Is your organization capable of investigating itself? Should you and/or I turn to some other State agency to request such an investigation of scientific misconduct by the CCC?

I look forward to hearing from you.

Sincerely yours,

Corey

Corey Goodman, Ph.D.

Begin forwarded message:

From: Corey Goodman <corey.goodman@me.com>
Date: November 23, 2010 5:54:32 PM PST
To: Peter Douglas <pdouglas@coastal.ca.gov>
Subject: CCC Douglas letter to NOAA Wieting contains knowingly false science

Dear Peter,

On November 10, 2010, you wrote a letter to NOAA Acting Director Donna Wieting, OCRM, concerning scientific claims of harm by Drakes Bay Oyster Company to the ecology of Drakes Estero, Point Reyes National Seashore, California. That letter contained false scientific claims. Please find enclosed a letter from me to you in which I describe why those scientific claims are false, why you knew or should have known that those claims were false and had been both retracted and discredited, and why you should retract your letter, retract any similar letters or documents, and refrain from making similar false statements. Please read my letter to learn the details of his false claims.

I would be happy to discuss this with you. Please contact me if you would like any additional information, or if I can answer any questions (corey.goodman@me.com).

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

Frost, Gavin

From:	Gary, Art
Sent:	Wednesday, December 22, 2010 5:08 PM
To:	Frost, Gavin
Subject:	FW: reflections on a note from Peter Douglas
Attachments:	CSG to Salazar.11_22_10.pdf; ATT00001.htm; CSG to Douglas.11_23_10.pdf; ATT00002.htm

(b) (5)

Arthur E. Gary
Deputy Solicitor
U.S. Department of the Interior
(202) 208-4423
(202) 208-5584 (Fax)

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From: Shafroth, William
Sent: Wednesday, December 22, 2010 7:05 PM
To: Russell, Lisa; Gary, Art; Wenk, Dan
Subject: FW: reflections on a note from Peter Douglas

Will Shafroth
Principal Deputy Assistant Secretary
for Fish and Wildlife and Parks
Department of the Interior
1849 C Street, NW, Room 3159
Washington, D.C. 20009
202-208-5347 (phone)

From: Corey Goodman [corey.goodman@me.com]
Sent: Tuesday, December 21, 2010 8:52 PM
To: Strickland, Thomas; Shafroth, William
Subject: reflections on a note from Peter Douglas

December 21, 2010

Dear Mr. Strickland,

Please find enclosed the reply from Peter Douglas (Executive Director of the California Coastal Commission) to my November 23, 2010 request that he retract his letter to NOAA that is based on false science concerning the oyster farm at Drakes Estero. In his November 10, 2010 letter to NOAA, Mr. Douglas failed to reference (amongst 51 citations) the National Academy of Sciences report from May 5, 2009, a report that refuted most of his scientific claims. In my November 23 letter, I also asked Mr. Douglas to investigate why CCC continues to propagate false science – scientific claims that in several instances the National Park Service either retracted several years ago, or corrected and retracted more recently.

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Mr. Douglas and others have attacked the messenger because they apparently cannot deal with the message - that NPS has been guilty of scientific misconduct in its claims that DBOC is causing harm to the harbor seals. Mr. Douglas has repeatedly accused me of demonizing NPS employees and engaging in the *"politics of personal destruction."*

The NPS harbor seal database does not support the claim that NPS Superintendent [redacted] made to Supervisor Kinsey on April 5, 2007, when he told him that NPS had overwhelming data of harm to the harbor seals by DBOC. The NPS database shows that [redacted] had no such data. [redacted] false claim to Kinsey started this controversy.

The alleged scientific misconduct by the NPS goes much deeper than that. As of the past seven months, we now know that the NPS has withheld – i.e. suppressed – two additional NPS databases that conclusively show that DBOC has not been disturbing the harbor seals in Drakes Estero.

The NAS, in their May 5, 2009 report, had specifically suggested that time and date-stamped photographs could resolve the controversy over whether the oyster farm was or was not harming the harbor seals. The NPS concealed from the NAS, just as it concealed from the Inspector General and the Marine Mammal Commission, the existence of over three and a half years of just such time and date-stamped photographs.

Starting two years before the NAS report, on May 5, 2007, NPS had two secret cameras, over 250,000 time and date-stamped photographs (taken every minute from dawn to dusk during the several-month pupping season), and detailed minute-to-minute logs of those photos. Those photos showed that Park visitors in kayaks, and not DBOC boats and workers, have been the occasional source of disturbances to the seals. The withheld NPS data contradicted the public NPS claims. This is scientific misconduct.

President Obama, in his speech on April 27, 2009 to the NAS, sent a powerful message about the integrity of science. The President said:

> *"And we have watched as scientific integrity has been undermined and scientific research politicized in an effort to advance predetermined ideological agendas."*
>
> *"… we are restoring science to its rightful place."*

From the moment Kinsey called me on April 28, 2007, my motivation has been to ensure scientific integrity - that policy is driven by good science.

If Douglas' harsh words make you question my intentions, please listen to and read my words. I gave a keynote talk on this issue to the California Council on Science and Technology on October 18, 2010. You can listen to that talk, and watch the accompanying slides, on YouTube at: www.youtube.com/coreysgoodman

You can also read my words in my November 22, 2010 letter to Interior Secretary Salazar (enclosed) and my November 23, 2010 letter to CCC Executive Director Douglas (enclosed). The letter to Secretary Salazar alleging scientific misconduct by NPS officials and scientists has triggered an investigation by the Department of Interior. Rather than calling me names, the CCC needs to take these allegations seriously and undertake a parallel investigation into their misuse of the same science.

I stand by the intent and integrity of my words, have repeatedly over the past three years tried to engage the California Coastal Commission in a substantive conversation, and thus am saddened by Douglas' repeated personal attacks on me. It is time for the CCC to focus on the message instead of attacking the messenger.

Thus, Mr. Douglas' reply to my recent request is a personal attack on the external whistleblower. We might write it off due to his illness were it not for the appearance of very similar words, and very similar tone and attitude, in emails I received from Douglas in December 2007 and January 2008 when I first asked him, and his staff scientist Dr. John Dixon, if they would look at the NPS harbor seal database with me. Dr. Dixon had admitted not knowing about the NPS database, and having relied on a single controversial data point - the NPS April 26, 2007 Trip Report - in making his September 11, 2007 report to the CCC.

In an email to me on December 23, 2007, Mr. Douglas accused me of being out to "*demonize*" Park employees. He accused me of "*fueling this mission with vitriolic rhetoric, spurious charges and personal defamatory accusation.*" This was written to me after I asked Mr. Douglas, and Dr. Dixon, if they would review the NPS harbor seal data and

compare it to the NPS and CCC reports about the impact of the oyster farm on the harbor seals.

I wrote back to Mr. Douglas on December 24, 2007 suggesting it was:

> " *the right time for the two of us to sit down and talk about these issues.*"

He wrote back to me on December 25, 2007:

> "*I also see no justification for spending any more time at public expense on what is obviously a misguided and spurious investigation ....*"

I wrote to Mr. Douglas on January 6, 2008:

> "*You asked me how and why I view this differently from you, but then when I offered to get together to answer your questions, you did not respond. You seem puzzled by my claims of scientific misconduct on the part of NPS. I am fully prepared to discuss this with you. But I am equally puzzled by your claims that the California Coastal Commission has its own data of disturbances of harbor seals that is independent of the NPS, and that validates the NPS claims, and I hope you too will discuss that with me. In fact, I was hoping that you would send me your independent data prior to our meeting so that I might be able to take a look at it. If I am wrong and you do indeed have independent harbor seal disturbance data for Drakes Estero, then I will stand corrected and will say so.*"

On January 11, 2008, Mr. Douglas wrote back to me:

> *"Nor do I see the value in spending time for a meeting on the issues you have raised nor do I think it is a good use of John's time."*

In a parallel exchange with Dr. John Dixon on December 24, 2007, I wrote:

> *"In the process of reviewing the science, I naturally read your report of September 11 [Dr. Dixon's report on the oyster farm to the CCC] with great interest. I am under the impression that you did not collect your own independent harbor seal data, and that you*

did not do your own independent analysis of the NPS harbor seal database. Rather, my understanding is that you relied upon information provided to you by the NPS including in particular the April 26 Trip Report that you cited, and the map that accompanies it. Could you please let me know if that is indeed correct. If you do have your own independent harbor seal data, could you please send it to me. Thanks very much. I want to make sure that I am fully informed and do not want to misrepresent your sources of harbor seal data. I would appreciate the opportunity to discuss this with you."

On January 11, 2008, Dr. Dixon wrote back to me:

"I perused [your submissions] *briefly and will review them carefully if my agency decides that is a good use of my time. Similarly, if there is an agency reason to do so, I would be happy to analyze any of the NPS data. However, this would not be a trivial undertaking and would require a significant commitment of time. Given budget constraints and the Coastal Commission's mandate, I think it is unlikely that I will be asked to pursue such analyses. Short of a directive from my agency, I will not participate in any discussions regarding Drake's Estero and the associated oyster mariculture."*

Mr. Douglas repeated the same false harbor seal claims in his recent November 10, 2010 letter to NOAA Director Wieting. Mr. Douglas wrote:

"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water."

As the basis for this statement, Douglas cited the Becker, Press, and Allen 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should inform CCC that the NPS claims were incorrect, that the photos and logs refute those claims, and that the Becker et al. 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal). In my letter to Douglas on November 23, 2010, I informed him that the Becker et al., 2009 was flawed.

Thus, in December 2007 just as in December 2010, CCC Mr. Douglas refused to consider the scientific facts, and instead engaged in the "politics of personal destruction". Maybe Pecksniffian is indeed an appropriate word here. We deserve better from the California Coastal Commission.

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

corey.goodman@me.com

415 663-9495

Begin forwarded message:

From: Peter Douglas <pdouglas@coastal.ca.gov>
Date: December 21, 2010 9:45:21 AM PST
To: Corey Goodman <corey.goodman@me.com>
Subject: RE: CCC Douglas letter to NOAA Wieting contains knowingly false science

Corey – I do not intend to waste taxpayer money, including scarce staff time, on a personal response to your spurious and irresponsible accusations. A discussion of these baseless allegations will be contained in the Commission's letter to NOAA that will soon be forthcoming in answer to a letter we received from the DBOC (to which your letter was attached). I don't know what you think you will accomplish by pursuing your bullying tactics. As I made clear at the Commission's meeting in San Francisco last week when one of your fellow travelers made similar sham charges, we will not tolerate tactics of intimidation, demonization of public employees, or the reprehensible politics of personal destruction. I witnessed the appalling spectacle you helped orchestrate last year against professionals who have dedicated their lives to public service and whose integrity is beyond reproach. It was shameful! We will not allow a similar witch hunt to be mounted against the Commission or its staff. We take great pride in our integrity, professionalism, objectivity, and the high quality of our work applying the law to the facts. One thing is certain, in your unrelenting zeal to attack, defame and

destroy the credibility of dedicated public servants you and your fellow pecksniffians have cost American taxpayers an inordinate amount of squandered public treasure. Peter douglas

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From: Corey Goodman [mailto:corey.goodman@me.com]
Sent: Monday, December 20, 2010 10:52 AM
To: Peter Douglas
Cc: donna.wieting@noaa.gov
Subject: Fwd: CCC Douglas letter to NOAA Wieting contains knowingly false science

Dear Peter,

Even though I asked you to "please respond to this request", I have not heard back from you since my November 23 letter to you. Unless I hear otherwise from you, I infer from your month-long silence that you agree with my criticism that you relied on false science when you wrote to NOAA Acting Director Donna Wieting, OCRM, and failed to cite the National Academy of Sciences report from May 5, 2009 that largely dismissed many of your arguments.

Did you give my email and letters to the CCC Commissioners as I requested? What action have they taken?

I wrote to you:

"You are charged by the people of California with conducting your "*affairs in an open, objective, and impartial manner free of undue influence and the abuse of power and authority.*" It appears as if your use of science – or in this case misuse of science -- concerning DBOC and Drakes Estero has not been objective and has not been impartial. I request that you investigate these allegations. If you are not capable of having an "*open, objective, and impartial*" investigation of your own conduct, then I request that you hand such an investigation over to another impartial State agency. Two elected members of the National Academy of Science – Dr. Peter Gleick and I – have warned you repeatedly of your repeated use of false science. It certainly needs to be investigated why you have repeatedly ignored a detailed report by the most prestigious scientific body in our country – the National Academy of Sciences – and why you continue to quote National Park Service documents that have been discredited and retracted. Only an open and transparent investigation will help clear the air. Please respond to this request for a retraction and an investigation in a timely fashion. Kindly provide me with information on whether you plan to retract your letter, investigate your use of science, how you plan to proceed, who will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public."

Have you begun such an investigation into the CCC misuse of science? Is your organization capable of investigating itself? Should you and/or I turn to some other State agency to request such an investigation of scientific misconduct by the CCC?

I look forward to hearing from you.

Sincerely yours,

Corey

Corey Goodman, Ph.D.

Begin forwarded message:

From: Corey Goodman <corey.goodman@me.com>
Date: November 23, 2010 5:54:32 PM PST
To: Peter Douglas <pdouglas@coastal.ca.gov>
Subject: CCC Douglas letter to NOAA Wieting contains knowingly false science

Dear Peter,

On November 10, 2010, you wrote a letter to NOAA Acting Director Donna Wieting, OCRM, concerning scientific claims of harm by Drakes Bay Oyster Company to the ecology of Drakes Estero, Point Reyes National Seashore, California. That letter contained false scientific claims. Please find enclosed a letter from me to you in which I describe why those scientific claims are false, why you knew or should have known that those claims were false and had been both retracted and discredited, and why you should retract your letter, retract any similar letters or documents, and refrain from making similar false statements. Please read my letter to learn the details of his false claims.

I would be happy to discuss this with you. Please contact me if you would like any additional information, or if I can answer any questions (corey.goodman@me.com).

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

April 28, 2010

To: Dr. Tim Ragen, Marin Mammal Commission

From: Dr. Corey Goodman, Marshall, CA; member, National Academy of Sciences

RE: **Harbor seal disturbance data: April 29, 2007 should be eliminated**

Note: at the request of the MMC, this document is a revised version of the January 18, 2009 document provided to the NAS panel. As such, its focus is on the 2007 disturbance events, with a focus on April 29, 2007.

When NPS scientist Dr. Ben Becker made his presentation to the NAS panel on September 4, 2008, some of his most important conclusions were based upon NPS records of disturbances to harbor seals by Drakes Bay Oyster Company (DBOC) in 2007. Kevin Lunny was suspicious of those data, and went back to examine the dates and times of the events that Becker cited. He continued to be struck by the fact that all of the "mariculture-related" disturbances in 2007 cited by the NPS occurred in less than two weeks prior to the May 8, 2007 Marin County Board of Supervisors hearing.

Becker told the NAS panel that DBOC had caused six disturbance events in 2007, all during that two-week period, and based powerful conclusions on a statistical analysis of those events. Lunny knew that I had already debunked four of those six 2007 disturbance events (three events on April 26, entered into the database nine months after the date, and one event on May 8, the day of the Marin County hearing). Lunny focused on the remaining pair of disturbance events that occurred fifty minutes apart on April 29, 2007. He was suspicious. April 29, 2007 was a Sunday. Lunny's oyster harvesters typically don't work on Sundays, and according to DBOC business records, they didn't that Sunday. Lunny looked at the tides for that day. They looked too high to him.

After discussing his suspicions with John Hulls (at the time, science correspondent, Pt. Reyes Light newspaper) and me in September, Lunny took three actions. First, Lunny contacted Dr. John Largier (Bodega Bay Marine Lab, U.C. Davis) to ask for his help, given his tidal buoy in Drakes Estero, in comparing the Pt. Reyes NOAA tidal buoy outside the estero in the ocean vs. the tidal lag at the inner sandbars inside Drakes Estero. Second, he asked John Hulls to find a date with similar tides in which he could directly examine and photograph the tidal conditions at the relevant inner sandbars in Drakes Estero. Hulls conducted his experiment on January 1 and 2, 2009.

Finally, Lunny asked me to look at Largier's tidal numbers and Hull's experimental results, and to compare them to the NPS harbor seal database, survey records, and Becker's paper and presentation to your panel. On October 25, 2008, I wrote to the NAS panel stating that the April 29, 2007 disturbance events were suspicious in that DBOC time card and payroll records showed that only one DBOC employee was working that Sunday, and it was Lunny's daughter selling oysters at the onshore retail counter. At that time I had not yet examined the details of the April 29 disturbance events, forms,

Conclusions

(1) The harbor seal disturbance events attributed to Drakes Bay Oyster Company (DBOC) on April 29, 2007 are not credible. No such disturbances could have occurred as described -- the tide was too high; the workers were not working. These data failed the NPS I&M harbor seal database QA/QC protocols and never should have been entered into the NPS database. These data failed the QA/QC protocols that Becker presented to the NAS panel on September 4, 2008 and never should have been presented to either the NAS or MMC panels. These data failed the QA/QC protocols in the Becker et al. paper in press in Marine Mammal Science and never should have been included in that paper.

(2) None of the harbor seal disturbance events attributed to DBOC during Kevin Lunny's three-year ownership of DBOC (2005-2007) are credible. Much of these data as described in NPS presentations and publications to the NAS panel are disputed and suspicious and do not pass the NPS I&M harbor seal database management QA/QC protocols and procedures.

(3) The only mariculture-related disturbances in the NPS I&M harbor seal database that may be credible from 1996 to 2007 are two disturbances in 1996 and two in 2003.

(4) Becker's presentation to the NAS panel on September 4, 2008, and his paper published in Marine Mammal Science, cherry-picked data by relying solely on the small number of disputed disturbances purported to be caused by the oyster farm, and completely excluded the hundreds of records of disturbances, mostly by Park visitors, of harbor seals that led to many thousands of seals getting flushed into the water during pupping season.

(5) After objections were filed concerning the first version of Becker's paper -- Becker I, he and colleagues further cherry-picked the NPS database and changed certain numbers and statistical analyses in resubmitting the second version – Becker II. The cherry-picked data, including 1996, 2006, and 2007 data that disputed, permitted Becker and colleagues to draw the unsubstantiated conclusion that the number of mariculture-related harbor seal disturbances increased as the number of harvested oysters increased.

(6) The preponderance of evidence supports the conclusion that disputed data and analyses, cherry-picked data, and data that did not pass NPS QA/QC protocols were presented to the NAS panel, and subsequently to the MMC panel.

April 29, 2007: Historical Context for Disturbance Record

To appreciate the importance of the April 29, 2007 disturbance events (as entered in the NPS I&M harbor seal database) requires understanding the historical context of that date within the broader discussions and NPS claims from 2005-2007. In particular, April 29, 2007 – and its purported disturbance events – took place twenty-four days after the April 5 meeting between PRNS Superintendent Don Neubacher and Marin County Supervisor Steve Kinsey during which Neubacher told Kinsey that NPS had data showing serious harm to the harbor seals in Drakes Estero caused by Drakes Bay

April 29, 2007: Observations Inconsistent with Business Practice

The April 29, 2007 entries into the NPS I&M harbor seal database are based upon a PRNS Harbor Seal Disturbance Survey form for that day filled out by "E + D Leite" (observers #142 and #143). Below is what their survey form reported.

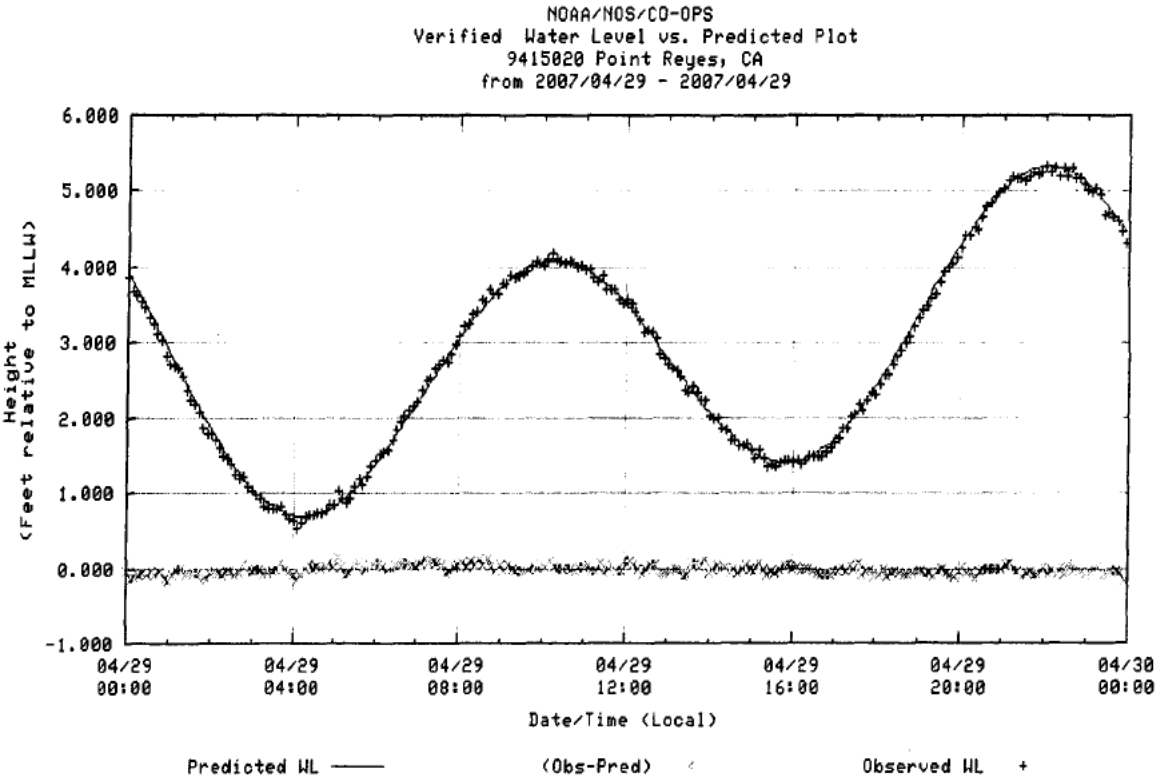
At 12:50, a motorboat flushed one seal from sandbar UEN. They wrote: *"mom & pup flushed when boat accelerated toward Bull Point from N. end of OB channel after throwing out bags."* The distance from the UEN haul-out site to the location of this motorboat would have been about one half mile or approximately 2,400 feet. This is equivalent to six to eight football fields in length.

At 13:40, the form recorded a second disturbance. A motorboat flushed five seals from sandbar UEN. The observers wrote: *"boat returned, threw more bags, left again."*

On April 22, 2008, the NPS, California Coastal Commission (CCC), and Lunny jointly adopted a new protocol stating that oyster boats are required to stay at least 300 feet away from seals to avoid disturbing them. This protective zone was established by NPS and CCC based upon the Marine Mammal Protection Act and recommendations from both the National Oceanic and Atmospheric Administration (NOAA) and California Department of Fish and Game. The distance described between the flushed seals and the purported oyster boat that allegedly disturbed them on April 29, 2007 – approximately 2,400 feet– was eight-fold further away than the NPS, CCC, NOAA, and CDFG agreed upon 300-foot protective zone.

According to Kevin Lunny, owner of DBOC, and Luis Armienta, one of the managers of his oyster farm, the April 29, 2007 disturbance records are inconsistent with their business practice and are nearly impossible to have occurred as described. Not only were none of the DBOC oyster harvesters working on Sunday April 29, 2007, but the times and distances are suspicious. The observers recorded that an oyster boat flushed a seal at sandbar UEN at 12:50 after throwing out oyster bags, and then returned and threw out more bags and flushed more seals at 13:40, fifty minutes later.

The members of the MMC panel that visited Drakes Estero on February 22, 2010 will remember that it takes twenty minutes or more to travel by boat from the oyster farm at the top of Schooner Bay, out along Schooner Bay, into the larger estero, and then along a circuitous route to sandbars UEN and OB. Traveling back and forth to sandbar UEN is so time consuming that oyster workers typically only make the trip once, not twice, per day to deposit oyster bags. It takes 20 minutes to motor back in, and 20 minutes to motor back out. Once at the dock of the oyster farm, it takes 20 minutes or so to prepare and load the boat with additional oyster bags, and this does not account for additional break time. As described by manager Armienta, this seldom happens – oyster workers motor out once and drop off oyster bags. There simply was not enough time on April 29 from 12:50 to 13:40 for the boat to return to the dock, pick up more bags, and motor back out to sandbar UEN. According to Armienta, it is hard to imagine that the events occurred as described (let alone the fact that none of the oyster workers were working that day).

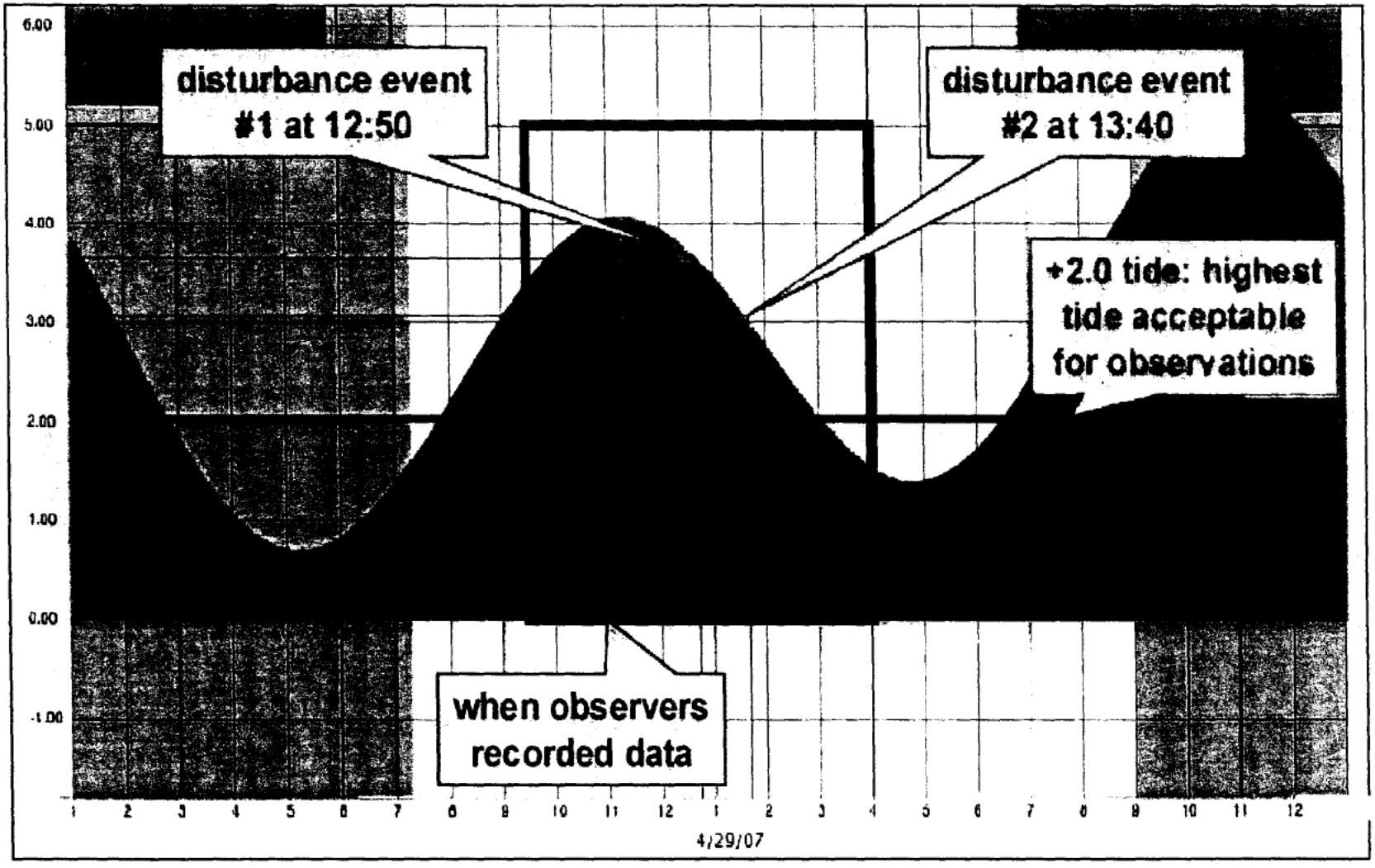


To determine the Drakes Estero lag time more precisely, Kevin Lunny wrote to Dr. John Largier (Bodega Bay Marine Laboratory, U.C. Davis) and asked for his correction based upon his buoy inside Drakes Estero relative to the Pt. Reyes NOAA buoy. Based on data from his buoy, Largier responded to Lunny's inquiry by writing that at the mouth of Schooner Bay (further into Drakes Estero than the sandbars UEN and OB), the correction is a 1.4 hr lag at high tide and a 1.7 hr lag at low tide compared to the Pt. Reyes NOAA buoy. The lag would be less at the sandbars UEN and OB.

At the request of Kevin Lunny, John Hulls designed and conducted an experiment to examine the tidal heights and sandbars in Drakes Estero at tides comparable to April 29, 2007. On January 1 and 2, 2009, Hulls measured the high tide at sandbar OB and determined that it had about a 1.3 hr lag at compared to the Pt. Reyes NOAA buoy tide chart. This is consistent with Largier's 1.4 hr lag further up the estero. Thus, in considering the lag from the Pt. Reyes NOAA buoy to sandbars UEN and OB, here I use a 1 hr lag (although the true lag is probably closer to the 1.3 hr lag measured by Hulls). A longer lag would make the tides higher at the reported times.

The graph on top of the next page presents the April 29, 2007 tide as on the Pt. Reyes NOAA buoy graph but from the "Mr. Tides" web site which provides an hourly time scale for better resolution. The time scale is for the ocean outside Drakes Estero.

tides at sandbars UEN and OB inside Drakes Estero for April 29, 2007



(see below) that state that observers should only make observations when the tides are below +2.0 ft. The +2.0 level is marked on the graphs on pages 9, 10, 13, and 14.

In his data collection of January 1 and 2, 2009, John Hulls noted when the very highest point on UEN and OB first rose above the water. At UEN, this was just at +3.0 ft. However, the highest location on UEN, Hulls noted, was some distance further west from the eastern sandbar adjacent to the deep channel where the seals haul-out. At sandbar OB, the highest location appeared at a tide of around +2.0 ft. The tide had to get lower at each location to have any considerable extent of the haul-out sites exposed and dry, particularly the haul-out sites immediately adjacent to the eastern deep channel from which the seals haul-out.

John Hulls photographed the estero, with particular reference to sandbars UEN and OB, at the times on January 2, 2009 at which the tides were similar to those reported in the disturbance records from April 29, 2007. He concluded that sandbars UEN and OB were under water at the times at which the observers claimed to have seen oyster workers flush seals into the water. All of Hulls' photographs and data are available upon request (see Hulls' report).

April 29, 2007: Disturbance Survey Violated NPS Protocols

Hester et al. (NPS July 2004: "Pinniped Long-Term Monitoring Program, San Francisco Area Network of Parks") is the handbook that from 2005-2007 provided the protocols and procedures for the PRNS harbor seal monitoring program. Hester et al. wrote:

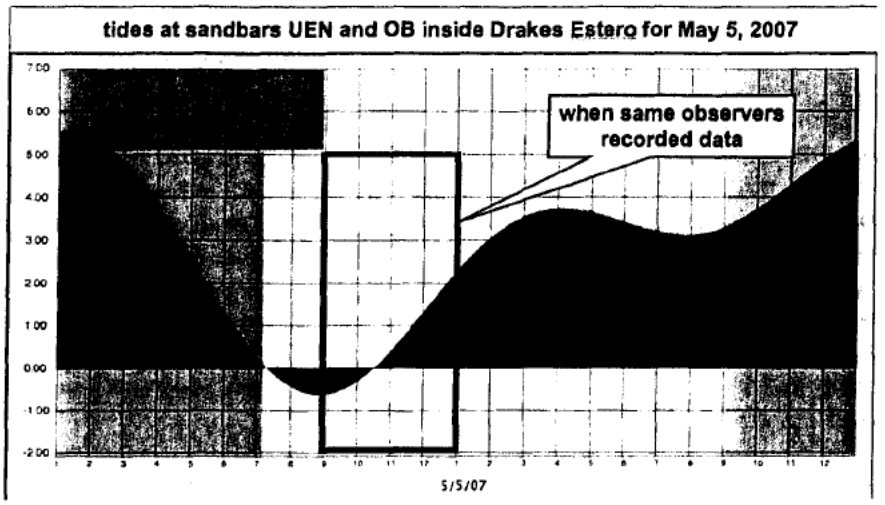
> *"To maximize the number of seals on the haul out site, surveys should be conducted between a medium (2.5 ft) to a low (-1.0 ft) tide level during mid-day."*

On page 23, Hester et al. wrote concerning when to conduct a harbor seal surveys:

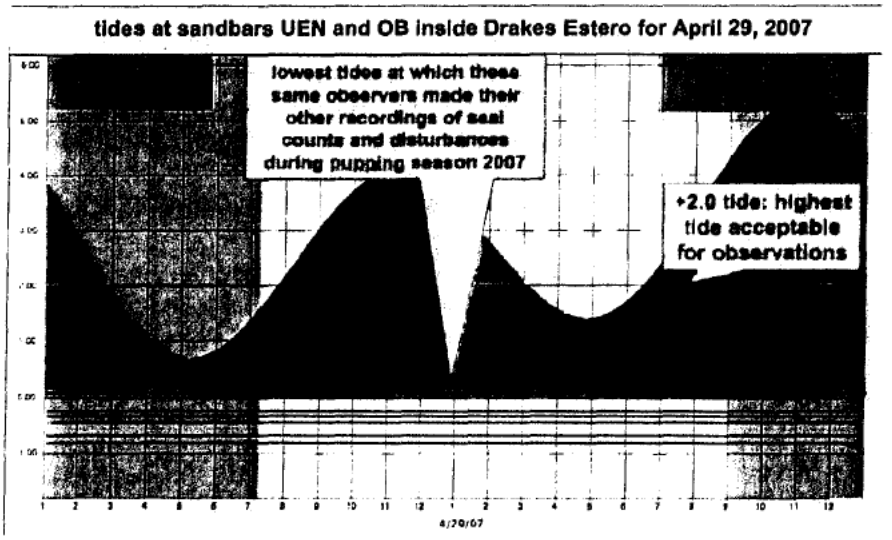
> *"Ideally +2.0 ft tide or less."*

The observations by E + D Leite on April 29, 2007 did not follow that protocol. This single fact should have disqualified these observations from being entered into the NPS I&M harbor seal database. The tide was above +2.0 – it was above +3.5 ft and +3.0 ft respectively for the two disturbances -- when they claimed to have observed oyster workers flushing the seals. The sandbars were under water. Given the shape of the tide chart for April 29, 2007, they probably should not have been making observations at all on that day, and certainly not during the period during which they recorded DBOC disturbances.

According to NPS protocols, the tides were mostly inappropriate during mid-day on April 29, 2007. For sandbars UEN & OB, the only time period during which the Leites could have picked a two-hour observation period and met the NPS protocols would have been during the three hours from 15:15 to 18:15 (around the low tide of +1.4). However, the Leites made their observations from 9:30 to 16:00, with disturbance records at 12:50 and 13:40 and seal counts at 14:15 and 15:15. They acknowledged this



With the exception of April 29, 2007, the Leites made their other 7 observations during pupping season according to NPS protocols. They observed disturbances and counted seals at tides of -0.8, -0.7, -0.4, -0.3, -0.3, 0.0, and +0.1 ft on the other dates. April 29, 2007 was the outlier. This is shown graphically below.



On April 29, the Leites made disturbance observations at +7.5 hr and +8.5 hr relative to the lowest low tide of +0.7 ft that occurred in darkness at 5:15, and at -4.0 hr and -3.0 hr relative to the high low tide of +1.4 ft that occurred in the late afternoon at 16:49.

The disturbance records on April 29 were made above a +3.0 ft tide. With the exception of April 29, 2007, the Leites made their other observations during the 2007 pupping season on days in which the lowest low tide was significantly less than +2.0 during daylight hours. On six dates, they made their observations at the low tide. On two dates, they made their observations either one hour before or one hour after the low low tide. Only on April 29 did they make their observations seven-eight hours after the low

September 4, 2008, and Becker's written QA/QC protocols in this paper and thus should not have been included in his paper in press in Marine Mammal Science journal.

The April 29, 2007 disturbance data are not credible. Disturbances to harbor seals by oyster workers could not have occurred as described. It was a Sunday. Time cards and pay records reveal that the oyster harvesters were not working. The UEN and OB sandbars were under water. The observers refer to an oyster boat that by their own description was approximately one half mile – approximately 2400 ft. or six to eight football fields -- away from the harbor seal haul-out site.

The NPS official overseeing the NPS I&M database should never have entered this data in the database. Dr. Ben Becker and his colleagues should never have included this data in their paper. This was the **first** entry in the NPS database (as provided to me on August 13, 2007) of an oyster worker disturbing a harbor seal in the two and one-half years during which Lunny had owned DBOC. And these critical (and false) observations were made nine days before the May 8, 2007 hearing.

The NPS needed these disturbance data to support Neubacher's accusations to Supervisor Kinsey twenty-four days earlier (April 5), and the conclusions they were about to make publicly on May 8. These key disturbances were the only such events in the NPS database on May 8 when Don Neubacher and Sarah Allen testified about harbor seal disturbances caused by DBOC to the Marin County Board of Supervisors.

Disturbance Events Cited in Becker I & Becker II Papers Included Disputed and Suspicious Records

The first version of the Becker et al. paper (Becker I - in press in the Marine Mammal Science journal) was submitted to your panel on June 3, 2008, and presented to the NAS panel by Becker on September 4, 2008. To correlate mariculture-related disturbances with harvested pounds of oysters, Becker I focused on oyster-related disturbance events from 2000-2007.

According to what Becker told the NAS panel, he went through the NPS I&M harbor seal database *"disturbance event by disturbance event"* with the NPS database manager (David Press, a co-author of the Becker paper). Do the disturbance events Becker cited meet the standard to be included in a publication and to be presented to the NAS panel as evidence that the oyster farm is harming the harbor seals? Do these events constitute bona fide mariculture-related disturbances? No.

Becker I listed one mariculture-related disturbance event in 2006 and six mariculture-related disturbances in 2007. However, none of these records are credible.

Once we eliminate those disturbance events that are not credible, we are left with zero disturbance events caused by the oyster farm over the three-year period 2005-2007. According to Becker's presentation to your panel and the first version of his manuscript (Becker I), there were zero mariculture-related disturbance events during the preceding five-year period 2000-2004.

29 records violated the database QA/QC protocols, violated Becker's QA/QC protocols, and should not have been included in his NAS presentation or his paper.

In summary, there are no credible mariculture-related disturbance events in the NPS I&M database for the three-year period (2005-2007) that Lunny owned DBOC. Becker I claimed that there are no mariculture-related disturbance events for the five-year period (2000-2004) before Lunny purchased DBOC. Thus, there were zero disturbances for the years cited in Becker I. Becker's analysis in the first version of his paper was false.

Prior to Becker's submission of the revised Becker II paper to the Editor of the Marine Mammal Science journal on October 24, 2008, and subsequently to the NAS panel, he knew that I had objected to his cited 2006 disturbance event and four of his six 2007 disturbance events on September 22, 2008. That was the extent of my formal objections.

What did Becker do in the next version of his paper, Becker II? On December 8, 2008, I wrote to you and described how Becker changed the years, the way in which he calculated the disturbances, and other features of his analysis. Most interesting, he told us in Becker I that he purposefully did not include data prior to 2000. He wrote:

> *"Disturbance data is only included for the years 2000 to 2007 because the subsite specific disturbance data prior to 2000 has not been converted to current data standards."*

For the Becker II paper, Becker told the Editor, Dr. Boness, in his cover letter: *"We now include disturbance data for 1996-2008."* He gave the Editor no reason why he included more years. He gave no explanation for why the pre-2000 data were now worthy of his paper when he excluded them from Becker I. Had they been brought up to "current data standards"? Becker never told us what changed to the pre-2000 data.

Interestingly, something else that is quite important did change between Becker I and Becker II that was not disclosed. Becker never told the Editor that for Becker I, he found zero mariculture-related disturbances in 2003 (see Table 1 in Becker I), whereas for Becker II, two mariculture-related disturbances in 2003 appeared on Figure 2B with no explanation of how they were missed in Becker I, or how Becker's QA/QC protocol failed him. Remember that he told the NAS panel that he and David Press reviewed the database *"disturbance event by disturbance event"*. The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II.

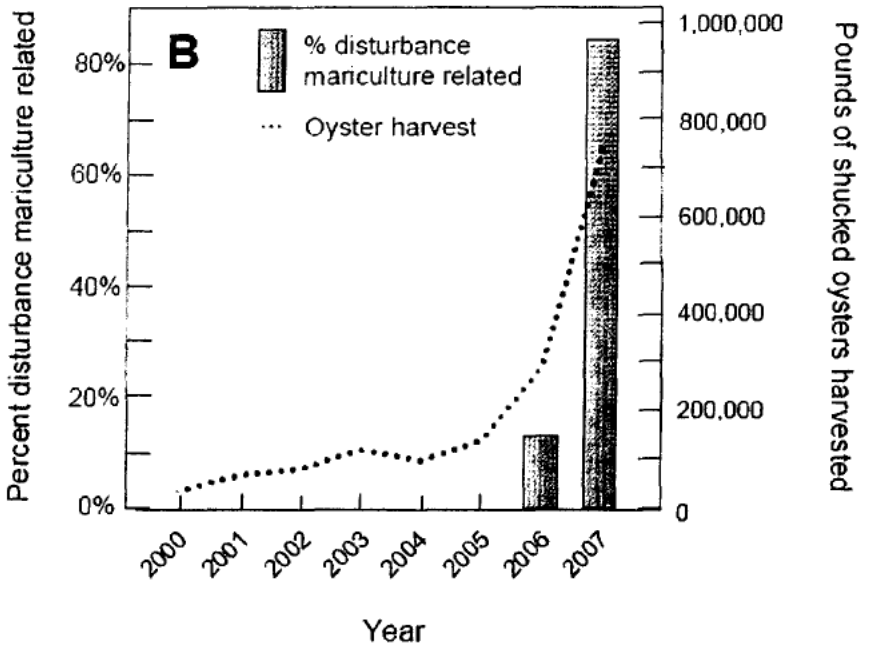
Why are the 2003 disturbance data important? During his presentation to the NAS panel, and in the first version of his paper, Becker made the conclusion that there is a positive correlation between the size of the oyster farm (as measured by pounds of harvested oysters) and the number of mariculture-related harbor seal disturbances. In Becker I, which analyzed 2000 to 2007, the authors claimed that there were zero mariculture-related disturbances in the years with lower numbers of oysters (2000-2005) (see Table 1 in Becker I). If indeed there were two mariculture-related disturbance events in 2003 when the number of oysters was relatively low, then the conclusion made in Becker I, and later reaffirmed in Becker II, might not withstand the objections raised about the veracity of the 2006 and 2007 disturbance events. The inclusion of the 2003 disturbance events in Becker II made this conclusion from the statistical analysis,

I had neither looked at nor commented on the 1996 data. It is striking that Becker included six 1996 disturbance events in his paper – four of which are not appropriate – and then claimed that he could do his statistics after removing four of the six 1996 records.

Becker told us in the text of the paper that he could exclude from his statistical analysis the four disturbance events in 1996 that do not exist in the NPS I&M database, but he nevertheless included these four events in the visually powerful figure 2B.

It appropriate to ignore the NPS mariculture-related disturbance in 2008. How can we trust the NPS in 2008 after they were accused of misrepresenting their data in 2007?

Below and on the next page are Figure 2B from the two different versions of the Becker paper: Becker I and Becker II [Becker, B.H., Press, D.T., and Allen, S.G. *Modeling the effects of El Nino, density-dependence, and disturbance on harbor seal (Phoca vitulina) counts in Drakes Estero, California: 1997—2007.* Marine Mammal Science (in press, 2009)].



In the two figures (above and on the top of the next page), note the differences between Becker I and Becker II, with particular reference to the 2003 data. Immediately above on the previous page is shown Figure 2B from Becker II. With the exception of the two disturbance events in 2003, all of the points above zero include disputed or suspicious disturbance events.
1996: should be 2 of 21, not 6 of 21;
2006: should be 0 of 33, not 1 of 33;
2007: should be 0 of 56, not 6 of 56;
2008: this is the year after NPS was accused of misconduct, and should not be included.

When the disturbance data are corrected, the correlation of disturbances to number of oysters gets much weaker. If Becker II had stayed with the same years as Becker I (2000-2007) and not cherry-picked the 1996 data, then the relationship would actually be a negative correlation driven by the two disturbances in 2003.

Below is a table with the rate of mariculture-related disturbance events based on the data cited in Becker I and in Becker II. In the left column it shows the data as presented in Becker I or Becker II. In the middle column it shows the correct disturbance rates when the disputed and suspicious data (not following QA/QC protocol) are removed.

Data cited in Becker I and II vs. same analysis without disputed data

year	data cited by Becker	without disputed data	lbs harvested oysters
1996	0.29 (6/21)	0.09 (2/21)	587,172
1997	0 (0/24)	0	476,791
1998	0 (0/31)	0	292,188
1999	0 (0/40)	0	125,749
2000	0 (0/44)	0	34,094
2001	0 (0/42)	0	65,676
2002	0 (0/37)	0	78,064
2003	0.05 (2/43)	0.05 (2/43)	118,643
2004	0 (0/49)	0	96,754
2005	0 (0/37)	0	138,958
2006	0.03 (1/33)	0 (0/33)	291,538
2007	0.11 (6/56)	0 (0/56)	466,503
2008	0.02 (1/40)	0 (Lunny has records disputing this)	492,787

color key: black = years and data cited in both Becker I and Becker II (2000-2007)
red = years and data cited only in Becker II
blue = data that changed from Becker I to Becker II; Becker I reported zero mariculture-related disturbances in 2003; Becker II reported two in 2003

Earlier in this report, I noted that correlation tests are amongst the weakest in statistics. If we compare the pounds of harvested oysters to the rate of mariculture-related disturbances from 1996 to 2007 (using the correct data in the middle column) using Pearson's test, we get a weak positive correlation of +0.47. If we make the same statistical comparison for 2000-2007, we get a very weak negative correlation of -0.12 (based upon the 2003 data, which appeared in Becker II but which was missed in Becker I). In other words, based on a single anecdote that is twelve years old, namely, the disturbance survey on May 4, 1996 of oyster workers (under a previous owner) disturbing seals at two different times, we can (incorrectly) conclude that as the number of pounds of oysters increases, so do the number of oyster farm disturbances. Without that record, the correlation flips.

Appendix

Timeline

Historical Context for April 29, 2007 Disturbance Survey

January 2005
In the January 8, 2009 issue of the Pt. Reyes Light newspaper, Editor Tess Elliott reported that in January 2005, shortly after Kevin Lunny purchased Drakes Bay Oyster Company from the Johnson's, a meeting of Superintendent Don Neubacher and an ad hoc group of local community members was held at the seashore headquarters. Ken Fox, President, Tomales Bay Association, was in attendance. Based on an interview of Ken Fox, Elliott wrote:

> *"The issue of Drakes Bay Oyster Company and what happens in 2012 was discussed for well over an hour," Fox said. "Gordon Bennett [of the Sierra Club] said that it would have been easy to get Johnson's out because their offenses were so egregious, but that it was going to be hard to get Kevin out, especially if he ran a good operation.*
>
> *"There seemed to be an agreement that there should be a pretty big push to get Lunny out," he added. "And Don didn't try to dissuade anybody."*

End of 2005 to April 2007
The Department of the Interior Office of the Inspector General (OIG) Report of July 21, 2008 on the management of Pt. Reyes National Seashore (PRNS), states:

> *[Marin County Supervisor] Kinsey told OIG investigators he had met with members of the Lunny family at various times since approximately the end of 2005 to discuss their concerns about the future of DBOC. In Kinsey's opinion, Neubacher was "holding [the Lunnys] hostage" until they agreed to sign a document agreeing to leave by 2012. He opined that Neubacher was "throwing down a gauntlet of obstacles" for the Lunnys by refusing to sign off on some building permits that the county was ready to issue to DBOC ...*

April 5, 2007
Superintendent Don Neubacher met with Marin County Supervisor Steve Kinsey on April 5, 2007 at the Park headquarters. Kinsey told Kevin Lunny (owner, DBOC) on April 11, 2007 that Neubacher made *"strong environmental accusations"* against DBOC including claiming that he had data of harm to harbor seals by DBOC. Kinsey told Lunny that Neubacher claimed that DBOC committed *"environmental felonies"* (see DOI OIG Report). Kinsey told Lunny that Neubacher claimed to have overwhelming data of environmental harm caused by DBOC, including in particular harm to harbor seals, a protected marine mammal.

publication, Allen he had no such data to support her claims. Her email to Cardaro on the 24th confirmed the same: *"no direct observations"*.

On the same day as Allen published her article in the local newspaper, she also authored her "Trip Report" describing the first FW's caused by DBOC in the two and one-half year history of ownership of DBOC by Lunny. Her alleged observations occurred in the late afternoon. A "Trip Report" was not normal protocol. Her observations were not entered onto normal survey and disturbance forms. Her data were not entered (as protocol specifies) in the QA/QC NPS database as provided to me nearly three months later on Aug 13, 2007. DBOC records show that the boat engine was broken that day and being repaired, and that the oyster workers had already clocked out and gone home when some of the disturbances were alleged to have occurred. The events could not have taken place as described. Neither Allen nor Neubacher mentioned the April 26 Trip Report at the May 8 hearing.

This trip report is suspicious. After a formal complaint about the April 26 Trip Report was filed by Lunny on Sept 27, 2007, the NPS database manager, David Press, nevertheless entered the April 26 Trip Report into the revised NPS database given to Goodman on January 16, 2008, further violating the NPS data management protocols. The data were then used in Becker's paper in press in Marine Mammal Science journal. Given that the oyster boat engine was broken, the workers had clocked out, and the data were not entered onto the correct forms and into the database for nine months, this record is not credible.

April 29, 2007

April 29, 2007 was a Sunday nine days before the upcoming Tuesday May 8, 2007 hearing of the Marin County Board of Supervisors. As of this date, there were no data in the NPS database showing what Neubacher had claimed to Supervisor Kinsey 24 days earlier on April 5, namely that NPS had data showing DBOC harming the harbor seals.

April 29, 2007 is the date of the first entry in the Aug 13, 2007 official NPS QA/QC'ed version of the NPS database of five FW's caused by DBOC during the two and one half year ownership by Lunny of DBOC. On the same day, 55 FW's were caused by Park visitors. This disturbance record, as described in this report, is highly suspicious and not credible.

Even if the April 29, 2007 entry had been a true record of a disturbance caused by DBOC, which is doubtful (see main body of this report), then as of April 29, 2007, DBOC would have caused 1/500th of the FW's of harbor seals in Drakes Estero recorded in the NPS harbor seal database from 2005 to 2007.

January 18, 2009

To: Dr. Susan Roberts, Director, Dr. Pete Peterson, Chair, and members, Ocean Studies Board panel to investigate NPS science concerning Drakes Estero, National Research Council, National Academy of Sciences

From: Dr. Corey Goodman, Marshall, CA; member, National Academy of Sciences

RE: **New Information Shows that the National Park Service Committed Scientific Misconduct in the Documents it Presented to Your Panel**

When NPS scientist Dr. Ben Becker made his presentation to your NRC panel on September 4, 2008, some of his most important conclusions were based upon NPS records of disturbances to harbor seals by Drakes Bay Oyster Company (DBOC) in 2007. Kevin Lunny was suspicious of those data, and went back to examine the dates and times of the events that Becker cited. He continued to be struck by the fact that all of the "mariculture-related" disturbances in 2007 cited by the NPS occurred in less than two weeks prior to the May 8, 2007 Marin County Board of Supervisors hearing.

Becker told your panel that DBOC had caused six disturbance events in 2007, all during that two-week period, and based powerful conclusions on a statistical analysis of those events. Lunny knew that I had already debunked four of those six 2007 disturbance events (three events on April 26, entered into the database nine months after the date, and one event on May 8, the day of the Marin County hearing), had discussed some of that data with you in my presentation on September 4, 2008, and would be following up with you (see my letters to you of September 22 and October 25, 2008). Lunny focused on the remaining pair of disturbance events that occurred fifty minutes apart on April 29, 2007. He was suspicious. April 29, 2007 was a Sunday. Lunny's oyster harvesters typically don't work on Sundays, and according to DBOC business records, they didn't that Sunday. Lunny looked at the tides for that day. They looked too high to him.

After discussing his suspicions with John Hulls (science correspondent, Pt. Reyes Light newspaper) and me in September, Lunny took three actions. First, Lunny contacted Dr. John Largier (Bodega Bay Marine Lab, U.C. Davis) to ask for his help, given his tidal buoy in Drakes Estero, in comparing the Pt. Reyes NOAA tidal buoy outside the estero in the ocean vs. the tidal lag at the inner sandbars inside Drakes Estero. Second, he asked John Hulls to find a date with similar tides in which he could directly examine and photograph the tidal conditions at the relevant inner sandbars in Drakes Estero. Hulls conducted his experiment just two weeks ago on January 1 and 2, 2009.

Finally, Lunny asked me to look at Largier's tidal numbers and Hull's experimental results, and to compare them to the NPS harbor seal database, survey records, and Becker's paper and presentation to your panel. On October 25, 2008, I wrote to you that the April 29, 2007 disturbance events were suspicious in that DBOC time card and payroll records showed that only one DBOC employee was working that Sunday, and it was Lunny's daughter selling oysters at the onshore retail counter. At that time I had not yet examined the details of the April 29 disturbance events, forms, and records.

Since Hulls' experiment on January 1 & 2, 2009, and Hulls write up of his data provided to Lunny and me on January 12 (to be submitted to you by Lunny), I have reviewed the NPS I&M harbor seal database, disturbance survey forms, and other NPS records.

I write to you today with my analysis of the disturbance events of April 29, 2007, their relationship to Largier's and Hulls' data, and their relationship to the NPS database and Becker's paper and presentation to you. Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described. Moreover, these data violated the NPS QA/QC protocols and never should have been entered into their database, and violated Becker's stated QA/QC protocols and never should have been included in his paper or presentation.

This new information provides strong support to the conclusion that, throughout the Summer and Fall of 2008, NPS officials and scientists provided your NRC panel with harbor seal data and analyses that are false and misleading. There is little ambiguity – your NRC panel was repeatedly presented with false science.

Tide charts and direct experimental analysis of tides similar to those in Drakes Estero on April 29, 2007 reveal that the sandbars in question were under water when seals were supposedly observed getting flushed off of them (by oyster workers that time clock and payroll records show were not working that Sunday). Swimming harbor seals cannot be flushed off of a sandbar that is under water. Seals cannot be flushed by workers that are not working. Seals cannot be flushed by workers purportedly working at a distance of six to eight football fields, six to eight times the official protective zone. This is prima facie false science – the tide charts and photos tell it all.

In Becker I (the first version of Becker's paper in press in Marine Mammal Science submitted to your panel on June 3 and presented to you on September 4, 2008), Becker considered oyster-related disturbances from 2000-2007 even though Lunny had owned DBOC only from 2005-2007. According to Becker I, there were zero mariculture-related disturbances during the five-year period 2000-2004. If we eliminate the suspicious and improbable records from 2006 and 2007, then there were also zero mariculture-related disturbances during the three-year period of Lunny ownership (2005-2007).

At the same time that NPS included mariculture-related disturbance records from 2006 and 2007 that were not credible, Becker and colleagues ignored the legitimate records of thousands of seals flushed into the water largely by Park visitors during 2005-2007.

In Becker II (the second revised version of the Becker et al. paper), Becker cherry-picked the data by arbitrarily going back to 1996 (instead of just 2000) to claim six oyster-related disturbances in 1996 (and none in 1997-1999). Four of those six disturbances were fabricated – they do not exist in the database – as I wrote to you on December 8, 2008. The other two were caused by oyster workers on a single day (May 4, 1996) – over twelve years ago and nine years before Lunny took ownership of the oyster farm and cleaned it up. Are we to believe that a weak correlation based on this one 12+-year old survey form from 1996 is evidence that DBOC is today causing harm to the seals?

Why did NPS officials ask Becker and colleagues to begin their study in August 2007, an analysis that ultimately led to their paper and presentation to you on September 4,

2008? Becker's analysis was initiated just a few weeks after Senator Feinstein's July 21, 2007 meeting in which she asked that an independent science panel review the NPS Marin County hearing testimony and published report (*"Drakes Estero: A Sheltered Wilderness Estuary"*) of May 2007, a request that became your panel's first study.

The fabricated story NPS presented to your NRC panel on September 4, 2008 and since about disturbances at sandbars OB and UEN had the effect of diverting the panel's attention away from the NPS misconduct in May of 2007. Your mission was to investigate this previous misconduct, including claims of harm to harbor seals by DBOC that I have documented to you previously were blatantly false (see my report to you on December 18, 2007, my presentation to you on September 4, 2008, and my letters to you on September 22 and October 25, 2008).

NPS officials and scientists knowingly misled your NRC panel and the Editor of the Marine Mammal Science journal. NPS scientist Dr. Ben Becker (verbally on September 4, 2008) and NPS Regional Director Jon Jarvis (in writing on September 24, 2008) both misled your panel about what NPS officials and scientists had said and written in May of 2007, and what their data actually shows. They presented you with false science including false explanations, false data, and false analysis.

On December 12, 2007, at the request of the NRC, I submitted a report documenting serious scientific misconduct on the part of NPS officials and scientists. That date was before the NPS I&M harbor seal database was inappropriately altered and the Becker manuscript was submitted to the Marine Mammal Science journal. In subsequent discussions, Dr. Susan Roberts insisted that your panel was neither going to investigate nor comment on scientific misconduct. Misconduct, I was told, was off limits.

Although you declared that you would not investigate scientific misconduct, you may now have little choice, if you are both to follow Federal law and uphold the integrity of the National Academy of Sciences. If the NPS presentation to the Marin County Board of Supervisors on May 8, 2007 (and accompanying Drakes Estero report) was chapter one of NPS scientific misconduct, then the NPS presentation to your NRC Ocean Studies Panel on September 4, 2008 (and accompanying Becker et al. paper and September 24 Jarvis letter) was chapter two of NPS scientific misconduct. **This second chapter of misconduct has inexorably placed your panel not solely as passive spectator but rather as active participant in the NPS misuse of science.**

In 1992, the NAS issued a report that proposed a standardized definition of scientific misconduct. Based on the NAS report, the White House OSTP issued a standardized federal policy for scientific misconduct in 2000. At the time, NAS President Bruce Alberts said about this policy: *"... we believe that the proposed common definition of misconduct and the procedures outlined for handling such allegations are a major step forward."* The OSTP policy, as Lunny noted in his recent letter to you, applies to all Federally-funded grants and contracts. How can the organization that first proposed the Federal policy, and which presently is a Federally-funded contractor for this study and thus subject to that policy, nevertheless continue to declare that the topic of the policy – scientific misconduct – is off limits?

The false science that the NPS gave the NRC surpasses the threshold of the OSTP definition of scientific misconduct that became Federal policy in 2000. The false science that the NPS gave the NRC also surpasses the threshold of the NPS January 31, 2008 Scientific Code of Conduct. Finally, the false science that the NPS gave the NRC puts the integrity of the National Academy of Sciences at risk, and should clearly surpass the threshold of action by the NAS to investigate these serious allegations. I believe you are now obligated – according to law, but more important, to uphold NAS integrity – to investigate whether the NPS presented the NRC with intentionally false and misleading scientific information to influence your deliberations.

Conclusions

(1) The harbor seal disturbance events attributed to Drakes Bay Oyster Company (DBOC) on April 29, 2007 are not credible. No such disturbances could have occurred as described -- the tide was too high; the workers were not working. These data failed the NPS I&M harbor seal database QA/QC protocols and never should have been entered into the NPS database. These data failed the QA/QC protocols that Becker presented to your NRC panel on September 4, 2008 and never should have been presented to you. These data failed the QA/QC protocols in the Becker et al. paper in press in Marine Mammal Science and never should have been included in that paper.

(2) None of the harbor seal disturbance events attributed to DBOC during Kevin Lunny's three-year ownership of DBOC (2005-2007) are credible. Much of these data as described in NPS presentations and publications to the NRC are either fabricated or falsified, and others are suspicious and do not pass the NPS I&M harbor seal database management QA/QC protocols and procedures.

(3) The only mariculture-related disturbances in the NPS I&M harbor seal database that may be credible from 1996 to 2007 are two disturbances in 1996 and two in 2003.

(4) Becker's presentation to you on September 4, 2008, and his paper in press in Marine Mammal Science that was submitted to you, cherry-picked data by relying solely on the small number of disputed (and in some cases falsified or fabricated) disturbances purported to be caused by the oyster farm, and completely excluded the hundreds of legitimate records of disturbances, mostly by Park visitors, of harbor seals that led to many thousands of seals getting flushed into the water during pupping season.

(5) After objections were filed concerning the first version of Becker's paper -- Becker I, he and colleagues further cherry-picked the NPS database and changed certain numbers and statistical analyses in resubmitting the second version – Becker II. The cherry-picked data, including 1996, 2006, and 2007 data that are fabricated or falsified, permitted Becker and colleagues to draw the unsubstantiated conclusion that the number of mariculture-related harbor seal disturbances increased as the number of harvested oysters increased.

(6) The preponderance of evidence supports the conclusion that fabricated and falsified data and analyses, cherry-picked data, and data that did not pass NPS QA/QC protocols were presented to your NRC Ocean Studies Board panel.

April 29, 2007: Historical Context for Disturbance Record

To appreciate the importance of the April 29, 2007 disturbance events (as entered in the NPS I&M harbor seal database) requires understanding the historical context of that date within the broader discussions and NPS claims from 2005-2007. In particular, April 29, 2007 – and its purported disturbance events – took place twenty-four days after the April 5 meeting between PRNS Superintendent Don Neubacher and Marin County Supervisor Steve Kinsey during which Neubacher told Kinsey that NPS had data showing serious harm to the harbor seals in Drakes Estero caused by Drakes Bay Oyster Company (DBOC). April 29 was five days after NPS scientist Dr. Sarah Allen admitted to NOAA's Joe Cardaro by email that NPS had *"no direct observations"* of DBOC causing seal disturbances. April 29 was nine days before the Marin County Board of Supervisors hearing that was called by Supervisor Kinsey, largely in response to the April 5 meeting, to ask for unanimous Board approval of a letter to Senator Feinstein requesting her assistance concerning NPS accusations against DBOC. This historical context is described in detail in the Appendix at the end of this report.

April 29, 2007: Disturbance Record in NPS I&M Database

April 29, 2007 was a Sunday nine days before the Tuesday May 8, 2007 hearing of the Marin County Board of Supervisors. As of this date, there were no data in the NPS I&M harbor seal database showing what Superintendent Don Neubacher had claimed to Supervisor Steve Kinsey twenty-four days earlier on April 5 -- namely, that NPS had data showing serious harm to the harbor seals by DBOC.

At the time of the Marin County hearing on May 8, the disturbances on April 29, 2007 were the only data in the NPS I&M database reporting disturbances (two events, fifty minutes apart) to the harbor seals in Drakes Estero by DBOC during the three-year (2005-2007) ownership by Kevin Lunny. This QA/QC'ed NPS database was sent to me from Regional Director Jon Jarvis by certified mail on August 13, 2007. That NPS database reports that on April 29, 2007, first one seal, and fifty minutes later four more seals, were flushed into the water (FW's) by DBOC workers. According to the same observers, on the same day (April 29), 55 harbor seal FW's from subsite L were caused by Park hikers.

As documented below, the April 29, 2007 DBOC disturbances could not have occurred according to a review of worker records and tidal charts. However, even if the entries were a true record of disturbances caused by DBOC, then as of April 29, 2007, DBOC would have caused $1/500^{th}$ of the FW's of harbor seals in Drakes Estero recorded in the NPS harbor seal database from 2005 to 2007.

April 29, 2007: Oyster Workers Were Not Working

April 29, 2007 was a Sunday. Except for long holiday weekends, Lunny's oyster harvesters do not work on Sundays. Lunny has gone back to his electronic time records and his pay records from April and early May, 2007. DBOC records show that only one

employee was working that day (Lunny's daughter Brigid), and she was selling oysters at the onshore retail counter. None of the employees who prepare oyster bags, harvest oysters, or work on oyster boats were working that Sunday. Not a single oyster worker had clocked in on Sunday April 29. DBOC has an electronic time clock, and their records are clear – no one from DBOC except Brigid Lunny was working on that day.

April 29, 2007: Observations Inconsistent with Business Practice

The April 29, 2007 entries into the NPS I&M harbor seal database are based upon a PRNS Harbor Seal Disturbance Survey form for that day filled out by "E + D Leite" (observers #142 and #143). Below is what their survey form reported.

At 12:50, a motorboat flushed one seal from sandbar UEN. They wrote: *"mom & pup flushed when boat accelerated toward Bull Point from N. end of OB channel after throwing out bags."* The distance from the UEN haul-out site to the location of this motorboat would have been about one half mile or approximately 2,400 feet. This is equivalent to six to eight football fields in length.

At 13:40, the form recorded a second disturbance. A motorboat flushed five seals from sandbar UEN. The observers wrote: *"boat returned, threw more bags, left again."*

On April 22, 2008, the NPS, California Coastal Commission (CCC), and Lunny jointly adopted a new protocol stating that oyster boats are required to stay at least 300 feet away from seals to avoid disturbing them. This protective zone was established by NPS and CCC based upon the Marine Mammal Protection Act and recommendations from both the National Oceanic and Atmospheric Administration (NOAA) and California Department of Fish and Game. The distance described between the flushed seals and the purported oyster boat that allegedly disturbed them on April 29, 2007 – approximately 2,400 feet– was eight-fold further away than the NPS, CCC, NOAA, and CDFG agreed upon 300-foot protective zone.

According to Kevin Lunny, owner of DBOC, and Luis Armienta, one of the managers of his oyster farm, the April 29, 2007 disturbance records are inconsistent with their business practice and are nearly impossible to have occurred as described. Not only were none of the DBOC oyster harvesters working on Sunday April 29, 2007, but the times and distances are suspicious. The observers recorded that an oyster boat flushed a seal at sandbar UEN at 12:50 after throwing out oyster bags, and then returned and threw out more bags and flushed more seals at 13:40, fifty minutes later.

The members of your NRC panel that visited Drakes Estero on September 5, 2008 will remember that it takes twenty minutes or more to travel by boat from the oyster farm at the top of Schooner Bay, out along Schooner Bay, into the larger estero, and then along a circuitous route to sandbars UEN and OB. Traveling back and forth to sandbar UEN is so time consuming that oyster workers typically only make the trip once, not twice, per day to deposit oyster bags. It takes 20 minutes to motor back in, and 20 minutes to motor back out. Once at the dock of the oyster farm, it takes 20 minutes or so to prepare and load the boat with additional oyster bags, and this does not account for additional break time. As described by manager Armienta, this seldom happens – oyster workers

motor out once and drop off oyster bags. There simply was not enough time on April 29 from 12:50 to 13:40 for the boat to return to the dock, pick up more bags, and motor back out to sandbar UEN. According to Armienta, it is hard to imagine that the events occurred as described (let alone the fact that none of the oyster workers were working that day).

April 29, 2007: The Tide Was Too High

The oyster workers were not working on Sunday April 29, 2007. Had they been working, the timing of the disturbance events are inconsistent with DBOC business practice. Most important, the tides were too high. At the time of the disturbance events, the haul-out sites on sandbar UEN were under water. **Swimming harbor seals cannot be flushed off of a sandbar that is under water.**

As stated above, the entry of two disturbance events on April 29, 2007 at 12:50 and 13:40 into the NPS I&M harbor seal database are based upon a PRNS Harbor Seal Disturbance Survey form for that day filled out by "E + D Leite" (observers #142 and #143).

Do these NPS records give us any indication of the tides on that day? The PRNS Harbor Seal Survey form for April 29, 2007, also filled out by "E + D Leite", noted the *"low tide level closest to survey time"* as "16:25" and that the tide was +1.4 (the high low tide was actually 16:49 or later that day). The observers record that at 14:15, they counted 751 seals in total on sandbars in Drakes Estero, including 245 seals at sandbar UEN and 35 seals at sandbar OB. However, in the notes they wrote: *"poor tide – counted when ..... at 3:15"*. On the photocopy given to me by NPS, I cannot read the 4 or so words between "when" and "at 3:15". Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15 (see below). If the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?

What were the tides on April 29, 2007?

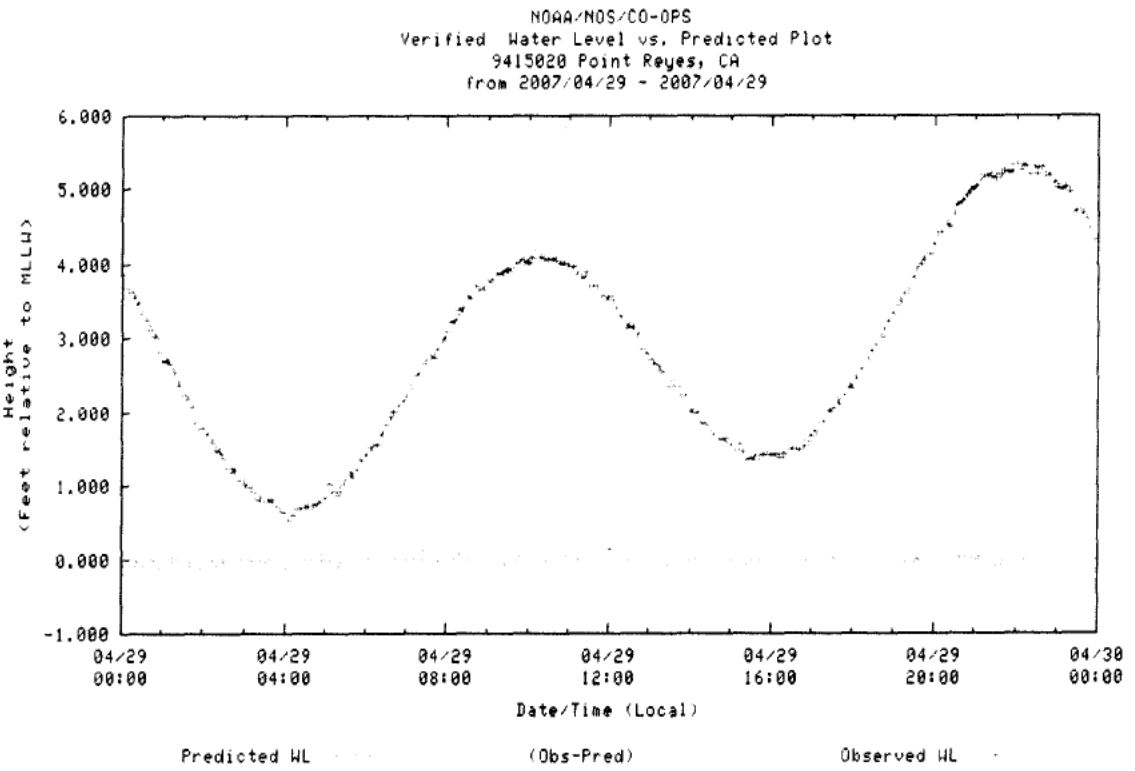
The official NOAA buoy for Point Reyes, outside the mouth of Drakes Estero, shows the observed water level in the graph below. The tides inside Drakes Estero lag behind these times, given the small mouth, large extensive set of bays, and the long channel.

The graph on top of the next page is for the Pt. Reyes NOAA buoy in the ocean. A similar graph for Drakes Estero would require a temporal lag correction.

The next issue is to determine the time conversion (the lag) factor for the inner sandbars UEN and OB in Drakes Estero relative to the NOAA buoy in the ocean. By how much time do the tides at sandbars UEN and OB lag behind the Pt. Reyes NOAA buoy?

The NPS July 2004 paper *"Pinniped Long-Term Monitoring Program, San Francisco Area Network of Parks"* by Hester, Allen, Adams, and Nevins (the handbook with protocols and procedures for the PRNS harbor seal monitoring program), tells the harbor seal observers (on pages 7 and 8 of the harbor seal standard operating procedures) to make a +45 minute correction for Drakes Estero relative to the tide book which uses Golden

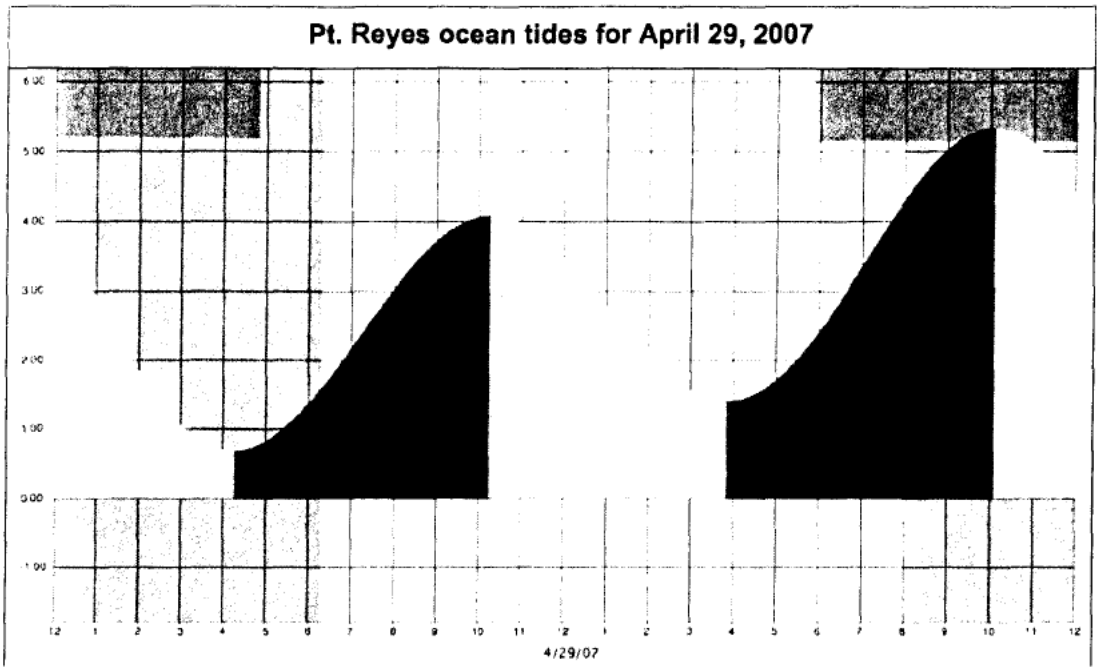
Gate Bridge from which to make adjustments. The problem with the +45 minute correction is that while it might be appropriate for most of harbor seal subsites near the mouth of the estero, it is unlikely to apply to the inner sandbars deeper into the estero.



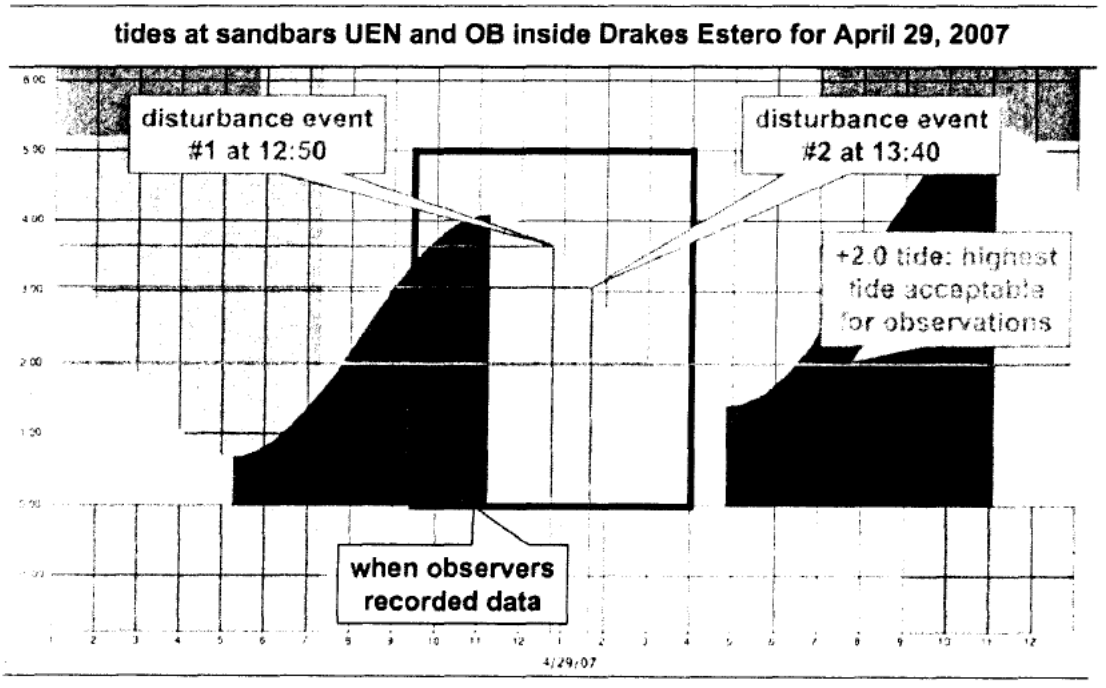
To determine the Drakes Estero lag time more precisely, Kevin Lunny wrote to Dr. John Largier (Bodega Bay Marine Laboratory, U.C. Davis) and asked for his correction based upon his buoy inside Drakes Estero relative to the Pt. Reyes NOAA buoy. Based on data from his buoy, Largier responded to Lunny's inquiry by writing that at the mouth of Schooner Bay (further into Drakes Estero than the sandbars UEN and OB), the correction is a 1.4 hr lag at high tide and a 1.7 hr lag at low tide compared to the Pt. Reyes NOAA buoy. The lag would be less at the sandbars UEN and OB.

At the request of Kevin Lunny, John Hulls designed and conducted an experiment to examine the tidal heights and sandbars in Drakes Estero at tides comparable to April 29, 2007. On January 1 and 2, 2009, Hulls measured the high tide at sandbar OB and determined that it had about a 1.3 hr lag at compared to the Pt. Reyes NOAA buoy tide chart. This is consistent with Largier's 1.4 hr lag further up the estero. Thus, in considering the lag from the Pt. Reyes NOAA buoy to sandbars UEN and OB, here I use a 1 hr lag (although the true lag is probably closer to the 1.3 hr lag measured by Hulls). A longer lag would make the tides higher at the reported times.

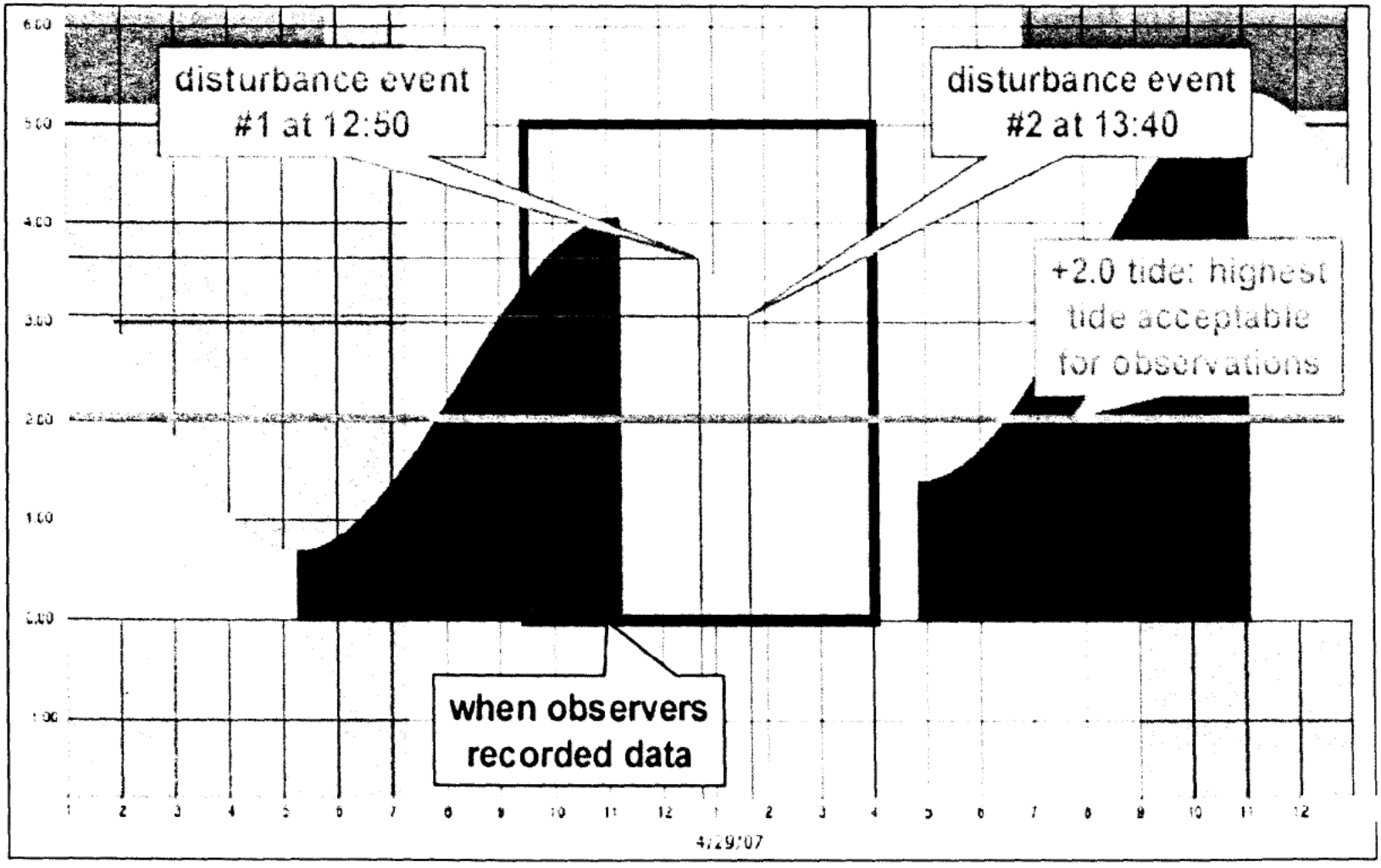
The graph on top of the next page presents the April 29, 2007 tide as on the Pt. Reyes NOAA buoy graph but from the "Mr. Tides" web site which provides an hourly time scale for better resolution. The time scale is for the ocean outside Drakes Estero.



To calculate the tidal height at inner sandbars UEN and OB inside Drakes Estero, we need to add at least one hour (according to Largier and Hulls, as noted above).



tides at sandbars UEN and OB inside Drakes Estero for April 29, 2007



Based upon these assumptions and corrections, the above graph presents the same tide data but with the time access shifted by one hour to the left to correct for the tides at inner sandbars UEN and OB in Drakes Estero. Largier's and Hulls' data suggest that the lag is greater than 1 hour (more like 1.3 hr). A larger version of this same graph is shown on the preceding page.

On April 29, 2007, the (low) low tide at Drakes Bay occurred at 04:14 and was +0.7 ft. At sandbars UEN and OB, this low tide would have occurred at 05:15 or later.

The (low) high tide occurred at 10:14 and was +4.1 ft. At sandbars UEN and OB, this high tide would have occurred at 11:14 or later.

The (high) low tide occurred at 15:49 and was +1.4 ft. At sandbars UEN and OB, this (high) low tide would have occurred at 16:49 or later.

Let's return to our tide chart with our one-hour time lag, and compare it to the disturbance observations in the NPS database.

The PRNS observers claimed to see an oyster boat flush one seal off sandbar UEN at 12:50 on April 29, 2007. At 12:50, only about one and one half hours after the high tide of +4.1 ft, the height of the tide at sandbars UEN and OB would have been above +3.5 ft (John Hulls, in his report of 1/12/09, calculates a tide of 3.60 at this time).

The PRNS observers claimed to see the same oyster boat flush five more seals off sandbar UEN at 13:40. At 13:40, the height of the tide at sandbars UEN and OB would have been above +3.0 ft (Hulls in his report calculates a tide of 3.05 at this time).

The tide in Drakes Estero would have still been above +2.0 ft at 15:00 and would have dropped below +2.0 ft for the first time since around 07:30 that morning at around 15:15 that afternoon. In other words, the tide would have been above +2.0 ft for about eight hours that day, and would have been above +2.0 ft during most of the time that the observers were recording their seal counts and disturbances.

At what tides are seal haul-out sites at sandbars UEN & OB above water?

We are interested, of course, as to when the eastern edges of sandbars UEN and OB close to the deep channel are above water. These are the haul-out sites used by the seals and cited by the NPS observers on April 29, 2007.

The NPS survey data from June 11, 2007 gives us a sense of this tidal height. On that date, the low tide of +1.9 ft occurred at 14:24 + 1 hr lag = around 15:24. The observations were made between 13:00 and 15:15. The observer noted: *"UEN under water entire survey."* OB, which is a bit lower, was the same. Thus, just before a +1.9 tide (and presumably at around +2.0 or so), both haul-out sites at sandbars UEN and OB were still under water. For the seal counts, the observer noted zero seals at UEN and OB while counting 23 seals at UEF, 51 at DEM, and 503 at L. These data suggest that the haul-out sites at sandbars at UEN and OB start to rise above water at tides around +2.0. This correlates with the NPS handbook for observers (see below) and Becker's paper

(see below) that state that observers should only make observations when the tides are below +2.0 ft. The +2.0 level is marked on the graphs on pages 9, 10, 13, and 14.

In his data collection of January 1 and 2, 2009, John Hulls noted when the very highest point on UEN and OB first rose above the water. At UEN, this was just at +3.0 ft. However, the highest location on UEN, Hulls noted, was some distance further west from the eastern sandbar adjacent to the deep channel where the seals haul-out. At sandbar OB, the highest location appeared at a tide of around +2.0 ft. The tide had to get lower at each location to have any considerable extent of the haul-out sites exposed and dry, particularly the haul-out sites immediately adjacent to the eastern deep channel from which the seals haul-out.

John Hulls photographed the estero, with particular reference to sandbars UEN and OB, at the times on January 2, 2009 at which the tides were similar to those reported in the disturbance records from April 29, 2007. He concluded that sandbars UEN and OB were under water at the times at which the observers claimed to have seen oyster workers flush seals into the water. All of Hulls' photographs and data are available upon request (see Hulls' report).

April 29, 2007: Disturbance Survey Violated NPS Protocols

Hester et al. (NPS July 2004: "Pinniped Long-Term Monitoring Program, San Francisco Area Network of Parks") is the handbook that from 2005-2007 provided the protocols and procedures for the PRNS harbor seal monitoring program. Hester et al. wrote:

> *"To maximize the number of seals on the haul out site, surveys should be conducted between a medium (2.5 ft) to a low (-1.0 ft) tide level during mid-day."*

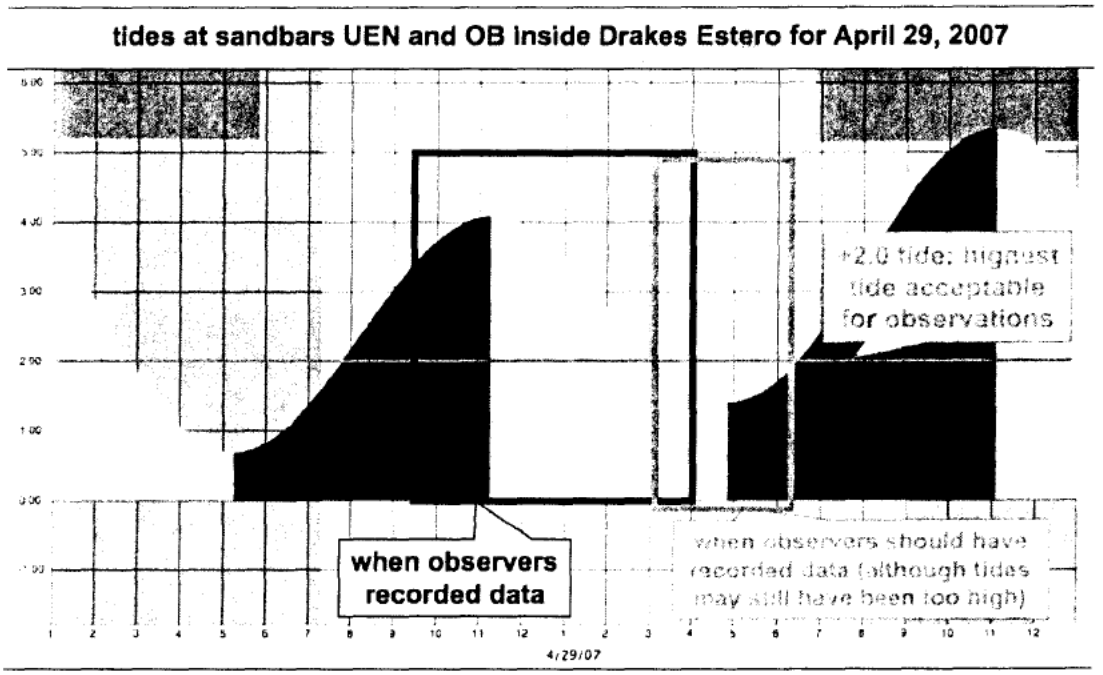
On page 23, Hester et al. wrote concerning when to conduct a harbor seal surveys:

"Ideally +2.0 ft tide or less."

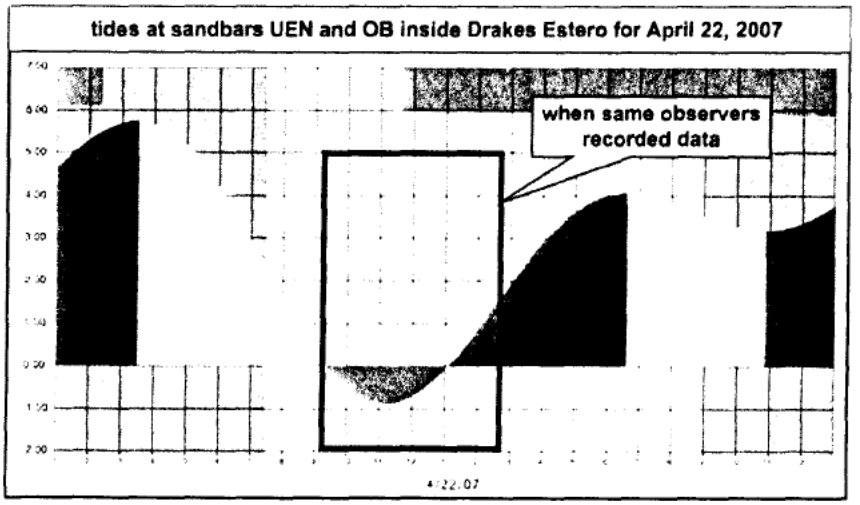
The observations by E + D Leite on April 29, 2007 did not follow that protocol. This single fact should have disqualified these observations from being entered into the NPS I&M harbor seal database. The tide was above +2.0 – it was above +3.5 ft and +3.0 ft respectively for the two disturbances -- when they claimed to have observed oyster workers flushing the seals. The sandbars were under water. Given the shape of the tide chart for April 29, 2007, they probably should not have been making observations at all on that day, and certainly not during the period during which they recorded DBOC disturbances.

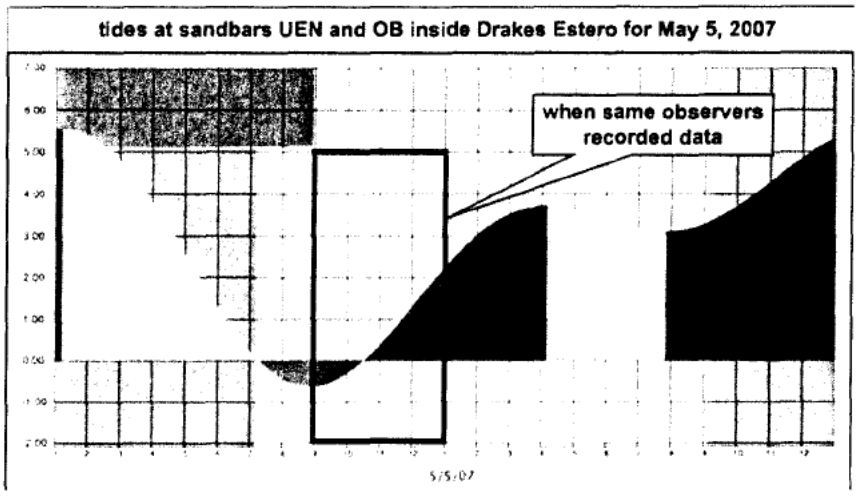
According to NPS protocols, the tides were mostly inappropriate during mid-day on April 29, 2007. For sandbars UEN & OB, the only time period during which the Leites could have picked a two-hour observation period and met the NPS protocols would have been during the three hours from 15:15 to 18:15 (around the low tide of +1.4). However, the Leites made their observations from 9:30 to 16:00, with disturbance records at 12:50 and 13:40 and seal counts at 14:15 and 15:15. They acknowledged this

when they wrote *"poor tide"*. The graph below shows in black when the Leites made their observations vs. in purple when they should have made their observations.

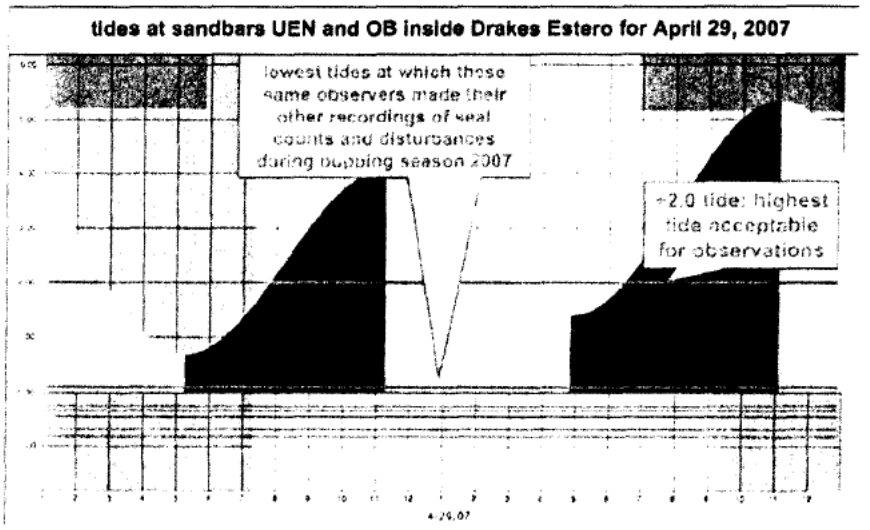


Was it typical of the Leites to make observations at inappropriate tides? No. They are observers #142 and #143 in the NPS I&M harbor seal database. They recorded no observations in the database prior to 2007. In 2007, they filed survey forms with data on 9 days: March 24, March 28, April 9, April 21 (a *"class with Sarah"*), April 22, April 29, May 5, May 9, and July 21. Eight of the observations (excluding July 21) were made during pupping season. Below are shown the tide charts and observation period for the Leites on their observation date immediately preceding April 29 (April 22) and immediately following April 29 (May 5). Note that on both dates (April 22 and May 5, 2007), the Leites were out during a low tide that fit the NPS I&M database protocols.





With the exception of April 29, 2007, the Leites made their other 7 observations during pupping season according to NPS protocols. They observed disturbances and counted seals at tides of -0.8, -0.7, -0.4, -0.3, -0.3, 0.0, and +0.1 ft on the other dates. April 29, 2007 was the outlier. This is shown graphically below.



On April 29, the Leites made disturbance observations at +7.5 hr and +8.5 hr relative to the lowest low tide of +0.7 ft that occurred in darkness at 5:15, and at -4.0 hr and -3.0 hr relative to the high low tide of +1.4 ft that occurred in the late afternoon at 16:49.

The disturbance records on April 29 were made above a +3.0 ft tide. With the exception of April 29, 2007, the Leites made their other observations during the 2007 pupping season on days in which the lowest low tide was significantly less than +2.0 during daylight hours. On six dates, they made their observations at the low tide. On two dates, they made their observations either one hour before or one hour after the low low tide. Only on April 29 did they make their observations seven-eight hours after the low

low tide or three-four hours before the high low tide. Moreover, on all of their observation dates during pupping season, the low tides were +0.1 ft or less.

By all NPS criteria, April 29, 2007 was not an appropriate day for observing harbor seals on the inner sandbars in Drakes Estero since the low tide in the estero occurred at around 5 am that morning. Why did the Leites make their six and one half hour survey on this inappropriate Sunday? Why didn't QA/QC eliminate these records to be consistent with NPS protocols? While we do not know the answers to these questions, we do know that five days earlier on April 24, 2007, Sarah Allen admitted that NPS had no direct observations (see Appendix). April 29, 2007 was the **first** record in the NPS database of DBOC workers disturbing harbor seals. Moreover, it was the **only** disturbance record in the NPS database nine days later on May 8 when Neubacher and Allen testified about harm to harbor seals by DBOC.

In summary, the survey and disturbance data on April 29, 2007 violated the NPS data management protocols. The data violated the NPS QA/QC procedures. The data should never have been collected. The data should never have been entered in the database. The data never should have cleared QA/QC. The data are not credible.

April 29, 2007: Disturbance Survey Violated Becker Protocols

At the NRC panel meeting on September 4, 2008, NPS scientist Dr. Ben Becker stated that he went through the harbor seal data *"disturbance event by disturbance event"*, and eliminated ambiguous data or data that did not meet certain criteria in terms of tides and quality. If this is true, then how did he include the April 29, 2007 disturbance data?

In Becker's paper in press in Marine Mammal Science (Becker II), he wrote (pg. 12):

> *These data were then filtered to remove: (1) data from observers with less than one year of survey experience, (2) observations at tide levels above +2 ft (+0.61 m) (MLW) when fewer seals would be present because some subsites might be submerged (Allen Miller 1988; Grigg et al. 2004), and (3) observation dates where weather reduced visibility. Tide level and tide time were standardized to the Golden Gate Bridge, San Francisco (PST).*

As described above, the inclusion of the April 29, 2007 data violated both of Becker's first two "filters". The Leites evidently did not have more than one year of survey experience. Their first survey in the database was March 24, 2007, and in that report, they acknowledged *"have lost confidence in identification [of pups] if not paired with mom."* They took a class with Sarah Allen on April 21, 2007, eight days prior to April 29. They do not appear to have been veteran observers on April 29, 2007. Moreover, their observations were not made at tide levels below +2.0 ft. The two purported disturbance records of oyster workers flushing seals were made at above +3.5 and +3.0 ft respectively, far above the +2.0 ft level set in Becker's paper.

Not only did the April 29, 2007 record violate the NPS I&M database management protocols and should not have been entered into the NPS harbor seal database, but it also violated Becker's verbal QA/QC protocols presented to the NRC panel on

September 4, 2008, and Becker's written QA/QC protocols in this paper and thus should not have been included in his paper in press in Marine Mammal Science journal.

The April 29, 2007 disturbance data are not credible. Disturbances to harbor seals by oyster workers could not have occurred as described. It was a Sunday. Time cards and pay records reveal that the oyster harvesters were not working. The UEN and OB sandbars were under water. The observers refer to an oyster boat that by their own description was approximately one half mile – approximately 2400 ft. or six to eight football fields -- away from the harbor seal haul-out site.

The NPS official overseeing the NPS I&M database should never have entered this data in the database. Dr. Ben Becker and his colleagues should never have included this data in their paper. This was the **first** entry in the NPS database (as provided to me on August 13, 2007) of an oyster worker disturbing a harbor seal in the two and one-half years during which Lunny had owned DBOC. And these critical (and false) observations were made nine days before the May 8, 2007 hearing.

The NPS needed these disturbance data to support Neubacher's accusations to Supervisor Kinsey twenty-four days earlier (April 5), and the conclusions they were about to make publicly on May 8. These key disturbances were the only such events in the NPS database on May 8 when Don Neubacher and Sarah Allen testified about harbor seal disturbances caused by DBOC to the Marin County Board of Supervisors.

Disturbance Events Cited in Becker I & Becker II Papers Included Fabricated, Falsified, and Suspicious Records

The first version of the Becker et al. paper (Becker I - in press in the Marine Mammal Science journal) was submitted to your panel on June 3, 2008, and presented to your NRC panel by Becker on September 4, 2008. To correlate mariculture-related disturbances with harvested pounds of oysters, Becker I focused on oyster-related disturbance events from 2000-2007.

According to what Becker told the NRC panel, he went through the NPS I&M harbor seal database *"disturbance event by disturbance event"* with the NPS database manager (David Press, a co-author of the Becker paper). Do the disturbance events Becker cited meet the standard to be included in a publication and to be presented to your NRC panel as evidence that the oyster farm is harming the harbor seals? Do these events constitute bona fide mariculture-related disturbances? No.

Becker I listed one mariculture-related disturbance event in 2006 and six mariculture-related disturbances in 2007. However, none of these records are credible.

Once we eliminate those disturbance events that are not credible, we are left with zero disturbance events caused by the oyster farm over the three-year period 2005-2007. According to Becker's presentation to your panel and the first version of his manuscript (Becker I), there were zero mariculture-related disturbance events during the preceding five-year period 2000-2004.

During the three years that Lunny owned DBOC (2005-2007), there are over one hundred disturbance events in the database documenting thousands of seals getting flushed into the water by Park visitors, but not a single FW caused by DBOC. All of the over one hundred disturbance events, and over three thousand flushed seals, were ignored, as Becker and colleagues focused on this minute subset of NPS data. This is a striking example of selective use, and selective omission, of data.

On September 22, 2008, I wrote to you and documented that the one and only mariculture-related disturbance event cited by Becker for 2006 was falsified in that it blatantly misrepresented what is in the NPS I&M database. *"Possibly oyster related"* as written in the side notes did not make this a verified mariculture-related disturbance. The observer described a boat that Lunny does not own (see DOI Office of Inspector General report for description of Lunny's boats). The observer did not call it an oyster boat, but rather a motor boat. Many fishing and recreational motorboats enter the estero. There is no reason to assume that this boat came from the oyster farm. No data confirm this as a mariculture-related disturbance event, and thus, it should not have been counted as one in Becker's paper. This is confirmed by paper co-author Dr. Sarah Allen who wrote to NOAA Joe Cardaro on April 24, 2007 and admitted that NPS had *"no direct observations"* of DBOC disturbing the harbor seals.

The six mariculture-related disturbance events cited by Becker for 2007 all occurred in the twelve days leading up to the May 8 Marin County Board of Supervisors hearing. In my September 22, 2008 letter to your panel, I documented that four of these six events were invalid. Three of them occurred on April 26 as reported in Dr. Sarah Allen's Trip Report. On that date, the oyster boat engine was broken and the workers had clocked out and gone home when Allen reported observing most of these disturbances.

NPS scientist Allen violated the NPS management protocols that she co-authored. Allen did not use the proper forms. Allen did not enter the data in the database for nine months (coincidentally right before submission of Becker's manuscript that relied heavily on these data). Lunny filed a formal complaint about this alleged disturbance several months prior to when Allen and Press entered the data into the NPS I&M database. The NPS never responded, but they nevertheless entered the data into the database without following their entry log protocol and without justifying how this data entry improved the integrity of their database. It is remarkable that they thought it appropriate to tamper with their database in violation of their own protocols just prior to submission of a paper for publication that was based upon this database. These April 26, 2007 disturbance events are not credible.

A fourth of these six mariculture-related disturbance events cited by Becker for 2007 occurred on May 8, the date of the Marin County Board of Supervisors hearing. It seems physically improbable that a single oyster boat could simultaneously flush seals from three different islands over one mile apart (or over sixteen football fields away). These data also should not have been included. They too are not credible.

In this report as documented above, I have described how the remaining two mariculture-related disturbance events cited by Becker for 2007 (occurring on April 29, 2007) could not have happened as described. The tides were too high. The workers

were not working. The timing of the events seems improbable. The entry of the April 29 records violated the database QA/QC protocols, violated Becker's QA/QC protocols, and should not have been included in his NRC presentation or his paper.

In summary, there are no credible mariculture-related disturbance events in the NPS I&M database for the three-year period (2005-2007) that Lunny owned DBOC. Becker I claimed that there are no mariculture-related disturbance events for the five-year period (2000-2004) before Lunny purchased DBOC. Thus, there were zero disturbances for the years cited in Becker I. Becker's analysis in the first version of his paper was false.

Prior to Becker's submission of the revised Becker II paper to the Editor of the Marine Mammal Science journal on October 24, 2008, and subsequently to your NRC panel, he knew that I had objected to his cited 2006 disturbance event and four of his six 2007 disturbance events on September 22, 2008. That was the extent of my formal objections.

What did Becker do in the next version of his paper, Becker II? On December 8, 2008, I wrote to you and described how Becker changed the years, the way in which he calculated the disturbances, and other features of his analysis. Most interesting, he told us in Becker I that he purposefully did not include data prior to 2000. He wrote:

> *"Disturbance data is only included for the years 2000 to 2007 because the subsite specific disturbance data prior to 2000 has not been converted to current data standards."*

For the Becker II paper, Becker told the Editor, Dr. Boness, in his cover letter: *"We now include disturbance data for 1996-2008."* He gave the Editor no reason why he included more years. He gave no explanation for why the pre-2000 data were now worthy of his paper when he excluded them from Becker I. Had they been brought up to "current data standards"? Becker never told us what changed to the pre-2000 data.

Interestingly, something else that is quite important did change between Becker I and Becker II that was not disclosed. Becker never told the Editor that for Becker I, he found zero mariculture-related disturbances in 2003 (see Table 1 in Becker I), whereas for Becker II, two mariculture-related disturbances in 2003 appeared on Figure 2B with no explanation of how they were missed in Becker I, or how Becker's QA/QC protocol failed him. Remember that he told the NRC panel that he and David Press reviewed the database *"disturbance event by disturbance event"*. The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II.

Why are the 2003 disturbance data important? During his presentation to your panel, and in the first version of his paper, Becker made the conclusion that there is a positive correlation between the size of the oyster farm (as measured by pounds of harvested oysters) and the number of mariculture-related harbor seal disturbances. In Becker I, which analyzed 2000 to 2007, the authors claimed that there were zero mariculture-related disturbances in the years with lower numbers of oysters (2000-2005) (see Table 1 in Becker I). If indeed there were two mariculture-related disturbance events in 2003 when the number of oysters was relatively low, then the conclusion made in Becker I, and later reaffirmed in Becker II, might not withstand the objections raised about the veracity of the 2006 and 2007 disturbance events. The inclusion of the 2003 disturbance

events in Becker II made this conclusion from the statistical analysis, particularly if the disturbance events of 2006 and 2007 were excluded, difficult to support. Perhaps this is why the data from 1996-1999 were included in Becker II. Given their conclusion from Becker I, statistically deriving the same conclusion in Becker II (given the inclusion of the 2003 data) was facilitated by the inclusion of the 1996 data.

Becker went on to tell the Editor of the Marine Mammal Science journal:

> *Lines 319-329: Results of oyster harvest vs. disturbance correlation and rank tests. These are all now based on disturbance rate rather than frequency. We illustrate here that* ***omitting up to nine of the disturbances (including the one in 2006 and 2/3 of those [in] 2007****) still would result in a significant increase in disturbance with increase in oyster harvest. Also see figure 2B.*

In his statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:

> *For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when* ***removing the 2006 disturbance, four of the 2007 disturbances*** *(including two disturbances on one day in 2007 that the mariculture company challenged), and* ***four of the 1996 disturbances*** *(nine total) from the analysis.*

Becker told us that *"This correlation is highly robust to sample size."* As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation. According to Dr. Michael Walker, a statistics professor at Stanford, this is a weak statistical test that is prone to having small samples distort correlations.

Why in Becker II did Becker expand pre-2000 to include 1996 data? Becker acknowledged that he should eliminate the 2006 disturbance record and four of the six 2007 disturbance records, although he did not actually do so in Becker II (he wrote that he could do his statistics without them, but still included them in figure 2B in his paper). We do not know whether Becker was aware that his other two 2007 disturbance events (from April 29, 2007) were false.

In Becker II, he claimed that there were six such events in 1996. In fact, as I wrote to you on December 8, 2008 (over six weeks after he resubmitted his revised Becker II manuscript to the Editor and to your NRC panel), he fabricated four of those six records: they simply do not exist in the NPS I&M harbor seal database. These are false claims, but they make for a dramatic data point in figure 2B of Becker II (see next page).

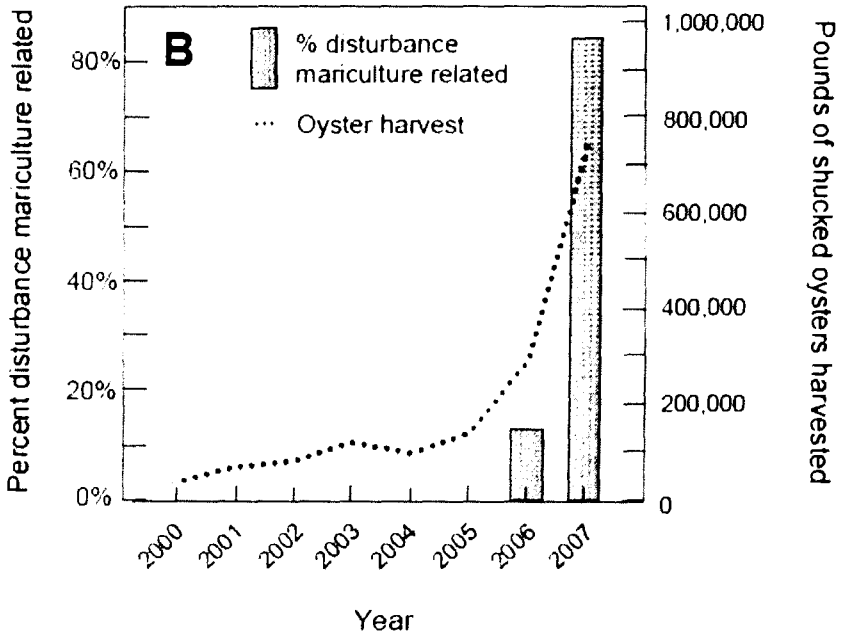
Becker wrote to Editor Boness that he could also use the Spearman ranks test to derive a correlation if he excluded nine disturbance events (one in 2006, four in 2007, and four unspecified in his letter to the Editor). In the text of the paper, he told us the identity of the other four excluded disturbance events: four of the six disturbance events in 1996.

Why did Becker do his statistics by removing four of his six records from 1996? Up until December 8, I had only objected to the one record in 2006 and four records in 2007. I had neither looked at nor commented on the 1996 data. It is striking that Becker included six 1996 disturbance events in his paper – four of which were fabricated – and then claimed that he could do his statistics after removing four of the six 1996 records.

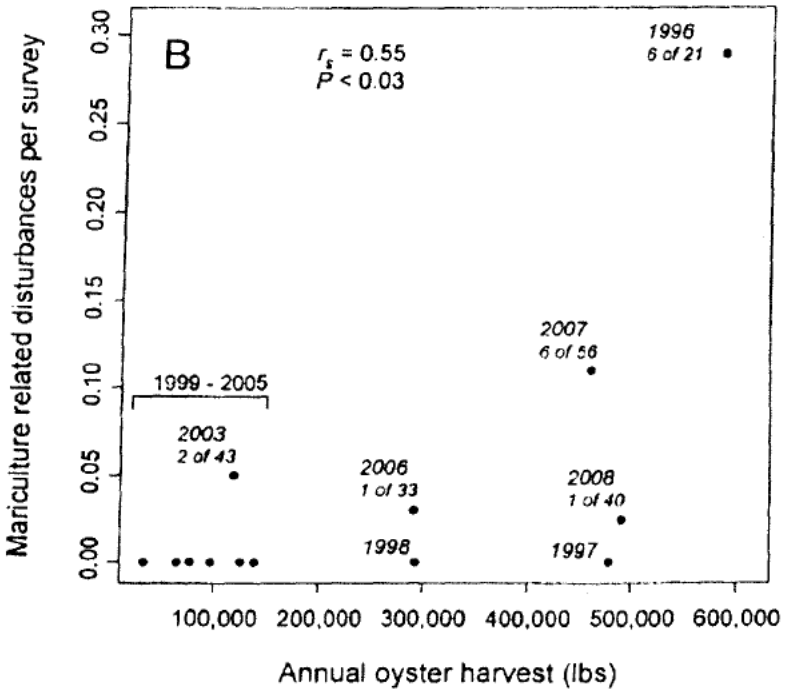
Becker told us in the text of the paper that he could exclude from his statistical analysis the four disturbance events in 1996 that do not exist in the NPS I&M database, but he nevertheless included these four events in the visually powerful figure 2B.

Finally, I think it appropriate to ignore the NPS mariculture-related disturbance in 2008. How can we trust the NPS in 2008 after they were accused of misconduct in 2007?

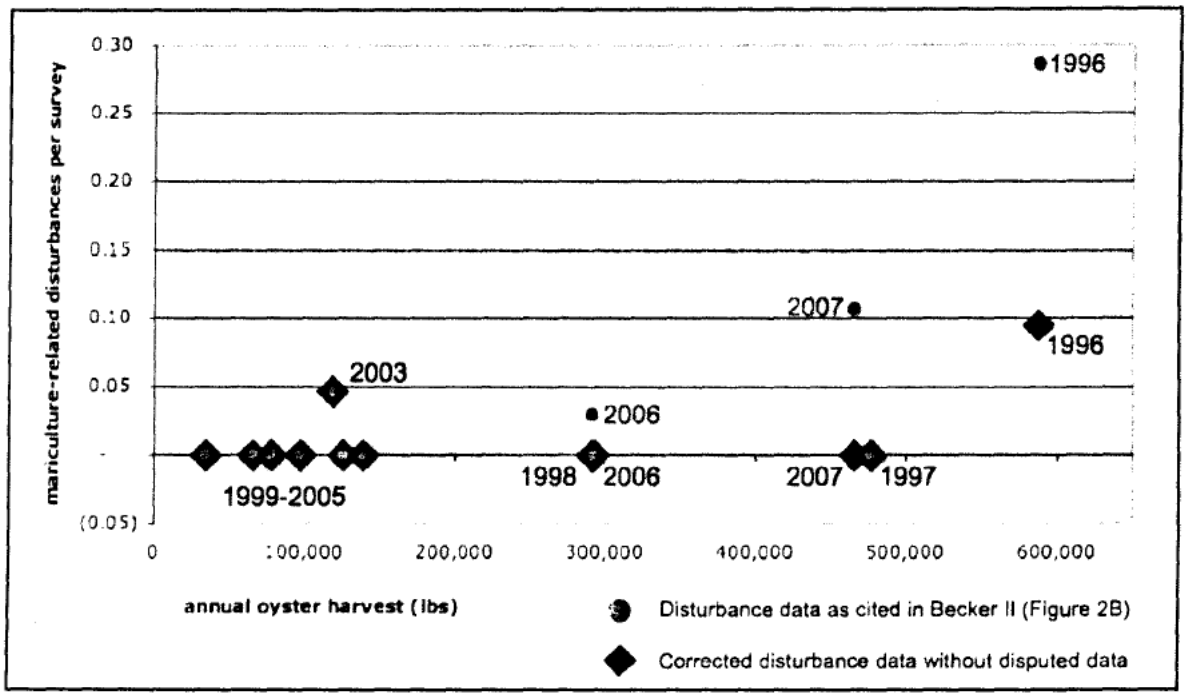
Below and on the next page are Figure 2B from the two different versions of the Becker paper: Becker I and Becker II [Becker, B.H., Press, D.T., and Allen, S.G. *Modeling the effects of El Nino, density-dependence, and disturbance on harbor seal (Phoca vitulina) counts in Drakes Estero, California: 1997—2007.* Marine Mammal Science (in press, 2009)].



In the two figures (above and on the top of the next page), note the differences between Becker I and Becker II, with particular reference to the 2003 data. Immediately above on the previous page is shown Figure 2B from Becker II. With the exception of the two disturbance events in 2003, all of the points above zero include false claims – falsified, fabricated, or suspicious disturbance events.
1996: should be 2 of 21, not 6 of 21;
2006: should be 0 of 33, not 1 of 33;
2007: should be 0 of 56, not 6 of 56;
2008: this is the year after NPS was accused of misconduct, and should not be included.



Below is a redrawing of Becker II Figure 2B, with and without this disputed data. In red are shown the data cited in Becker II. In blue are shown the same years but corrected with the disputed (fabricated, falsified, suspicious) data excluded. Note that when the data are corrected, the only two years above zero are 2003 and 1996.



When the disturbance data are corrected, the correlation of disturbances to number of oysters gets much weaker. If Becker II had stayed with the same years as Becker I (2000-2007) and not cherry-picked the 1996 data, then the relationship would actually be a negative correlation driven by the two disturbances in 2003.

Below is a table with the rate of mariculture-related disturbance events based on the data cited in Becker I and in Becker II. In the left column it shows the data as presented in Becker I or Becker II. In the middle column it shows the correct disturbance rates when the fabricated, falsified, and suspicious data (not following QA/QC protocol) are removed.

Data cited in Becker I and II vs. same analysis without disputed data

year	data cited by Becker	without disputed data	lbs harvested oysters
1996	0.29 (6/21)	0.09 (2/21)	587,172
1997	0 (0/24)	0	476,791
1998	0 (0/31)	0	292,188
1999	0 (0/40)	0	125,749
2000	0 (0/44)	0	34,094
2001	0 (0/42)	0	65,676
2002	0 (0/37)	0	78,064
2003	0.05 (2/43)	0.05 (2/43)	118,643
2004	0 (0/49)	0	96,754
2005	0 (0/37)	0	138,958
2006	0.03 (1/33)	0 (0/33)	291,538
2007	0.11 (6/56)	0 (0/56)	466,503
2008	0.02 (1/40)	? [illegible]	492,787

color key: black = years and data cited in both Becker I and Becker II (2000-2007)
red = years and data cited only in Becker II
blue = data that changed from Becker I to Becker II; Becker I reported zero mariculture-related disturbances in 2003; Becker II reported two in 2003

Earlier in this report, I noted that correlation tests are amongst the weakest in statistics. If we compare the pounds of harvested oysters to the rate of mariculture-related disturbances from 1996 to 2007 (using the correct data in the middle column) using Pearson's test, we get a weak positive correlation of +0.47. If we make the same statistical comparison for 2000-2007, we get a very weak negative correlation of -0.12 (based upon the 2003 data, which appeared in Becker II but which was missed in Becker I). In other words, based on a single anecdote that is twelve years old, namely, the disturbance survey on May 4, 1996 of oyster workers (under a previous owner) disturbing seals at two different times, we can (falsely) conclude that as the number of pounds of oysters increases, so do the number of oyster farm disturbances. Without that record, the correlation flips.

The only reasonable conclusion is that Becker needed to cherry-pick the 1996 disturbance data to support his pre-determined thesis. The positive correlation is based upon a single survey taken over twelve years ago and nine years before Lunny took over ownership of the oyster farm and cleaned it up. Becker II claimed there were six mariculture-related disturbance events in 1996 when in fact there were only two – the other four simply do not exist in the NPS I&M harbor seal database.

Are we to believe that a very weak correlation based on this one twelve+-year old survey form from a single day in 1996 (May 4, 1996) is evidence that DBOC was causing serious harm to the harbor seals in 2007? Does this one record from 1996 teach us anything about Drakes Estero in 2007 or today? Does this one record from 1996 allow us to conclude that as the number of oysters increased, so did the number of oyster-related disturbances?

Summary

In this report, I have presented new information that suggests that, throughout the Summer and Fall 2008, NPS officials and scientists provided your NRC panel with harbor seal data and analyses that was false and misleading. As shown here, there is little ambiguity – your NRC panel was presented with false science.

Tide charts and experimental analysis of tides in Drakes Estero all confirm that on Sunday April 29, 2007, the UEN and OB sandbars were under water when seals were supposedly observed getting flushed. Business records (time clock and payroll records) show that the oyster workers were not working on that Sunday. Swimming harbor seals cannot be flushed off of a sandbar that is under water. Seals cannot be flushed by workers that are not working.

With the debunking of the two disturbance events from April 29, 2007, we can now conclude that none of the mariculture-related disturbances claimed by Becker to have occurred in 2006 or 2007 were valid. None pass the threshold of the NPS harbor seal database protocols. None pass the threshold of the QA/QC protocols outlined in Becker's paper and to your panel on September 4, 2008.

When Becker resubmitted his paper to the Marine Mammal Science journal, and to your panel, he went back to 1996 (including data he previously said should not be included) so that he could cherry-pick two legitimate mariculture-related disturbances in 1996. Becker also fabricated four additional disturbance events that simply do not exist in the NPS harbor seal database. If the Becker II paper were revised to remove the disputed data, then the authors' hypothesis would collapse.

Becker I cited six mariculture-related disturbance events in 2007. After arguments were presented that four of these six events (April 24, 2007 and May 8, 2007) were not credible, Becker essentially conceded these disturbance events. In Becker II, he stated that his statistical analysis was robust when he eliminated these four events.

Clearly, the 2007 disturbance events are key. On April 24, 2007, Dr. Sarah Allen wrote to NOAA's Joe Cardaro and admitted that NPS had *"no direct observations"* of DBOC disturbing seals, consistent with the fact that Becker's cited 2006 disturbance is invalid.

I have shown here that the remaining two mariculture-related disturbance events from 2007 could not have occurred as reported, and should neither have been entered into the NPS database nor included in Becker's paper and presentation to your NRC panel.

Concerning DBOC disturbance of harbor seals in 2007, Superintendent Don Neubacher and Senior Scientist Dr. Sarah Allen gave testimony to the Department of Interior Office of Inspector General (DOI OIG). The DOI OIG Report of July 23, 2008 (pg 25) stated:

> *The first version of the Sheltered Wilderness report, uploading to the PRNS Web site in February 2007, was written prior to the 2007 pupping season and reflected, "Disturbances to resting and breeding seals currently remain low because oyster activities are not occurring at existing seal haul out sites." The updated version of May 2007 stated that disturbances to the seals had "increased dramatically" in 2007 and specified that one area in the estero had experienced an 80 percent decline in seals. Allen and Neubacher explained that the situation with the seals did not become an issue until 2007, when DBOC began to expand its operation.*

In summary, we have come full circle. In May of 2007, the NPS testimony and Drakes Estero Report claimed that disturbances to the harbor seals by the oyster farm had increased dramatically in 2007, as DBOC expanded its operation. In July of 2007, Senator Feinstein asked for an independent science panel to investigate that NPS testimony and report. Your NRC panel resulted from Feinstein's request. One year later, the NPS submitted Becker's paper to you, and had Dr. Ben Becker present his results and conclusions to you on September 4, 2008. This paper diverted attention away from the Drakes Estero Report by claiming a statistical analysis showing that mariculture-related disturbances are positively correlated to the number of oysters harvested. Just as the initial 2007 claims that the disturbances to the seals by DBOC had "increased dramatically" in 2007 were false, so too the 2008 claims that the disturbances correlated with size of the oyster farm are equally false.

Epilogue – Cherry-Picking and Abuse of the Scientific Process

As I was finishing this report, I noticed something that had been staring at all of us for many months -- the title of Becker's paper: *Modeling the effects of El Nino, density-dependence, and disturbance on harbor seal (Phoca vitulina) counts in Drakes Estero, California: 1997—2007.* The years 1997-2007 were reinforced in the second sentence of the abstract where he wrote: *"Here, we use an 11-yr (1997-2007) study of a seal colony located near a mariculture operation in Drakes Estero ..."* If Becker had stuck to those years, and to the correct mariculture-related disturbance data that met his QA/QC protocols, then he would have found no relationship between disturbances and number of oysters. Actually, he would have found a very weak negative correlation (-0.17).

Becker cherry-picked the 1996 data, but never changed his title or abstract, which still begins with 1997. The only way they could get their positive correlation, if they used the corrected data, was to include data from the year before the study period – 1996.

Cherry-picking -- the misuse of facts by selective choice or presentation of data -- is one of the basic *"categories of deceitful tactics and abuse of the scientific process"*, according to Dr. Peter Gleick (President, Pacific Institute; member, NAS; MacArthur Fellow). In Gleick's February 7, 2007 testimony to the Senate Committee on Commerce, Science, and Transportation in a hearing on "Climate Change Research and Scientific Integrity", he referenced cherry-picking data as one form of abuse of the scientific process. However, with those same words, he could just as well have been referring to the misuse of scientific research by the National Park Service in its claims of harm to the harbor seals in Drakes Estero by Drakes Bay Oyster Company.

Appendix

Timeline

Historical Context for April 29, 2007 Disturbance Survey

January 2005

In the January 8, 2009 issue of the Pt. Reyes Light newspaper, Editor Tess Elliott reported that in January 2005, shortly after Kevin Lunny purchased Drakes Bay Oyster Company from the Johnson's, a meeting of Superintendent Don Neubacher and an ad hoc group of local community members was held at the seashore headquarters. Ken Fox, President, Tomales Bay Association, was in attendance. Based on an interview of Ken Fox, Elliott wrote:

> *"The issue of Drakes Bay Oyster Company and what happens in 2012 was discussed for well over an hour," Fox said. "Gordon Bennett [of the Sierra Club] said that it would have been easy to get Johnson's out because their offenses were so egregious, but that it was going to be hard to get Kevin out, especially if he ran a good operation.*
>
> *"There seemed to be an agreement that there should be a pretty big push to get Lunny out," he added. "And Don didn't try to dissuade anybody."*

End of 2005 to April 2007

The Department of the Interior Office of the Inspector General (OIG) Report of July 21, 2008 on the management of Pt. Reyes National Seashore (PRNS), states:

> *[Marin County Supervisor] Kinsey told OIG investigators he had met with members of the Lunny family at various times since approximately the end of 2005 to discuss their concerns about the future of DBOC. In Kinsey's opinion, Neubacher was "holding [the Lunnys] hostage" until they agreed to sign a document agreeing to leave by 2012. He opined that Neubacher was "throwing down a gauntlet of obstacles" for the Lunnys by refusing to sign off on some building permits that the county was ready to issue to DBOC ...*

April 5, 2007

Superintendent Don Neubacher met with Marin County Supervisor Steve Kinsey on April 5, 2007 at the Park headquarters. Kinsey told Kevin Lunny (owner, DBOC) on April 11, 2007 that Neubacher made *"strong environmental accusations"* against DBOC including claiming that he had data of harm to harbor seals by DBOC. Kinsey told Lunny that Neubacher claimed that DBOC committed *"environmental felonies"* (see DOI OIG Report). Kinsey told Lunny that Neubacher claimed to have overwhelming data of environmental harm caused by DBOC, including in particular harm to harbor seals, a protected marine mammal.

The OIG Report states (concerning April 5, 2007 Kinsey-Neubacher meeting):

> *Kinsey said the atmosphere was like that of a "war room." Kinsey could not recall whether he told Lunny that Neubacher was "crazed," but he felt it was accurate to say that Neubacher was "very upset" and "seemed obsessed" with proving that DBOC was harming seals and eelgrass in the estuary.*
>
> *Kinsey confirmed that he told Lunny that Neubacher intended to shut DBOC down. Kinsey stated that although he did not specifically remember Neubacher saying this, the tenor of the meeting left no doubt in Kinsey's mind that Neubacher intended to shut DBOC down prior to 2012.*
>
> *According to Kinsey, Neubacher made "strong environmental accusations" against DBOC during their April 2007 meeting and made reference to DBOC committing environmental felonies. Kinsey summed up Neubacher's portrayal of Lunny as a "character assassination."*

As of April 5, 2007, Lunny had owned DBOC for two and one-half years (beginning in January 2005). The NPS harbor seal database (obtained on August 13, 2007) recorded over 2000 seal FW's (flushed into water, the most serious disturbance to seals and pups) during the three seal pupping season (March-May) from 2005 until April 5, 2007, but not one of them had been caused by DBOC. As of April 5, 2007, when Neubacher made his strong claim to Supervisor Kinsey, there were no NPS data to support Neubacher's claim of harm to harbor seals by DBOC. Not a single harbor seal had been flushed into the water by oyster workers as of April 5th. Not a single record in the NPS database showed a verified disturbance to harbor seals by the oyster farm from January 2005 until April 5, 2007.

As a result of their April 5, 2007 meeting, Supervisor Kinsey invited Superintendent Neubacher to attend a hearing before the Marin County Board of Supervisors on May 8, 2007 to consider, as quoted in the OIG Report:

> *... "adoption of a draft letter to our federally elected representatives" supporting the continued operation of DBOC.*

<u>April 24, 2007</u>

NPS Senior Scientist Dr. Sarah Allen emailed Joe Cardaro of NOAA. Writing in response to his request for data showing harm to harbor seals by DBOC, Allen admitted that she and NPS had *"no direct observations"* of DBOC causing seal disturbances. Allen was right – the NPS database had record of no FW's by DBOC as of April 24, 2007. It was two weeks before the May 8th hearing, and NPS still had no data showing harm to harbor seals by DBOC.

<u>April 26, 2007</u>

Dr. Sarah Allen published a first-authored article in the <u>Pt. Reyes Light</u> newspaper claiming that DBOC had recently put oyster bags in pupping areas and as a result seal numbers at that site had dropped dramatically. The NPS database reveals that as of April 24, 2007, when he would have submitted the final version of her article for

publication, Allen he had no such data to support her claims. Her email to Cardaro on the 24th confirmed the same: *"no direct observations"*.

On the same day as Allen published her article in the local newspaper, she also authored her "Trip Report" describing the first FW's caused by DBOC in the two and one-half year history of ownership of DBOC by Lunny. Her alleged observations occurred in the late afternoon. A "Trip Report" was not normal protocol. Her observations were not entered onto normal survey and disturbance forms. Her data were not entered (as protocol specifies) in the QA/QC NPS database as provided to me nearly three months later on Aug 13, 2007. DBOC records show that the boat engine was broken that day and being repaired, and that the oyster workers had already clocked out and gone home when some of the disturbances were alleged to have occurred. The events could not have taken place as described. Neither Allen nor Neubacher mentioned the April 26 Trip Report at the May 8 hearing.

This trip report is suspicious at best. After a formal complaint about the April 26 Trip Report was filed by Lunny on Sept 27, 2007, the NPS database manager, David Press, nevertheless entered the April 26 Trip Report into the revised NPS database given to Goodman on January 16, 2008, further violating the NPS data management protocols. The data were then used in Becker's paper in press in Marine Mammal Science journal. Given that the oyster boat engine was broken, the workers had clocked out, and the data were not entered onto the correct forms and into the database for nine months, this record is not credible.

April 29, 2007

April 29, 2007 was a Sunday nine days before the upcoming Tuesday May 8, 2007 hearing of the Marin County Board of Supervisors. As of this date, there were no data in the NPS database showing what Neubacher had claimed to Supervisor Kinsey 24 days earlier on April 5, namely that NPS had data showing DBOC harming the harbor seals.

April 29, 2007 is the date of the first entry in the Aug 13, 2007 official NPS QA/QC'ed version of the NPS database of five FW's caused by DBOC during the two and one half year ownership by Lunny of DBOC. On the same day, 55 FW's were caused by Park visitors. This disturbance record, as described in this report, is highly suspicious and not credible.

Even if the April 29, 2007 entry had been a true record of a disturbance caused by DBOC, which is doubtful (see main body of this report), then as of April 29, 2007, DBOC would have caused 1/500th of the FW's of harbor seals in Drakes Estero recorded in the NPS harbor seal database from 2005 to 2007.

March 24, 2010

To: Dr. Tim Ragen, Executive Director, Marine Mammal Commission

From: Dr. Corey Goodman, Marshall, CA; member, National Academy of Sciences

RE: **Harbor seal disturbance data**

In anticipation of our scheduled conference call next Monday, you asked parties to provide feedback on the data points to be discussed (i.e., the NPS harbor seal oyster farm-related disturbance events). In response I have prepared the comments below.

I. The NPS scientists keep changing their assertions of oyster farm-related harbor seal disturbances from their database

The harbor seal disturbance claims by the NPS against the oyster farm keep changing, even though the database remains largely unchanged (with one exception – April 26, 2007). It looks as if NPS interpretation of their own data is very soft, especially the older data. Each time NPS describes their data, they assert that it has been through QA/QC, with multiple scientists looking at it and following rigorous protocols. But NPS accounts of what constitutes an oyster farm-related disturbance keep changing. They have provided different accounts in different reports, including to the MMC.

Here are two examples. In the May 8 and May 11, 2007 version of the Drakes Estero Report ("Drakes Estero: A Sheltered Wilderness Estuary"), NPS wrote that during the breeding season, the oyster farm had caused six disturbances in 1997 and one from 1998 to 2001. In the July 27, 2007 non-public secret version of the Drakes Estero Report, NPS changed the wording from six times in 1997 to several times in 1997. Why did NPS make that change? If NPS thought the claim was wrong (which it was), why didn't they eliminate it all together? It winds up that there are zero oyster farm-related disturbances in 1997 recorded in the NPS database. Why did they report otherwise?

NPS's [redacted] most recently claimed to the MMC that there is an oyster farm-related disturbance in 1999, although we were not given the original datasheet to verify that conclusion. Rather, in the NPS database this event is simply listed as a "motor boat". In [redacted] paper submitted in October 2008 [redacted], the years 1997-2002 were all listed as years with zero oyster-farm related disturbances.

Thus, 1997 was described incorrectly in the NPS Drakes Estero Report. Moreover, the years 1998 to 2001 were described in contradictory ways in different reports by the same NPS scientists. As it stands, there is no reason to consider the 6/29/1999 event as a definitive oyster farm-related disturbance sinc[redacted] published that there were none that year after careful QA/QC examination of the database.

Here is a third and fourth example: 1982 and 1983. We were told in [redacted] most recent manuscript) that two different scientists went through and verified the information in the notes from [redacted]. At the MMC hearing on February 21, 2010, we were given a handout and told that there were four disturbance events in 1982 and

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scientists put it on their list sent to the MMC that has been through extensive QA/QC. Surely this cannot be considered a bona fide disturbance that the Commission wants to have drive statistical analysis. If the panel focuses on only F and FW, then it will be in much better shape.

Second, the Commission should consider only those flushes (F and FW) during the same sensitive pupping and molting season as defined in [redacted] namely March to July of each year. [redacted] only considered disturbances during this period. The Commission should do the same. Any so-called disturbance in another month should be discounted. Rates should be calculated as done in [redacted] as the rate during March-July.

Third, the Commission should consider only those flushes (F and FW) from March to July that occurred since the 1992 change in the protocols. Before that time, Johnson's was allowed in the main channel and lateral channel during pupping season. Since 1992, neither Johnson's nor DBOC has been allowed in the main channel or proximal lateral channel during the pupping season. The protocol was changed to protect the seals, since they haul out onto sandbars from the main channel. The disturbances before the protocol change are irrelevant for MMC's current analysis.

Fourth, the Commission should consider only that data that conformed to the NPS protocols. MMC should consider only that data that uses the proper forms and procedures, and was entered into the database in a timely fashion (as mandated by the protocols; see Hester [redacted] et al., 2004). NPS has strict protocols for collecting and storing of harbor seal data (see Hester, [redacted] et al., 2004); we should only rely on data that meets those criteria. Thus, any data not on the proper forms, or entered into the database many months after the fact, should be discounted. Moreover, if data is entered or changed after the fact, the NPS protocols say that the database manager must write in the log how this change improved the integrity of the database.

Fifth, the Commission should consider only those disturbances that can be definitively shown to be caused by the oyster farm. If the record simply says "motorboat", that is not sufficient. Kevin Lunny and [redacted] insist that they have regularly seen motorboats not belonging to the oyster farm in Drakes Estero. They see and note such boats regularly. The oyster farm owns only two motorboats: a grey one and a white one. Each is about 16 feet long. All other boats belong to someone else. Boats of other colors, boats running up or down the main channel -- all such boats must be considered potentially having nothing to do with the oyster farm unless specified as such.

If the Commission follows these five simple guidelines, it will eliminate most of the disputed data and have a very brief conversation.

III. Disturbance event analysis

A. 1982-1983. These data come from [redacted] old data notebooks. These data were requested by Dr. Goodman via FOIA in 2007. Dr. Goodman was told by NPS that such data did not exist. The Department of Interior Inspector General asked about this data. They too were told it did not exist. Now three years later NPS says the data exist. Dr.

finger of estero, went between est far and est mid past est mid and near and stopped between est near & A – stopped at a buoy offshore NW of study site – pulled up a net (some alarmed no flushes)". Perhaps she was citing the 2nd event at a closer distance as observed by Rowe. But only Stalker gives the 12:26 time. Rowe gives both times as 12:30. What do we believe? Did they put this correctly into the database? The database manager entered 12:26 and sandbar A. This does not jive with the datasheets. Sandbar A jives with Rowe's account at 12:30 at 1600 yards.

Is this an oyster farm-related disturbance? Was it only a head alert? Did it really occur at 200-300 yards or at 1600 yards? Did it occur at sandbar A or UEN? From these two disturbance reports, we cannot tell. How can the Commission rely upon these data?

The 5/4/96 data as recorded by Leslie Rowe are clearly oyster farm-related. She attributes the disturbance to "oyster harvesters". But she calls the disturbance "head lifts only". We are not told distance. Does that count? Is the Commission going to count head lifts as disturbances?

In summary, from 1996, there are at most two bona fide disturbances, and if we eliminate head alerts, then there are none.

C. 1999. The database shows one disturbance on 6/29/1999 caused by a "boat" with a comment "motor boat anchored, pulled up net, boat left after seals rehauled." In the (b) (6), (b) (7)(C) paper in 2008, they did not count this event and said there were zero oyster farm-related events in 1999. Now in 2010 the NPS scientists want to count this event. They do not provide us with the datasheet. We should go along with (b) (6), (b) (7)(C) who assured us that the data had been through rigorous QA/QC, and thus not count 1999. We are given no reason to be confident that this is an oyster farm-related disturbance, and (b) (6), (b) (7)(C) did not count it as such in 2008.

D. 2003. The disturbance data PDF given to us by Press recently suggested three disturbance events in 2003 caused by oyster boats (two head alerts and one a flush). However, in (b) (6), (b) (7)(C) in 2008, they said there were only two such events. Is it two or three? What does the Commission accept? MMC should eliminate the head alerts and only count a single flush on 5/8/2003 at sandbar A.

E. 2006. The 2006 data was not counted by (b) (6), (b) (7)(C) in the 2007 Drakes Estero Report, but then was counted by (b) (6), (b) (7)(C) in 2008. It describes seals getting flushes at UEF by a motorboat. The boat is described as "blue yellow, possibly oyster related zipped through the channel and headed in the direction of Johnson's". DBOC does not own a blue yellow boat. "Possibly" oyster related does not equal oyster related (on the original datasheet, it actually reads "oyster related?" (b) (6), (b) (7)(C) did not count this data for a good reason – it is not verified as oyster related. It should be eliminated.

In addition, UEF is too far away and the observer could not observe the seals. Finally, May 6, 2006 was a Saturday. There was no reason for DBOC oyster workers to be on the Estero, particular in a channel on a Saturday. There are no records of DBOC workers on the Estero that day. Conclusion: this was not a DBOC boat.

Kinsey 24 days earlier on April 5 -- namely that NPS had overwhelming data showing DBOC harming the harbor seals.

April 29, 2007 is the date of the first entry in the Aug 13, 2007 official NPS QA/QC'ed version of the NPS database (sent to Dr. Goodman) of five FW's caused by DBOC during the two and one half year ownership by Lunny of DBOC. On the same day, 55 FW's were caused by Park visitors. This disturbance record is highly suspicious and not credible.

No such disturbances could have occurred as described -- the tide was too high (all of the sandbars were under water); the workers were not working (it was a Sunday). These data failed the NPS I&M harbor seal database QA/QC protocols and never should have been entered into the NPS database. The volunteers went out at the wrong time. These data failed the QA/QC protocols that Becker presented to the NRC panel on September 4, 2008. These data failed the QA/QC protocols in the Becker et al. paper (Becker II) in Marine Mammal Science and never should have been included in that paper.

For a complete analysis of this disturbance event, see Goodman 's "CSG to NRC 1_18_09.pdf" included here.

Conclusion: this was not a DBOC boat.

H. May 8, 2007. The May 8th claim is also troublesome, since it occurred on the day of the Marin County Supervisors hearing and described a situation that is suspicious – a single oyster boat was claimed to have simultaneously disturbed seals on three different islands well over one mile apart. That seems physically impossible. The observer showed up at 8:45 am and immediately recorded an oyster boat flushing seals simultaneously from three different islands. This is especially odd because the oyster workers knew they were being scrutinized and were being extra careful.

IV. Which disturbance events should the Commission consider?

If the MMC follows the five simple guidelines I've laid out, and considers the disturbance event analysis as described above, it will come to the following conclusions:

- MMC should exclude all of the events prior to the 1992 protocol.
- MMC should exclude all of the head alerts and only count flushes.
- MMC should exclude the data from motorboats that are not clearly owned and operated by DBOC, or that cannot be verified as being an oyster boat.
- MMC should exclude the controversial data from April 26, 2007 (workers clocked out, boat broken, data not on proper forms; data not entered into database), April 29, 2007 (workers not working, tides too high), and May 8, 2007 (physically impossible and unlikely given the events).

What events remain? Prior to the May 8, 2007 hearing, and the resulting controversy, there is only one potentially reliable oyster farm-related disturbance record:

simultaneous flushes of seals on three different islands over one mile apart, all by the DBOC foreman, Jorge, who knew to be careful and was taking a boat out to collect a water sample as mandated by the State.

In conclusion, during the two and one half years that Lunny had owned DBOC, his oyster workers had never caused a single disturbance of the harbor seals as recorded in the NPS database. During those same years, the database recorded thousands of seals getting flushed, most by Park visitors, but none of them were flushed by DBOC. The record was clean. Zero DBOC disturbances. But on April 5, 2007, Superintendent (b) (6), (b) (7)(C) claimed just the opposite to Supervisor Kinsey. He claimed to have overwhelming data that DBOC had caused harm to harbor seals. (b) (6), (b) (7)(C) had zero data. A hearing was planned. Lunny told his workers to be extra careful because (b) (6), (b) (7)(C) was making false claims about them. Suddenly, in the final two weeks before the hearing, disturbances were claimed for the first time in two and one half years. But the workers were not working, or the boat was broken, or the tides were too high. Are these data reliable? Can the Commission draw meaningful scientific conclusions from these data? These data should be disregarded.

March 25, 2010

To: Dr. Tim Ragen, Marine Mammal Commission

From: Kevin Lunny, Drakes Bay Oyster Farm

Re: Drakes Estero Seal Disturbance Notes

Dear Dr. Ragen,

The MMC requested DBOF comments and observations, as part of its review of harbor seals and disputed NPS harbor seal data at Drakes Estero.

To clarify, DBOF will not address disputed NPS data prior to January 1, 2005 as we did not own the farm prior to that date and have no first hand knowledge regarding what occurred during that time.

DBOF submits comments on NPS harbor seals data on disturbance events identified by NPS in 2006, 2007 (in three instances), 2008 and 2009. We hasten to point out that the first we heard of disturbances attributed to the oyster farm in 2008 and 2009 was at the MMC meetings in February. We saw details about these disturbances for the first time when the MMC submitted these work sheets to us a few days ago. To date, NPS never contacted DBOF about possible disturbances.

In these notes (below), we review the disturbance events included in NPS studie(b) (6), (b) (7)(C) (b) (6), (b) (7)(C) and work sheets, and challenge each. From our records, and our in-Estero operational protocols, we conclude that none of these disturbances were caused by the oyster farm, oyster farm boats and/or oyster farm workers.

Our records support our conclusions.

Some over-arching comments:

(1) The observations described by NPS observers are in no way consistent with how DBOF conducts its daily business in Drakes Estero.

(2) The 2006 disturbance report described a boat we do not own, and described its location at a place, the main channel, not used at that time of year. The disturbance record does not even describe the boat as "oyster-related." Remember, NPS reported to NOAA that there were no disturbances prior to April 24, 2007.

(3) The three 2007 disturbances all occur in a cluster of twelve days immediately prior to the Marin County Board of Supervisors' hearing. Each is seriously flawed. Either the time was wrong, the tides were wrong or the business was closed on a Sunday (each is detailed in the notes below).

meters. The disturbance was recorded at nearly double that distance – close to 1.5 miles away -- and on an impaired visibility day.

6. Count is not shown on NPS observer's worksheet – only disturbance of 24 seals. Does not show if these were pups or adults. Were they counted before flushing? The chart required that a before and after count should be displayed. Or, did they count the seals as they were flushing? 2200 meters away?
7. DBOF boat operators are all trained to keep an adequate distance so not to disturb seals.

Conclusion: This was not a DBOF boat and the NPS database should be clarified that this was not an oyster farm related disturbance.

April 26, 2007

Notes:

1. All DBOF employees clocked out by 4:37PM on this day.
2. DBOF work hours of operation are 8:00AM to 4:30PM. April 26, 2007 was no exception. Occasionally, DBOF work hours shift to 7:00AM to 3:30PM to allow for early tides. Time cards, computerized certified payroll records and DBOF staff fully support this statement.
3. The white DBOF boat was out of the water for repair and inoperable Apr 26, 2007. The repairs to the white boat were not completed until 10:00 the next morning. DBOF Daily Job Reports and certified payroll reports support this statement.
4. The "east end of OB haulout site" is the main channel. "Half way along the channel going west" would be referring to the lateral channel. "The boat was fouled in eelgrass" in the east end of the OB haulout site. "The operators were poling through the eelgrass bed." Once halfway along the channel going west, they used the engine again.
    a. **There is virtually NO EELGRASS on the east end of OB or UEN.** This is the deep "main channel". This is the location where seals haul out. There is also no eelgrass on the east end of the lateral channel. Eelgrass begins in the lateral channel basically mid-way in the channel – exactly where the trip report tells us that the operators began using the motor again. (see attached NPS Drakes Estero eelgrass map)
    b. DBOF boat operators do not use the main or lateral channel during pupping season.
    c. DBOF operators do not "pole" through eelgrass. They partially lift drive unit, motor slowly and clear prop often. If DBOF operators "poled through eelgrass beds", they would be poling almost continuously throughout Drakes Estero – which they do not do.
5. At 3:50PM observer noticed boat mired in eelgrass – heading west. Observer "did not see the number of seals present before the boat was there" and indicated that a disturbance likely happened (drag marks in the sand, heads bobbing and wet seals hauling out "when I began surveying" (3:50PM)). Five minutes later, at 3:55PM, the observer recorded a disturbance: "all flushed into the water except

April 29, 2007

Notes:

1. April 29, 2007 was a Sunday.
    a. DBOF staff does not usually work on Sundays. DBOF staff works Tuesday through Saturday. April 29th was no exception.
    b. DBOF staff (except the retail store staff) did not work on April 29th, 2007. Electronically stamped time cards, daily job reports and computerized certified payroll records support this fact.
2. The observer saw a boat "throwing out bags" at 12:50PM and again "threw out more bags" at 13:40.
    a. DBOF staff places bags on an oyster bed one time per day. Each trip into the bay is expensive and so trips into the bay are kept to a minimum. There would be no reason to place bags in the same location, 2 times within 50 minutes, on the same day.
    b. It would not be possible for a boat to be at OB, then travel back to the shoreside facility, reload bags, and be back at OB within 50 minutes. For this disturbance record to be accurate, two different boats and two different crews would have to have been involved, all on a day off and without pay.
    c. No staff was working at the facility to prepare bags for planting. For the trip report to be accurate, a crew would also have been working on shore to prepare the bags for planting, also on their day off and without pay.
3. The trip report and disturbance survey identify disturbances at a time that OB was indisputably well under water and no harbor seals could have been hauled out. The MMC panel has been provided the tidal documentation to support this fact.
4. NPS' QA / QC protocols were not adhered to. This disturbance record must be rejected and removed from the database because the observation of the disturbance was outside of the time & tide level allowed by QA/QC rules.

Conclusion: This was not a DBOF boat and the NPS database should be clarified so that this was not an oyster farm related disturbance.

May 8, 2007

The observer "just arrived" at 8:45AM. Start time of survey was 8:45AM. In another location, observer explains that she "saw a boat at 8:40 before I was at site and set up". She then explained the exact route of the boat, obviously watching closely. Within 3 minutes of arriving, by 8:48AM, in "blur conditions" and "tough to see," she had counted 72 adult seals and 50 pups on UEN. By 8:55AM, she had counted 42 adults and 13 pups on OB. And by 8:57AM, she counted 18 adults and 5 pups at UEF, at a distance of roughly 1600 meters in bad sight conditions. By 9:05AM, she counted 114 adults and 78

staff meeting so the Lunnys could tell the oyster farm staff of the NPS accusation. On or about April 20th, 2007, the Marin County Board of Supervisors announced that they would consider writing a letter to US Senator, Dianne Feinstein to intervene in the NPS DBOF issue. On April 24, 2007, NPS notified NOAA, in writing, that there were no direct observations of seal disturbances caused by DBOF. The supervisors' meeting was on the morning of May 8, 2007 – the same day as this alleged disturbance. None of the disturbances happened before April 5th, 2007, contrary to what (b) (6), (b) (7)(C) told Kinsey. NPS was correct when NOAA was notified that there were no disturbances before April 24, 2007. All of the alleged DBOF disturbances and the claim that DBOF caused an 80% decline in harbor seals happened after the NPS learned that a U.S. Senator could get involved. All happened in a matter of about two weeks during a time that DBOF staff was on high alert not to disturb seals.

On May 8, 2007, a boat did travel to the sentinel mussel buoy located in the main channel, across from UEN, to collect a sample for marine biotoxin analysis. The boat was operated by (b) (6) a 27 year veteran oysterman in Drakes Estero. DBOF has certified payroll records that identify (b) (6) as the boat operator. He has been a supervisor for most of his career in Drakes Estero (b) (6) was present and an important part of the interagency meetings and decisions that produced the harbor seal protocols in 1992. Part o (b) (6) job is to train other staff members about protecting harbor seals in Drakes Estero. (b) (6) was acutely aware that on that very day, May 8, 2007, NPS would be standing before the Marin County Board of Supervisors to accuse DBOF of causing a severedecline in harbor seals in Drakes Estero (b) (6), (b) (7)(C) claim to Steve Kinsey plus NPS staff and the Sierra Club had already written articles in local newspapers to this effect). (b) (6) also knew that the NPS was using this claim to support their plan to evict the oyster farm from Drakes Estero.

(b) (6) swears that he did not disturb any seals on that day. How can he remember? Because he can tell you that he NEVER flushes seals when he collects samples. He uses the eastern edge of the main channel and the seals pay no attention. He also remembers how hypersensitive he was on that very day, May 8, 2007, during pupping season, with the Supervisors' meeting that day (b) (6) agreed to write a statement that memorializes his clear recollection if the MMC panel would find it necessary.

Conclusion: This was not a DBOF boat and the NPS database should be clarified so that this was not an oyster farm related disturbance.

The May 8th alleged disturbance is the third alleged disturbance in the few weeks after NPS claimed that DBOF caused grave harm to the harbor seals, was later forced to admit to NOAA that there were no observations and the May 8, 2007 hearing where the Marin County Board of Supervisors would bring in Senator Dianne Feinstein to shine some light on PRNS. All of these observations within this time period are severely flawed and all should be corrected in the database.

March 14, 2008

e. DBOF boats did not go anywhere near OB on that day.
f. All DBOF records and logs clearly support these facts.

Conclusion: This was not a DBOF boat and the NPS database should be clarified so that this was not an oyster farm related disturbance.

Final Notes

Drakes Bay Oyster Farm respectfully requests that the MMC conclude, based on this analysis, and the review of others, that DBOF did not commit these disturbances, that the NPS harbor seal data was not accurate, and that the NPS studies, reports and presentations based on the incorrect NPS harbor seal data should be corrected.

Correcting this data is critically important. This data was used by NPS and the California Coastal Commission to recommend restrictions and limitations on the farm's production, based on the incorrect assumption that the oyster farm was causing harm to harbor seals.

To assist the MMC, DBOF offers to make its records and supporting documentation available for review upon request of the Panel.

Thank you for addressing the NPS harbor seal data issue.

Sincerely.

Kevin Lunny

November 23, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Executive Director Peter Douglas, California Coastal Commission

Re: REQUEST THE CALIFORNIA COASTAL COMMISSION STOP PROMOTING FALSE AND DISCREDITED SCIENCE CONCERNING DRAKES ESTERO

Dear Executive Director Douglas:

In your letter of November 10 to Donna Wieting, Acting Director, Office of Ocean and Coastal Resource Management (OCRM), National Oceanic & Atmospheric Administration (NOAA), you assert that Drakes Bay Oyster Company (DBOC) is having a negative impact on the ecology of Drakes Estero at Point Reyes National Seashore. However, your letter to Wieting contains numerous false scientific claims that were refuted over one year ago by the National Academy of Sciences (NAS) report of May 5, 2009. I write to request that you retract your letter, retract other letters or documents with similar claims, and refrain from making similar false claims in the future.

Your letter to Wieting repeats false scientific claims that have their origins in the NPS May 2007 Drakes Estero Report (*Drakes Estero: A Sheltered Wilderness Estuary*). Most of those same claims were repeated by Dr. John Dixon, California Coastal Commission (CCC) scientist, in his September 2007 report to the CCC. In your letter to Wieting, you cite both documents. The parallel claims in both documents were retracted by the NPS in 2007 and subsequently refuted by the NAS report in 2009. This could have been cleared up years ago, but you will remember that back in December 2007, you refused my request when I asked to meet with Dr. Dixon to go over the science.

(1) Are you aware that most of those scientific claims have been discredited?

(2) Are you aware that NPS retracted most of those scientific claims in 2007?

(3) Are you aware that the NAS May 5, 2009 report refuted those scientific claims?

NPS RETRACTED MOST OF THEIR FALSE CLAIMS IN TWO DOCUMENTS IN 2007

First, the NPS retracted many of these scientific claims against DBOC in their secret, non-public July 2007 version of the Drakes Estero Report. For example, in the July 27 version, NPS deleted the claims concerning impacts of DBOC on sediments, fish communities, and harbor seals.

Second, the NPS made more extensive retractions a few months later in their September 18, 2007 Clarification document. I encourage you to read both documents

and consider the implications to the credibility and integrity of the CCC as you continue to repeat false scientific claims that even the NPS retracted three years ago.

In the September 18, 2007 Clarification document, NPS retracted most major claims against DBOC. Concerning oyster feces in the sediments, the NPS document stated:

> *"The NPS incorrectly interpreted the report by Dr. Roberto Anima ..."*
>
> *"The Elliott-Fisk et al. (2005) report notes oyster feces are not a problem..."*

Concerning the impact of DBOC on eelgrass, NPS stated:

> *"The current level of impact to eelgrass beds by the oyster operation may or may not be significant to the overall persistence of eelgrass within Drakes Estero."*

Concerning the impact of DBOC on the harbor seals, NPS stated:

> "*More focused analyses are required to determine if oyster operations are affecting seal distribution and productivity within Drakes Estero."*

Finally, concerning the overall impact of DBOC on Drakes Estero, NPS concluded:

> *"Scientific studies to date are inconclusive as to the extent to which oyster farming is altering natural resources within the Estero..."*

In a letter to you on October 30, 2007, Dr. Peter Gleick, a fellow member of the NAS, MacArthur Fellow, President and co-founder of the Pacific Institute, and world-renown environmentalist and water expert, wrote about the September 18, 2007 NPS Clarification document and NPS retractions of their false claims. Dr. Gleick wrote:

> *... the memo of September 18 by the National Park Service ... essentially acknowledges the many errors and misrepresentations of the NPS ...*

Concerning the NPS Clarification document, Dr. Gleick wrote to the Sierra Club (as provided to you and your staff in multiple documents over the past few years):

> *... this NPS 'rebuttal' ... acknowledges very clearly that the NPS was wrong ... over and over and over again, but couched in language that pretends the opposite.*
>
> *The NPS errors were NOT minor, but major and misleading, and now, given the responses, pretty obviously intentional.*

I had hoped that Dr. Gleick's letters to you and the Sierra Club in the fall of 2007 would have encouraged you to correct your misuse of the NPS false science. Evidently they have not. I once again encourage you to read these NPS documents and Gleick letters.

NAS 2009 PANEL REPORT REFUTED THE NPS 2007 FALSE CLAIMS

While the NPS retracted many of their false claims against DBOC in 2007 – including most of the claims that you repeat in your letter to Wieting, the National Academy of Sciences (NAS) report of May 5, 2009 went much further in criticizing the NPS false science. The NAS stated that NPS misrepresented their own scientific studies in the Drakes Estero Report. It is thus difficult to reconcile the history of NPS retractions and NAS repudiation of the NPS false claims with the letter you recently sent Wieting.

Several key members of your CCC staff were present on July 21, 2007 at Senator Feinstein's Olema meeting during which allegations of NPS scientific misconduct were raised concerning NPS claims that scientific data showed that DBOC was harming the ecology Drakes Estero. During the Olema meeting, your staff heard Senator Feinstein ask, and NPS Director Mary Bomar agree, that NPS should request that the NAS conduct a study to determine if the NPS had correctly represented the scientific data concerning DBOC and Drakes Estero.

It is important to note that four days after the July 21,2007 Olema meeting, NPS Superintendent (b) (6), (b) (7)(C) issued his "*acknowledgement of corrections*" in which he retracted two major claims against DBOC concerning oyster feces in the sediments and impacts on fish communities. Two days later, (b) (6), (b) (7)(C) and others completed their July 27, 2007 non-public version of the Drakes Estero Report (discussed above) in which they deleted many of the major claims against DBOC.

The NPS formerly asked the Ocean Studies Board of the National Research Council (NAS) on October 24, 2007 to review the scientific claims in the NPS Drakes Estero Report and other NPS public presentations. The NPS asked the NAS to examine:

> *the scientific basis for the National Park Service (NPS) presentations and the report (including revisions), "Drakes Estero: A Sheltered Wilderness Estuary," on the ecological effects of the Drakes Bay Oyster Company operations on Drakes Estero…*

The resulting May 5, 2009 NAS report by the Ocean Studies Board, *Shellfish Mariculture in Drakes Estero*, concluded:

> *The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, overinterpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects.*

The 2009 NAS report repudiated nearly every one of the scientific claims made by the NPS in their 2007 Drakes Estero Report, and thus nearly all of the scientific claims made by Dr. Dixon in his 2007 report to the CCC, and nearly all of the claims that you recently made to NOAA's Wieting in your November 10, 2010 letter. None of those claims remains standing. Do you not know that your claims were refuted by the NAS?

Although your letter to Wieting contains 51 citations, the NAS report never made it onto

your list. Why did you ignore the report by our country's most prestigious scientific body that refuted nearly all of the NPS scientific claims that you repeated? The NAS charged the NPS with misrepresenting their own science. Why do you keep repeating the same false claims? I encourage you to retract your letter in light of the NAS report.

Let me give you just one example from the NAS report: the impact of DBOC on eelgrass. This is an issue that you consider in some detail in your letter to Wieting. I use this example as an illustration to demonstrate that you are repeating false science that was refuted by the NAS report in 2009. The NAS report concluded:

> *The absence of eelgrass directly under oyster culture racks represents a small-scale and localized impact on the biogenic habitat. Numerous boat propeller scars in the eelgrass beds, partially affecting a total area of about 50 acres, are also evident and attributable to oyster culturists because they are the only ones allowed to use motorized vessels in the estero. Nevertheless, the total percentage of eelgrass area lost (1%) or partially degraded by propeller scars (7%) and thus attributable to oyster mariculture represents about 8% of all eelgrass habitat in Drakes Estero as of 2007. Eelgrass has approximately doubled in areal cover in Drakes Estero from 1991 to 2007, implying little systemic threat from the existing intensity of oyster culturing activities. Oysters have the potential to benefit eelgrass because their filtering activity improves local water clarity (and hence light penetration) and because they release biodeposits and ammonium (plant nutrients).*

That is quite a different conclusion than is made in your letter to Wieting. I encourage you to read the NAS report and modify your assertions accordingly. You will discover that most of your summary claims in your letter to Wieting are incorrect.

NPS RESPONSE TO THE MAY 5, 2009 NAS PANEL REPORT

When the NAS report was released on May 5, 2009, NPS issued a press release from the office of then Pacific West Regional Director Jon Jarvis in which the NPS stated:

> *Certainly, we apologize for the errors in our original document and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report.*

By "original document", Jarvis was citing the May 2007 version of the Drakes Estero Report, the one reviewed by the NAS report, and the one that you cite in your letter to Wieting. Jarvis apparently was citing both the July 2007 secret non-public version of the Drakes Estero Report and the September 2007 Clarification document when he wrote of the "final, corrected version of the report." Both of those documents retract most of the claims made in the original Drakes Estero Report. Since Jarvis, currently the Director of the NPS, openly acknowledged in 2009 the many errors and mistakes in the Drakes Estero Report, why in 2010 do you keep citing it and repeating these false claims?

NPS HARBOR SEAL CLAIMS REFUTED BY NPS PHOTOS AND DETAILED LOGS

I include here a letter I sent yesterday to Interior Secretary Ken Salazar, alleging that officials and scientists in the NPS violated a series of federal government rules, regulations, and codes, and in so doing committed scientific misconduct. Please carefully read this document and it's four appendices. It involves some of the same scientific claims that you repeat concerning disturbances to the harbor seals by DBOC boats and workers, NPS claims that are refuted by NPS secret cameras, photographs, and detailed logs. The revelations from the NPS photos and logs should encourage you to retract the letter you sent to Wieting, retract letters and documents with similar false claims, and refrain from making similar false claims in the future.

The issue concerns the NPS claims over the past three and a half years that NPS data shows that DBOC boats and workers have been disturbing the harbor seals and pups in Drakes Estero in PRNS. These claims were based on a weak (and now known to be flawed) body of NPS data: a volunteer harbor seal monitoring database. The NPS failed to tell a series of investigations, inquiries, and reviews that it had a second and more reliable (and verifiable) body of NPS data: minute-by-minute, dawn-to-dusk photographs from hidden cameras focused on oyster farm operations and certain harbor seal haul-out sites. Moreover, the conclusions from this more reliable body of NPS data in large part contradicted the conclusions NPS officials and scientists had been making from the less reliable (and flawed) body of data.

The NPS failed to tell the following people and groups about the existence of the secret cameras, photographs, and logs: elected officials (e.g., Marin County Supervisors, Senator Feinstein, Representative Woolsey), the DOI Inspector General, the National Academy of Sciences, the Marine Mammal Commission, the press, the public, the editor of the Marine Mammal Science journal, and the owners of DBOC.

Given what you wrote in your letter to Wieting, it appears as if NPS also failed to tell you and others at the CCC about the secret cameras, photos, and logs. In case you were unaware of them, by sending you this letter, I am informing you of the photos and logs, and the fact that they lead to the opposite conclusion from what has been claimed by both the NPS and CCC. If you would like more detail, please download and examine Appendix 2 that accompanies the letter to Secretary Salazar.

I ask you to stop making these false claims that DBOC is disturbing the harbor seals. According to the NPS photographic data, DBOC is not. The photos clearly show that the occasional disturbances to seals come from kayakers, not oyster boats or workers.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED TO EIS PROCESS

The NPS misconduct is continuing unabated and is having serious impact on policy decisions at Point Reyes, particularly on the Environmental Impact Statement (EIS) process currently being conducted by NPS. To my knowledge, the NPS photos and

logs have not been disclosed as part of the EIS process for the DBOC lease renewal. Rather, the same false claims, including the flawed 2009 NPS paper by [redacted] in the journal *Marine Mammal Science*, were submitted for the EIS process, but not the NPS photos and logs that refute those claims and that paper. This failure also and independently constitutes scientific misconduct and suggests that the ongoing EIS process has been damaged, possibly fatally.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED BY THE CCC

The NPS false science is also being spread by your organization, the California Coastal Commission, as you appear to be using the false science to negatively influence the EIS process. For example, in your November 10 letter to Wieting, you wrote:

> *"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water." (citation #49)*

As the basis for this statement, you cited (#49) the [redacted] 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should have informed the CCC that the NPS harbor seal claims were incorrect, that the photos and logs, presumably never shared with CCC, refute those claims, and that the Becker et al. 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal). By including here the material I sent yesterday to Secretary Salazar, I am informing you that [redacted] et al., 2009, your citation #49, is seriously flawed.

Please read my letter to Salazar, carefully read the four appendices with it, and then in accordance with the conclusions from the NPS photos and detailed logs, retract your letter to Wieting.

CONCLUSIONS

I request that you and the California Coastal Commission immediately:

(1) retract your Nov. 10 letter to Donna Wieting, Acting Director, OCRM, NOAA,

(2) retract other letters or documents containing similarly false scientific claims that you have submitted as part of the EIS process for DBOC and Drakes Estero,

(3) refrain from submitting additional letters or documents containing similarly false scientific claims concerning DBOC and Drakes Estero,

(4) refrain from repeating and promoting this false science, and

(5) begin an open and transparent investigation to determine why false science continues to be repeated in letters and documents emanating from the CCC.

It is imperative that you begin an investigation into the use of science – or in this case the misuse of science -- by the CCC. Your organization has been making these false claims for over three years now, and it is worrisome that the CCC appears to be letting a predetermined political agenda drive the misuse of science.

You are charged by the people of California with conducting your "*affairs in an open, objective, and impartial manner free of undue influence and the abuse of power and authority.*" It appears as if your use of science – or in this case misuse of science -- concerning DBOC and Drakes Estero has not been objective and has not been impartial. I request that you investigate these allegations. If you are not capable of having an "*open, objective, and impartial*" investigation of your own conduct, then I request that you hand such an investigation over to another impartial State agency.

Two elected members of the National Academy of Science – Dr. Peter Gleick and I – have warned you repeatedly of your repeated use of false science. It certainly needs to be investigated why you have repeatedly ignored a detailed report by the most prestigious scientific body in our country – the National Academy of Sciences – and why you continue to quote National Park Service documents that have been discredited and retracted. Only an open and transparent investigation will help clear the air.

Please respond to this request for a retraction and an investigation in a timely fashion. Kindly provide me with information on whether you plan to retract your letter, investigate your use of science, how you plan to proceed, who will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public.

Time is of the essence, since the EIS is underway, and you have weighed in on the EIS process with this false science. I ask you to retract this false science from the EIS.

Please distribute this letter to the six CCC Commissioners, the one North Coast representative, and the appropriate Commission staff.

I look forward to hearing from you. Do not hesitate to contact me if you have any questions or want further information.

Sincerely yours,

Corey S. Goodman, Ph.D

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

cc: Acting Director Donna Wieting, OCRM, NOAA
David Kaiser, Senior Policy Analyst, OCRM, NOAA
John McCamman, Director, CA Department of Fish & Game
Secretary Lester Snow, CA Resources Agency
Assemblymember Jared Huffman, CA State Assembly, 6th District
Senator Mark Leno, CA State Senate, 3rd District
Senator Dianne Feinstein, US Senate
Representative Lynn Woolsey, US House
Marin County Supervisor Steve Kinsey
PRNS Superintendent [redacted] NPS
Yosemite Superintendent [redacted] NPS
Drakes Bay Oyster Company owners Kevin and Nancy Lunny

APPENDIX: How I Got Involved in This Issue

Three and a half years ago, on August 28, 2007, Marin County Supervisor Steve Kinsey first asked me to look at National Park Service science concerning the impacts of DBOC on Drakes Estero, and to come report on that science at a Marin County hearing on May 8, 2007. At that hearing, I made three particularly relevant statements in my testimony:

> *"I believe that public policy decisions can and should be informed by quality science. But this must be science conducted rigorously, without agendas or conflicts-of-interest. The political process can be dangerously misled by bad or misused science. One of my greatest concerns when I see science being invoked in public policy debates is to make sure that it is good science and not pseudo-science or ... a blatant misuse of science."*
>
> *"My only hesitation in coming forward to testify today is the realization that openly expressing my views as a scientist may cause me to come under personal attack by local groups that are determined to remove Lunny's operation from the PRNS. Nevertheless I feel compelled to speak out for good science instructing public policy."*
>
> *I end with a note of caution. Beware of sudden claims of "new" data that refute what I have laid out here today and in my more detailed written testimony. If such claims are made, insist on seeing the complete database, check for bias, and seek independent review."*

Brief Biosketch

Dr. Corey S. Goodman is a scientist, educator, and biotech entrepreneur. With a B.S. from Stanford and Ph.D. from Berkeley, he spent 25 years as a biology professor at Stanford and the University of California Berkeley. Goodman is currently on the faculty of U.C. San Francisco. He was elected a member of the National Academy of Sciences (NAS), American Academy of Arts and Sciences, and American Philosophical Society. He won numerous scientific awards (e.g., Alan T. Waterman Award from the National Science Board, Canada Gairdner International Award in Medical Sciences, March-of-Dimes Prize in Developmental Biology), was a Howard Hughes Medical Institute Investigator, Evan Rauch Chair of Neuroscience, and co-founded the Wills Neuroscience Institute.

Goodman moved into biotech to apply biomedical discoveries to human and environmental health. He co-founded Exelixis, Renovis, and PhyloTech, was CEO of Renovis, and President of Pfizer's Biotherapeutics and Bioinnovation Center. Today Goodman is Managing Director and co-founder of venBio, Board Chair of six biotech companies, and Board member of two others.

Amongst his many public policy roles, Goodman is on the Board of the California Council on Science and Technology, Pacific Institute, Bay Area Science and Innovation Consortium, and is former Chair of the National Research Council's (NAS) Board on Life Sciences.

DBOC's Responses to the 2008 IG's Report – Scientific Misconduct
12/10/10

1) **IG (p. 2):** "Additionally, (b) (6), (b) (7)(C) and (b) (6), (b) (7)(C) made concerted attempts to refute Kevin Lunny's disputed portrayal of oyster farming as beneficial for Drakes Estero. Our investigation revealed that although (b) (6), (b) (7)(C) intended to bring the potential negative effects of the DBOC operation to the public's eye to counter what he considered "misinformation,"…"

DBOC: Which Kevin Lunny portrayal of "oyster farming as beneficial for Drakes Estero" is (b) (6), (b) (7)(C) "refuting"? How was it disputed? What misinformation from Kevin Lunny was he trying to refute? What evidence exists that caused (b) (6), (b) (7)(C) change of opinion about "potential negative effects" of oyster farming in the Estero between the 1998 EA for repairing/replacing existing oyster farm facilities and 2005 when the farm was purchased by the Lunnys?

2) **IG (p. 2):** "Further, we found that (b) (6), (b) (7)(C) did not have the authority to extend any RUO. In addition, an extension of DBOC's particular RUO would violate a congressional mandate that the oyster operation be removed as soon as the RUO expires in order to manage Drakes Estero as wilderness."

DBOC: As the DOI IG did not "parse the legalities of the issue of extending the lease beyond 2012", it can be assumed that the legal statements were provided by NPS (see #1). Did (b) (6), (b) (7)(C) provide a copy of the RUO (attachment A)? Was the investigator told that the RUO contains a section (Article 11) that describes the process NPS would use for the extension of use? What congressional mandate would be violated by issuing a SUP to extend the existing use?

3) **IG (p. 2):** "Conversely, our investigation revealed that, until April 22, 2008, Kevin Lunny had been operating DOB without a Special Use Permit since he bought the oyster operation in 2005 and had refused to sign a permit despite ongoing negotiations with PRNS…"

DBOC: Did NPS tell the DOI IG that the NPS had failed to issue this same SUP (Attachment B) since 1997? Kevin Lunny negotiated in good faith to obtain a SUP. DBOC signed a permit following negotiations and ultimate agreement. What is the motive for DBOC to "refuse" to sign permit? DBOC had every reason to complete SUP as soon as possible. Throughout these "negotiations", the NPS continued to add more restrictive conditions with each step and each version of the SUP (Attachments C, D, E, F, G and H, available upon your request).

(NOTE: Refer to page 43, paragraph 3 of the IG report whereby Marin County Supervisor Steve Kinsey states: "In Kinsey's opinion (b) (6), (b) (7)(C) was 'holding [the Lunnys] hostage' until they agreed to sign a document agreeing to leave by 2012. He opined that (b) (6), (b) (7)(C) was 'throwing down a gauntlet of obstacles' for the Lunnys".)

(ALSO NOTE: On page 35, paragraph 1 of IG's report: Kinsey's aide speculated that [redacted] was "putting the brakes on" DBOC's permitting process so that he would have a better argument for converting the site to wilderness in 2102".)

4) **IG (p. 3):** "NPS RUOs are deeded interests in the real estate and by policy cannot be renewed beyond their expiration dates."

DBOC: The NPS was not asked to renew or extend the RUO. The NPS was asked to consider issuing a SUP as prescribed within the RUO. Did the NPS tell the IG investigator that creating a SUP to allow the existing agricultural use to continue within PRNS after the expiration of the RUO is not only common, but universal? Why would NPS continue argue that RUOs cannot be extended but omit the fact they regularly continue similar used by issuing SUPs (e.g. as NPS did for the dairy and beef ranches in PRNSS)? Why did NPS fail to provide the specific oyster RUO (Attachment A) that contains the explicit SUP process to continue the existing use?

5) **IG (p. 5):** "While most of Drakes Estero has been designated or converted to wilderness status, the acreage used by DBOC remains potential wilderness because the oyster mariculture operation (cultivation of marine life for food) is a nonconforming use that is allowed to operate in PRNS until its RUO with NPS expires."

DBOC: This sentence is not true. Most of Drakes Estero has not been designated or converted to wilderness status. Did NPS tell the IG about the fact that property rights reserved by the State of California are also an impediment from full wilderness? Did NPS tell the IG that those rights have not been ceded by the State of California? Did the NPS tell the IG that Congress determined that certain PRNS lands were ineligible for full wilderness designation *solely because of the reserved State's rights*? Did NPS tell the IG that even if the oyster farm was gone, the State will still own the rights?

6) **IG (p. 7):** "Our investigation revealed that [redacted] and others wrote the Sheltered Wilderness report to counter local newspaper articles, such as one in the Point Reyes Light titled, "Drakes Bay Oyster Company has little impact on estero," issued on May 18, 2006."

DBOC: In this section, the IG gives the NPS reason for the DESWE report "to counter local newspaper articles". This conflicts w/OIG's statement made in Results (see #2) which states "…Kevin Lunny's disputed portrayal…". If investigation revealed that it was "counter local newspaper articles", then why not state that in the "Results"? Is this a serious error made by the IG? Was the IG given two different answers to the same question of NPS?

7) **IG (p. 7):** "A reporter from the *Point Reyes Light* requested and received the DE Assessment report from PRNS Marine Ecologist [redacted] something [redacted] described in an interview as a mistake."

DBOC: Why would [redacted] state that releasing a NPS report to the public is a mistake?

8) **IG (p. 8):** "[redacted] began working on a report to counter the conclusions drawn in the article…"

DBOC: Once again here, as in #7 above, the IG gives the NPS reason for the DESWE report "to counter conclusions drawn in the article". This conflicts w/OIG's statement made in Results (see #2) which states "…Kevin Lunny's disputed portrayal…". If investigation revealed that the report was to "counter local newspaper articles", then why not state that in the "Results"? Is this a serious error made by the IG? Was the IG given two different answers to the same question of NPS?

9) **IG (p. 9):** "He [redacted] said PRNS was not attempting to counter the *Point Reyes Light* article but to get "objective information" to the public."

DBOC: This statement from [redacted] contradicts testimony from other NPS officials. Why did NPS have so many different answers to the same question? (see #s 2, 7 and 9)

10) **IG (p. 10):** "…but the report was released to the oyster farmer…"

DBOC: The NPS did not provide the DEASWE report to the "oyster farmer" as stated by [redacted] PRNS did, however, provide copies of the report to Gordon Bennett of the Sierra Club. Gordon interrupted a group tour of the oyster farm to supply a copy of this report to each participant. This was the first time DBOC was made aware of the report. NPS did not ever provide DBOC with a copy of this report.

11) **IG (p. 10):** According to [redacted] "The oyster operator has been misusing some of the information out of the report to support his position."

DBOC: How was the oyster farmer "misusing some of the information"? DBOC began to challenge information contained in the report because it was not supported by the science it cited. We believe our challenges were appropriate and accurate. We are not aware of any instance where DBOC was guilty of what [redacted] alleged. Did the IG ask [redacted] for supporting evidence for this claim?

12) **IG (p. 11):** Wullschleger statements:

- He told the OIG he was concerned about the DE Assessment report because it was basically trying to make statements from things…that weren't statistically significant and say, 'Well, they're different. So therefore there must be an impact on the estuary.'
- Given that sample sizes were small and that most results were not statistically significant, I was surprised that the conclusions section began with the relatively strong statement '…oyster Mariculture has had an impact on the marine fish and

invertebrates of DE'…Although not well defined by NPS, the word impact is typically used to indicate an effect that is not only negative but substantive in magnitude.

- A scientist for the Pacific West Region of NPS opined that in the SW report, [redacted] and "probably her colleagues" had "drawn conclusions…that simply cannot be sustained, particularly since there was something a little bit sketchy about the Elliott-Fisk paper," which "…itself was overreaching"."

  DBOC: Wullschleger makes several strong statements about PRNS's science here…why aren't these detailed prominently on the Results page?

13) **IG (p. 13):** "According to [redacted] the report by the DHS Environmental Scientist contained a lot of incorrect information that Allen was focused on correcting in a response to the California Department of Health Services at that time; the Sheltered Wilderness report was not her primary focus."

DBOC: Did the IG ask for evidence that the DHS paper "contained a lot of incorrect information"? Was it true that [redacted] contested incorrect information and wasn't thinking about the DEASWE report or was she concerned the DHS report would conflict with the DEASWE report? Attached are both versions of the DHS report (Attachments I and J), before and after NPS demanded that changes to the report be made.

14) **IG (p. 15):** "The Research Cooperative Extension Specialist opined that the statements [redacted] made in the report were erring on the side of caution…before any damage could be done. He said that although the preponderance of available research suggested that oyster farming had a negative impact on Drakes Estero…"

DBOC: The Research Cooperative Extension Specialist opinion suggests that the available research literature identifies that oyster farming has a negative effect and that NPS could have been acting before any damage could be done. The oyster farm has existed for over 80 years and the NAS findings are in opposition to the "specialist" quoted in the IG report.

15) **IG (p. 16):** "She [redacted] told him (Roberto Anima) that she remembered him voicing concern about oysters contributing to sediment in a portion of Drakes Estero known as Abbott's Lagoon…"

DBOC: Abbott's Lagoon is not a part of Drakes Estero. There are no oysters in Abbotts Lagoon.

16) **IG (p. 17):** "She [redacted] explained that the current owner of the oyster farm wanted to extend his lease with NPS when it expired and that PRNS was trying not to allow the extension of that lease."

DBOC: This statement captures why PRNS appeared to be obsessed with "showing harm" caused by the oyster farm.

17) **IG (p. 18):** "Essentially, that same statement was incorporated into the Sheltered Wilderness report from the August 2006 document that a PRNS Ecologist prepared to counter the *Point Reyes Light's* portrayal of the DE Assessment report.

DBOC: See #s 2, 7, 9 and 10.

18) **IG (p. 20):** "During the radio broadcast in July 2006, [redacted] said the most important impact to the estero due to oyster farming was the introduction of non-native species, particularly the Didemnum tunicate …"

DBOC: [redacted] said the most important impact to the estero due to oyster farming was the introduction of non-native species, particularly the Didemnum tunicate (commonly referred to as "sea squirts"). Where is the data to support this claim that oyster farming introduced Didemnum in Drakes Estero?

19) **IG (p. 23):** "…oyster operation had been discarding oyster bags on the beach where the seals gave birth, thus impacting their habitat."

DBOC: This statement made to Dr. Tim Ragen, in an effort to involve the Marine Mammal Commission is false. DBOC has never placed oyster bags or any other gear in areas where seals give birth nor has it "discarded" any oyster bags in seal birthing areas. Where is the evidence to support this serious allegation? If this claim were true, why wouldn't NPS have notified DBOC? Asked DBOC to be more careful? They did not. PRNS maps (Attachments K, L and M) that identify seal haul out areas as well as GPS based locations of oyster bags also refut[redacted] statement to Ragen.

20) **IG (p. 24):** "…but at the time, it seemed that we were having dramatic change in that estuary…"

DBOC: At the time, [redacted] felt there was a dramatic change in the estuary. He told the IG that he'd "do it different now". Did [redacted] later realize that there were not dramatic changes taking place and therefore now he would do it differently? If so, why did he refuse to correct the record?

21) **IG (p. 24):** "…the harbor seal population was down 80 percent in the estero during the MCBS hearing without specifying that the decline was "site specific"."

DBOC: Did the IG ask the NPS to identify the specific site? Do the specific seal numbers – more than 250 seals, including 100 pups two years ago, dropping to 35 last Sunday, match the data available for the specific subsite referenced by NPS? The NPS refused to tell DBOC or Dr. Goodman which subsite had the 80% decline with the seal numbers given by [redacted] Later, NPS claimed that they were referring to subsite OB. The seal numbers given by NPS and the 80% claim does not support this assertion.

The seal numbers, pup numbers and the 80% decline does in fact match a subsite. It clearly matches the record for only one subsite: seal haul out site A. Importantly, sandbar A is not within the shellfish lease, DBOC boats do not go near sandbar A and DBOC workers do not go near sandbar A. See seal haul out map (Attachment K).

22) **IG (p. 25):** "Goodman and Lunny questioned the authenticity of a "trip report" [redacted] wrote in which she documented DBOC's oyster bags being placed on seal haul out sites and oyster farm workers disturbing seals on April 26, 2007."

DBOC: With regard to the April 26, 2007 "trip report", the IG missed the relevant points. One must read the IG report regarding this trip report and then consider the most important facts surrounding this issue – not included in the IG report (Attachments N, O, P and Q).

23) **IG (p. 27):** ". [redacted] was frustrated with the owner of the oyster operation because he was "not listening" to NPS."

DBOC: The NPS never told DBOC about any disturbance. Where is the evidence to support the allegation that the "oyster operator" was not listening?

24) **IG (p. 27):** "The Scientist, NPS Pacific West Region, explained that it was "absolutely pointless" for a scientist to fabricate one day's worth of data to reach a certain conclusion because it would not be considered anything more than an "anecdote," which "isn't worth anything"."

DBOC: This "trip report" has not been treated as an "anecdote" or "not worth anything"…it has been used and widely distributed as the "example" that the oyster farm is disturbing seals. For example, it was the single piece of data given to the California Coastal Commission as an example of oyster caused disturbance. Dr. John Dixon of the CCC admitted that this was the only seal data he received from NPS prior to producing his report. Based on the Dixon report, the CCC imposed significant restrictions and regulatory conditions to reduce seal disturbances caused by DBOC. The NPS scientist was probably correct that "one day's worth of data" shouldn't be worth anything. In this case, "one day's worth of data" [redacted] trip report), has been specifically and independently used to drive policy decisions and public opinion.

25) **IG (p. 26):** "Although the more recent version indicated a more extensive encroachment of bags on seal habitats, both versions of the map reflected oyster bags within prohibited areas."

DBOC: This statement is false. Oyster production where shown is, and has always been, permitted. The oyster beds did not move. Oysters have been growing in these exact areas for many decades. Seal haul out maps (Attachments R, S, T, U, V, W, X, Y, Z, AA, AB and AC) have been available for decades. The only thing that changed is that NPs decided to secretly change the haul out area map. The new undated version includes more of the oyster growing area. What evidence did/can NPS provide to show that seal

behavior changed between 2005 and 2007 in Drakes Estero so that the haul out areas shown map needed to be expanded? DBOC has only seen seals hauled out along the edge of a deep water channel. CDFG maps, the 1992 interagency protocols and map (Attachment T) and current NPS agree that seals haul out areas are directly adjacent to deep water. What evidence did/can NPS provide that supports their alterations of the haul out area maps to include area hundreds of yards from any channel at all?

The 1992 interagency protocols provide for how this area is to be used. There were no prohibited areas within the CDFG leases at this time. Neither map shows oyster production in prohibited areas. What evidence did/can NPS provide to support its allegation that DBOC had oysters in prohibited areas in both versions of this map? If NPS truly did not understand the CDFG leases and the 1992 protocols, and actually believed that DBOC was illegally growing oysters in prohibited areas, why didn't they notify DBOC? Why didn't they notify CDFG? Why did the NPS only tell this to the IG?

26) **IG (p. 28):** [redacted] explained that the pre-existing seal site from the 2005 map that was extended on the 2007 map was a "lateral channel" that Lunny knew he was not supposed to use."

DBOC: The 1992 Record of Agreement describes how oyster farm operators and workers may use these areas. This agreement does not prohibit this area.

Note: [redacted] knew of the 1992 protocols, knew of the pupping season lateral channel closure that has existed since 1992. [redacted] was co-author of "Modeling Harbor Seal Disturbance", 2009 (Attachment AD). It this report [redacted] assert that the lateral channel was not closed during pupping season until the California Coastal Commission first closed it before the 2008 pupping season. See letter from DBOC to the NRC on this issue (Attachment AE). Although NPS later acknowledged the error in a separate memo, the report was not corrected, the conclusions have not been corrected and the statistical analysis has not been re-computed.

27) **IG (p. 28):** [redacted] said he had asked [redacted] o document that meeting following Lunny's assertion at the NCBS hearing that NPS had not provided guidance to him about harbor seal areas the DBOC was to avoid."

DBOC: [redacted] statement to the IG was false. Lunny made no such assertion. Lunny's testimony at the Marin County Board of Supervisors is available (attachment). Lunny never denied having a meeting with [redacted] Lunny *initiated* that meeting. Lunny's statement to the MCBS was that PRNS never brought any supposed impacts caused by DBOC to harbor seals to the attention of Lunny or DBOC. DBOC was, and still is, following harbor seal protection protocols.

28) **IG (p. 29):** [redacted] ecalled that during the MCBS hearing in May 2007, Lunny said NPS had never told him where the seal pupping areas were, but she also said that in 2005 she had shown Lunny where those areas were on a map."

DBOC [redacted] statement is also false. DBOC was not asked by NPS, CDFG, or any other agency, not to use certain portions of the CDFG lease. DBOC was briefed by Johnson Oyster Company, CDFG and NPS about where the seals areas are and how to conduct operations when in the vicinity. Both [redacted] were fixated on convincing the IG that NPS "told" Lunny something important about seal haul out areas and how they were to be used. What evidence did/can NPS provide that shows inappropriate use of these oyster beds?

29) **IG (p. 29)** [redacted] stated: "Remember, he refused to get a permit for any operation, and he already refused to listen to any of our direction."

DBOC: This statement is false. [redacted] statement that Lunny "refused to get a permit for any operation" is wrong. [redacted] knew full well that Lunny had obtained many required permits for DBOC operations and [redacted] knew full well that Lunny was negotiating in good faith to obtain a third NPS SUP. [redacted] had already signed and issued the other two SUPs to DBOC. What evidence did/can NPS provide that can support this allegation?

[redacted] told the IG that Lunny "refused to listen to any of our direction". This statement is also false and inflammatory. What evidence did/can NPS provide that would support this serious allegation? In 2006, the Point Reyes Light published a story (Attachment AF) where NPS chief of Interpretation is quoted. "Kevin has done a fantastic job of cleaning up." National Seashore spokesman, John Dell Osso said, "Everything we've asked him to do, he's done." DBOC can provide significant evidence to support Dell'Osso's accurate quote.

30) **IG (p. 29):** [redacted] added that since Lunny had said the state had authority over the estero, he was not recognizing NPS' authority in that way."

DBOC: DBOC always recognized NPS authority. DBOC followed all directives, obtained all permits, etc. What evidence did/can NPS provide that shows that DBOC was not recognizing NPS authority?

31) **IG (p. 30):** "According to [redacted] oyster bags were placed in seal haul out areas for the first time in 2007 due to DBOC's dramatic increase in production."

DBOC: This statement is false in two ways. First, oyster bags were placed only in traditional oyster harvest areas, not in seal haul out areas. Seals haul out along the edge of deep channels. Oysters were not placed in the areas where seals haul out. The NPS inexplicably changed seal haul out areas on maps, now showing seal haul out areas, far from deep water, where seals do not haul out. What evidence did/can NPS provide that shows seal behavior changed so that maps needed to be redrawn. What evidence did/can NPS provide that shows seals use all the areas, far from deep water, to haul out. DBOC has never witnessed seals hauling out anywhere except along the edge of deep water, as shown on earlier seal haul out maps. Second, DBOC production did not dramatically increase. These same oyster beds have been used for many decades. In a 1998 NPS

Environmental Assessment (Attachments AG and AH), signed by [redacted], NPS agreed to allow oyster production to continue at "current production levels" of 700,000 pounds per year. DBOC production in 2007 was 466,533 pounds.

32) **IG (p. 30)** [redacted] recalled that she informe[redacted] about DBOC's oyster bags being placed in prohibited areas in mid or early April 2007."

DBOC: Bags were not placed in prohibited areas. NPS has GPS documentation that proves oysters were not in a prohibited area. Bags were, and still are today, in the very same traditional oyster beds. DBOC was never contacted by CDFG, NPS or any other agency about oysters being placed in a prohibited area. These have never been prohibited areas and have traditionally been highly utilized by the oyster farm. This area includes the only fully approved shellfish growing area in California and has been highly recognized for this fact (Attachment AI). These islands are the most valuable part of the CDFG lease. What evidence did/can NPS provide that shows DBOC placed oyster bags in a prohibited area?

From: David M We iman [mailto:agresources@erols.com]
Sent: Tuesday, May 26, 2009 4:53 PM
To: Shafroth, Will (will.shafroth@ios.doi.gov)
Cc: Dan Wenk (dan_wenk@nps.gov); Jarvis, Jon (Jon_Jarvis@nps.gov)
Subject: Lunnyy Letter to Jarvis on Jarvis/NPS Response to NAS Report -- Jarvis Has Not Responded -- Request Your Assistance to Obtain Response

Will.

On behalf of Kevin and Nancy Lunny, your assistance is requested in a time-sensitive matter.

As you know, on May 5, the National Academy of Sciences (NAS) released their report on National Park Service (NPS) science concerning the oyster farm in Drakes Estero. The NAS report concluded in the very first paragraph of their statement, ***"the National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, over interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects.***"

Later the same day, NPS Regional Director Jarvis issued a press release and then gave a series of interviews with various newspapers and other media outlets. According to the Jarvis press release, "***we appreciate the thoroughness of the academy's report and especially that the academy concurred with many of our conclusions in the final, corrected version of the (Drakes Estero) Report.***"

Immediately after Jarvis issued this statement, we contacted the National Academy and requested a copy of the "***final correct version of the (Drakes Estero) Report***". In response, the NAS told us that this report does not exist.

Jarvis went on to state that he disagreed or otherwise disputed certain NAS conclusions, but those disagreements were not specified or identified. According to a May 21st Point Reyes Light newspaper editorial, "***It's clear what the Academy agrees with (the park's description of the estero's ecology) and what it disagrees with (each of the park's claims of environmental harm). It is not clear what Jarvis agrees or disagrees with.***"

These Jarvis statements raised a series of critically important questions, among them: *did NPS, with regard to the NAS conclusions pertaining to NPS science,*

accept or reject the NAS Report, in whole or in part? And if so, which parts and why?

With the NAS Report issued, Jarvis made no effort to communicate with the Lunnys about any aspect of the NAS report or how to move forward. He did not apologize to the Lunnys. He made no attempt to undo the damage NPS had done to their good name. Therefore, to better understand precisely what Jarvis said and what he meant, on Monday, May 11, Kevin and Nancy Lunny submitted a list of questions to the Regional Director seeking explanations, but they have yet to receive a response. Given the profile and sensitivity of this issue, they expected an immediate clarification of his statements. They have heard nothing.

If Jarvis rejected the NAS findings and insists, once again, that the oyster farm is harming the environment, then the Lunny family is entitled to (1) know precisely what that harm is, and (2) be provided full and complete access to the data, documents, reports and the full record that justified reinstating such accusations.

This is not the first time Jarvis reversed himself and this is not the first time accusations were reinstated. In fact, Jarvis' public statements following the release of the NAS Report were disturbingly similar to statements in actions in two separate instances: one immediately after Olema, and then another later in 2007 through January 2008. The imposition, withdrawal and reinstatement of NPS accusations have become a way of life at Drakes Estero. The Lunny family -- all three generations -- are deeply concerned that most recent Jarvis statements were another "*refuse-to-justify it*" experience.

First Example:
2007 Jarvis Proposed Special Use Permit That Cut the Farm In Half.

(1) **July 21, 2007:** ***At Olema Meeting, Feinstein-Bomar Direct Jarvis to Work With Lunny to Finalize Pending Special Use Permit.*** At the close of the Olema meeting, Senator Feinstein and Director Bomar directed that Jarvis and Lunny work to get the SUP in place as the first order of business. At the conclusion of the meeting, Jarvis told Lunny to "prepare a clean SUP" and he (Jarvis) would sign it. Jarvis then left for a planned one-week vacation, and said that the permit could be resolved as soon as he returned in early August.

(2) **July 31, 2007:** ***Jarvis Overturns His Own Request to Lunny -- that Lunny Prepare a SUP – And instead, NPS Prepares New SUP That Cuts Oyster Farm in Half Due to Claims of Environmental Harm.*** Ten days after Olema and one day after Jarvis returned from vacation, he rejected the Feinstein-Bomar directive. Instead, he unilaterally decided that a clean SUP from Lunny was not the way to proceed. Before communicating again with Kevin Lunny, Jarvis put forward a NPS-drafted SUP which contained a *"put-the-farm-out-of-business"* provision. Jarvis now insisted that CDFG-approved historical growing areas, which are consistent with the NPS-NOAA-CDFG current growing area protocols, would be eliminated and all growing oysters would be removed immediately. These areas accounted for nearly half of the oyster growing area used by the Lunnys. Any farmer or rancher knows that the reality of a "cut the ranch in half" requirement is little more than a badly disguised "taking," and nothing more than a ticket out of business. But that's what Jarvis presented to the Lunny family. Worse, the justification -- harm to harbor seals – was a claim with no data to support it, as the NAS confirmed. One of the key science issues to be evaluated by the pending independent science review was preemptively decided by Jarvis.

(3) **August 6, 2007:** ***Jarvis Insists Environmental Harm to Harbor Seals Justified Eliminating Half the Oyster Farm -- Surprised to Learn that Taking Half the Farm Destroys the Entire Farm.*** Jarvis and two members of his staff met with Kevin and Nancy Lunny to discuss their draft permit. At the meeting, they insisted that environmental harm to harbor seals justified the provision that cut the farm in half. That this issue was to be studied by the up-coming independent science review was irrelevant to Jarvis. Kevin and Nancy Lunny asked to see the evidence of the harm to seals. Neither Jarvis nor anyone else from NPS was able to provide it. The provision was eventually deleted.

Second Example:
Clarification Document

(1) **July 21, 2007:** ***Olema Feinstein-Bomar Directive to NPS -- Do Not Publish or Release Response to Goodman Testimony Report.*** Toward the end of the Olema mini-summit on Drakes Estero, Jarvis and Neubacher announced that they had peer-reviewed the Drakes Estero Report and were ready to release a response to Dr. Goodman's testimony and reports (May 8 and May 29) to the Marin County Board of

Supervisors. The Senator and Director instructed Jarvis and Neubacher to (a) provide copies of the peer reviews to Dr. Goodman; but, (b) NOT to release any new reports or responses until after the completion of an "outside, independent" review.

(2) **September 18, 2007:** ***Jarvis Rejects Feinstein-Bomar Directive -- NPS Issues Report, Retracts Accusations of Environmental Harm.*** Jarvis rejected those directives and issued the "Clarification of Law, Policy and Science" document in September 2007. It was a remarkable document. In it, NPS retracted every major accusation of environmental harm publicly made against the Lunny's oyster farm. These retractions address eel grass, sediment, harbor seals and other issues. The claims and accusations in the May NPS testimony before the Board of Supervisors -- similar claims in the Drakes Estero Report and claims to various Federal and State agencies -- were each retracted, but were done in the middle of paragraphs using language that disguised the retractions as a validation of the NPS false science. The report, however, was sent to Dr. Goodman on the pretense that he requested it (he did not), was highly misleading, and written and presented as a,harsh broadside to Goodman's critical assessment.

(3) **December 28, 2007:** ***Jarvis Flip-Flop -- Accusations of Environmental Harm Reinstated.*** Inexplicably, some 100 days later, after Jarvis publicly released the "Clarification" document that retracted the claims of environmental harm, he flip-flopped when he reinstated the same previously retracted accusations and claims in a December interview with the San Francisco Chronicle. There were, at the time, no communications to the Lunny family or anyone at DBOC about environmental conflicts.

(4) **December 31, 2007:** ***Lunny Family Stunned by New Jarvis Accusations and Claims – Demand Explanation, Accountability***. Once again, the Lunny's faced defamatory accusations from a high-ranking NPS official. The Lunnys were intimidated by the circumstances and upset by the revelations. After all, the previous April the Superintendent told locally elected officials that the Lunnys were environmental criminals and NPS was suspending all actions on their permit. A lengthy letter asking detailed questions was prepared and immediately submitted to Jarvis. The questions covered a range of issues, from harbor seals to haul out maps -- and finally whether or not Jarvis stood by his September Clarification letter.

(5) **January 14, 2007:** ***Jarvis Rejects Accountability -- Refused to Answer Questions***. The Jarvis response to define and explain those accusations and claims, "*I do not think long, detailed, point by point responses are productive...*" He simply refused to provide any basis whatsoever for any charge, any claim and/or any accusation. The Jarvis statement speaks for itself.

The Lunny family believes that if a Federal Department or Agency makes public accusations of environmental harm, that department or agency has a responsibility to, at the very least, explain the basis for such accusations. In May 2007, NPS leveled serious accusations, some criminal against the Lunnys. By September 2007, Jarvis withdrew the accusations, but in a twisted fashion so as to confuse the public. Then in December, inexplicably and without any communications with the Lunny family, Jarvis reinstated the same accusations. When asked to explain, he refused.

The Lunny concern today -- Jarvis may have done it again. In Jarvis' response to the NAS, he cites reports that do not exist and criticizes unspecified NAS findings. Jarvis implies that claims of environmental harm are being reinstated (again).

On January 21, 2009, among his very first acts, President Obama issued a Memorandum to all Heads of Executive Departments and Agencies, in which he stated in the very first line, *"A democracy requires accountability, and accountability requires transparency."* Today, Kevin and Nancy Lunny ask for accountability and transparency.

The recent editorial in the Point Reyes Light concluded:

> *"**Last year, the Inspector General found that the original Sheltered Wilderness report was distributed to the Sierra Club, National Parks and Conservation Association, Environmental Action Committee and others. From there, its erroneous message rippled out – to the Board of Supervisors, Lynn Woolsey, Dianne Feinstein and Barbara Boxer, California's Coastal Commission, Marine Mammal Commission, California Resources Agency, Marine Life Protection Act Task Force, California Department of Fish and Game and NOAA. These people and agencies are now being misled; at best, they are confused. Jarvis must now assure us he will set the record straight.***"

The Inspector General found wrongdoing on the part of the NPS. The NAS Report, while explicitly stating that they would not touch the allegations of scientific misconduct, nevertheless was highly critical and all but dismissive of the NPS science and claims of harm concerning the oyster farm and Drakes Estero. The Luuny family trusted that when the NPS claims against them were shown to be false by a respected and independent third party, the NPS would correct the record and "make things right". But Jarvis' public statements appear to be needlessly expanding the conflict instead of serving as a constructive tool to resolve it. A meaningful response from Jarvis is required.

We ask that your office direct Jon Jarvis to provide a timely -- *comprehensive and complete* -- response as quickly as possible.

Thanks,

dave w.

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From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Monday, May 11, 2009 12:35 PM
To: 'jon_jarvis@nps.gov'
Subject: NAS/NRC Drakes Estero Report

Dear Jon,

Please read and respond to the attached letter.

Thank you,

Kevin

DBOC to Jon Jarvis 05.11.09.pdf
25K View Download

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

May 11, 2009

Jon Jarvis
Regional Director
National Park Service
1111 Jackson Street, Suite 700
Oakland, CA 94607

Dear Mr. Jarvis.

On May 5, 2009, in response to National Academy of Sciences Report on NPS science at Drakes Estero, the Pacific West Region of the National Park Service issued a press release entitled, *"Park Service to Use National Academy of Sciences Report to Improve Management of Drakes Estero."* You were also interviewed by the media on May 5 and over the subsequent few days and made several additional statements.

We acknowledge the Park Service apology and express our appreciation for it. That said, we are confused by certain statements that have been made and, by this letter, ask for clarifications.

(1) **NPS Rejects Unspecified NAS Conclusions**. According to an article in the Marin Independent Journal, "*Report: Point Reyes Oyster Farm Poses No Danger to the Estero*," you said: "*we (NPS) agree with some conclusions, disagree with some and say we need more research too.*"

(A) Please itemize the NAS conclusions in which NPS concurs.

(B) Please itemize the NAS conclusions in which NPS "disagrees."

(C) Please provide a detailed explanation for those instances in which NPS disagrees and provide supporting data and documentation.

(2) **NPS Contradicts NAS, Renews Claims that Oysters in Drakes Estero Harming Environment**. According to an AP story published in the San Jose Mercury News,

entitled "Report Criticizes Feds Over Marin Oyster Farm:"

> *National Park Service officials said the non-native Pacific oysters raised by the farm are damaging the ecosystem.*
>
> *But the National Academy of Sciences says in its report that it found no major negative environmental impact. The panel also suggests that park officials misrepresented some of the facts to support their position. Park Service Director Jon Jarvis says he disagrees with some of those findings.*

(A) Please explain and detail how and why the National Academy is wrong.

(B) Notwithstanding NAS conclusions of no environmental harm, NPS still claims that non-native Pacific oysters are harming the environment at Drakes Estero. Please detail the harm. Provide the data that supports and substantiates that harm.

(3) **NPS Plan to Correct the Record with Marin County Board of Supervisors, Federal and State Agencies, the Citizens of Marin and the Public at Large**. According to an article published in the Point Reyes Light, "Park Service Abuses Data, Apologizes:"

> *In a press release, Jarvis wrote that the Academy affirmed [NPS's Science Advisor Sarah] Allen's conclusions [in the NPS Report, "Drakes Estero, A Sheltered Wilderness Estuary], but over the phone contradicted himself. "It's the conclusions that are debated," he said, "but not the raw data..."*
>
> *Still its determination that the park, "in some instances selectively presented, over interpreted, or misrepresented the available scientific information" approximates the definition of scientific misconduct as written in the federal register.*
>
> *"The allegations of scientific misconduct is based on there being intentional falsification of data," he (Jarvis) said. "Neither the IG nor the Academy found that. What they did find in both cases was overreaching."*
>
> *Jarvis declined to describe his plan for correcting the public record.*

(A) NPS testified, published, hand-delivered and otherwise disseminated information, reports, documents, data and reports that, according to the NAS "*in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and*

overlooking potentially beneficial effects..." These reports, information, documents and data were provided to the Marin County Board of Supervisors, Congresswoman Woolsey, Senators Feinstein and Boxer, other locally elected officials, California Costal Commission, Marin Mammal Commission, California State Resources Agency, MLPA Task Force, California Department of Fish and Game, NOAA among others. Please detail your plan and timetable for correcting the public record with all parties and interests.

(B) According to the Inspector General's Report, NPS also provided the same flawed reports, information, documents and data to certain environmental groups including the Sierra Club, National Parks and Conservation Association (NPCA) and the Environmental Action Committee (EAC). These groups, today, are actively publishing, disseminating and/or are circulating this flawed and tainted scientific information. Please detail your plan and timetable for correcting the public record with these and other environmental groups.

(C) Please provide copies of the letters and documents in which the corrections are made.

(4) According to the NPS Pacific West Region News Release on May 5, 2009:

"Certainly, we apologize for the errors in our original document [Drakes Estero, A Sheltered Wilderness Estuary] and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report"

(A) Identify each of the specific "*errors*" in the original document being referenced.

(B) Explain the "*steps being taken to correct them.*"

(C) You state, "*we appreciate...that the academy concurred with many of our conclusions in the final, corrected version of the report.*" To which "*conclusions*" are you referring? Itemize and detail.

(D) Your statement references the "*final, corrected version of the report.*" We are unfamiliar with such a document. Immediately after the NAS Report was published, we asked the NAS panel for this document and they were unable to provide it. Will you please provide us with a copy of the final, corrected version of the Drakes Estero report.

This has been an agonizing ordeal for our family. NPS, since we purchased the oyster farm in January 2005, has been making a sustained series of accusations, claims, and charges – ranging from environmental criminality to environmental harm. Now, it appears as if a "new generation"

of charges is emerging.

This is painfully unacceptable.

We were heartened by the NPS apology. But a few words in a press release, unfortunately, will not restore our good name -- and neither will it absolve NPS of its responsibility to take responsibility for the damage it has done to us and to itself. NPS must clean up the situation it has created for our family and our community, starting with correcting the record of false NPS claims.

We ask that you, in good faith, please clarify this immediately and provide detailed and complete answers to the questions set forth in this letter.

Sincerely,

Kevin Lunny Nancy Lunny

United States Department of the Interior

OFFICE OF THE SOLICITOR
316 N. 26th Street, Room 3005
Billings, Montana 59107-1394
Telephone (406) 247-7583
Telefax (406) 247-7587

FAX COVER SHEET

FACSIMILE TRANSMITTED TO: 510 -- 419-0143

To: Gavin Frost

From: Rita

Client/Matter:

Date: 12-7-10

Number of Pages: - 4 - (*including cover sheet*)

DOCUMENTS	NUMBER OF PAGES *

COMMENTS:

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Graeber, Rita

From: Frost, Gavin
Sent: Tuesday, December 07, 2010 9:30 AM
To: Graeber, Rita
Subject: Fw: Letter: NAS Panel and Withheld Data Concern

Please print and fax. Thx.

Delivered by SOL Blackberry Services

From: Peter H. Gleick (b) (6)
To: naspresident <naspresident@nas.edu>; 'pgleick@pacinst.org' <pgleick@pacinst.org>
Cc: 'cpeters@email.unc.edu' <cpeters@email.unc.edu>; 'nhi519@abdn.ac.uk' <nhi519@abdn.ac.uk>; 'bcp@gso.uri.edu' <bcp@gso.uri.edu>; 'Brett.R.Dumbauld@usda.gov' <Brett.R.Dumbauld@usda.gov>; 'carolynf@u.washington.edu' <carolynf@u.washington.edu>; 'hofmann@ccpo.odu.edu' <hofmann@ccpo.odu.edu>; 'hauke@whoi.edu' <hauke@whoi.edu>; 'manahan@usc.edu' <manahan@usc.edu>; 'francis.obeirn@marine.ie' <francis.obeirn@marine.ie>; 'painert@u.washington.edu' <painert@u.washington.edu>; 'robert.whitlatch@uconn.edu' <robert.whitlatch@uconn.edu>; Cicerone, Ralph J. <RCicerone@nas.edu>; Frost, Gavin; Roberts, Susan <SRoberts@nas.edu>; Colglazier, Bill <BColglaz@nas.edu>; Hinchman, Jim <JHinchman@nas.edu>
Sent: Mon Dec 06 09:58:34 2010
Subject: RE: Letter: NAS Panel and Withheld Data Concern

Dear Ralph,

Thank you for your thoughtful response. I'm sorry that there is no explicit recourse for the Panel now that it has been dissolved, especially since part of their initial charge was to look at the misuse of science in the Drake's Estero debate. It's ironic that the misuse seems to have extended to data provided to (or in this case withheld from) the Panel itself, but I'm happy to hear that the Academy has been following the issue. I look forward to hearing about future NAS-related efforts.

Sincerely,

Peter Gleick

At 06:22 AM 12/6/2010, naspresident wrote:

Dr. Peter H. Gleick, President
Pacific Institute

Dear Peter:

Thank you for sending me a copy of your House testimony before you presented it last week. I testified to that committee in May but as you said, your recent session might indeed be the last such session as the committee will be abolished soon.

I have received your December 2 letter about the Drakes Estero study. Corey Goodman has also told me a great deal about the large number of National Park Service (NPS) photographs whose existence is now known. He gave a 65-minute presentation on the subject in California on October 18 and I have viewed a video

recording of his presentation. I have also examined a large number of records from Corey, the report from our committee's work, and other records. Also, I have interviewed numerous people who were active or interested in that study.

Before receiving your letter, I had already contacted (more than once) a federal agency with authority over the NPS, noting that the photographs could have been of help to our committee. Indeed, I pointed out that as you noted, our committee had recommended that photographic records would be valuable.

Corey Goodman has also told me that there is underway an inquiry by the Marine Mammal Commission (MMC) that could be important. I have found that the MMC inquiry is focused much more on harbor seals than was our National Research Council Ocean Studies Board committee. The MMC has been made aware of the existence of this large photographic record.

Still further, the Solicitor's office in the U. S. Department of Interior is now looking into the NPS's interactions with our study committee and the photographic records. They have asked our staff and others to participate in their examination and we have agreed to help.

In these ways, there are good chances to delve more deeply into the issues that you raise as well as other related ones. I am very reluctant to ask the members of our study committee to re-open their work while formal U. S. Government (USG) inquiries are underway (nor do we have any charge to do so); that committee finished its work and the committee was formally disbanded more than a year ago. Depending on what the USG agencies find and report, we can return to this scene.

Yours sincerely,

Ralph Cicerone

Copies to:
cpeters@email.unc.edu (Dr. Charles Peterson - Panel Chair)
nhi519@abdn.ac.uk (Dr. Paul Thompson)
bcp@gso.uri.edu (Dr. Barry Costa-Pierce)
Brett.R.Dumbauld@usda.gov (Dr. Brett Dumbauld)
carolynf@u.washington.edu (Dr. Carolyn Friedman)
hofmann@ccpo.odu.edu (Dr. Eileen Hofmann)
hauke@whoi.edu (Dr. Hauke Kite-Powell)
manahan@usc.edu (Dr. Donal Manahan)
francis.obeirn@marine.ie (Dr. Francis O'Beirn)
painert@u.washington.edu (Dr. Robert Paine)
robert.whitlatch@uconn.edu (Dr. Robert Whitlatch)
gavin.frost@sol.doi.gov (Gavin Frost)

Dr. Peter H. Gleick

President, Pacific Institute [*22 Years of Research for People and the Planet: 1987-2009]*
Member, U.S. National Academy of Sciences
MacArthur Fellow

Contact: Terry L. Asbury (tasbury@pacinst.org)
Executive Assistant to Dr. Peter Gleick

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510 251-1600 phone
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www.pacinst.org (Pacific Institute site)
www.worldwater.org (World Water site)
www.bottledandsold.org (Bottled and Sold -- the book)

Frost, Gavin

From: Corey Goodman [corey.goodman@me.com]
Sent: Saturday, January 08, 2011 12:06 PM
To: Frost, Gavin
Subject: perpetuation of false science by NPS supporters
Attachments: EAC and NPCA letter to CCC and DOI_12.13.10.pdf; ATT00001..htm

Gavin,

I thought you'd find this email and letter string of interest to see how the NPS false science gets perpetuated and propagated by various supporters.

I've previously forwarded to you the string of letters and emails in which California Coastal Commission Executive Director Peter Douglas wrote to NOAA, trying to insert himself into the EIS process for the oyster farm, and repeated the same discredited NPS science that the NAS largely dismissed in 2009. Douglas cited 51 references but "forgot" to mention the NAS study. His main reference for harm to the harbor seals was the 2009 [redacted] et al. paper (which needs to be retracted given the suppressed data). When I challenged his misuse of science, he shot back a string of angry accusation, all unbecoming of a high-ranking government official. When I subsequently asked to get together with him and his staff, he refused, saying the issue was of no importance to his commission (?). He has been refusing to meet with me to discuss the NPS data since 2007, so in this regard, he remains consistent.

Now we witness the entrance of Amy Trainer, Executive Director of the Environmental Action Committee of West Marin. She previously has had no involvement on the national stage in terms of my misconduct complaint, has never met with me, and certainly has no reason to write to Tom Strickland. On December 13, she wrote a letter to Strickland and Douglas asking to meet with both of them (trying to elevate Douglas to the same level as Strickland), saying that I was "simply wrong" without providing details. Interesting correlation. You had spent the previous week interviewing a variety of NPS employees. What has historically happened is that when the heat is on NPS, they turn to the CCC and pass the baton. In this case, it appears that they asked Ms. Trainer to write to Strickland and try to insert Douglas (from CCC) into your process. Not very subtle! The timeline tells it all -- why did she write to Strickland the Monday after you interviewed NPS employees? Interesting correlation.

See below my letter to her this morning. She and her board have also refused to meet with me for three and a half years. Fear of facts. Blind support of NPS misuse of science.

Also of interest are the common phrases and language used to attack the messenger. NPS Superintendent Cicely Muldoon has accused me in the newspaper of engaging in the "politics of personal destruction" (but could provide no details when I challenged her). CCC Exec. Director Peter Douglas accused me "spurious and irresponsible accusations", "intimidation", "demonization", and the "reprehensible politics of personal destruction." EAC Exec. Director Amy Trainer has now accused me of being "divisive and counter-productive" and seeking to "demonize and intimidate." I continue to encourage folks to listen to my CCST talk on YouTube and read my letters to Salazar and Douglas. I have been data driven in my allegations of scientific misconduct. This is not about individuals, but rather is about the culture in NPS that permitted a pre-determined political agenda to drive the misuse of science. These words that keep getting repeated are attempts to divert focus away from government wrongdoing and accountability.

By the way, so that you can see the "big picture" of how the EAC has been behaving, there was a string of letters in the local newspaper (the Point Reyes Light) a few months ago about the current EAC leadership. In the October 21, 2010 issue of the Point Reyes Light, Mark Dowie, former President of the EAC board, implored Ms. Trainer to meet with me and appealed to her membership to insist on an open and honest discussion of the issue with the EAC board and members. In the next issue of the Light were two letters from Tom Thornley (former EAC board member) and John Grissim (former Executive Director of EAC). Mr. Thornley wrote:

> *"It is troubling enough that the National Park Service has relied on and produced falsified science, secretly taped the activities of the oyster farm and refused to treat Mr. Lunny fairly; what is more distressing is that our local environmental organization, the EAC, has abetted this fiasco and to this day, refuses to even hear the evidence to the contrary from Dr. Corey Goodman ..."*

Mr. Grissim concluded:

> *"I am forced to conclude that EAC has gradually been taken over by a small group of people who regard the group as their private organization for their private agendas. I fear that EAC is no longer a community-based non-profit that listens to the community and does good work for the environment. And that is indeed a turn for the worse."*

Best,

Corey

Begin forwarded message:

From: Corey Goodman <corey.goodman@me.com>
Date: January 8, 2011 8:01:37 AM PST
To: Amy Trainer <eac@svn.net>
Cc: jerry meral <jmeral@horizoncable.com>, Carolyn Longstreth (b) (6)
Subject: request to meet with the EAC board and members

January 8, 2011

To: Amy Trainer, Exec. Director, Environmental Action Committee of West Marin

From: Corey Goodman, Ph.D.

Dear Amy,

In light of your public statements as EAC executive director supporting the National Park Service claims that their data shows that the oyster farm is harming harbor seals in Drakes Estero, I request you convene an EAC board meeting and invite me and your members to review the NPS data.

In early December, you wrote a letter to a high-ranking Department of Interior official, and copied a wide range of elected and appointed officials throughout our federal and state government, saying that I was *"simply wrong."* You were citing my contention that NPS officials are guilty of scientific misconduct for suppressing for three and a half years the secret cameras, more than 250,000 photos, and detailed logs that contradicted their public claims that the oyster farm was harming harbor seals in Drakes Estero. Your letter, however, failed to provide any facts or details as to how these conclusions are wrong.

Two and a half months ago you made a similar statement on ABC7-KGO evening news when you said that you *"wholly disagree"* with my reasoning. Then too you gave no facts to support your statement. For months you have declined my requests to meet with you to discuss your statements. I'm perplexed by your continuing reluctance to offer any evidence in support of your public statements, as I am mystified by EAC's refusal to examine and discuss the merits of the NPS data that have come to light.

You wrote that my assertions are *"divisive and counter-productive"* and claimed that I seek to *"demonize and intimidate."* I'm baffled as to how seeking the truth is counter-productive, and how analyzing (the previously withheld) NPS data is *"divisive."* The environmental movement has historically been the watchdog for abuses of science by government. Why turn your back now on the fact our government has suppressed key data that contradicts its claims - claims that impact our community?

You wrote that you want a respectful dialogue. On that point we can find common ground. One way to change the tenor and tone would be to bring us together for an open and transparent discussion of the scientific facts. I look forward to meeting with your board and members to review the NPS data, the facts behind my contention, and evidence behind your public criticism of it. I encourage you to open this meeting to your membership and past leaders.

Sincerely yours,

Corey

Corey S. Goodman, Ph.D.

corey.goodman@me.com

December 13, 2010

Assistant Secretary Thomas Strickland
Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

Executive Director Peter Douglas
California Coastal Commission
45 Fremont, Suite 2000
San Francisco, CA 94105

Re: Request to brief Department of the Interior and California Coastal Commission on the Drakes Estero Environmental Impact Statement

Dear Assistant Secretary Strickland and Executive Director Douglas:

We are writing to encourage your respective agencies to focus on the substantive policy and natural resources concerns that will need to be addressed in the Environmental Impact Statement (EIS) process regarding commercial use of national park wilderness at Drakes Estero, Point Reyes National Seashore. The Department of the Interior, as decision-maker on this issue affecting national public lands policy and protection of a critically important natural resource, and the California Coastal Commission, as the agency responsible for implementation of the California Coastal Act, should collaborate on this EIS process. We are aware of continuing efforts by the Drakes Bay Oyster Company and Mr. Corey Goodman to undermine your respective agencies and staff, divert the attention of your agencies from this important work on the EIS, and engage you in their tired assertions of "conspiracy" and "misconduct."

Point Reyes National Seashore Superintendent Muldoon recently encouraged "respectful dialogue around complex issues" in a local newspaper. The divisive and counter-productive rhetoric explicit in Mr. Goodman's continued assertions rejects this suggestion and instead seeks to demonize and intimidate the Seashore and Commission staff. In his recent letters to your agencies, Mr. Goodman alleges that your concerns about resource impacts by the oyster operation are unwarranted, and that your senior staff has committed "misconduct."

With this letter, we are offering to brief you on why Mr. Goodman is simply wrong in his various allegations and more importantly, why protecting marine wilderness, rather than commercializing it, is in the best interest of Department of the Interior, California Coastal Commission, and the Estero's national constituency. We have recently submitted detailed EIS scoping comments that justify and amplify your concerns.

Thank you and your respective staff for the tireless work to steward the places the public has put in your trust. If we can be of assistance on the EIS, please let us know.

Neal Desai
Associate Director, Pacific Region
National Parks Conservation Association

Amy Trainer
Executive Director
Environmental Action Committee
of West Marin

Cc:
California State Senator Mark Leno
California State Assembly member Jared Huffman
U.S. Representative Lynn Woolsey
U.S. Senator Dianne Feinstein
U.S. Senator Barbara Boxer
Marin County Supervisor Steve Kinsey
Marin County Supervisor Charles McGlashan
John McCamman, Director, CA Department of Fish & Game
Secretary Lester Snow, CA Resources Agency
Acting Director Donna Wieting, OCRM, NOAA
David Kaiser, Senior Policy Analyst, OCRM, NOAA
DOI Deputy Assistant Secretary Will Shafroth
DOI Science Advisor Dr. Marcia McNutt
NPS Director Jon Jarvis
NPS Deputy Director Dan Wenk
NPS Science Advisor Dr. Gary Machlis
NPS PRNS Superintendent Cicely Muldoon
NPS Yosemite Superintendent Don Neubacher
NPS Pacific West Regional Chief Scientist Dr. Dave Graber
DOI Acting Inspector General Mary Kendall
DOI Assistant Inspector General John Dupuy
Presidential Science Advisor Dr. John Holdren
NAS President Dr. Ralph Cicerone
Marine Mammal Commission Executive Director Dr. Tim Ragen

Frost, Gavin

From: Corey Goodman [corey.goodman@me.com]
Sent: Monday, January 03, 2011 11:40 PM
To: Frost, Gavin
Subject: Fwd: EAC and NPCA letter to DOI and CCC regarding Drakes Estero EIS
Attachments: EAC and NPCA letter to CCC and DOI_12.13.10.pdf; ATT00001..htm

Gavin,
And so the attacks on me intensify. The surrogates are out in force, rallying the troops. They talk of me demonizing others, but I ask you, who is being demonized? You've heard my talk, read my papers, talked to me. Onto whom is the "politics of personal destruction" being waged? It looks to me like the one being demonized is the external whistleblower. I hope before this is over that you will comment on these attacks. The same words used against me have gone from NPS Muldoon to CCC Douglas and now to these outside groups. I have thick skin. But imagine I wasn't 59, didn't have an independent career, didn't have the credentials I do -- do you think any individual in the government -- Interior or NPS -- could possibly withstand these assaults, simply for speaking the truth? Could you?

They offer to brief folks on why I am simply wrong. Interestingly, I have repeatedly asked them to brief me, and they refuse. I've sent them emails -- over and over again -- asking them to tell me, debate me, meet with me, discuss with me, and they refuse. They are afraid of the truth.

Best,
Corey

From: "Bishop, Lamonte" <Lamonte.Bishop@sen.ca.gov>
Date: January 3, 2011 2:04:14 PM PST
To: "Donna"(b) (6)
Subject: FW: EAC and NPCA letter to DOI and CCC regarding Drakes Estero EIS

Donna,

What's going on here? Is your group in opposition to the EAC? Isn't Goodman a member of your group?

LaMonte'

LaMonte' Bishop
Senior District Representative
Office of Senator Mark Leno
3501 Civic Center Dr Ste 425
San Rafael, CA 94903
Phone: 415-479-6612
Fax: 415-479-1146
LaMonte.Bishop@sen.ca.gov
www.sen.ca.gvov/leno

-----Original Message-----
From: Mills, Carole
Sent: Monday, January 03, 2011 10:59 AM

To: District - District 03 (SD03); Capitol - District 03 (SC03)
Subject: FW: EAC and NPCA letter to DOI and CCC regarding Drakes Estero EIS

FYI

Carole Simon Mills
District Representative
Senator Mark Leno
3501 Civic Center Dr. Ste. 425
San Rafael, CA 94903
Phone: (415) 479-6612
FAX: (415) 479-1146
carole.mills@sen.ca.gov
www.sen.ca.gov/leno

-----Original Message-----
From: Neal Desai [mailto:ndesai@npca.org]
Sent: Sunday, December 26, 2010 11:55 AM
To: Neal Desai
Subject: FYI: EAC and NPCA letter to DOI and CCC regarding Drakes Estero EIS

FYI as you were on cc list and may not have received a copy when sent.

Dear Assistant Secretary Strickland and Commission Director Douglas,

Please see attached letter from the Environmental Action Committee of West Marin and the National Parks Conservation Association requesting an opportunity to brief you on the substantive policy and natural resources issues pertinent to the Drakes Estero Wilderness Environmental Impact Statement.

We look forward to the opportunity to meet and discuss these important issues with you.

Sincerely yours,
Amy

December 13, 2010

Assistant Secretary Thomas Strickland
Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

Executive Director Peter Douglas
California Coastal Commission
45 Fremont, Suite 2000
San Francisco, CA 94105

Re: Request to brief Department of the Interior and California Coastal Commission on the Drakes Estero Environmental Impact Statement

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Thank you and your respective staff for the tireless work to steward the places the public has put in your trust. If we can be of assistance on the EIS, please let us know.

Neal Desai
Associate Director, Pacific Region
National Parks Conservation Association

Amy Trainer
Executive Director
Environmental Action Committee
of West Marin

Cc:
California State Senator Mark Leno
California State Assembly member Jared Huffman
U.S. Representative Lynn Woolsey
U.S. Senator Dianne Feinstein
U.S. Senator Barbara Boxer
Marin County Supervisor Steve Kinsey
Marin County Supervisor Charles McGlashan
John McCamman, Director, CA Department of Fish & Game
Secretary Lester Snow, CA Resources Agency
Acting Director Donna Wieting, OCRM, NOAA
David Kaiser, Senior Policy Analyst, OCRM, NOAA
DOI Deputy Assistant Secretary Will Shafroth
DOI Science Advisor Dr. Marcia McNutt
NPS Director Jon Jarvis
NPS Deputy Director Dan Wenk
NPS Science Advisor Dr. Gary Machlis
NPS PRNS Superintendent Cicely Muldoon
NPS Yosemite Superintendent Don Neubacher
NPS Pacific West Regional Chief Scientist Dr. Dave Graber
DOI Acting Inspector General Mary Kendall
DOI Assistant Inspector General John Dupuy
Presidential Science Advisor Dr. John Holdren
NAS President Dr. Ralph Cicerone
Marine Mammal Commission Executive Director Dr. Tim Ragen

United States Department of the Interior

OFFICE OF THE SOLICITOR
316 N. 26th Street, Room 3005
Billings, Montana 59107-1394
Telephone (406) 247-7583
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FAX COVER SHEET

FACSIMILE TRANSMITTED TO: 510-419-0143

To: GAVIN FROST

From: ROBIN DEGUARA

Client/Matter:

Date: 12/3/10

Number of Pages: - 7 - (*including cover sheet*)

DOCUMENTS	NUMBER OF PAGES

COMMENTS:

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Deguara, Robin

From: Frost, Gavin
Sent: Friday, December 03, 2010 11:43 AM
To: Deguara, Robin
Subject: Fw: Letter: NAS Panel and withheld data concern
Attachments: NAS NPS Photo Memo December 2010.pdf

Please print all and fax to Oakland SOL. Thanks.

Delivered by SOL Blackberry Services

From: Peter H. Gleick <pgleick@pipeline.com>
To: cpeters@email.unc.edu <cpeters@email.unc.edu>; nhi519@abdn.ac.uk <nhi519@abdn.ac.uk>; bcp@gso.uri.edu <bcp@gso.uri.edu>; Brett.R.Dumbauld@usda.gov <Brett.R.Dumbauld@usda.gov>; carolynf@u.washington.edu <carolynf@u.washington.edu>; hofmann@ccpo.odu.edu <hofmann@ccpo.odu.edu>; hauke@whoi.edu <hauke@whoi.edu>; manahan@usc.edu <manahan@usc.edu>; francis.obeirn@marine.ie <francis.obeirn@marine.ie>; painert@u.washington.edu <painert@u.washington.edu>; robert.whitlatch@uconn.edu <robert.whitlatch@uconn.edu>; rcicerone@nas.edu <rcicerone@nas.edu>; Frost, Gavin; SRoberts@nas.edu <SRoberts@nas.edu>
Sent: Thu Dec 02 17:17:15 2010
Subject: Letter: NAS Panel and withheld data concern

Dear Colleagues,

Please see the attached letter about critical data (photos and data logs) that now appears to have been intentionally withheld from your 2009 NAS Panel review of the Drakes Bay ecosystem and oyster farm. I believe the National Academy and the Panel will have to serious assess the facts, the implications of this, and the appropriate response. I wonder if there are precedents for previous Committee or Panel reports in which critical information was withheld? Is there a structure within the NAS for addressing these questions?

Thank you for your work on these issues.

Sincerely,

Peter Gleick

Dr. Peter H. Gleick

President, Pacific Institute [*22 Years of Research for People and the Planet: 1987-2009*]
Member, U.S. National Academy of Sciences
MacArthur Fellow

Contact: Terry L. Asbury (tasbury@pacinst.org)
Executive Assistant to Dr. Peter Gleick

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www.worldwater.org (World Water site)
www.bottledandsold.org (Bottled and Sold -- the book)

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Research for People and the Planet

Letter to the U.S. National Academy of Sciences Ocean Studies Board, President Ralph Cicerone, and members of the Drakes Estero Review Panel

From: Dr. Peter H. Gleick, President, Pacific Institute, member U.S. National Academy of Sciences (Section 64, 63)

Re: Data and information appears to have been intentionally withheld from a U.S. National Academy of Sciences Panel

December 2, 2010

I write with serious concern that the U.S. National Academy of Sciences (of which I am a member) has become implicated in a growing abuse of science and a formal case of scientific misconduct. In particular, a recent NAS panel conducted a review of the scientific evidence around impacts of the Drakes Bay Oyster Company (DBOC) farm in Drake's Estero, California. During that review, it now appears that the National Park Service (NPS) ***intentionally withheld critical evidence from the National Academy Panel.*** This evidence would have helped the Panel properly answer some of the issues in the Panel's scope of work. Indeed, the final report of the NAS Panel even noted that it would have been helpful to have ***precisely*** the kind of data, photos, and logs that were withheld.

Background

In April 2008, the Ocean Studies Board of the National Research Council (National Academy of Sciences) convened a Panel, as commissioned by NPS, to review all of the data concerning the impact of DBOC and Drakes Estero, to compare them to the NPS document titled *Drakes Estero: A Sheltered Wilderness Estuary*, and to report on whether the NPS had drawn the correct conclusions from these data and studies and presented them correctly. Among other issues, the scope and questions for the Panel's efforts included:

- "What is the body of scientific studies on the impact of the oyster farm on Drake's Estero and what have they shown?
- What effects can be directly demonstrated by research conducted in Drake's Estero itself?"

One of the key issues addressed by the NAS Panel was NPS claims over the past three and a half years that the Drakes Bay Oyster Company (DBOC) boats and workers were disturbing harbor seals and pups in Drakes Estero in Point Reyes National Seashore (PRNS). As part of this review, the Panel asked the NPS to provide harbor seal disturbance data. Some data, reports of observation from volunteers, and scientific report summaries were provided to the NAS.

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Withholding of Data from the NAS Panel

It now appears that the data submitted by the NPS were selective, partial, and misleading. In particular, it appears that the NPS intentionally hid critical information and data from the NAS and failed to tell the NAS Panel (and other investigations and reviews), that it had 250,000 minute-by-minute, dawn-to-dusk digital photographs (and logs made from those photographs) from hidden cameras focused on oyster farm operations and specific harbor seal haul-out sites.

The NPS failed to disclose these key data (photos and logs) to the NAS Panel among others (including the DOI Inspector General (IG), the Marine Mammal Commission (MMC), elected officials, the public, and press). Evidence now suggests that the existence of these data was known by PRNS Superintendent (b) (6), (b) (7)(C), scientist (b) (6), (b) (7)(C), and Pacific West Regional Chief Scientist (b) (6), (b) (7)(C), all of whom appeared before the NAS Panel or provided information to it.

The NAS Panel wrote, in the final May 5, 2009 report:

> *... It is not possible for the committee to resolve the controversy over individual survey sheets, but the focus on these observations highlights how this type of* [volunteer] *monitoring program is best utilized to indicate potential disturbance problems (that might result in decreased use of a haul-out habitat) rather than to quantify them definitively.* ***The latter would require a data collection system that could be independently verified, such as time and date stamped photographs.*** *This verification is especially important in circumstances where there is an indication of a source of disturbance that could lead to a regulatory action, as was the case with disturbances attributed to DBOC."* [emphasis added]

How ironic: the NAS Panel formally recommended in the May 5, 2009 report that "time and date stamped photographs" would provide independent verification of disturbance records and help resolve the controversy over oyster farm disturbances in Drakes Estero. These photographs actually existed and were kept from the NAS.

The NAS Panel had a meeting on September 4, 2008 at which representatives of the NPS said nothing of the cameras, photos, or detailed logs. Instead, they submitted a technically flawed pape (b) (6), (b) (7)(C) n 2009) that argued that the oyster farm was disturbing the seals (despite the overwhelmingly contradictory photographic evidence in their possession). At that meeting were Pacific West Regional Director John Jarvis, Superintendent (b) (6), (b) (7)(C) and scientist (b) (6), (b) (7)(C) among others. None mentioned the cameras, photos, and logs. These data would have been crucial to the NAS investigations and reviews.

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The photographs have only come to light in the past couple of months. Recent reviews indicate that they directly contradict the NPS claims of harm to seals. Evidence, submitted as part of a formal complaint to the Department of the Interior, suggests that staff of the National Park Service at the Point Reyes National Seashore knew about, and suppressed, these data.[1] Those logs and the photographs themselves appear to contradict claims made by the National Park Service to the NAS Panel. My understanding from scientists who have now reviewed those photographs is that they do not show

> "a single *bona fide* major DBOC disturbance of seals at subsite OB in Drakes Estero over three and a half years. Every boat trip was photographed and analyzed, and not a single bona fide major disturbance of the seals was observed. The photos showed -- and NPS officials and scientists knew all along -- that DBOC was not disturbing the seals. The only disturbances to OB seals as revealed by the photos were from occasional kayakers who got well within 100 yards of the seals..."[2]

Conclusion/Recommendations

I'm not sure what to do, or what the National Academy of Sciences should do, at this point. The reputation of the Academy and the quality of the work of the Panels and Boards (I served two full terms of the Water Sciences and Technology Board, and have served on numerous NAS panels and committees) depends on the integrity of science, open access to data and information on the problems we tackle, and the full use of the best available science. This case raises serious concerns that the quality of the conclusions of the NAS Panel was compromised and that different, stronger conclusions about misrepresentations and misuse of science would have come out of the final report. Here are four suggestions:

1. At a minimum, the Ocean Studies Board and the members of the Panel should review the facts around these data, when their existence was known, and perhaps request a formal response from the parties involved.

2. The Ocean Studies Board and the Panel should consider issuing an addendum, a formal statement, or some follow-on comment about this problem, or an update on the impacts on seals based on the new data.

---

[1] From a "Request for Department of the Interior to Investigate Scientific Misconduct by National Park Service Employees" (submitted by Dr. Corey S. Goodman, member, National Academy of Sciences to Secretary Ken Salazar, Department of the Interior), November 22, 2010.

[2] Ibid.

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3. The Ocean Studies Board, and perhaps all NAS Boards, should review their internal guidelines for scientific integrity, data submission, and data review.

4. The National Academy should review this case in the context of overall Academy integrity of science rules, processes, and guidelines.

5. The National Academy should issue a statement saying explicitly that the Panel should have been given the data, photos, and logs in order to be able to conduct a complete and comprehensive assessment as required by the scope of work.

Sincerely,

Peter Gleick

Dr. Peter H. Gleick

Copies to:

cpeters@email.unc.edu (Dr. Charles Peterson - Panel Chair)
nhi519@abdn.ac.uk (Dr. Paul Thompson)
bcp@gso.uri.edu (Dr. Barry Costa-Pierce)
Brett.R.Dumbauld@usda.gov (Dr. Brett Dumbauld)
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robert.whitlatch@uconn.edu (Dr. Robert Whitlatch)
rcicerone@nas.edu (Dr. Ralph Cicerone, President, NAS)

a (b) (6), (b) (7)(C)

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Frost, Gavin

From: (b) (6), (b) (7)(C)
Sent: Friday, December 10, 2010 12:38 AM
To: Frost, Gavin
Subject: requested documents

Hi Gavin,
I am having trouble getting your requested documents to upload and send via email from home tonight. Instead I will try just providing the links (see below) to where you can download these from the Marine Mammal Commission website. Please let me know if this works and sorry for any inconvience.

(b) (6), (b) (7)(C)

(b) (5)

(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-663-8132 (FAX)

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SFAN I&M Program
Harbor Seal Monitoring

David Press

Ecologist / Data Manager

Outline

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- Inventory and Monitoring Program
- Pinniped Monitoring Protocol
- Harbor Seal Field Methods
- Data Management
- Annual Data Work Flow
- Reporting

EXPERIENCE
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- Harbor seal monitoring is a project of the San Francisco Area Network (SFAN) Inventory and Monitoring (I&M) Program
- SFAN is one of 32 national networks
- I&M program center Fort Collins, CO
- I&M Program a component of NPS Natural Resource Challenge, implemented in 1999

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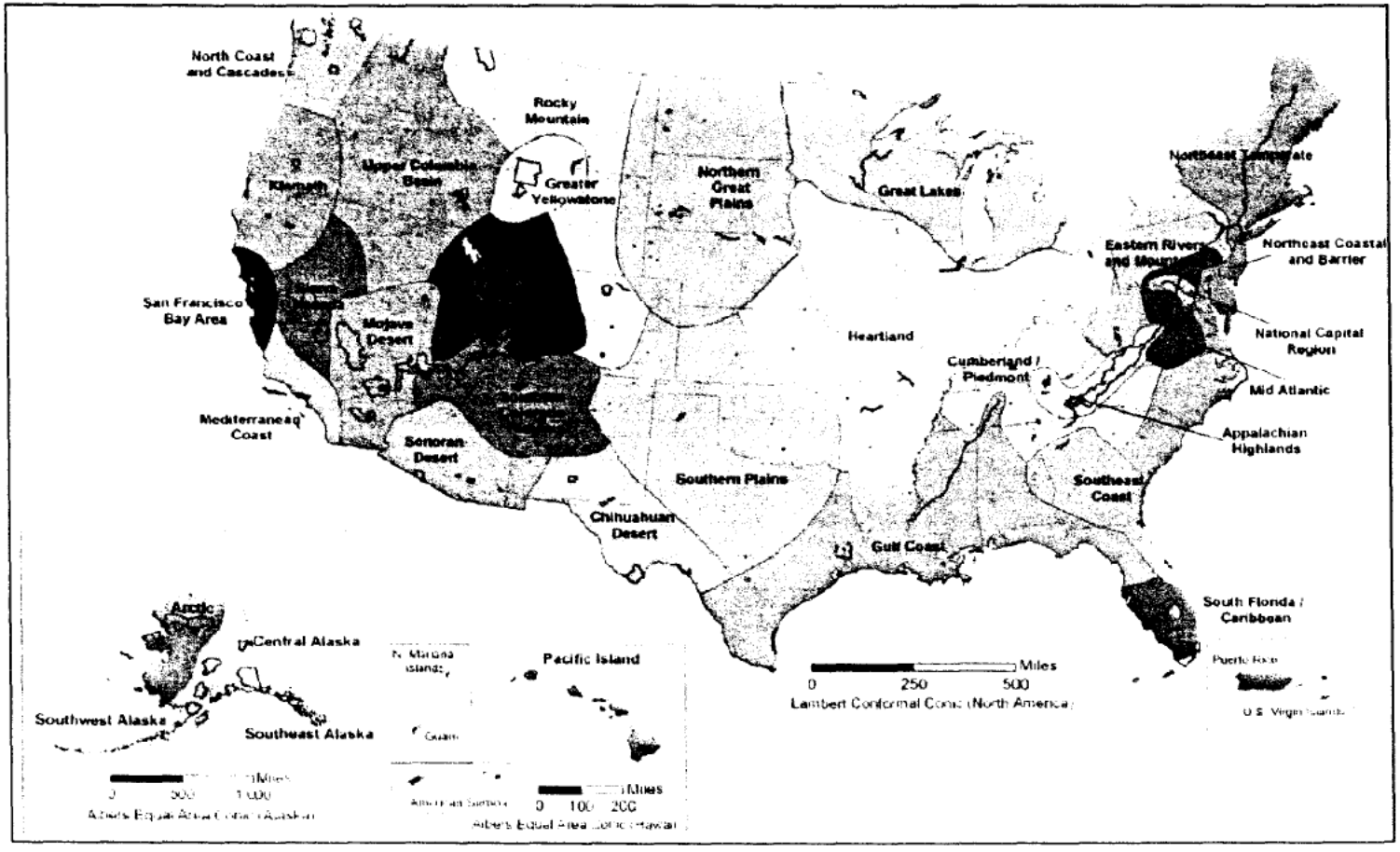

Map of the 32 I&M ecoregional networks that include more than 270 park units with significant natural resources. The 32 networks share core funding and a professional staff to inventory park natural resources and conduct long-term monitoring of park ecosystems.

I&M National Program

EXPERIENCE
YOUR
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- Techincal assistance: sampling design, statistical analyses, modeling, GIS, data management, website design
- Guidance documents: protocol production, data management, publications
- Tools: national databases, database templates, GIS applications
- Collaboration

EXPERIENCE
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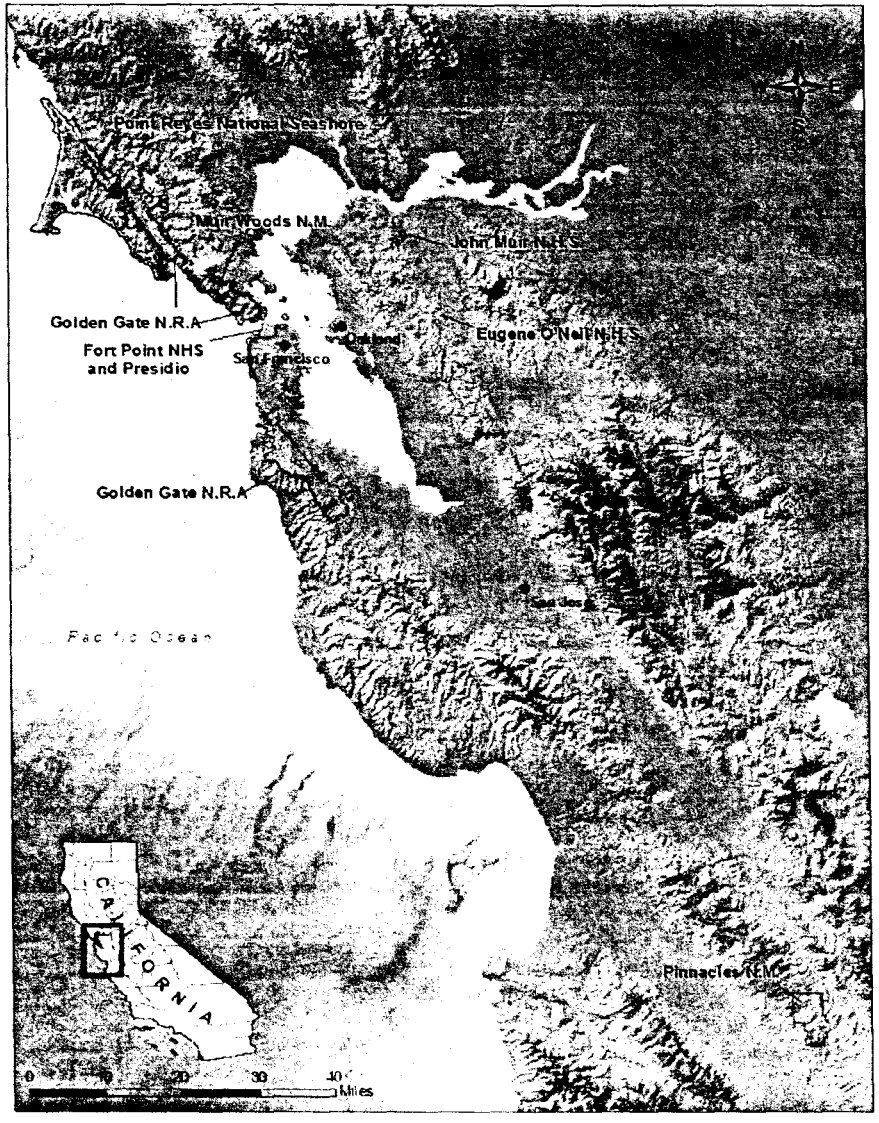

SFAN Monitoring Plan

EXPERIENCE
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- Completed in 2005. Includes network data management plan.
- Identified and ranked 63 biotic and abiotic vital signs.
- 18 vital signs prioritized for initial funding.
- Budget restrictions likely to reduce funded programs to 10 vital signs

SFAN Vital Signs

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- Air Quality
- Amphibs/Reptiles
- Invasive Plants
- Salmonids
- Landbirds
- Landscape Dynamics
- Raptors (PINN)
- Pinnipeds
- Stream Flow
- Water Quality
- Wetlands
- Western Snowy Plovers
- Northern Spotted Owls
- Rocky Intertidal
- Stream Flow

Pinniped Monitoring Protocol

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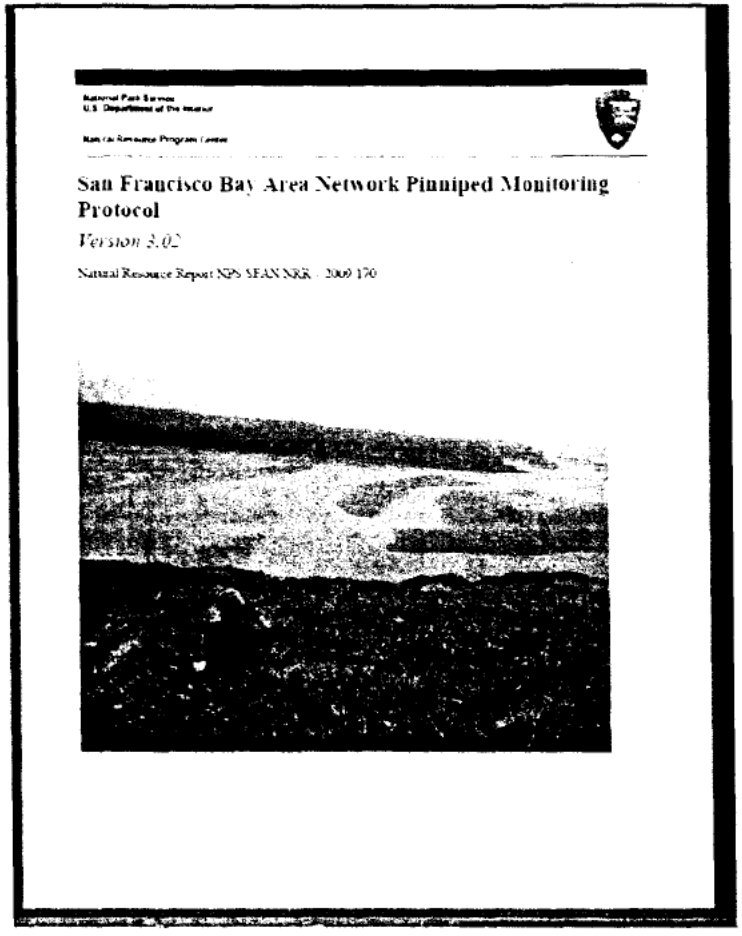

- Protocol approved December 2009.
- Harbor seals and northern elephant seals
- Open peer review 2004
- Dr. David Ainley, Dr. Jim Harvey

Pinniped Monitoring Protocol

EXPERIENCE
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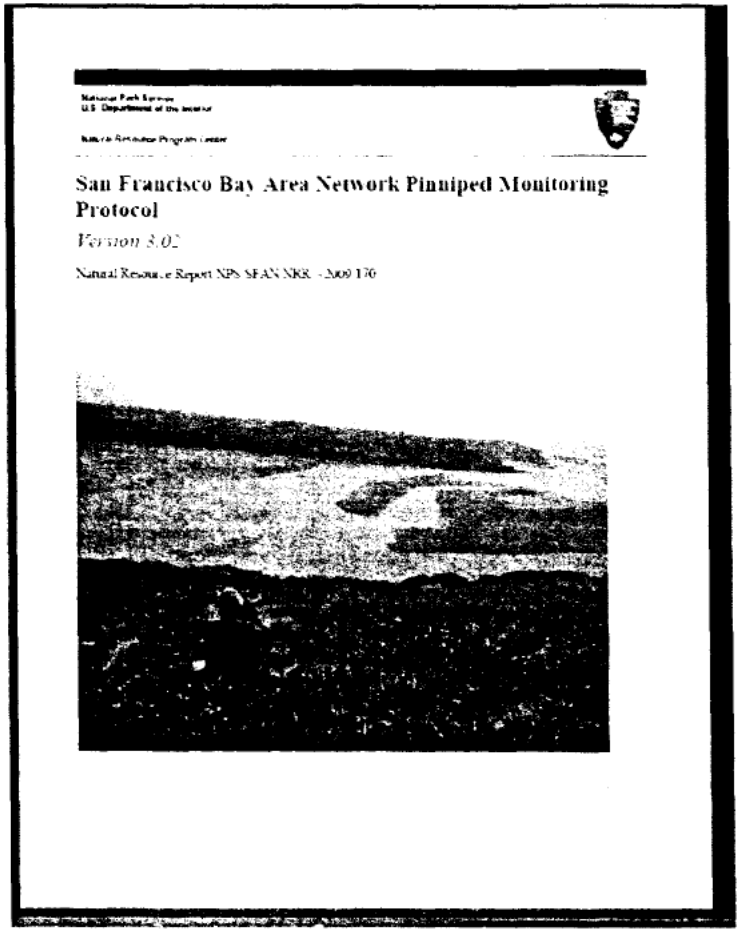

- 2008 blind peer review coordinated by NPS and University of Washington
- 2 anonymous reviewers, Dr. Jim Agee (UW), Dr. Penny Latham (NPS)
- No modifications required to data collection or analytical methods.
- Protocol approved December 2009.

Pinniped Monitoring Protocol

EXPERIENCE
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- Monitoring Objectives

1. Determine the long-term trends in population size and seasonal distribution of harbor seal populations at primary sites in the SFAN parks during the breeding and molt seasons.
2. Determine long-term trends in reproductive success of harbor seals through annual estimates of pup production at PORE and GOGA.
3. Determine the long-term trends in sources, frequency and level of effects of natural and anthropogenic disturbances on harbor seal haul out use and productivity.

Pinniped Monitoring Protocol

EXPERIENCE
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- Power to Detect Trends

  Adults: 90% power to detect 10% annual decline in the six major SFAN sites over 3 years.

  Pups: 88% power to detect 10% annual decline in the six major SFAN sites over 4 years.

  Drakes Estero: 80% power to detect 25% decline takes 21 years for adults and 15 years for pups

Pinniped Monitoring Protocol

EXPERIENCE
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- Standard Operating Procedures

  - Field Methods
  - Data Management
  - Data Analysis and Reporting
  - Safety Procedures

Field Methods

EXPERIENCE
YOUR
AMERICA

- Volunteers and NPS wildlife biotech
- 2009: 49 volunteers, 450 hours of monitoring March-July
- Eight monitoring locations.
- Breeding season: March 1 – May 31
- Molt Season: June 1 – July 31

EXPERIENCE
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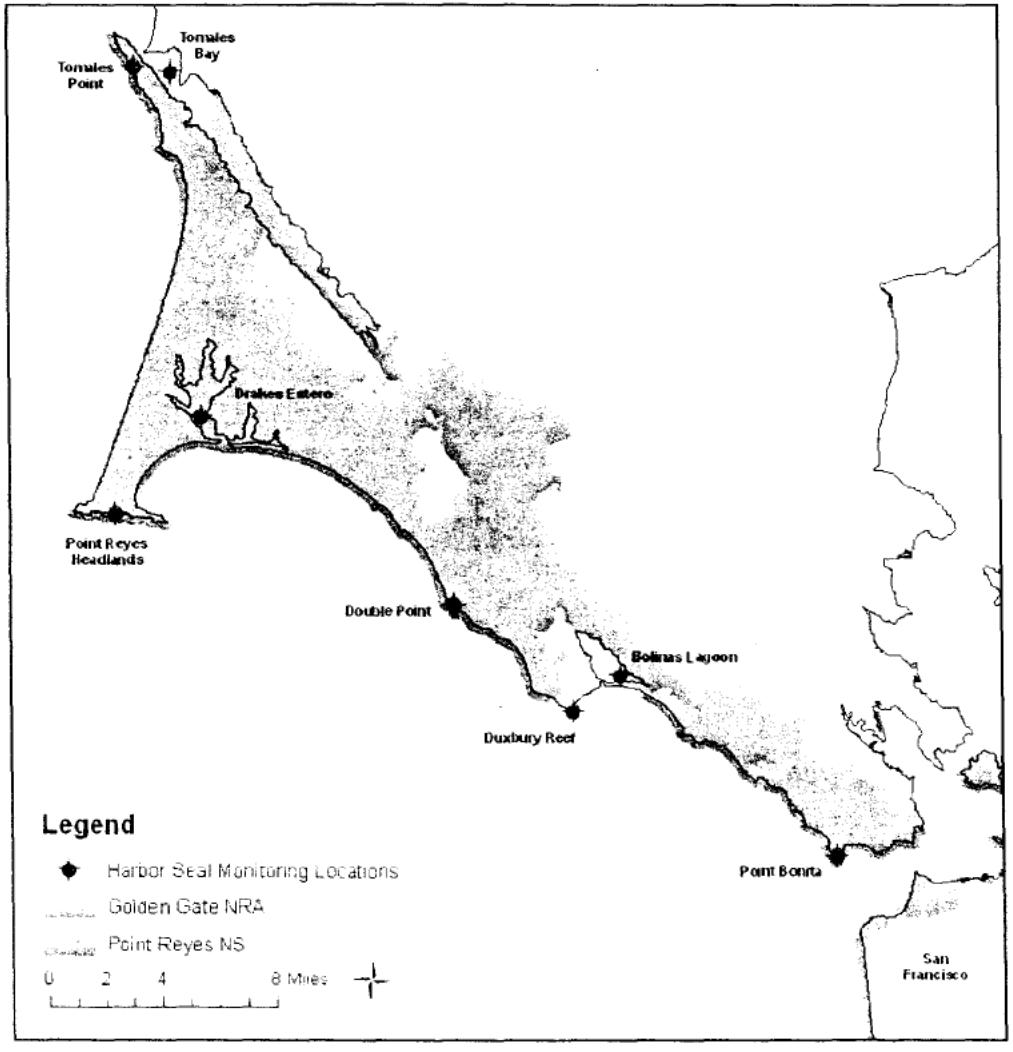

Field Methods

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- Data collected by trained volunteers and staff from fixed observation points.
- Two classroom sessions.
- One field session.
- Pup identification.
- Mentoring program.
- Quality certification.

Field Methods

EXPERIENCE
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- 1-2 surveys per week. Minimum of two during peak season (Apr 15 – May 15).
- Medium (2.5 ft) to low (-1.0 ft) tide.
- Two hours, with counts occurring every half-hour.
- Each subsite is surveyed separately, comprising a grand total for the site.

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Double Point

● Observation Point

Field Methods

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Census Data

- Adults / Immatures
- Pups (March 1 – May 31 only)
- Dead pups
- Red-pelaged seals
- Shark-bite seals
- Time / Subsite

Disturbance Data

- Time / Subsite
- Source Category
- Specific Source
- Source number
- Response
- Flush numbers

EXPERIENCE
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POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY Page ___ of ___

Date _____ Day of Week _____ Year _____ Location _____

Start Time _____ End Time _____ Observers: _____

Weather: Visibility (1,2 or 3)____ Rain (Y/N)____ Low Tide Level closest to survey time _____

# of White Pelicans _____ # of Brown Pelicans _____ All subsites surveyed? (Y or N) _____

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count

*SUBSITES: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UE1=Up Estero 1st, UE2=Up Estero 2nd, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RH=Rupe Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, PWP=Pickleweed Island, HWY1=Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef)

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Page ___ of ___

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date _____ Year _____ Location _____ Observers _____

Time	Source *	Number	Sub-Site	Seal Behavior **	No. Before Disturbance (Total Seals)	No Adult Immature Seals Remain On site	No. pups Remain On site	No Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)

*SUBSITES: **Drakes Estero** (A=Creamery, AI=A1 seasonal, DEM=Drakes Estero Mouth, OB=Oyster Bar, UE1=Up Estero Far, UE2=Up Estero Near, L=Limantour spit, DB=Drake's Beach. **Double Point** (SB= South beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef)

**SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush; FW=flush into water, (Record Strongest Reaction)

Data Management

EXPERIENCE
YOUR
AMERICA

- Relational MS Access database
- Harbor seal and elephant seal monitoring data
- Data entry, QA/QC, data summaries.
- Complete user-interface
- Custom queries built for data summaries and QA/QC

Data Management

EXPERIENCE
YOUR
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- Database modeled after national database template
- Spatial component of data built-into database
- Table relationships completely defined
- Definitions for all tables and fields

EXPERIENCE
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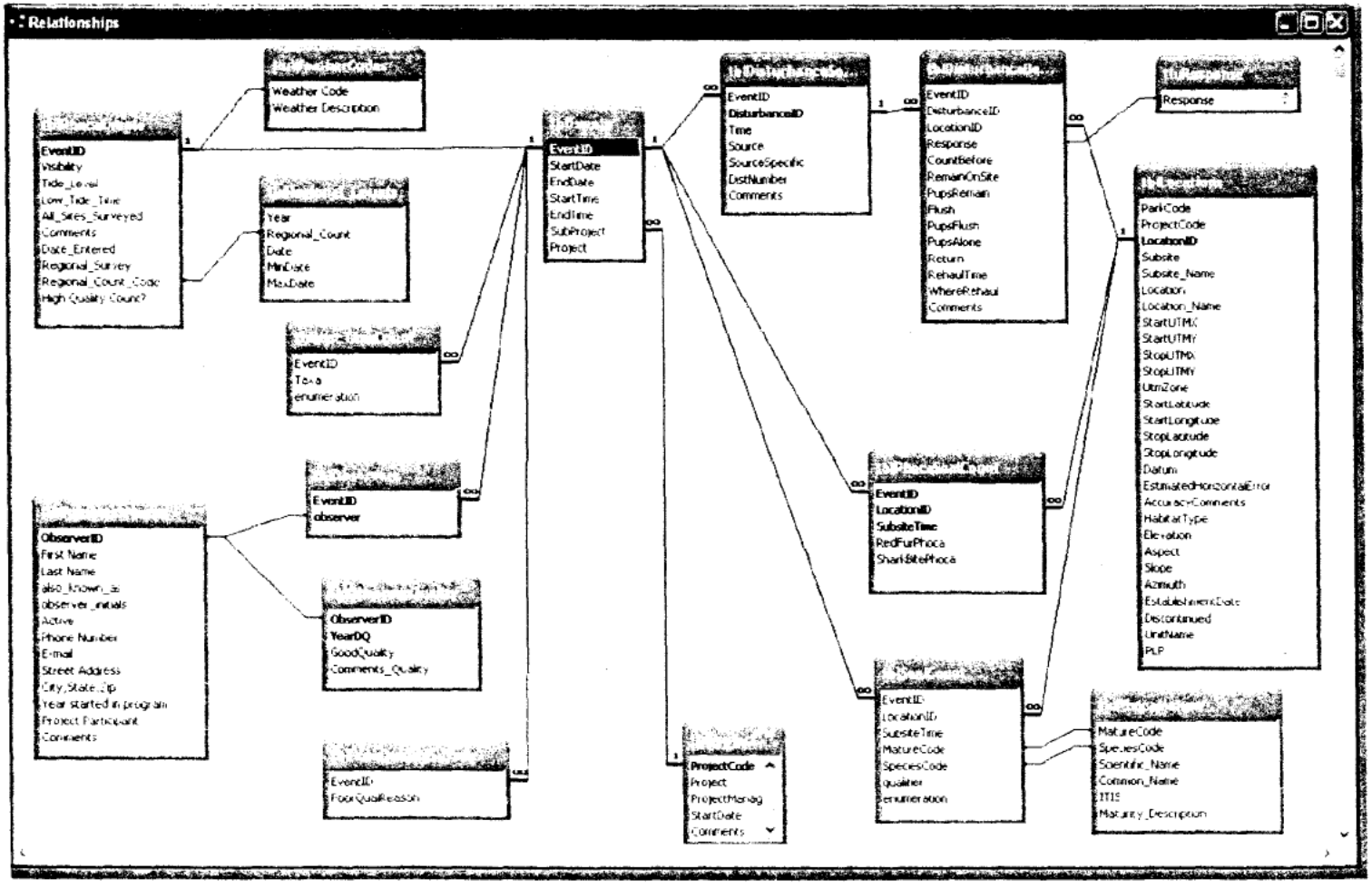

Data Management

EXPERIENCE
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- Metadata records compliant with FGDC standards as required under Executive Order 12906
- Metadata records accompany all FOIA requests
- Metadata records maintained online at NPS Data Store public website

EXPERIENCE
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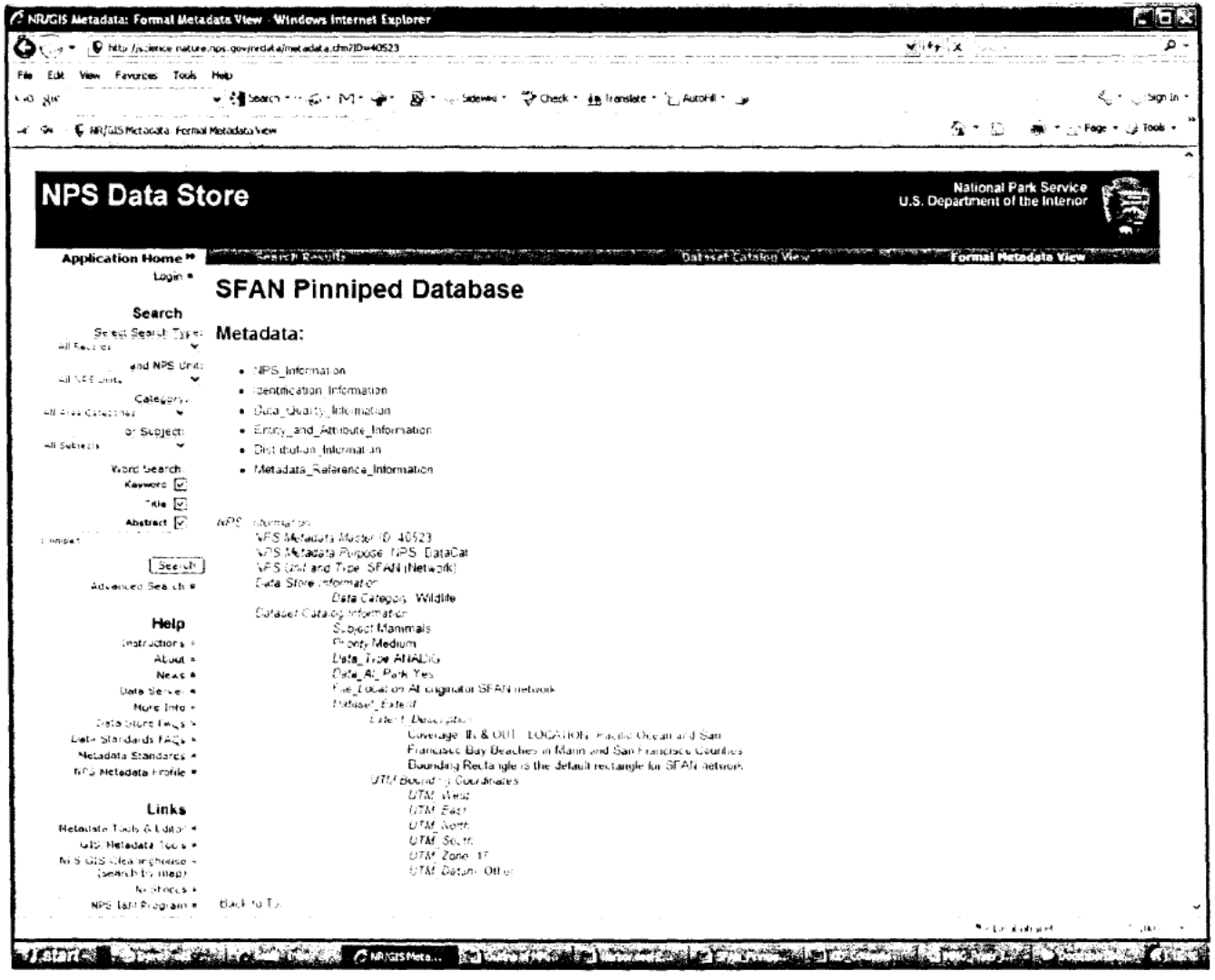

Data Work Flow

EXPERIENCE
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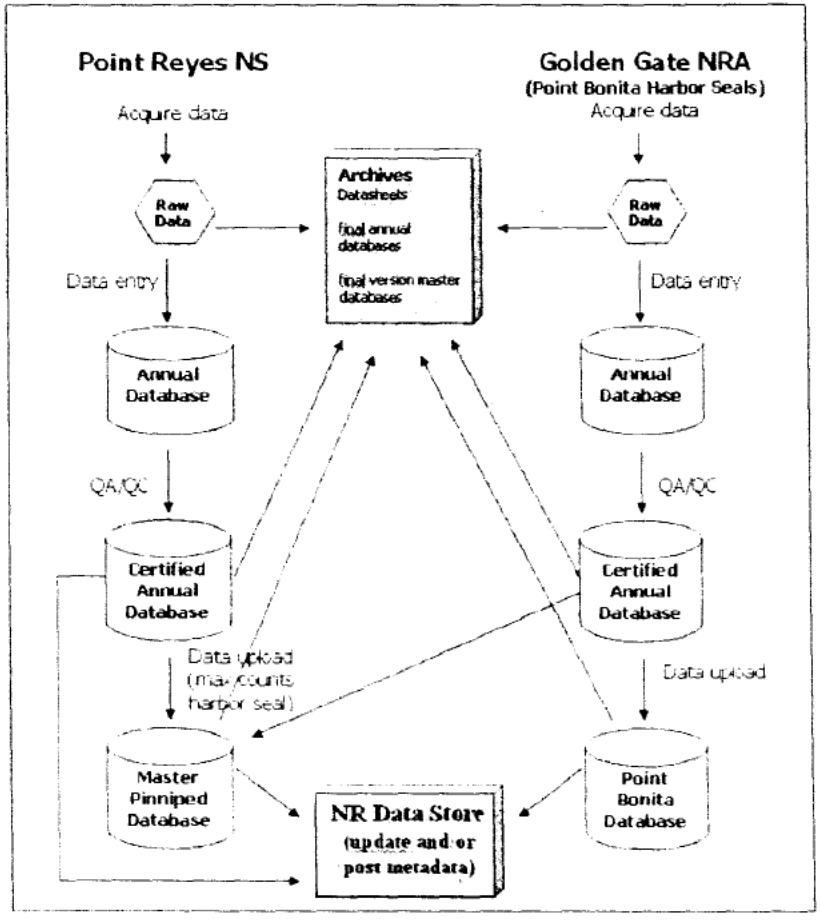

Data Work Flow

EXPERIENCE
YOUR
AMERICA

- Annual Database – August to July of next year; all raw data entered
- Count data ranked as high vs. poor quality data.
- All data sheets error-checked against digital records
- 10% of data records randomly selected for additional error-checking by Data Manager
- Series of queries designed to check data for "logic" errors

Data Work Flow

EXPERIENCE
YOUR
AMERICA

- Merge annual dataset with master database.
- Harbor seal count data condensed to maximum count per survey.
- Disturbance data transferred as is.
- Archive data sets.
- Update database log - tracks significant database updates and data edits

Data Reporting

EXPERIENCE
YOUR
AMERICA

- Annual monitoring report completed as soon as possible.
- Provides general overview of monitoring year. No subsite data.
- Maximum counts by location, comparisons with other monitoring years, disturbance counts by source, disturbance rates.
- Summaries based on maximum total count per location for breeding and molting seasons.
- Poor quality count data excluded from summaries
- Disturbance data not filtered for quality.

Data Reporting: Poor Quality Counts

EXPERIENCE
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AMERICA

- observer quality
- visibility
- other weather conditions (ie. wind, glare)
- incomplete survey

Data Reporting: Disturbance Data

EXPERIENCE
YOUR
AMERICA

- Only "actual" disturbances included – head alert, flush, flush into water responses
- Disturbance data not filtered for quality based on observer experience, weather, tide, etc.

EXPERIENCE
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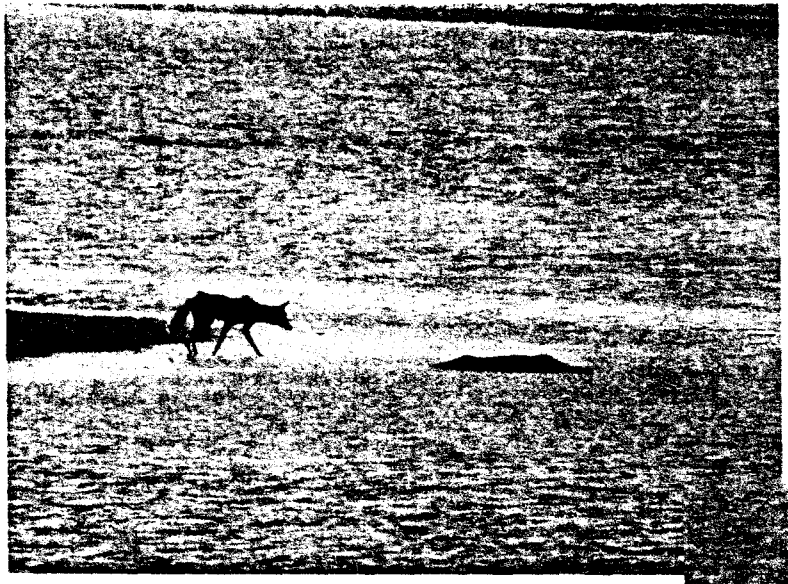

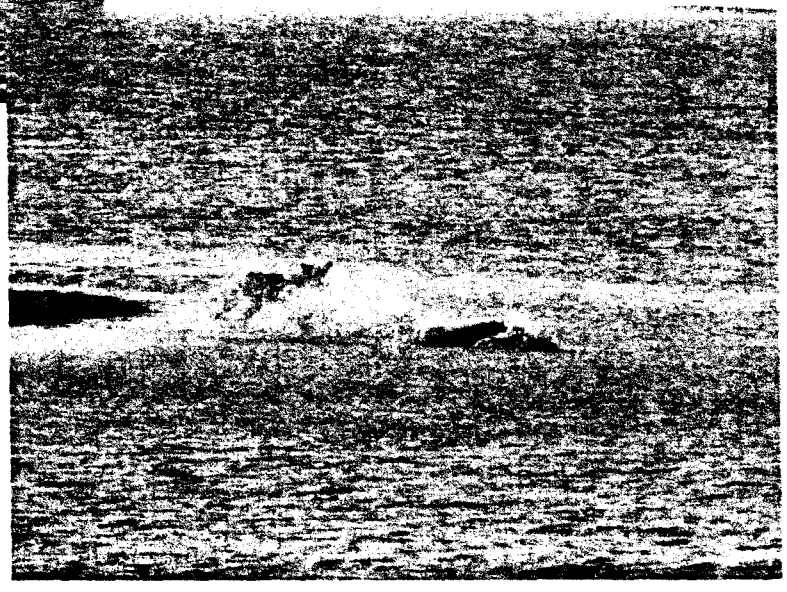

Photos courtesy of J. Thompson

Data Reporting

EXPERIENCE
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- Annual report peer-review internal and external
- Reports approved by NPS Key Official
- Report posted to SFAN I&M website following approval

EXPERIENCE
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NPS: Nature & Science » Networks: San Francisco Bay Area Network » Pinnipeds - Windows Internet Explorer

National Park Service
Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

National Park Service Networks

NPS » Nature & Science » I & M » Networks » San Francisco Bay Area » Vital Signs » Harbor Seals

San Francisco Bay Area Network

Harbor Seals

Harbor seals (*Phoca vitulina richardsi*) are the dominant and only year round resident pinniped in the San Francisco Bay Area, California. Within the San Francisco Bay Area, the population at Point Reyes represents the largest concentration of harbor seals in the State of California, other than the Channel Islands. Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal. Long-term monitoring studies of harbor seals have been conducted at selected colonies for 30 years, and are currently conducted at 7 locations along the Point Reyes seashore and at Point Bonita in the Golden Gate National Recreation Area.

Nature & Science

Inventory & Monitoring

Network Home :
- About Us
- Inventories
- Monitoring
- Reports & Publications
- Network Contacts
- Data Use/Info Statement
- SFAN Intranet (NPS only)

Vital Signs
- Air Quality
- Amphibians and Reptiles
- Butterflies - T & E
- Fish
- Landbirds
- Landscape Dynamics
- Pinnipeds
- Plants - Communities
- Plants - Invasives
- Plants - Rare
- Raptors
- Riparian Habitat
- Snowy Plover, Western
- Spotted Owl, Northern
- Stream Flow
- Water Quality
- Weather and Climate
- Wetland Habitat

Parks: Nature & Science

Field Surveys

- Surveys are conducted weekly, at 12 sites during the breeding season (March - June) of each year.
- Bi-monthly surveys are conducted for all pinnipeds year-round.

For more information on becoming a volunteer, contact the

Project Updates 2009

Annual Reports

80% decline at OB in 2007

EXPERIENCE
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- Sheltered Wilderness, public testimony
- 80% estimate of decline in use of OB in 2007 compared to 2004 was based on best professional judgment from previous years of study
- Peak pup count date at DE in 2007 was similar to other years but at OB it was later
- Count of April 23 used although actual peak later discovered to be May 4
- Actual decline at OB from 2004-2007 based on May 4 peak was 53% for pups, 65% for pups and 56% overall.

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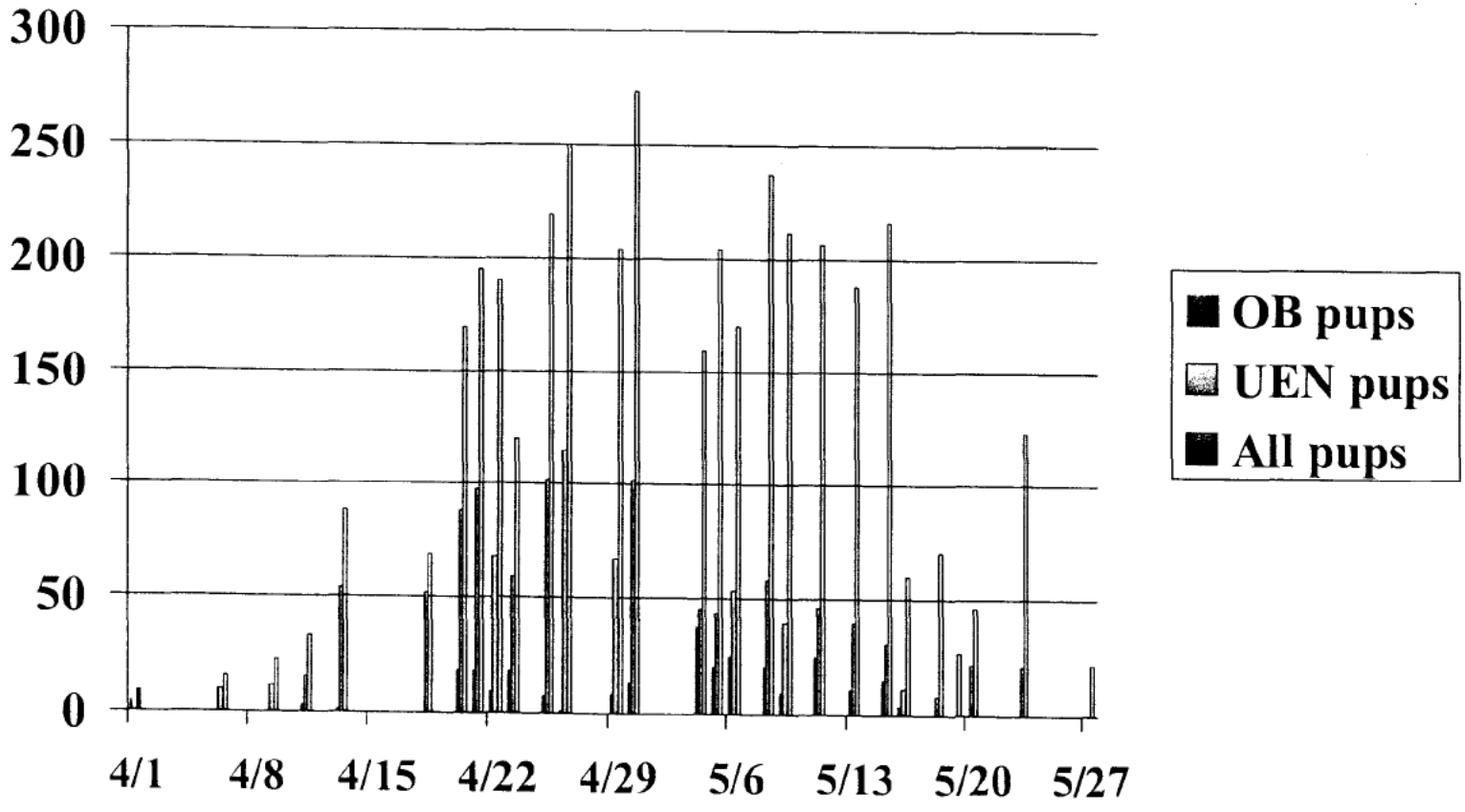


EXPERIENCE
YOUR
AMERICA

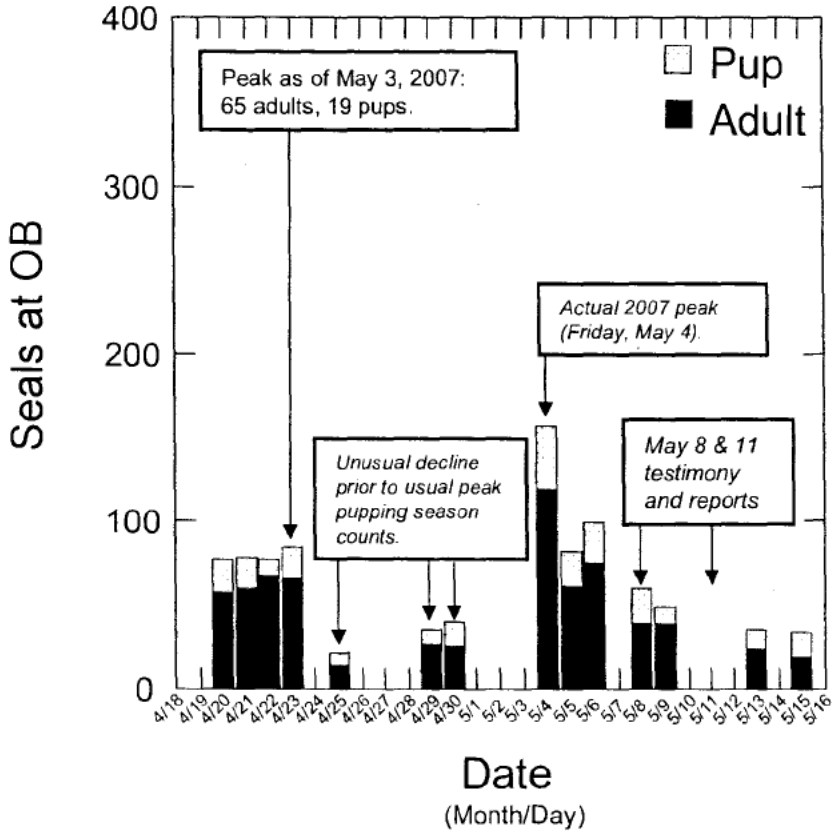


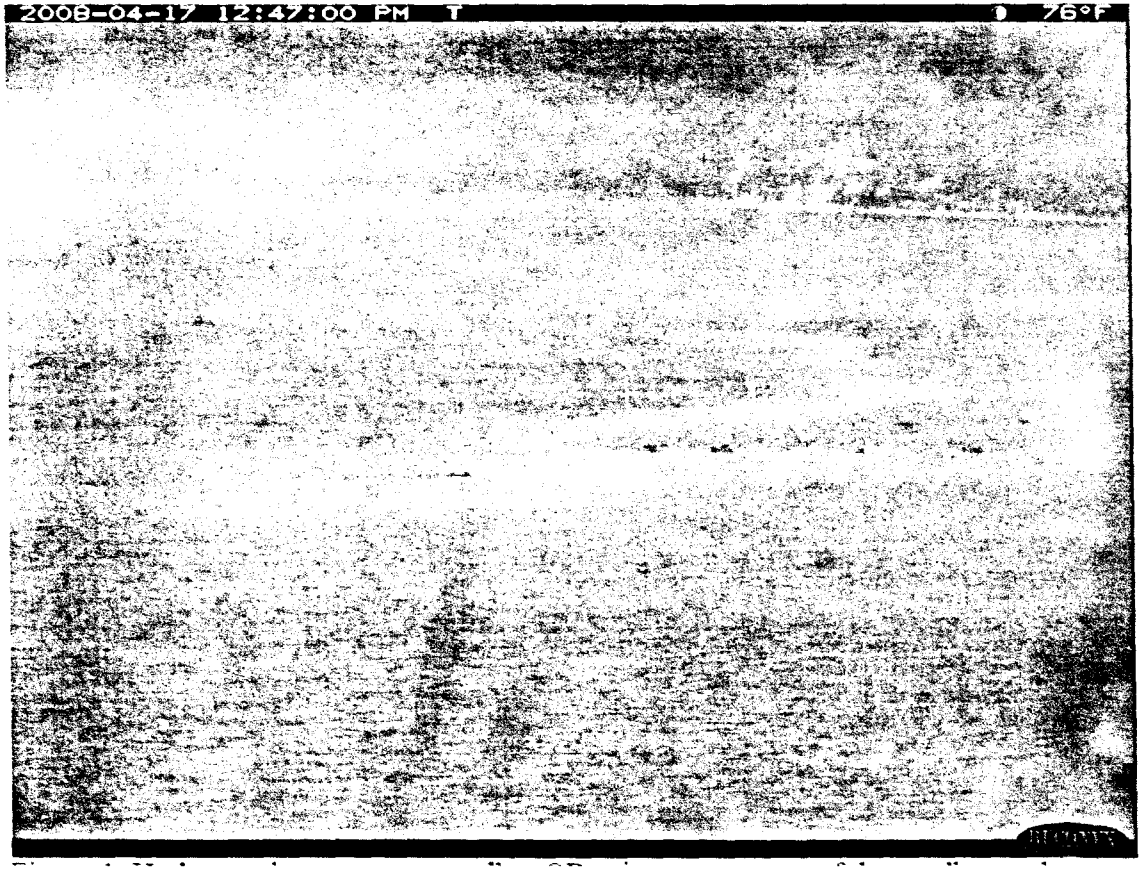
Figure 1. Harbor seal counts at Drakes Estero subsite OB in 2007. NPS used data available through May 3 to prepare May 8 and 11 testimony and reports. This is why the 80% decline was presented.

DBOC Disturbance Data

EXPERIENCE
YOUR
AMERICA

- Only DBOC may operate motorboats in Drakes Estero
- Harbor seal use sandbars at higher tides

EXPERIENCE
YOUR
AMERICA



Sandbar OB on falling tide. 3 hours and 35 min prior to low tide of 0.89 ft (Golden Gate).

EXPERIENCE
YOUR
AMERICA

Sandbar OB on falling tide. 2 hours and 45 min prior to low tide of 1.68 ft (Golden Gate).

DBOC Disturbance Data

EXPERIENCE
YOUR
AMERICA

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- Multiple subsites grouped under one disturbance source/time

EXPERIENCE
YOUR
AMERICA

Photo courtesy of R. Campbell

DBOC Disturbance Data

EXPERIENCE
YOUR
AMERICA

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- Multiple subsites grouped under one disturbance source/time
- Data edits, additions
- Program organization, transition from PORE to I&M

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:22 PM
To: McCoy, Lytashia
Subject: Fw: requested documents

Delivered by SOL Blackberry Services

From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Fri Dec 10 02:37:43 2010
Subject: requested documents

Hi Gavin,
I am having trouble getting your requested documents to upload and send via email from home tonight. Instead I will try just providing the links (see below) to where you can download these from the Marine Mammal Commission website. Please let me know if this works and sorry for any inconvience.

(b) (6), (b) (7)(C)

(b) (5)

(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-663-8132 (FAX)

EXPERIENCE
YOUR
AMERICA

SFAN I&M Program
Harbor Seal Monitoring

David Press

Ecologist / Data Manager

Outline

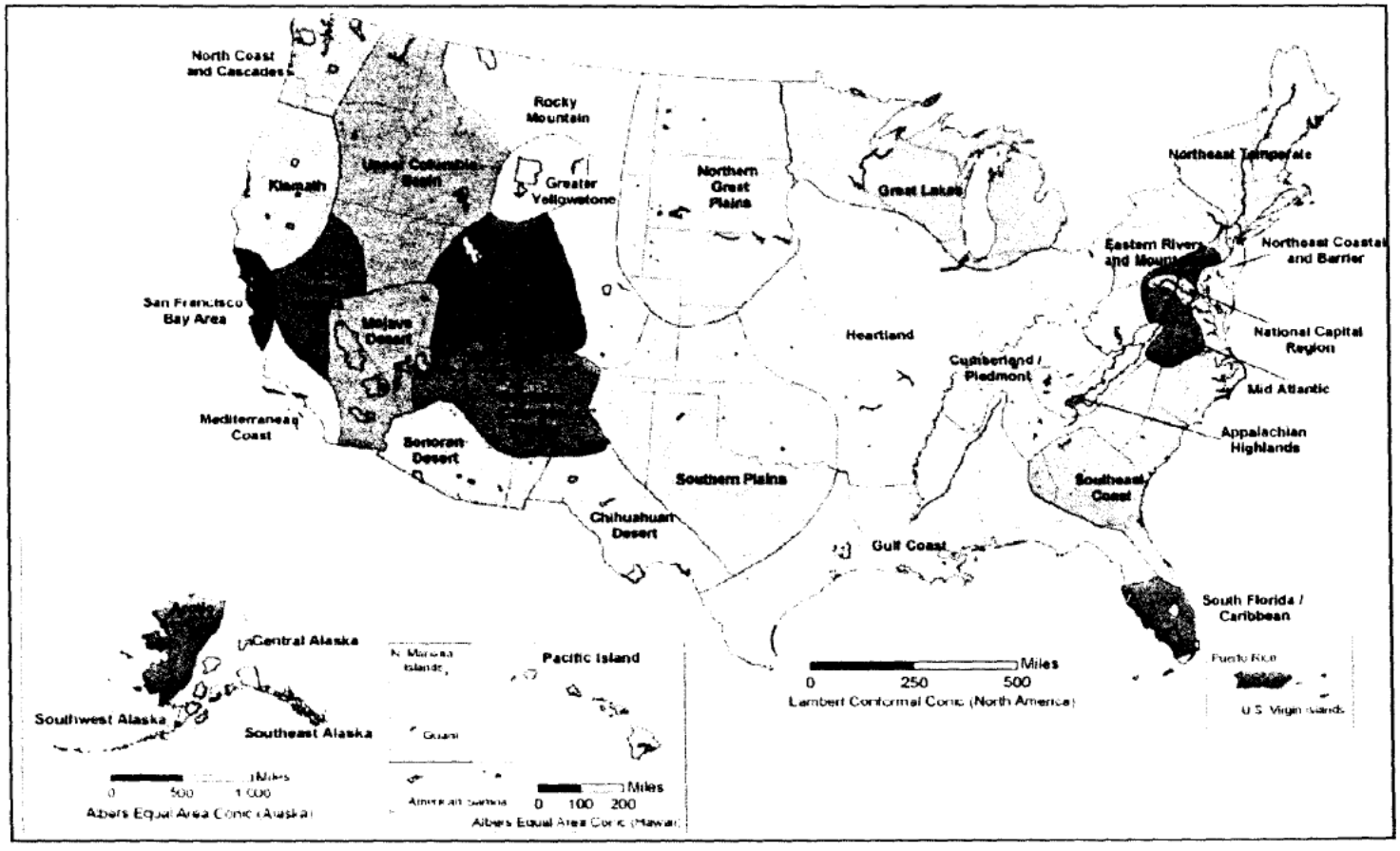
EXPERIENCE
YOUR
AMERICA

- Inventory and Monitoring Program
- Pinniped Monitoring Protocol
- Harbor Seal Field Methods
- Data Management
- Annual Data Work Flow
- Reporting

EXPERIENCE
YOUR
AMERICA

- Harbor seal monitoring is a project of the San Francisco Area Network (SFAN) Inventory and Monitoring (I&M) Program
- SFAN is one of 32 national networks
- I&M program center Fort Collins, CO
- I&M Program a component of NPS Natural Resource Challenge, implemented in 1999

EXPERIENCE
YOUR
AMERICA



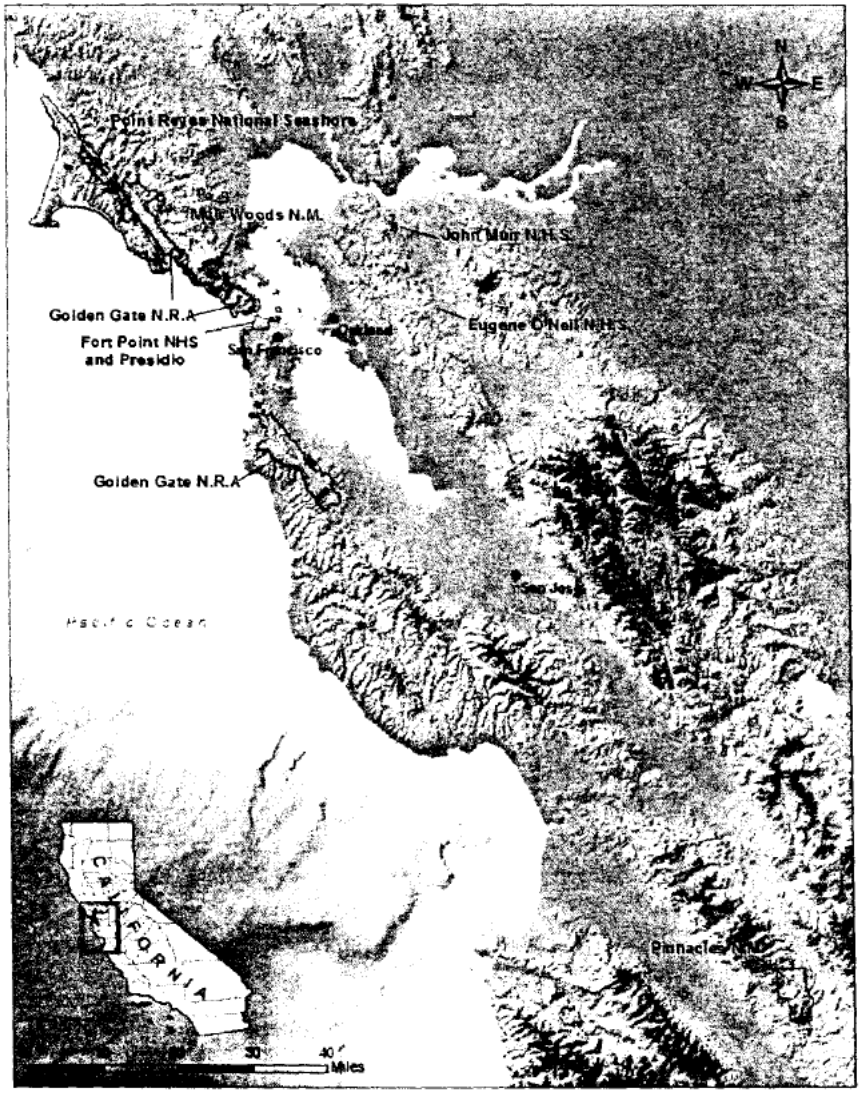
Map of the 32 I&M ecoregional networks that include more than 270 park units with significant natural resources. The 32 networks share core funding and a professional staff to inventory park natural resources and conduct long-term monitoring of park ecosystems.

I&M National Program

EXPERIENCE
YOUR
AMERICA

- Techincal assistance: sampling design, statistical analyses, modeling, GIS, data management, website design
- Guidance documents: protocol production, data management, publications
- Tools: national databases, database templates, GIS applications
- Collaboration

EXPERIENCE
YOUR
AMERICA



SFAN Monitoring Plan

EXPERIENCE
YOUR
AMERICA

- Completed in 2005. Includes network data management plan.
- Identified and ranked 63 biotic and abiotic vital signs.
- 18 vital signs prioritized for initial funding.
- Budget restrictions likely to reduce funded programs to 10 vital signs

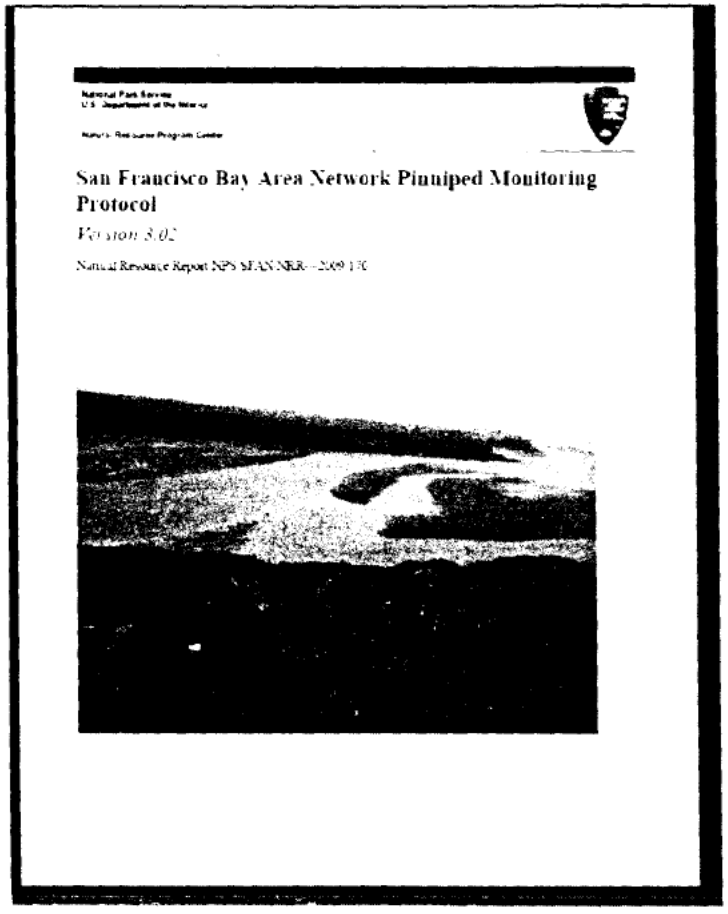
SFAN Vital Signs

EXPERIENCE
YOUR
AMERICA

- Air Quality
- Amphibs/Reptiles
- Invasive Plants
- Salmonids
- Landbirds
- Landscape Dynamics
- Raptors (PINN)
- Pinnipeds
- Stream Flow
- Water Quality
- Wetlands
- Western Snowy Plovers
- Northern Spotted Owls
- Rocky Intertidal
- Stream Flow

Pinniped Monitoring Protocol

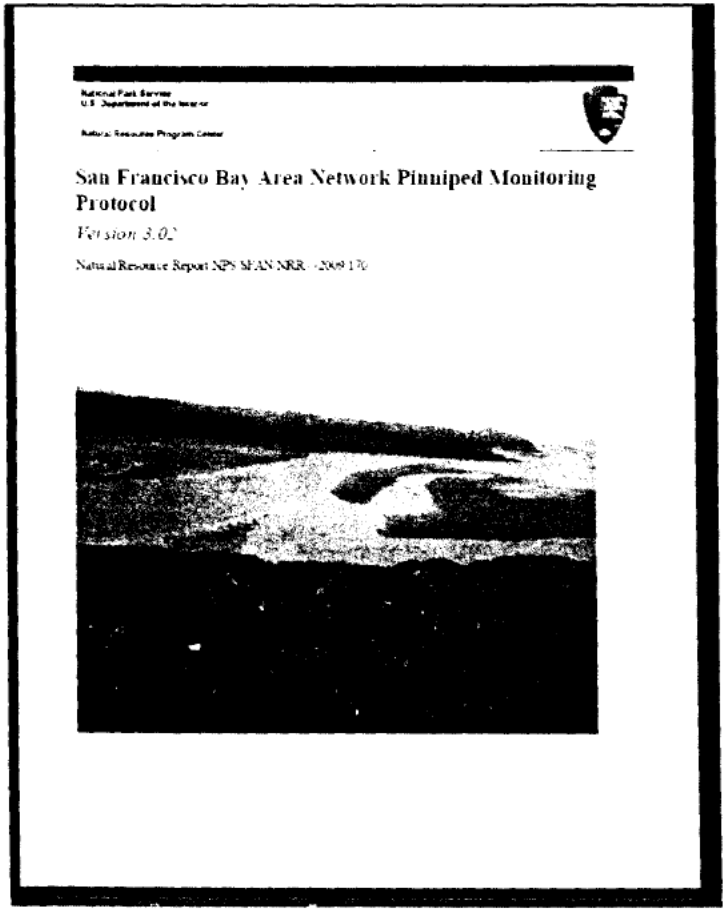
EXPERIENCE
YOUR
AMERICA



- Protocol approved December 2009.
- Harbor seals and northern elephant seals
- Open peer review 2004
- Dr. David Ainley, Dr. Jim Harvey

Pinniped Monitoring Protocol

EXPERIENCE
YOUR
AMERICA



- 2008 blind peer review coordinated by NPS and University of Washington
- 2 anonymous reviewers, Dr. Jim Agee (UW), Dr. Penny Latham (NPS)
- No modifications required to data collection or analytical methods.
- Protocol approved December 2009.

Pinniped Monitoring Protocol

EXPERIENCE
YOUR
AMERICA

- Monitoring Objectives

1. Determine the long-term trends in population size and seasonal distribution of harbor seal populations at primary sites in the SFAN parks during the breeding and molt seasons.
2. Determine long-term trends in reproductive success of harbor seals through annual estimates of pup production at PORE and GOGA.
3. Determine the long-term trends in sources, frequency and level of effects of natural and anthropogenic disturbances on harbor seal haul out use and productivity.

Pinniped Monitoring Protocol

EXPERIENCE
YOUR
AMERICA

- Power to Detect Trends

  Adults: 90% power to detect 10% annual decline in the six major SFAN sites over 3 years.

  Pups: 88% power to detect 10% annual decline in the six major SFAN sites over 4 years.

  Drakes Estero: 80% power to detect 25% decline takes 21 years for adults and 15 years for pups

Pinniped Monitoring Protocol

EXPERIENCE
YOUR
AMERICA

- Standard Operating Procedures

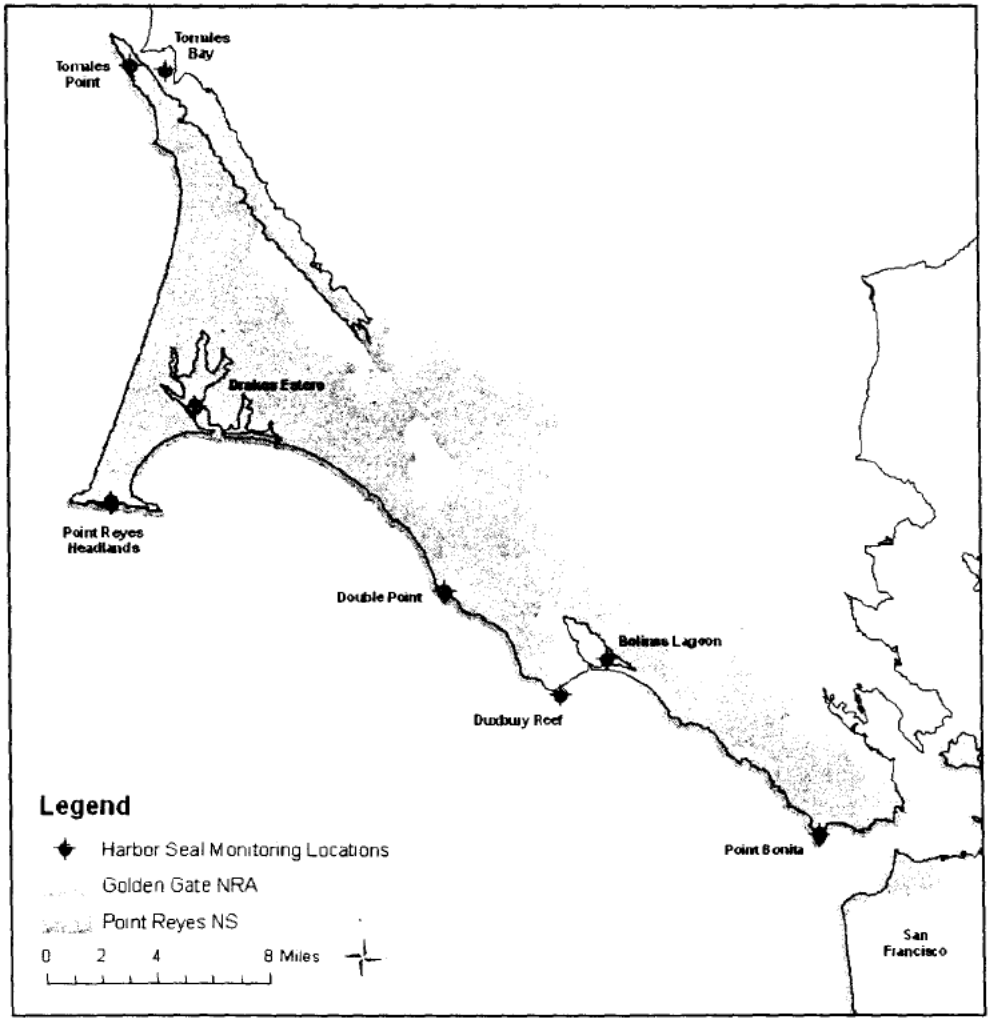
  - Field Methods
  - Data Management
  - Data Analysis and Reporting
  - Safety Procedures

Field Methods

EXPERIENCE
YOUR
AMERICA

- Volunteers and NPS wildlife biotech
- 2009: 49 volunteers, 450 hours of monitoring March-July
- Eight monitoring locations.
- Breeding season: March 1 – May 31
- Molt Season: June 1 – July 31

EXPERIENCE
YOUR
AMERICA



Field Methods

EXPERIENCE
YOUR
AMERICA

- Data collected by trained volunteers and staff from fixed observation points.
- Two classroom sessions.
- One field session.
- Pup identification.
- Mentoring program.
- Quality certification.

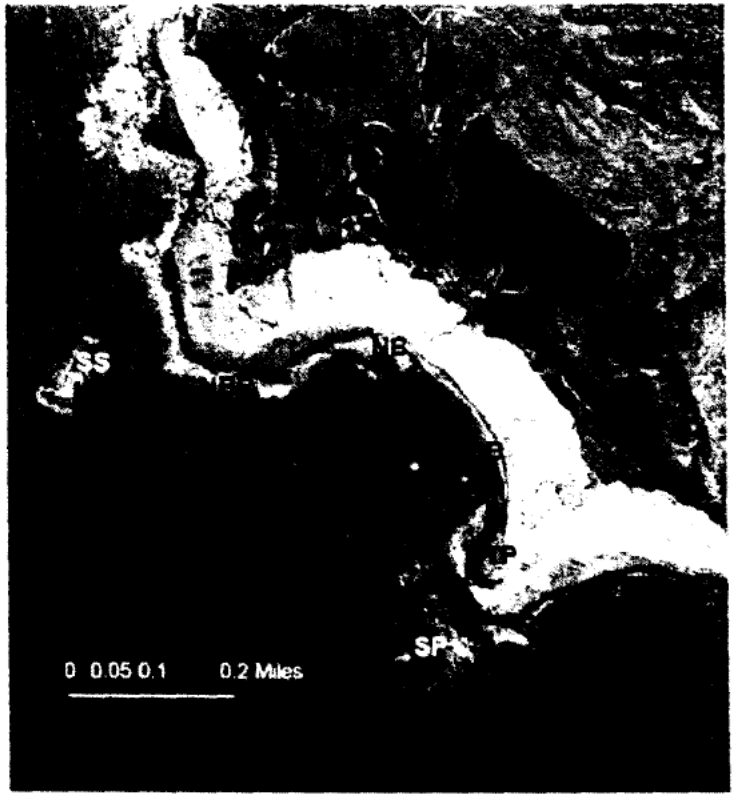
Field Methods

EXPERIENCE
YOUR
AMERICA

- 1-2 surveys per week. Minimum of two during peak season (Apr 15 – May 15).
- Medium (2.5 ft) to low (-1.0 ft) tide.
- Two hours, with counts occurring every half-hour.
- Each subsite is surveyed separately, comprising a grand total for the site.

EXPERIENCE
YOUR
AMERICA

Double Point



- Observation Point

Field Methods

EXPERIENCE
YOUR
AMERICA

Census Data

- Adults / Immatures
- Pups (March 1 – May 31 only)
- Dead pups
- Red-pelaged seals
- Shark-bite seals
- Time / Subsite

Disturbance Data

- Time / Subsite
- Source Category
- Specific Source
- Source number
- Response
- Flush numbers

EXPERIENCE
YOUR
AMERICA

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY Page ___ of ___

Date _____ Day of Week_____Year_____ Location _____

Start Time _____End Time _____ Observers:_____

Weather: Visibility (1,2 or 3)_____ Rain (Y N) ___ Low Tide Level closest to survey time _____

# of White Pelicans _____ # of Brown Pelicans _____ All subsites surveyed? (Y or N) _____

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y N	Survey Total All subsites Each ½ hour	Comments

Visibility: 1=clear, 2=slightly fog/mist but still able to count, 3=unable to conduct an accurate or full count

*SUBSITES: **Drakes Estero**: A=A random, A1=A1 random, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Fan, UEN=Up Estero Near, L=Limantour Spit, **DB**=Drake's Beach/**Double Point**: SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack)
Tomales Point: BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach; **Tomales Bay**: (SI=Seal Island, CI=Clam Island, HI=Hog Island)
Bolinas Lagoon: (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) **Duxbury Reef**: (DUX=Duxbury Reef)

EXPERIENCE
YOUR
AMERICA

Page ___of___

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date _____Year_____ Location _____Observers _____

Time	Source *	Number	Sub-Site	Seal Behavior **	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)

*SUBSITES: Drakes Estero, A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach, Double Point: SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

**SEAL BEHAVIOR: NR=no response, HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Data Management

EXPERIENCE
YOUR
AMERICA

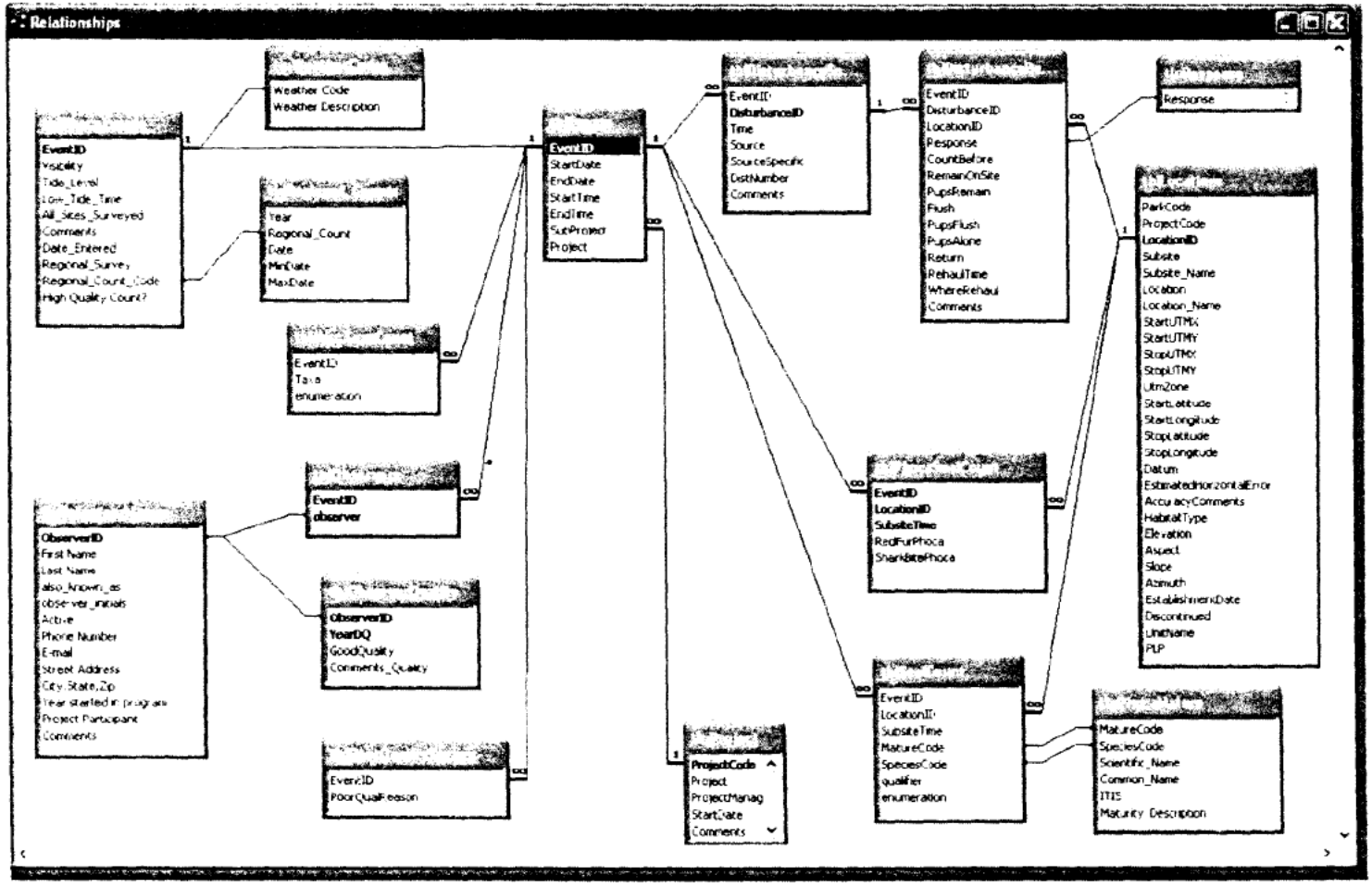
- Relational MS Access database
- Harbor seal and elephant seal monitoring data
- Data entry, QA/QC, data summaries.
- Complete user-interface
- Custom queries built for data summaries and QA/QC

Data Management

EXPERIENCE
YOUR
AMERICA

- Database modeled after national database template
- Spatial component of data built-into database
- Table relationships completely defined
- Definitions for all tables and fields

EXPERIENCE
YOUR
AMERICA

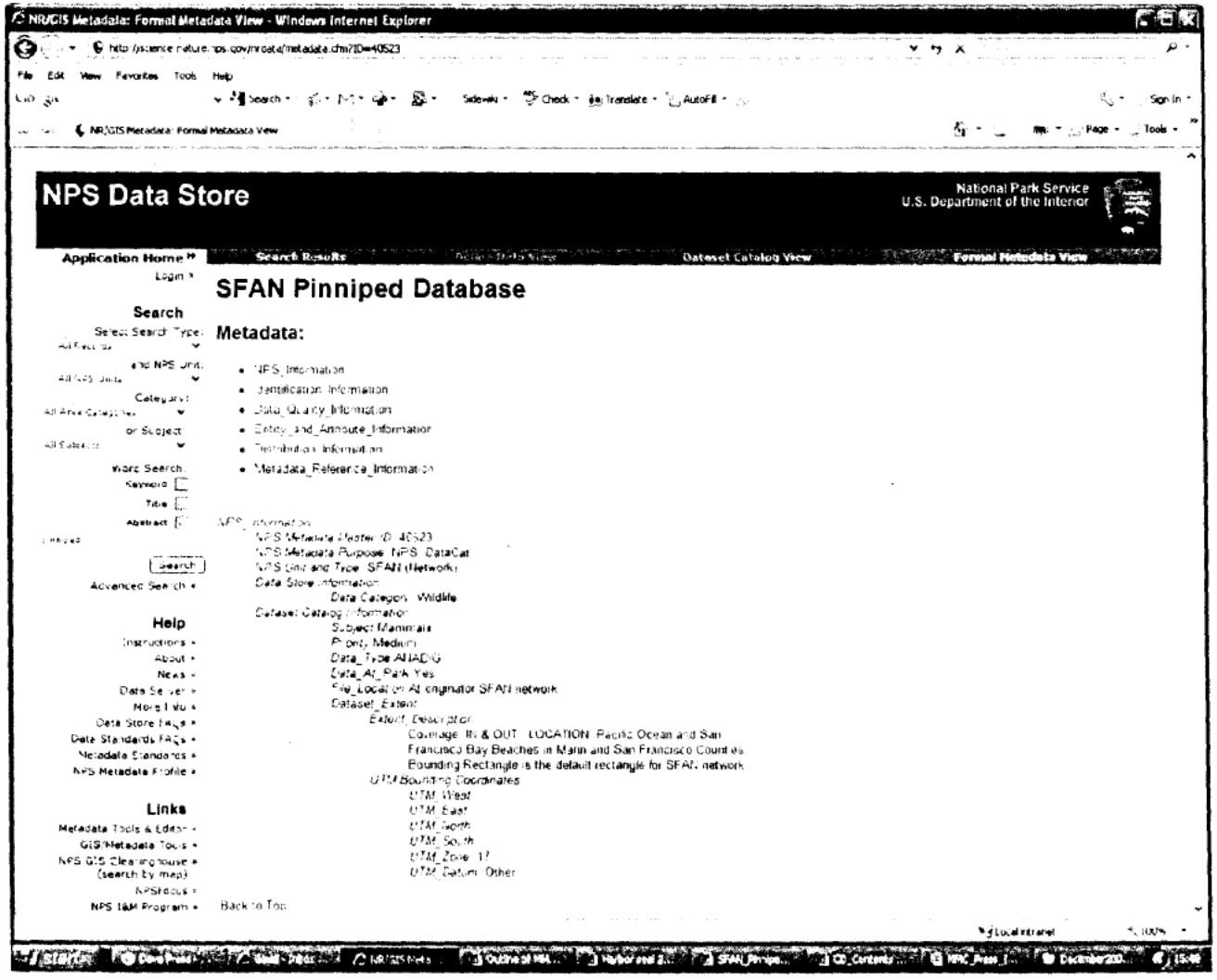


Data Management

EXPERIENCE
YOUR
AMERICA

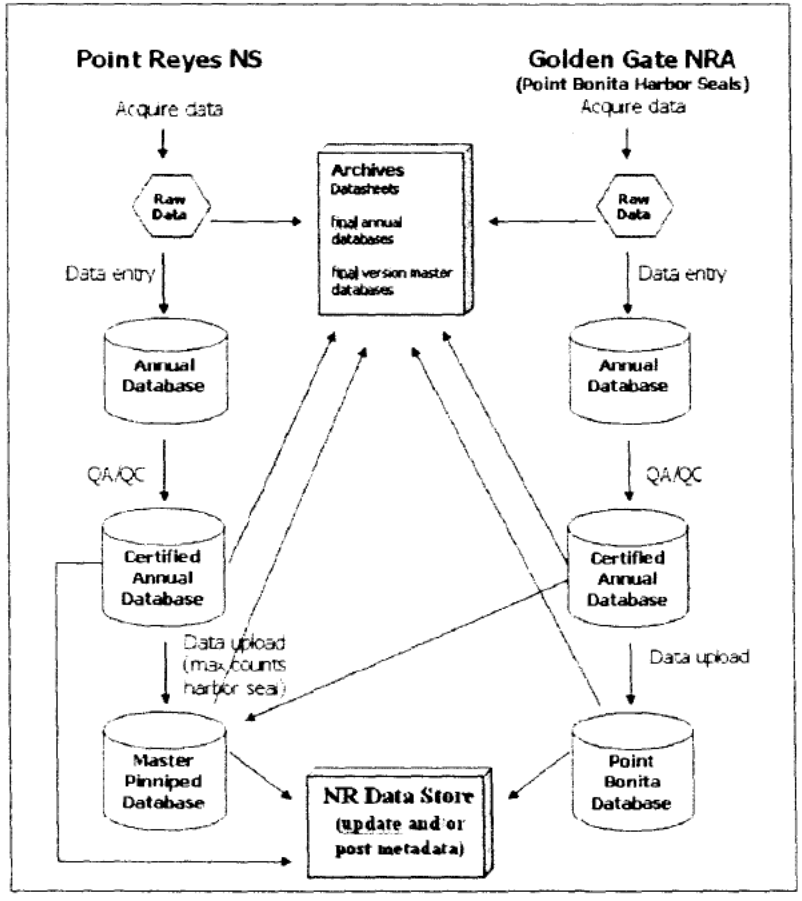
- Metadata records compliant with FGDC standards as required under Executive Order 12906
- Metadata records accompany all FOIA requests
- Metadata records maintained online at NPS Data Store public website

EXPERIENCE
YOUR
AMERICA



Data Work Flow

EXPERIENCE
YOUR
AMERICA



Data Work Flow

EXPERIENCE
YOUR
AMERICA

- Annual Database – August to July of next year; all raw data entered
- Count data ranked as high vs. poor quality data.
- All data sheets error-checked against digital records
- 10% of data records randomly selected for additional error-checking by Data Manager
- Series of queries designed to check data for "logic" errors

Data Work Flow

EXPERIENCE
YOUR
AMERICA

- Merge annual dataset with master database.
- Harbor seal count data condensed to maximum count per survey.
- Disturbance data transferred as is.
- Archive data sets.
- Update database log - tracks significant database updates and data edits

Data Reporting

EXPERIENCE
YOUR
AMERICA

- Annual monitoring report completed as soon as possible.
- Provides general overview of monitoring year. No subsite data.
- Maximum counts by location, comparisons with other monitoring years, disturbance counts by source, disturbance rates.
- Summaries based on maximum total count per location for breeding and molting seasons.
- Poor quality count data excluded from summaries
- Disturbance data not filtered for quality.

Data Reporting: Poor Quality Counts

EXPERIENCE
YOUR
AMERICA

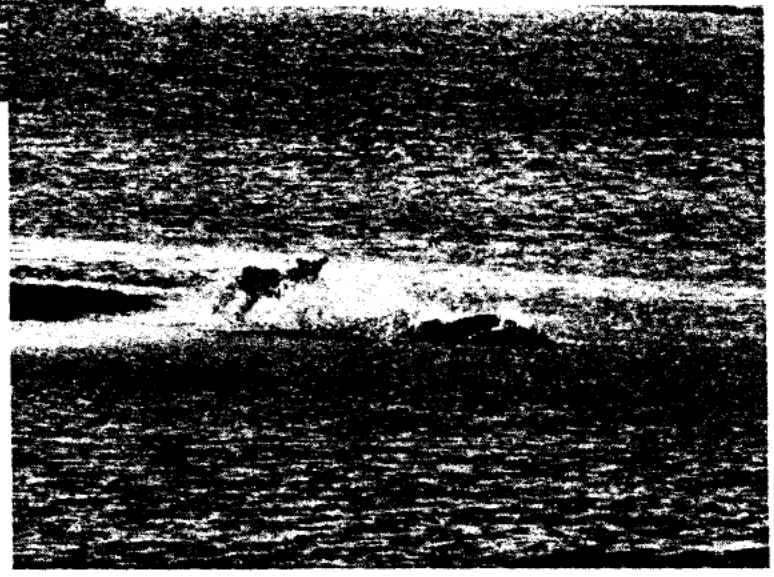
- observer quality
- visibility
- other weather conditions (ie. wind, glare)
- incomplete survey

Data Reporting: Disturbance Data

EXPERIENCE
YOUR
AMERICA

- Only "actual" disturbances included – head alert, flush, flush into water responses
- Disturbance data not filtered for quality based on observer experience, weather, tide, etc.

EXPERIENCE
YOUR
AMERICA

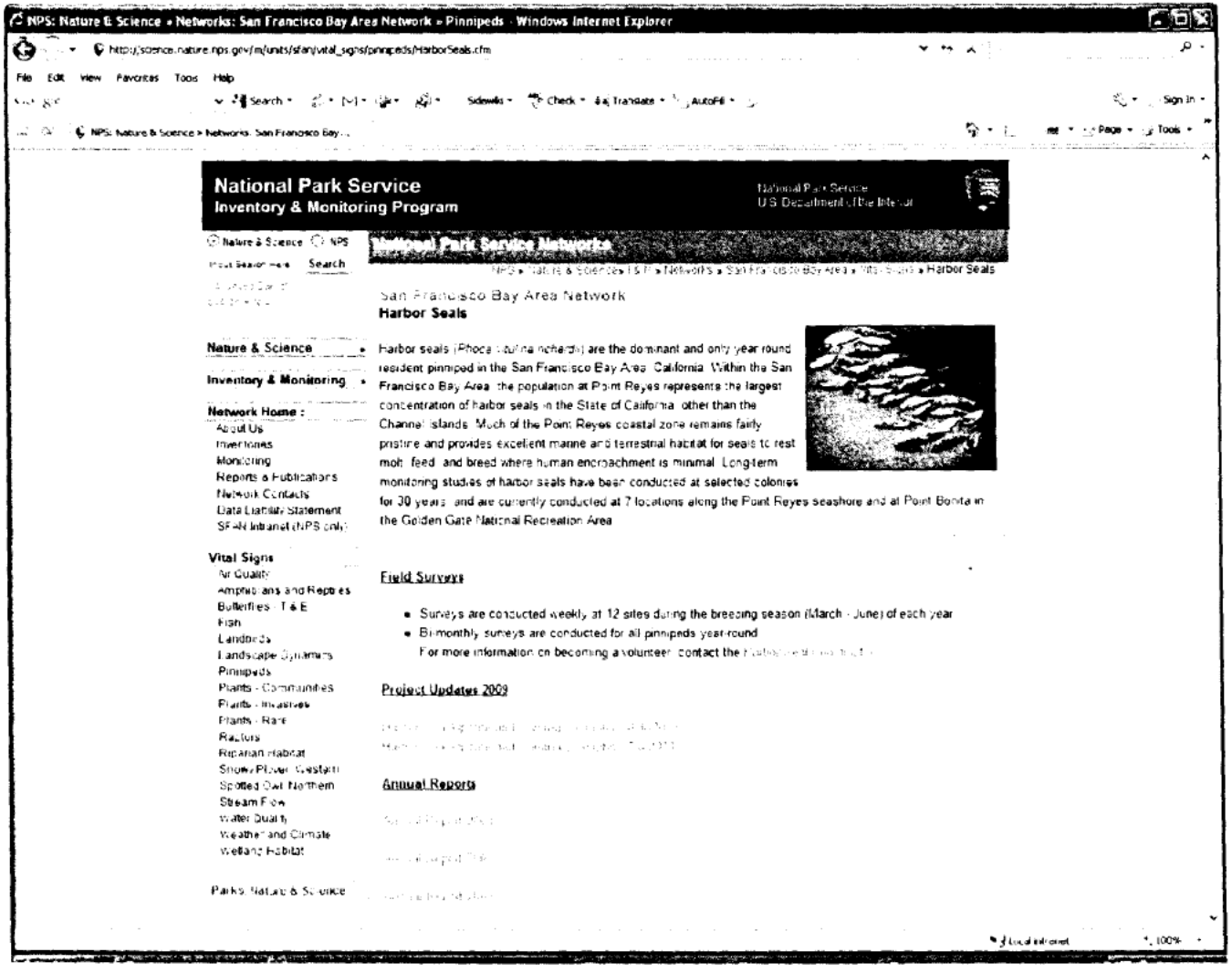


Photos courtesy of J. Thompson

Data Reporting

EXPERIENCE
YOUR
AMERICA

- Annual report peer-review internal and external
- Reports approved by NPS Key Official
- Report posted to SFAN I&M website following approval



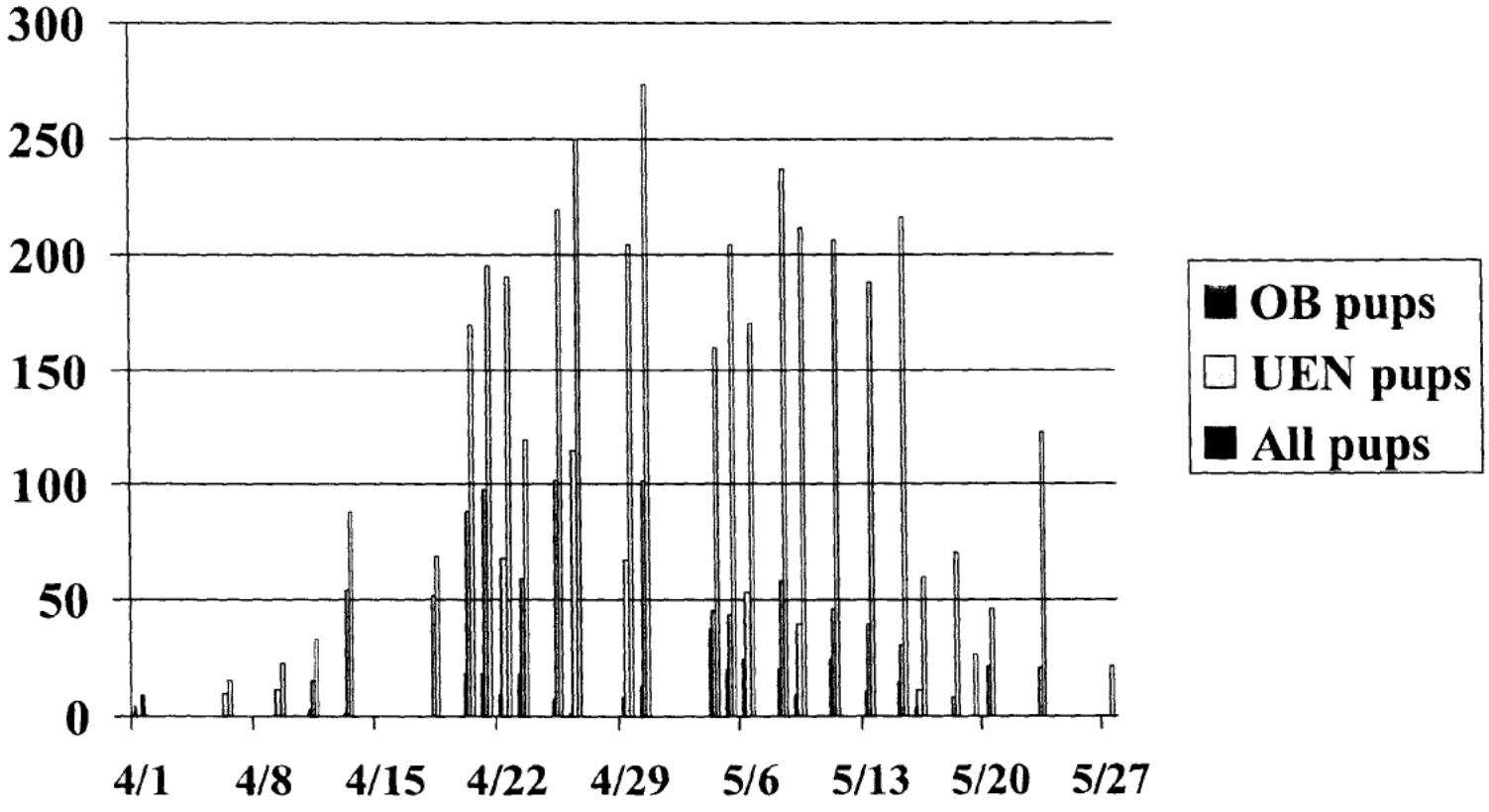
EXPERIENCE
YOUR
AMERICA

80% decline at OB in 2007

EXPERIENCE
YOUR
AMERICA

- Sheltered Wilderness, public testimony
- 80% estimate of decline in use of OB in 2007 compared to 2004 was based on best professional judgment from previous years of study
- Peak pup count date at DE in 2007 was similar to other years but at OB it was later
- Count of April 23 used although actual peak later discovered to be May 4
- Actual decline at OB from 2004-2007 based on May 4 peak was 53% for pups, 65% for pups and 56% overall.

EXPERIENCE
YOUR
AMERICA



EXPERIENCE
YOUR
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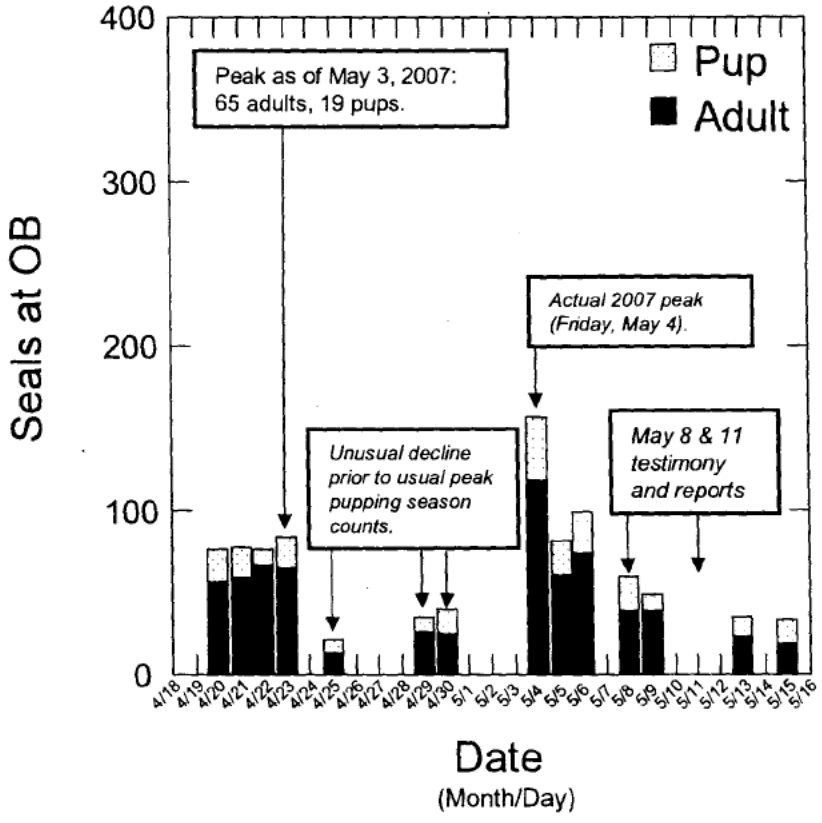

Figure 1. Harbor seal counts at Drakes Estero subsite OB in 2007. NPS used data available through May 3 to prepare May 8 and 11 testimony and reports. This is why the 80% decline was presented.

DBOC Disturbance Data

EXPERIENCE
YOUR
AMERICA

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EXPERIENCE
YOUR
AMERICA

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EXPERIENCE
YOUR
AMERICA

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YOUR
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EXPERIENCE
YOUR
AMERICA

Photo courtesy of R. Campbell

DBOC Disturbance Data

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National Park Service
U.S. Department of the Interior

Pacific West Region

1111 Jackson Street
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Oakland, CA 94607-4807

510-817-1320 phone
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Pacific West Region News Release

For Immediate Release
John A. Dell'Osso, Public Affairs Officer
Date: May 5, 2009

Park Service to Use National Academy of Sciences Report to Improve Management of Drakes Estero

A National Academy of Sciences report released today identified several errors in a National Park Service publication on the impacts of commercial oyster farming at Drakes Estero, located within Point Reyes National Seashore, but affirmed the majority of the report's conclusions.

The report, commissioned by the Park Service, notes that the Service already has corrected most of the errors in the report entitled "The Drakes Estero: A Sheltered Wilderness Estuary," and that there is much scientific uncertainty related to the impact of the oyster facility on the estuary.

"Certainly, we apologize for the errors in our original document and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report."

Jarvis cited the importance of using the best available science in managing the 2000 acres that make of eastern portion of Drakes Estero, a congressionally designated potential wilderness that is home to 90 bird species and one of the largest harbor seal populations in California.

The Department of the Interior's Inspector General issued a report last fall citing errors in the report, including inaccuracies regarding the source of sedimentation in the estero, but did not find evidence of scientific misconduct.

"When we are facing scientific uncertainty when it comes to managing nationally significant ecological areas such as the Drakes Estero, we tend to come down on the side of protecting the resource," Jarvis said. "We will use the findings in the academy's report to strengthen our commitment to protecting this ecologically rich estuary."

###

EXPERIENCE YOUR AMERICA
The National Park Service cares for special places saved by the American people so that all may experience our heritage.

NPS In Their Own Words

National Park Service (NPS) Responsed to National Research Council (NRC) Report: Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California (Released May 5, 2009)

THE NATIONAL RESEARCH COUNCIL ON NEW NAS STUDY

"CURRENT LEVEL OF OYSTER FARMING UNLIKELY TO HAVE SUBSTANTIAL IMPACT ON DRAKES ESTERO ECOSYSTEM"

National Research Council – Press Release
May 5, 2009

> WASHINGTON -- A ***new report from the National Research Council finds a lack of strong scientific evidence that the present level of oyster farming operations by Drakes Bay Oyster Co. (DBOC) has major adverse effects on the ecosystem of Drakes Estero***...
>
> Furthermore, ***the National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects***...
>
> Regarding the assessment of scientific information by NPS, ***the committee found that none of the versions of "Drakes Estero: A Sheltered Wilderness Estuary" achieved a rigorous and balanced synthesis of the impacts from oyster farm operations***.
> http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12667

SHELLFISH MARICULTURE IN DRAKES ESTERO, POINT REYES NATIONAL SEASHORE, CALIFORNIA

National Research Council – Full report
May 5, 2009

> The Park Service's report, *Drakes Estero: A Sheltered Wilderness Estuary*, "gave an interpretation of science that exaggerated the native and overlooked potentially beneficial effects of the oyster culture operation" (p 52).

The NAS study found that the National Park Service "selectively presented, over-interpreted or misrepresented the available scientific information on potential impacts of the oyster mariculture operation" (pg 53).
http://www.nap.edu/catalog.php?record_id=12667

NATIONAL PARK SERVICE ON NEW NAS STUDY

"PARK SERVICE TO USE NATIONAL ACADEMY OF SCIENCES REPORT TO IMPROVE MANAGEMENT OF DRAKES ESTERO"

National Park Service Pacific West Region
May 5, 2009

"Certainly, we apologize for the errors in our original document and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "***We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report.***"...
http://www.nps.gov/pore/parknews/newsreleases_20090506_drakes_estero.htm

"SCIENTISTS SIDE WITH DRAKES BAY OYSTER FARMER"

San Francisco Chronicle, A-1
May 5, 2009

Jarvis apologized Tuesday for mistakes that were made on the initial report but defended the Park Service's handling of the science. ***"They didn't say our research was wrong. They just said it was incomplete," Jarvis said. "What there really is here is a disagreement among scientists about the level of impact on the environment. That does not mean that one side is guilty of misconduct."***
http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/05/06/MNIQ17ERPE.DTL&hw=oyster&sn=001&sc=1000

"OYSTER COMPANY REDEEMED IN NEW REPORT"

ABC News -- San Francisco KGO
May 5, 2009

"We definitely apologize for any exaggerations or misrepresentations that may have been put out in any publication," National Park Service

spokesperson John Dell'Osso said. "So we just want to hear that report, look at the some recommendations; for example they talked about doing additional scientific studies, we are all for that."
http://abclocal.go.com/kgo/video?id=6798276

"REPORT: POINT REYES OYSTER FARM POSES NO DANGER TO ESTERO"
Marin Independent Journal
May 5, 2009

"We agree with some conclusions, disagree with some and say we need more research, too," said Jarvis, who oversees the Pacific region...

Both officials for the Point Reyes National Seashore and its supporters say they disagree with the academy's assertion that oysters were once a vital part of the estuary's ecology...
http://www.marinij.com/ci_12302288?source=most_emailed

"REPORT CRITICIZES FEDS OVER MARIN OYSTER FARM"
Associated Press
May 6, 2009

National Park Service officials said the nonnative Pacific oysters raised by the farm are damaging the ecosystem.

But the National Academy of Sciences says in its report that it found no major negative environmental impact. The panel also suggests that park officials misrepresented some facts to support their position.

Park Service Director Jon Jarvis says he disagrees with some of those findings.
http://www.mercurynews.com/news/ci_12310151

"AG INTERESTS, ENVIROS SPAR OVER CALIF. WILDERNESS PLAN"
GreenWire
May 7, 2009

The NAS report was the second to cast doubt on the National Park Service's treatment of the oyster cannery. Last July, the Interior

Department's inspector general found service employees had intentionally stacked scientific data to hurt the oyster company's case...

The Park Service did not return phone calls for comments on the case yesterday, but the agency's Pacific West regional director, Jon Jarvis, defended the service's work on the case in an interview with the San Francisco Chronicle.
http://www.nytimes.com/gwire/2009/05/07/07greenwire-ag-interests-enviros-spar-over-calif-wildernes-12208.html

"PARK SERVICE ABUSES DATA, APOLOGIZES"
Point Reyes Light
May 7, 2009

The regional director of the National Park Service apologized on Tuesday after the National Academy of Sciences reported that park officials exaggerated, selectively presented and misrepresented scientific research on Drakes Bay Oyster Company. The report found no evidence that the cultivation of oysters in Drakes Estero damages seals or eelgrass beds – charges the director, Jon Jarvis, has endorsed for over two years.

"I apologize," Jarvis said. "There was some overreaching."
...
In a press release, Jarvis wrote that the Academy affirmed [NPS' Science Advisor Sarah] Allen's conclusions [in the disputed Drakes Estero Report], but over the phone he contradicted himself. "It's the conclusions that are debated," he said, not the raw data...

Still, its determination that the park "in some instances selectively presented, over-interpreted, or misrepresented the available scientific information" approximates the definition of scientific misconduct as written in the federal register.

"The allegations of scientific misconduct is based on there being intentional falsification of data," he [Jarvis] said. "Neither the IG nor the Academy found that. What they did find in both cases was overreaching."
...

Jarvis declined to describe his plan for correcting the public record.
(Not available on web as of 5/8/09)

"SCIENTISTS SIDE WITH MARIN OYSTER FARM"
MediaNews
May 7, 2009

"We agree with some conclusions, disagree with some and say we need more research, too," said Jarvis, who oversees the Pacific region.
http://www.insidebayarea.com/oaklandtribune/localnews/ci_12311981

"SCIENTISTS: OYSTER COMPANY DOES NOT HARM ECOSYSTEM"
West Marin Citizen
May 7, 2009

Jon Jarvis, regional director for the National Park Service – although apologetic for the errors made in the first version of the park's Sheltered Wilderness Estuary study – said the Seashore's subsequent corrections were consistent the Academy's conclusions in their report...

Seizing on a passage where the authors are careful to hedge their position, Jarvis said, "The science is not complete enough to make a solid conclusion." The passage reads: "The lack of evidence of major adverse effects is not the same as proof of no adverse effects nor is it a guarantee that such effects will not manifest in the future. A more definitive understanding of the adverse or beneficial effects cannot be readily or inexpensively obtained."

Jarvis also disagrees with the NAS report that states that Lunny's oyster operation may potentially replace the ecological benefits that were lost when the native Olympia oysters disappeared.
(Not available on web as of 5/8/09)

West Marin Citizen

PO Box 158
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West Marin Citizen - May 7, 2009

Drakes Bay Oyster Company

Scientists: Oyster company does not harm ecosystem

By Andrea Blum

Kevin Lunny's oyster company in Point Reyes National Seashore won a key battle on Tuesday in its fight to wipe its record clean. The National Academy of Science's Research Council report on Drakes Estero concluded that the existing science does not support the claim that Drakes Bay Oyster Company harms the ecosystem of the estero – a claim that runs contrary to what National Park officials have said publicly since Lunny took over the operation in 2005.

In fact, the report emphasized that the oyster operation produces many positive ecological effects including improving water clarity and in turn helping eelgrass thrive.

"There is a lack of strong scientific evidence that shellfish farming has major adverse ecological effects on Drakes Estero at the current levels of production and under current operational practices including compliance with restrictions to protect eelgrass, seals, waterbirds, and other natural resources," the authors wrote.

In addition, the report's authors said that the four versions of the National Park Service's controversial study, "Drakes Estero: A Sheltered Wilderness Estuary" misrepresented the available scientific information by exaggerating negative effects and overlooking the beneficial effects of the oyster operation. "[The park's report] in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations," academy scientists said.

"The NAS report concluded what I have been saying for two years," Dr. Corey Goodman said on Tuesday. The National Academy of Sciences member and Marshall resident spearheaded the demand to look into what he believed to be suspect scientific claims by the Seashore in 2007. "Finally we can set the record straight."

But the conclusions reached by the panel and even those presented by the Inspector General report last year still have not laid the oyster controversy to rest both in park policy decisions and in the realm of science. The report has not assuaged wilderness supporters who want to see the oyster operation cease after Lunny's lease expires in 2012. "The NAS report states that due to limited studies there is no definitive proof one way or the other that the oyster farm is causing substantial harm to the ecology of the Estero, though site-specific negative impacts have been documented," said Fred Smith, Executive Director of the Environmental Action Committee of West Marin.

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Researchers from the panel agree that studies on the ecosystem are limited but what few exist from the estero itself and worldwide gave enough solid data to conclude that the oyster operation has little negative impact on the ecosystem.

The estero is home to the one of the largest colonies of harbor seals in the state and its eelgrass beds doubled in size from 1991 to 2007, "implying little systemic threat from the existing intensity of oyster culturing activities," the authors wrote.

Jon Jarvis, regional director for the National Park Service – although apologetic for the errors made in the first version of the park's Sheltered Wilderness Estuary study – said the Seashore's subsequent corrections were consistent the Academy's conclusions in their report. But according to the NAS, even the last iteration of the park's study, "never achieved a rigorous and balanced synthesis of the mariculture impacts."

"They improved with each version and got closer and closer but never hit the mark," said Dr. Charles Peterson, the Chairman of the Council's committee for "Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drake's Estero in Point Reyes National Seashore. "They followed up with a clarification and a policy document which came very close and in the end did a reasonable job. But they never identified the ecological services provided by the oysters." The report said that the National Seashore only made the corrections after outside criticism from the community prompted the Seashore to release the "Corrections and Clarification" documents.

Even allowing for the park's corrections, the National Academy authors said their own conclusions still did not align with the park's in at least one important issue: the farm's impact on seals."NPS selectively presented harbor seal survey data and overinterpreted the seal disturbance data, which are incomplete and nonrepresentative of the full spectrum of activities that could potentially disturb seals in the area," the authors said. "The oyster farm's potential negative effects on the harbor seal population represent the most serious concern and cannot be thoroughly evaluated because the effects have not been fully investigated."

Seizing on a passage where the authors are careful to hedge their position, Jarvis said, "The science is not complete enough to make a solid conclusion." The passage reads: "The lack of evidence of major adverse effects is not the same as proof of no adverse effects nor is it a guarantee that such effects will not manifest in the future. A more definitive understanding of the adverse or beneficial effects cannot be readily or inexpensively obtained."

Jarvis also disagrees with the NAS report that states that Lunny's oyster operation may potentially replace the ecological benefits that were lost when the native Olympia oysters disappeared.

Legal issues

With their purview restricted to science, the committee mostly skirts the legal issues, namely, what happens when Lunny's lease, called a "Reservation of Use," expires in 2012. The park service wants to convert the estero to Wilderness status, as stipulated by the Point Reyes Wilderness Act of 1976. Lunny wants to extend the lease.

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"The Department of Interior's Office of the Solicitor advised Point Reyes National Seashore that the Superintendent does not have the authority to extend the RUO because of the congressional mandate designating Drakes Estero as Potential Wilderness," the authors write. "The Solicitor stated that under the Wilderness Act, NPS is mandated to convert to Wilderness status soon as the [commercial oyster operation] activity can be removed."

In deference to the legal issues, the authors ponder the benefit of additional scientific studies. "Our committee concludes that this decision on extension of the RUO hinges on the legal interpretation of the legislative mandate rather than a scientific analysis of the impacts of DBOC on the Drakes Estero ecosystem. As such, more scientific study of DBOC operations and Drakes Estero would not necessarily affect National Park Service decisions about the future of oyster farming in the estero."

Ultimately, the panel acknowledges that the final decision to permit or prohibit a particular activity, such as shellfish farming, in a particular location, such as Drakes Estero, "necessarily requires value judgments and tradeoffs that can be informed, but not resolved, by science."

Washington quick to respond

In a letter sent Tuesday to US Secretary of Interior Ken Salazar, Senator Dianne Feinstein stated her concerns that the National Park Service has systematically tried to shut down Drakes Bay Oyster Company, "by casting it as harmful to the environment." Feinstein goes on to say, "I find it troubling and unacceptable that the National Park Service exaggerated the effects of the oyster population on Drakes Estero's ecosystem," and asks the secretary to review the Academy's findings. She believes the report rejects the ecological reasons the Park Service has for not extending the Lunny's lease beyond 2012 when the reservation of use expires and the estero converts to Wilderness.

Kevin Lunny, owner of Drakes Bay Oyster Company applauded the report. He said, "We are thrilled that the community can now understand that the oyster farm is not harming the estuary as we have said all along. The NPS has misrepresented science and now its been proven by the experts."

West Marin Citizen - May 7, 2009

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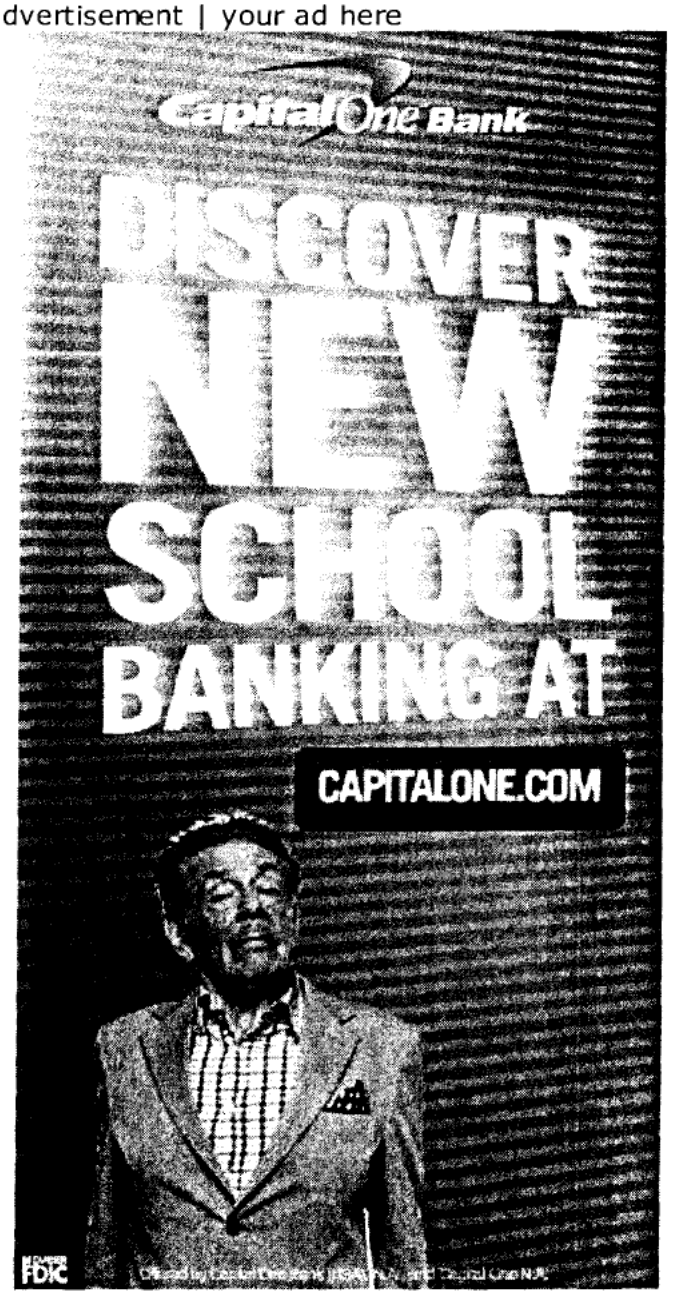

Scientists side with Drakes Bay oyster farmer

Peter Fimrite, Chronicle Staff Writer
Wednesday, May 6, 2009

More...

Supporters of a Marin County oyster farmer claimed victory Tuesday after a panel of scientists concluded that National Park Service officials made errors, selectively presented information and misrepresented facts in a series of reports about his Drakes Bay shellfish operation.

The findings mark the second time in a year that the Park Service has been put under a spotlight for essentially fudging data in its attempts to show that the Drakes Bay Oyster Co. harmed the environment.

While the report did not specifically accuse anyone of misconduct, it raised serious questions about governmental misuse of scientific data.

"I find it troubling and unacceptable that the National Park Service exaggerated the effects of the oyster population on the ... ecosystem," U.S. Sen. Dianne Feinstein, D-Calif., wrote in a letter Tuesday to Interior Secretary Ken Salazar.

In fact, the farm, which operates under a federal lease until 2012, had no demonstrable negative impacts on the bay's ecosystem, harbor seals or native eelgrass, biologists with the independent National Research Council found.

The findings were widely seen as vindication for the oyster company, which has been embroiled in a rancorous dispute with the Park Service over its impact on the pristine estuary along the Point Reyes National Seashore.

Started in 2005

The trouble started in 2005, when Kevin Lunny, a local rancher, purchased the oyster farm from

Johnson Oyster Co. He was required to get a special-use permit from the California Coastal Commission, which had placed a cease-and-desist order on the property as a result of previous problems.

In the midst of those negotiations and discussions about extending the 2012 lease, the Park Service came out with accusations of environmental damage, setting off a series of dueling scientific reports.

"What has happened is the National Academy of Sciences has shown that all the claims made by the National Park Service are wrong," Lunny said. "It gives us a clean bill of health."

Lunny and others claim Jon Jarvis, the Pacific West regional director of the National Park Service, deliberately misrepresented data to bolster his own ideological agenda.

Jarvis apologized Tuesday for mistakes that were made on the initial report but defended the Park Service's handling of the science.

"They didn't say our research was wrong. They just said it was incomplete," Jarvis said. "What there really is here is a disagreement among scientists about the level of impact on the environment. That does not mean that one side is guilty of misconduct."

The battle intensified in 2007, when the Park Service issued a report claiming, among other things, that oyster farming reduced the number of harbor seals and damaged eelgrass beds.

Lunny, who is trying to persuade the Park Service to renew a 40-year occupancy agreement in 2012, was furious. His case was helped by Corey Goodman, a biological scientist who reviewed Park Service studies on oysters.

They accused Park Service officials of fabricating environmental problems to drive the oyster company off the bay where explorer Sir Francis Drake purportedly landed more than 430 years ago.

Among the disputed claims was a complaint that Lunny expanded his farm to an area historically used by female harbor seals and their pups, and that oyster boats were observed scaring off seals in the area. The Park Service said the number of harbor seals declined from 250 to 50 in the area Lunny developed.

Park Service officials also claimed the oyster farm could hasten the spread of destructive nonnative species that hitchhike on the oyster shells. The voluminous waste produced by oysters, they said, increased sedimentation in the estuary.

Goodman used Park Service records to refute much of the disputed data, including evidence that the amount of eelgrass in the bay doubled between 1991 and 2001, and that the number of harbor seal pups increased overall in the bay while oyster harvesting was under way.

Complained to feinstein

Lunny and his supporters complained to the Marin County Board of Supervisors and Feinstein. The inspector general of the U.S. Department of the Interior issued a report last year accusing Park Service officials of exaggerating data.

The Park Service agreed to pay for the latest review, which pointed out that Park Service scientists did not mention in six reports that native Olympia oysters lived in the estuary until they were over-harvested and wiped out.

Although the Park Service corrected mistakes in later reports, the panel concluded that the agency "selectively presented, over-interpreted, or misrepresented the available scientific information on potential impacts of the oyster mariculture operation."

Pete Peterson, a professor of marine biology at the University of North Carolina who chaired the study committee, said political pressure, funding issues and conflicting mandates, not deliberate misconduct, are concerns.

"I'm disturbed by the recognition that what went on at Drakes Bay is part of a bigger picture nationwide in which the Park Service has a dual mandate," Peterson said, "the use and enjoyment of cultural resources and the responsibility that those resources are sustained for future generations. That's almost a catch-22."

Jarvis said the new research will be valuable to the Park Service to guide scientific studies that will assist it in making future decisions. But he does not intend to extend the oyster farm's lease in 2012, despite Feinstein's request for that in her letter to Salazar.

"The permit of use and occupancy expires in 2012," Jarvis said, "and that really is a policy and law issue, not a science issue."

Drakes bay home to birds, seals, oysters

Also called Drakes Estero, the bay is home to tens of thousands of endangered birds, including 90 separate bird species, and the largest seal colony on the coast.

It is located within an area of the seashore that was designated a wilderness area in 1976, meaning it has special protected status as an unaltered ecological region. The bay itself is listed as "potential wilderness" only because the oyster company is there.

Once the oyster farm is gone, park officials say, the bay would become the only marine wilderness on the West Coast from Canada to Mexico.

The Drake's Bay Oyster Co., which was Johnson Oyster Co. until it was purchased by Kevin Lunny in 2005, has been thriving. It produces about 460,000 pounds of shucked oysters a year, plus about 1 million Manila clams a year.

With 30 employees, it is one of the largest oyster farms in California, far outstripping the production of growers in nearby Tomales Bay.

E-mail Peter Fimrite at pfimrite@sfchronicle.com.

This article appeared on page **A - 1** of the San Francisco Chronicle

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The New York Times

127 HOURS NOW PLAYING

May 7, 2009

Ag interests, enviros spar over Calif. wilderness plan

By DEBRA KAHN, Greenwire

SAN FRANCISCO -- A Bay Area oyster cannery in an estuary slated to become a federal wilderness area is at the heart of a battle pitting proponents of fishing and local food production against environmental advocates.

Both sides are claiming victory after a National Academies of Science (NAS) panel released a report this week finding the federal government lacked scientific evidence to back assertions that the Drakes Bay Oyster Co. is harming the Marin County estuary (*E&ENews PM*, May 5).

At issue is California's last oyster cannery, which has continued operations under a provision in the 1962 law that established the Point Reyes National Seashore. When the 1.5-acre oyster farm closes, the estuary, Drakes Estero, will become a 2,250-acre federal wilderness under the 1976 Point Reyes Wilderness Act.

The NAS report was the second to cast doubt on the National Park Service's treatment of the oyster cannery. Last July, the Interior Department's inspector general found service employees had intentionally stacked scientific data to hurt the oyster company's case. In some instances, the Interior report said, the service overstated evidence of harbor seal disturbance and sediment formation.

The Park Service did not return phone calls for comments on the case yesterday, but the agency's Pacific West regional director, Jon Jarvis, defended the service's work on the case in an interview with the San Francisco *Chronicle*.

"They didn't say our research was wrong. They just said it was incomplete," he told the newspaper. "What there really is here is a disagreement among scientists about the level of impact on the environment. That does not mean that one side is guilty of misconduct."

Environmental groups that support the planned 2012 closure of Drakes Bay Oyster echoed Jarvis' assertions.

"Just because someone with a financial interest in the outcome of the decision accuses someone of scientific misconduct doesn't mean there was misconduct," said Gordon Bennett, conservation chairman of the Sierra Club's Marin County Chapter. "Was there sloppiness? Yeah, absolutely. Were Park Service staff underfunded and overworked? Yeah. Does that lead to sloppy work? Yes."

The oyster company's owner, Kevin Lunny, and his backers say Interior should take the farm's commitment to local, sustainable mariculture and environmentally responsible operations into account.

"The report makes it just very, very clear that the oyster farm's really been given a clean environmental bill of health," Lunny said. "It's never been said by us that there are zero impacts. There are impacts to

produce food. Boats have to go out there, just like we were farming fields or raising cattle."

But environmentalists say such arguments are irrelevant. They say the 1974 agreement granting the farm an operating permit was superseded by the 1976 wilderness law, which says the area would become wilderness after the farm's residency permit expired. The question of the farm's effects on the estuary should be moot after 2012, they say.

"There were public hearings in 1976 and congressional action," Bennett said. "This is basically on automatic pilot now, and the Park Service has no authority to change that. The majority of both houses of Congress would have to decide for the first time ever that they would overturn the Wilderness Act."

Appeal to Interior secretary

Lunny said he hopes to take his case to Interior Secretary Ken Salazar.

"Mr. Salazar, he's a great environmentalist and conservationist, a wilderness supporter, and he's also sensible," Lunny said. "We are farming in farmland. Drakes Estero is surrounded by commercial livestock production. These also are cultural resources that the Park Service is mandated to protect."

Other area businesses, he said, are "fearful that if they're successful in driving out one of the most sustainable and important farms in the seashore, this is just the first domino."

To which Bennett responds: "There are lots of wilderness areas that had logging operations going on before becoming wilderness. They all had cultural attributes, people that had jobs. The whole point of having wilderness area was to have some small portion of U.S. land designated wilderness so every time you came into conflict, it wouldn't always be decided in the favor of commercial operations."

The NAS report says any decision about extending the farm's lease past 2012 needs to go beyond the realm of science. "Like other zoning and land use questions, this issue will be resolved by policymakers charged with weighing the conflicting views and priorities of society as part of the decision-making process," it says.

Sen. Dianne Feinstein (D-Calif.) tried to broker a compromise between Drakes Bay and environmental groups late last year. The effort ended after Lunny and the American Land Conservancy failed to reach an agreement. Lunny said the group offered him between $300,000 and $500,000, but not enough land in nearby Tomales Bay to accommodate his operations.

Feinstein sent a letter to Salazar on Tuesday defending the oyster company.

"If the Park Service forces the cessation of the mariculture operations, it may well be eliminating conditions that were an important part of the ecosystem as it existed long before the park was established," she wrote. "The National Academy of Sciences report does not present any compelling ecological reason for refusing to renew the Drakes Bay Oyster Company lease in 2012."

For his part, Lunny says the buyout effort was not serious.

"It wasn't a proposal, it was a guaranteed bankruptcy proposal," he said. "This doesn't include keeping a food source for our community, keeping the last oyster cannery in the state."

Looking to Capitol Hill

Meanwhile, the Sierra Club and other environmental groups sent 10 lawmakers a **letter** (pdf) late last month asking them to support the deal between the American Land Conservancy and the oyster company.

"Because of this legitimate and serious effort being made to resolve the issue in a consensus manner, through a buyout, we urge the Congress to support the buyout effort and to oppose any efforts to reduce wilderness protections at Drakes Estero and Point Reyes," they wrote.

Rep. Lynn Woolsey (D), whose congressional district includes the oyster company, has not taken a position on its fate. She did oppose a provision that Feinstein tried to add to the fiscal 2009 Interior appropriations bill that would have extended the farm's lease, but she said in a December 2008 letter that she was waiting for the NAS report to determine the effects of oyster farming on the bay.

"The issue has sharply divided my district," she wrote to Rep. Norm Dicks (D-Wash.), the chairman of the House Interior Appropriations Subcommittee. "Some support the oyster farm as an example of clean sustainable agriculture that is good for the local economy, while others oppose an extension, saying it would seriously undermine the Wilderness Act."

Click here (pdf) to read the environmentalists' letter.

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Public Employees for Environmental Responsibility News Release (www.peer.org)

For Immediate Release: May 7, 2009
Contact: Carol Goldberg (202) 265-7337

COMMERCIAL AQUACULTURE IN WILDERNESS PUSHED BY KEY SENATOR — Point Reyes National Seashore Oyster Farm Dispute Opens Legal Can of Worms

Washington, DC — A senior Democratic Senator is pressuring the Obama administration to grant an illegal permit to keep a commercial aquaculture operation in part of a national park that is supposed to be managed as wilderness. The concerted campaign to retain current non-native oyster cultivation in Point Reyes National Seashore may cause Wilderness Act protections to be set aside to benefit politically-favored enterprises, according to Public Employees for Environmental Responsibility (PEER).

On May 5, 2009, U.S. Sen. Dianne Feinstein (D-CA), chair of the appropriations subcommittee setting the National Park Service budget, wrote to Interior Secretary Ken Salazar strongly expressing her desire that he issue a new permit to allow the oyster farm to continue past the end of its current permit in 2012. The Interior Department's Office of the Solicitor has formally opined that the oyster enterprise must, by law, be discontinued as a "non-conforming use".

Sen. Feinstein contends that a new report by the National Academies of Science which found no "strong scientific evidence that shellfish farming has major adverse ecological effects" means that the Parks Service should therefore allow the operator "run its oyster company" past 2012 and address any problems that do arise through "adaptive management".

"The fate of the Point Reyes commercial oyster operation is a legal question about the requirements of the Wilderness Act, not a scientific question about how damaging non-native bi-valves can be," stated PEER Executive Director Jeff Ruch whose organization has successfully sued to stop wilderness violations in national parks from Olympia, Washington, to Cumberland Island, Georgia. "How is Senator Feinstein's arm twisting essentially different from Republican legislators who induced the Bush administration to ignore environmental laws?"

The National Academies report follows a 2008 Inspector General report which concluded that Park Service employees engaged in no "disparate treatment" of the enterprise located in Drakes Estero, one of the most sensitive stretches of the national seashore. The Inspector General, however, demurred on the underlying scientific issues. The National Academies report on those issues stated that Park Service assessments "exaggerated the negative" but, overall, concluded that little was definitively known about the true environmental effects. The National Academies also cautioned that "statements in the report should not be interpreted as recommendations in support or opposition to an extension of the lease" but conceded Interior lawyers had already ruled the lease extension contrary to law.

"Senator Feinstein is setting up a scientific straw man and misusing of the National Academies by dragging it into a permit dispute," Ruch added. "The National Park Service is not supposed to conduct experiments on treasured natural assets to facilitate commercial profit. I am glad that Park Service is overly cautious in protecting these resources."

###

Read the Feinstein letter to Sec. Salazar

View the Interior Solicitor opinions on the oyster operation permit

Look at the new National Academies report

Revisit the 2008 Inspector General's report

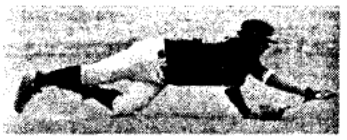
See the array of Wilderness challenges facing the national park system

MARIN'S PULITZER PRIZE-WINNING NEWSPAPER $1.25

POINT REYES LIGHT

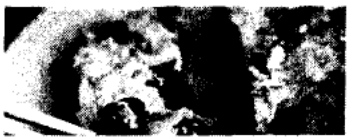
Volume LXII No. 10/ Point Reyes Station, California May 7, 2009

POINT REYES > **Visionary** commission opens forum on green collar jobs. /**11**



TOMALES > **Braves beat** Eagles in dramatic double overtime game on Friday. /**8**

SAN GERONIMO> **Relay** race through rain raised money for organ donation. /**2**



CALENDAR > **Honor moms** at pancake breakfast at Bolinas Firehouse on Sunday. /**16**

Park Service abuses data, apologizes

by Tess Elliott

The regional director of the National Park Service apologized on Tuesday after the National Academy of Sciences reported that park officials exaggerated, selectively presented and misrepresented scientific research on Drakes Bay Oyster Company. The report found no evidence that the cultivation of oysters in Drakes Estero damages seals or eelgrass beds—charges the director, Jon Jarvis, has endorsed for over two years.

"I apologize," Jarvis said. "There was

Please turn to **page 9**

Farmers try to kill death tax

by Natalie Jones

Gary Thornton is a fifth-generation Tomales rancher whose grandmother was a Marshall, of the family that founded Marshall. He directs most of his energy towards raising cattle and sheep, but for the last nine years has spent about 15 percent of his time just trying to meet tax payments and keep his ranch from being turned over to the federal government.

"If you count stress and worry, about 80 percent," Thornton added with a strained laugh.

Thornton's father died in 2000, leaving him the family ranch and about $1 million in taxes due to the federal estate tax, to be paid over 15 years. Through a

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HABLANDO /4

Swine flu, narcotraffic and Cinco de Mayo relevance

GUEST COLUMN /5

Bike to work in West Marin for raffle prizes

Rewards of motherhood that transcend a holiday

Iraq war strikes home

by Nathaniel Page

Jake Velloza, who grew up in Inverness, died near the entrance to a combat outpost 12 miles south of Mosul, Iraq on Saturday. He was 22.

"I went numb when I heard the news," said Jake's third- and fourth-grade teacher, Fred Gilardi.

Jake was born on June 21, 1986 in Santa Rosa to Susan and Bob Velloza. He was their only child. He attended West Marin School and Tomales High. Gilardi remembers a sweet-hearted, quiet, compassionate child. "Jake had a really caring attitude with all the other students," he said. Friends remember an oft-rambunctious classmate who spent a lot of time banished to the hall. All recall that he excelled in athletics.

At a track meet in middle school, he won the long jump, the high jump, the dash, and a couple sprints, breaking several school records. "Then later that night he pitched a no hitter," said his teammate, Tristan Keady, "and it wasn't even hard for him. I never saw him train. But he was really humble about it. Never bragged."

Jake preferred technical to academic

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>> Park

continued from page 1

some overreaching."

The report represents a small triumph for Kevin Lunny, who purchased the right to operate in Drakes Estero in 2005. Since then he has faced antagonism from the park and environmental groups that want to see the operation closed in 2012, after which he would need a special use permit to continue.

Pressure from Senator Dianne Feinstein led to an investigation by the Department of the Interior's Inspector General (IG) and now a report by the National Research Council. Feinstein hoped that the report would clarify the controversy over the company's future.

"It's satisfying to know that we have a clean environmental bill of health," Lunny said. "But we know this is not the end. This doesn't mean the lease will be renewed. We know there are more hurdles."

The Academy reviewed several versions of a report, "Drakes Estero: A Sheltered Wilderness Estuary," by Point Reyes National Seashore (PRNS) senior science advisor Sarah Allen, which claimed that oyster workers disturbed seals and resulted in a huge decline in seal population. It also claimed that sediment from oyster feces was harming eelgrass beds. Allen lied about the conclusions of a USGS study to prove these points.

In a press release, Jarvis wrote that the Academy affirmed Allen's conclusions, but over the phone he contradicted himself. "It's the conclusions that are debated," he said, not the raw data.

The report found the park's record of seal disturbances insufficient, and found no research correlating seal disturbances to changes in seal population. Eelgrass beds doubled in size between 1991 and 2007, and an exotic species attached to oyster shells has an insignificant effect on the estero.

The report recommended that if the park wished to find evidence of negative impact, it would need to conduct further research. However, it expresses doubt that the park has the funds for such research, and notes that if the oyster company is being closed in 2012 such research may be irrelevant.

What happens to the business in 2012 was not the subject of the Academy's review. The report reiterates the park's opinion that the estero should be converted to wilderness as soon as possible. Drakes Estero is a "potential wilderness area" and the only obstacle to its wilderness designation is the oyster company. However, the company's lease has a renewal clause that would allow it to continue if the park granted it a special use permit.

The oyster farm, which has operated continuously since 1934, provides nearly 40 local jobs, produces 60 percent of the Bay Area's oysters and is the last cannery in the state.

Drakes Bay Oyster Company hopes to continue operating past 2012, when its reservation of use expires.

In May of 2007, PRNS Superintendent Don Neubacher told the Marin County Board of Supervisors that Drakes Bay Oyster Company was causing chronic disturbances to seal pups, resulting in an 80 percent decline in population. Disturbance of seals, protected by the Marine Mammal Protection Act, constitutes a felony.

Supervisor Steve Kinsey reported to the IG that in a private meeting, Neubacher showed him aerial photographs of oyster boats disturbing seals and said that Lunny could face criminal charges. While the IG report did not corroborate this fact, Kinsey stands by his testimony.

In July, National Park Service Director Mary Bomar met with Feinstein, Kinsey, Jarvis, Neubacher and Lunny in Olema. They agreed that Jarvis would initiate an independent review of the park's existing science on Drakes Estero. Marshall resident and Academy member Corey Goodman, also in attendance, submitted a scientific misconduct and ethics complaint.

By the end of the summer, the park signed a contract for a $480,000 review by the Academy.

The 100-page report released on Tuesday is the first of the two-part review. The second part aims to establish best management practices of shellfish aquaculture. However, best management standards already exist for the industry.

Charges of scientific misconduct by the park remain unanswered by either the IG's investigation or the Academy's review. The former stated that it did not evaluate the validity of such charges, but only reported that charges were made. The latter stated that the review was "not an inquiry into potential scientific misconduct and made no such determinations."

Still, its determination that the park "in some instances selectively presented, overinterpreted, or misrepresented the available scientific information" approximates the definition of scientific misconduct as written in the federal register.

Jarvis insists otherwise. "The allegation of scientific misconduct is based on there being intentional falsification of data," he said. "Neither the IG nor the Academy found that. What they did find in both cases was overreaching."

Lunny argues that the overreaching carried an agenda. "If it were just the sloppy use of data, accident or ineptitude, one would expect that the mistakes would fall on both sides," he said. "But they don't. All the errors are to the detriment of the oyster farm and the benefit of the Park Service's policy of removing the oyster farm. It's not that we want someone in trouble. That's not the point. The point is this false science has been moving around like a virus. These conclusions remain on public record."

Jarvis declined to describe his plan for correcting the public record.

"Jon Jarvis has been named in the press as a potential candidate for the next director of the National Park Service," Goodman said. "Surely our government can not consider Jarvis as a suitable candidate for this high position with the cloud of scientific misconduct hanging over his head."

Public Meeting

WASTE REDUCTION STRATEGIES IN MARIN

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Marin County Board of Supervisors Chambers

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Marin Independent Journal
www.marinij.com

Feinstein backs extension of Drakes Bay oyster permit

Rob Rogers
Posted: 05/07/2009 04:44:59 PM PDT

Sen. Dianne Feinstein has thrown her support behind an effort to allow Marin County's largest oyster farm to continue operating within the Point Reyes National Seashore past the expiration of its permit in 2012.

In a letter this week to Interior Secretary Ken Salazar, Feinstein draws on the conclusions of a report released Wednesday by the National Academy of Sciences to argue that Drakes Bay Family Farms should be allowed to extend its permit with the National Park Service. The report, which addresses concerns by the National Park Service, concludes that the farm does not appear to be harming the waters or wildlife of Drakes Estero.

"The National Park Service has to make a decision soon on whether to renew (owner Kevin Lunny's) permit to continue their mariculture operations in the Drakes Bay," Feinstein wrote. "The National Academy of Sciences report does not present any compelling ecological reason for refusing to renew the Drakes Bay Oyster Company lease in 2012."

A spokesman for the senator would not comment on the issue beyond the information provided in Feinstein's letter.

The California Democrat's action has drawn criticism from environmental groups that have argued Congress should not support the continued operation of a commercial business within a national park.

"The National Academy report has nothing to do with the Wilderness Act," said Gordon Bennett, conservation chairman of the Sierra Club's Marin Group, citing the federal law that defined the protection and use of the nation's wilderness areas. The 1976 Point Reyes Wilderness Act defines Drakes Estero as "potential wilderness."

"It's important to manage the property well during the remainder of its lease, so the National Academy report is good in that regard," Bennett said. "But past 2012, it doesn't matter if it's the greenest operation in the world. It's still a commercial operation that doesn't qualify for operation within a wilderness area."

Bennett noted a 2004 memo by the Department of the Interior's San Francisco field office, which concludes that the federal government is empowered to treat "potential wilderness" as wilderness, and to "steadily continue to remove all obstacles to the eventual conversion of these lands and waters to wilderness status."

The memo rejects the assertion made by both Lunny and former Assistant Secretary of the Interior John Kyl that the Wilderness Act could not transfer to the federal government the fishing and mineral exploration rights held by the state of California.

"It is the view of this office that the remarks in the Kyl letter are not only inaccurate but overridden by the Congressional action" of the 1965 State Act, the memo says. "The Park Service must make decisions regarding the management of potential wilderness even though some activities may temporarily detract from its wilderness character."

Farm owner Lunny disagrees with the notion that the law requires him to leave the seashore.

"This (farm) is a pre-existing use. It doesn't have to be removed," Lunny said. "There's nothing in the Point Reyes Wilderness Act that says anything about the farm not being able to continue as a nonconforming use."

Feinstein appears to agree. Like the National Academy report, the senator criticizes the National Park Service for presenting reports that appeared to exaggerate the oyster farm's negative effects on harbor seals, and did not take into consideration the positive contributions the farm may have made to the estuary's ecology.

"Drakes Estero has been home to a family-owned oystering business since 1934 - long before the Park was established," Feinstein wrote. "I find it troubling and unacceptable that the National Park Service exaggerated the effects of the oyster population on the Estero's ecosystem."

A coalition of 15 environmental organizations, including the Environmental Action Committee of West Marin, the Marin Audubon Society, the Marin Conservation League, the National Wildlife Federation and the Sierra Club sent an April 28 letter to House Speaker Nancy Pelosi and other congressional leaders urging them not "to grant new federal benefits to an individual business interest."

"It's really the same situation we've heard in San Francisco about opening the continental shelf to energy development," the Sierra Club's Bennett said. "The administration ruled that we may love renewable energy projects, but we can't put them in a national park or national marine sanctuary.

"Similarly, we're not saying oysters are bad," Bennett said. "We like oysters. But the farm doesn't belong in a wilderness area."

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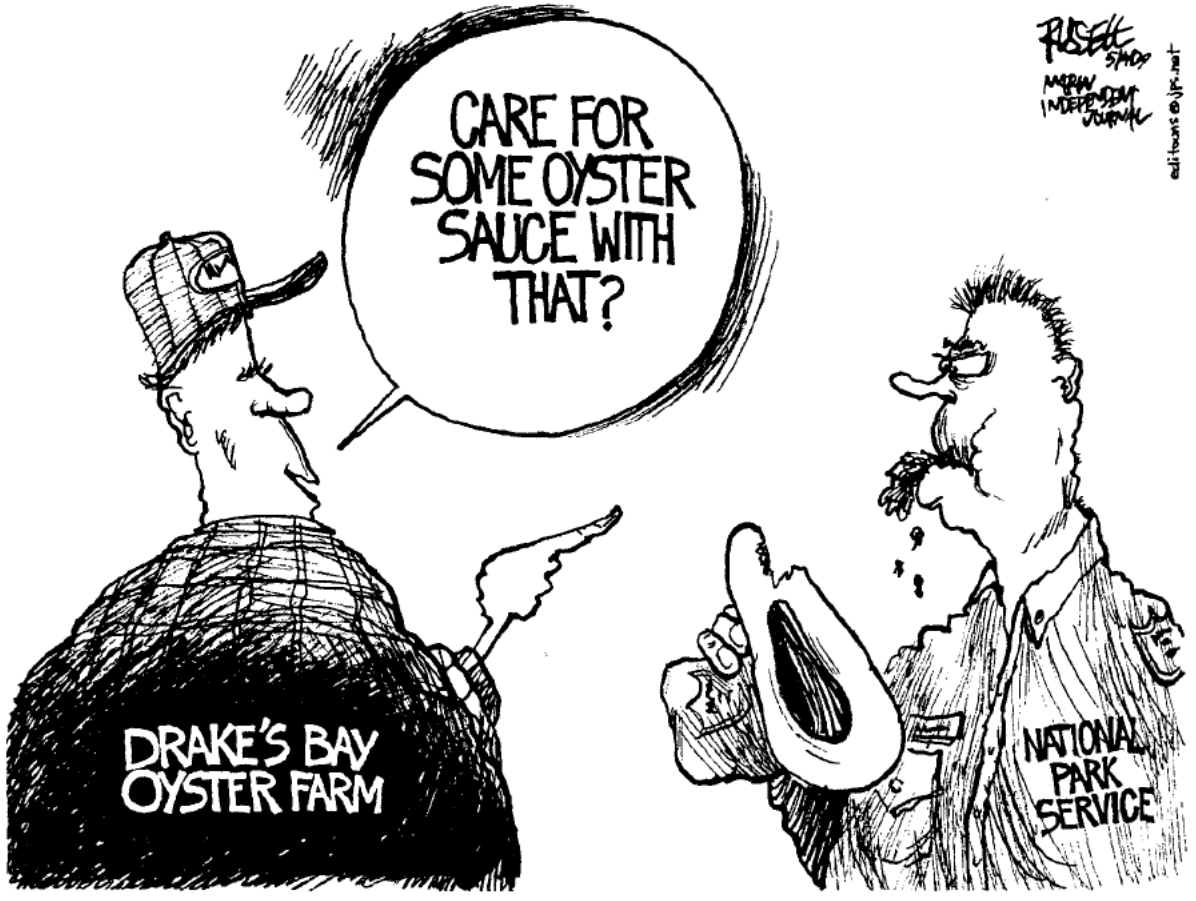
SATURDAY SOAPBOX



marinij.com

Online comments about the Pt. Reyes oyster farm debate

A sampling of edited comments posted online about the IJ story (www.marinij.com/ci_12302288) on the National Academy of Sciences findings that do not support the National Park Service's argument that the Drakes Bay oyster farm harms the local environment.

"Renew the lease on the oyster farm. We should applaud the oyster farm for standing up for its rights. I also wonder how the Sierra Club managed to take over the park service. Finally, a victory for the little guy."

— Dalong

"The park service has been ridiculous and vindictive over this whole oyster issue. My family and I have enjoyed going to that oyster farm for years, since it was Johnson's."

— Marjorie Morgenstern

"The owner can start packing because his legally executed contract with the federal government will expire in 2012. Drakes Estero can be cleaned up and allowed to heal after the removal of miles of oyster racks and other man-made structures. If you want a fresh oyster, just travel a few miles east to Tomales Bay and eat all the oysters you can handle. A deal is a deal in America."

— Wave the Flag

"The park service and its supporters don't want a private business operating within the park regardless of whether there are adverse environmental impacts or not. With the new administration, this kind of anti-capitalist thinking has a new supporter in the White House. The oyster farm should be allowed to operate beyond 2012, but I wouldn't bet on it happening."

— Marin Republican

What better way to generate protein, support a local business and generate taxes."

— Thom

"Typical of arrogant government bureaucrats to disagree if the results are opposite their agenda. That statement speaks volumes."

— JJJ

"I'm with Lunny, and I think most people are. There are so many environmental problems out there, his operation is beloved and is not creating truly meaningful problems. Leave him alone and take on real environmental hazards. The park service clearly has got an axe to grind with him because he didn't just shut up and go away. He's embarrassed them by pointing out the flaws in their 'science.'

— Marin homeowner

"There is virtually no true wilderness left in Marin. The Sierra Club is known for these land grabs under the pretext of 'wilderness.' If it is to be classified as a wilderness area, does that mean that kayaks and canoes will no longer be allowed on Drakes Estero?"

— Snark Attack

"Since the oyster farm has no impact on the estero, I hardly think Lunny should just walk away because a bunch of bureaucrats 3,000 miles away, 30-plus years ago attached an arbitrary 'wilderness' label to the bay. Having the farm in the park brings in revenue and attracts visitors to the park. Hold the farm to high environmental standards and inspections, but let them be."

— San Rafael resident

Marin Independent Journal

Thursday Readers' Forum

Posted: 05/14/2009 09:21:40 AM PDT

Report's findings overstated

The IJ's May 6 article on the National Academy of Sciences report on Drakes Estero overstates the report's findings and its significance. While the report concludes that, due to limited studies, there is no current evidence of substantial adverse impacts from the oyster business located in Drakes Estero, it acknowledges that a lack of evidence does not mean that there are no impacts.

Indeed, it recognizes the existence of site-specific disturbances to seals and eel grass.

The NAS report has no bearing on the estero's congressional designation as wilderness, a designation that prohibits this type of commercial enterprise from continued operation in the estero - regardless of the environmental impacts of that enterprise.

When Drakes Bay Oyster Co. acquired the rights to operate in 2005, it entered into a binding agreement with the federal government, and had full knowledge of the estero's wilderness designation in 2012 and the impending expiration of those rights. Yet, since then, it has been working to undermine the estero's designation for monetary gain.

If Drakes Estero's wilderness status were to be reversed, it would be the first time of which we are aware that designated wilderness in a national park would have been abandoned for commercial profit. We oppose any effort that would overturn the wilderness status of Drakes Estero and, in doing so, threaten other wild and vital places, so important for wildlife habitat and personal renewal.

Frederick Smith, executive director,

Environmental Action Committee of West Marin

http://www.marinij.com/opinion/ci_12369157

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Read Full Report

Date: May 5, 2009
Contacts: Jennifer Walsh, Media Relations Officer
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FOR IMMEDIATE RELEASE

CURRENT LEVEL OF OYSTER FARMING UNLIKELY TO HAVE SUBSTANTIAL IMPACT ON DRAKES ESTERO ECOSYSTEM

WASHINGTON -- A new report from the National Research Council finds a lack of strong scientific evidence that the present level of oyster farming operations by Drakes Bay Oyster Co. (DBOC) has major adverse effects on the ecosystem of Drakes Estero, a body of water north of San Francisco within Point Reyes National Seashore, which is owned by the National Park Service. The report adds that the adverse or beneficial effects of oyster farming cannot be fully understood given the existing data and analyses. Furthermore, the National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, overinterpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects.

In 1976 when a commercial shellfish operation existed in Drakes Estero, Congress designated it as a potential wilderness area. The Department of the Interior, which oversees NPS, has indicated that the oyster farm now located on Drakes Estero conflicts with full wilderness status, and upon the termination of the farm's lease in 2012, NPS should proceed with converting the area to wilderness. Recently, various versions of the NPS' Drakes Estero report have stimulated public debate over whether scientific information justifies closing DBOC after the lease expires. The debate led to the request for a Research Council study to help clarify the environmental issues connected with oyster farming in Drakes Estero and assess the scientific basis for the NPS presentations, reports, revisions, and a clarification document. The study was not an inquiry into potential scientific misconduct and made no such determinations.

While examining the impacts of oyster farming, the committee that wrote the report affirmed that effects on the estero are derived from two sources: the presence and biological processes of the oysters and the activities of the oyster farmers. As in other bodies of water, the magnitude and significance of the ecological impacts from oyster farming vary with the intensity of operations. Oysters filter materials from the water as well as excrete materials that sink to the bottom. To some extent, the oysters in Drakes Estero replace the filtering and material processing that was lost more than a hundred years ago when the native Olympia oysters were overharvested, but insufficient information is available to know how many oysters and how much biomass existed under these historical baseline conditions.

The committee found that oyster farm activities are likely to have some influence on animal and plant life in the estero. For example, oyster boats may disturb harbor seals during the breeding season, but a lack of information exists on how disturbances from various sources affect the seals. Drakes Estero is a significant breeding location for harbor seals – about 20 percent of the mainland California population comes ashore on sandbanks during the season they give birth. To date, no studies have determined whether seals' short-term responses to disturbances have long-term consequences on the population. But, if seal behavior during the breeding season is affected, a precautionary approach would minimize disturbances to avoid potential effects on their population, the report says.

The committee also examined the ecological impacts of shellfish farming on eelgrass, fish, and birds in the estero. Eelgrass beds approximately doubled in area from 1991 to 2007 but are absent directly underneath the oyster culture racks, which represent a small fraction of the total acreage. Propeller scar damage from DBOC boats also affect the eelgrass, but damaged eelgrass can regenerate quickly, limiting the long-term impacts. Definitive conclusions about potential effects of oyster farming activities on fish could not be reached, and a study of impacts of oyster bags on shorebirds in an area near Drakes Estero indicated modest effects, some negative and others positive.

Past practices of importing oysters from Japan and other regions resulted in the introduction of several nonnative species, including a parasite that infects oysters. DBOC's current practices -- in which they import larvae from domestic hatcheries and voluntarily participate in a set of industry guidelines called the High Health Program -- minimize the risk of introducing disease pathogens and external "hitchhiker" species.

Regarding the assessment of scientific information by NPS, the committee found that none of the versions of "Drakes Estero: A Sheltered Wilderness Estuary" achieved a rigorous and balanced synthesis of the impacts from oyster farm operations. The last document, "National Park Service Clarification of Law, Policy, and Science on Drakes Estero," which was intended to correct and clarify previous statements made by the NPS, provided the agency's most accurate release of science relating to shellfish farming impacts. The reinterpretations of science prompted by outside criticism appeared to have influenced the NPS decision to prepare and release the Acknowledgment of Corrections and Clarification documents.

In addition, the final NPS clarification document does not fully reflect the conclusions of the Research Council committee in two areas. First, NPS did not acknowledge the changing ecological baseline of Drakes Estero, where native Olympia oysters probably played an important role in structuring the ecosystem until they were functionally eliminated. Second, NPS selectively presented harbor seal survey data and overinterpreted the seal disturbance data, which are incomplete and nonrepresentative of the full spectrum of activities that could potentially disturb seals in the area. The oyster farm's potential negative effects on the harbor seal population represent the most serious concern and cannot be thoroughly evaluated because the effects have not been fully investigated.

The committee emphasized that the decision to extend the lease hinges on the legal interpretation of the legislative mandate rather than on scientific analysis. As such, more scientific study of DBOC operations and Drakes Estero may not affect National Park Service decisions about the future of oyster farming in the estero. The ultimate decision to permit or prohibit a particular activity -- such as oyster farming -- in any location requires value judgments and tradeoffs that can be informed, but not resolved, by science, the committee noted. Similar to other zoning and land-use questions, this issue will be settled by policymakers charged with weighing the conflicting views and priorities of society as part of the decision-making process.

A webcast public briefing on the report's findings and recommendations will take place Thursday, May 7, at 11:30 a.m. PT. The webcast and an e-mail form to submit questions will be available at http://national-academies.org.

The report was sponsored by the National Park Service. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an

1863 congressional charter. Committee members, who serve pro bono as volunteers, are chosen by the Academies for each study based on their expertise and experience and must satisfy the Academies' conflict-of-interest standards. The resulting consensus reports undergo external peer review before completion. For more information, visit http://national-academies.org/studycommitteprocess.pdf. A committee roster follows.

Copies of SHELLFISH MARICULTURE IN DRAKES ESTERO, POINT REYES NATIONAL SEASHORE, CALIFORNIA are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242 or on the Internet at HTTP://WWW.NAP.EDU. Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

# # #

[This news release and report are available at HTTP://NATIONAL-ACADEMIES.ORG]

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Spatial use of Drakes Estero, California, by harbor seals correlated to anthropogenic disturbance and natural variation during 1982-2009

129 page power point presentation

Benjamin H. Becker[1], David T. Press, and Sarah G. Allen

Point Reyes National Seashore

Point Reyes Station, CA 94956

Abstract

Long-lived, slowly reproducing K-selected species maximize their long-term survival and are predicted to respond to anthropogenic disturbances by moving away or remaining vigilant rather than habituating. Thus, spatial buffers in breeding areas may provide some resilience for populations facing disturbance as well as climate change, urbanization, and other anthropogenic and natural impacts. To better understand pinniped vulnerability to anthropogenic disturbance and displacement effects in a National Park, we used data collected between 1982 – 2009 to explore potential mechanisms which may affect the proportion of Point Reyes (California) harbor seals (*Phoca vitulina*) selecting haul-out sites within a large colony (Drakes Estero), and utilization of that colony in relation to other nearby colonies. Isolated sandbars had higher pup:adult ratios, indicating they are generally more important for pupping. There was no detectable relationship between human-related disturbance rate and the number of seals or pup:adult ratios at specific haul-out sites within Drakes Estero, suggesting that short-term human disturbance did not have a significant effect on spatial use, but rather that spatial use is

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determined by general sandbar isolation. However, within Drakes Estero, after removing effects of El Niño, the proportion of seals (total seals and pups only) hauled out near mariculture activities (a longer-term disturbance) was lower during years of higher oyster harvest (-0.08 ± 0.02, ~ 59 seals). Compared to oyster harvest, regional population size did poorly in explaining total seals or pups in the upper estero. Binomial generalized linear models ranked by quasi-AICc indicated that oyster harvest, seal counts at a nearby colony, and loss of a major haul out site within Drakes Estero, best explained pup and total seal use of Drakes Estero. Regional population size, short-term human disturbance rate, and other factors were not important in explaining overall seal use of Drakes Estero. Concurrent with higher oyster harvest and after removing effects of other covariates, the proportion of Point Reyes regional seals using Drakes Estero declined by -0.07 ± 0.02 for seal pups (-65 ± 18 total pups), and -0.05 ± 0.02 for total counts (-192 ± 58 total seals). This study, while correlational, supports the prediction that chronic human disturbance (as measured by mariculture activities) coupled with natural processes, affects seal haul out patterns at both the colony and regional scales.

Key Words

Phoca vitulina, *mariculture, disturbance, harbor seal, resilience, generalized estimating equations.*

Introduction

A variety of factors may influence habitat availability for breeding and molting pinnipeds, including coastal development (Seuront and Prinzivalli 2005), human encroachment and disturbance (Yochem et al. 1987, Gerrodette and Gilmartin 1990, Suryan and Harvey 1999, Thompson et al. 2001), predation (Nordstrom 2002), climate change (Freitasa et al. 2008), and natural variation in habitat suitability. Moreover, since longer lived, slowly reproducing K-selected species maximize their long-term survival, they tend to respond to anthropogenic disturbances by increasing heart rates and energetic costs. Thus, we expect seals to move away from, or remain vigilant to, disturbance sources rather than habituate as some smaller, quickly reproducing species do (Bisson *et al.* 2008). This might be particularly evident for females with pups which should be more risk averse than adult males. Further, Frid and Dill (2002) found that chronic, long-term disturbance stimuli resulted in habitat shifts and subsequently reduced access to resources in all of the fourteen bird and mammal studies they reviewed. In marine mammals, bottlenose dolphin (*Tursiops* sp.) declined in relative abundance due to long-term disturbance, primarily from tour boat vessels (Bejder *et al.* 2006). Similarly, Hawaiian monk seal (*Monachus schauinslandi*) pup survival was lower when seals were displaced to suboptimal habitats (Gerrodette and Gilmartin 1990). In the few disturbance studies where alternative habitat was not available, disturbed animals did not move, but may have sustained higher stress levels and reduced reproductive success (manatees: Buckingham *et al.* 1999, diving ducks: Knapton *et al.* 2000).

Wursig and Gailey (2002) stated that there is a "need to consider potential loss of feeding and breeding habitat from shellfish and finfish farms, particularly given predicted

increases in these facilities in nearshore environments." Negative impacts of aquaculture also have been found in ranging bottlenose dolphins (Watson-Capps and Mann 2005). Similarly, several questions are generated by recent findings that oyster harvest activities may have "potential negative interactions" with harbor seal use (*Phoca vitulina*) at two sites near mariculture operations in Drakes Estero, California (NRC 2009, Becker et al. 2009) and it is "likely that visits to these areas by oyster farm workers (within 500 m of seals) can be expected to lead to short-term disturbance of any seals using these haul-out areas at the time" (NRC, P. 49). First, are these potential negative interactions detected with additional years of monitoring data? Second, are females and pups sensitive to negative interactions? Third, is there a difference in the impact of typically short-term park visitor disturbance versus potentially longer-term activities that place and service mariculture structures on and adjacent to the sandbars where seals haul out? Last, could any spatial effects on seal use cascade up from the subsites near the oyster operations to throughout the entire estuary's breeding and pupping season population and to surrounding areas?

It is likely that proximate impacts of oyster harvest activities (or other disturbances) disturb seals and potentially cause them to move away from the subsites in Drakes Estero and elsewhere (NRC 2009, Becker et al., 2009, Allen and Huber 1984a, Montgomery et al. 2007). This would reduce available habitat for hauled out seals on either short or long time scales, depending on the length and frequency of the disturbance / displacement (Gill 2007). Affected seals might choose to haul out nearby, or leave the Estero for other areas. If the seals simply moved to other areas within the Estero, the proportion of the population using Drakes Estero compared to the rest of Point Reyes

would not change. Conversely, if there were some competition for space or reduced use of other naturally or anthropogenically deteriorated haul-outs by females with pups, it could cause crowding on limited sand bar sites, and lead to a cascading population level effect causing some seals to not use the estuary (Gill 2007).

The National Research Council (NRC) reported that the National Park Service (NPS) pinniped monitoring program provides "as yet untapped potential for assessing trends in the abundance of harbor seals in Drakes Estero in relation to wider regional trends" (NRC 2009, p. 84). Based on the NRC's suggestions, we expanded the Becker et al. (2009) analysis of seal use within Drakes Estero in response to mariculture by 1) adding ten additional years of data for a total of 21 years of survey between 1982 and 2009, 2) improving the statistical methods, and 3) testing multiple factors at three spatial scales that may be related to seal use (for total seals and pups). The scales ranged from a) *subsite* level seal counts and pup:adult ratios (13 years of data: 1997 - 2009), to b) *colony* level for distribution of seals within all of Drakes Estero (21 years of available data during 1982 – 2009), to c) the *regional* level comparing seal counts in Drakes Estero to the other surrounding colonies at the Point Reyes Peninsula (15 years of data during 1982 – 2009) (Fig. 1). This last regional effect would be somewhat surprising, since mariculture chiefly occurs in a limited area in the upper sandbars of Drakes Estero. However, cascading spatial effects in ecology are possible (Elkin and Possingham 2008) and reduced seal use of individual subsites where breeding/pupping occurs could lead to overall reduced use of the estero, and increased migration to other less disturbed colonies if available. Furthermore, the upper intertidal sandbars that are isolated from the mainland (and therefore from park visitors and predators) have historically had more

females and pups than the sandbars attached to the mainland near the mouth of the estero (Allen Miller 1988). We made several predictions that scaled from *subsite* to *intra-colony* to *regional* scales (Fig. 1).

Subsite scale - We predicted that 1) isolated island sandbars in Drakes Estero which are buffered from predators (Nordstrom 2002) and human disturbance should be more important for pupping (as measured by higher pup:adult ratios); 2) disturbance should reduce use of these island sandbars by females with pups (as measured by the pup:adult ratio); and 3) short-term human-induced disturbance would not be related to a reduced number of seals using subsites in Drakes Estero, since more seals could also lead to more opportunity for disturbance.

Intra-colony scale – We predicted that 1) changes in regional population size should be manifested in increased or decreased use of the upper estero due to density-dependence, and 2) increased mariculture activity (as measured by harvest level) would shift seal use away to other haul-outs. The second prediction is based on the assumption that oyster harvest should explain seal distribution better than overall human disturbance since the former is more likely to consist of long-term and persistent events (placement and tending equipment, long-term presence of equipment (NRC 2009, Fig. 1), while the latter is typically of brief duration by hikers and park visitors. We predicted this despite the fact that documented disturbances by visitors are far more common than by those by mariculture activities (Becker et al. 2009, NPS Data).

Regional scale - We predicted that 1) the effects of El Niño - Southern Oscillation (ENSO) on seal use of Drakes Estero as a whole, would be the same as for other colonies in the region; 2) regional population size expansion would only affect the proportion of regional seals using Drakes Estero if the estero had more good habitat than other colonies; 3) overall Drakes Estero human disturbance rates would not be related to overall seal use because disturbance would increase with population size and human disturbances are typically of short duration; and 4) relative use of Drakes Estero compared to other seal colonies would be influenced by (a) within site sandbar dynamics (e.g., natural loss of a major pupping subsite), (b) nearby colony dynamics (disturbance at a nearby colony that could move more seals to Drakes Estero), and (c) mariculture activity that would partially explain overall use of Drakes Estero in relation to other regional colonies. The latter could occur if seals were displaced locally by mariculture activity, but had reduced options for haul out areas due to factors (a) and (b).

Methods

Study Area

The Point Reyes peninsula is along the north-central California Coast (38°30'N to 37°30'N). The peninsula is located within the Point Reyes National Seashore, a unit of the National Park Service (NPS). The topographic diversity of the peninsula provides a broad range of substrates for harbor seals to haul out of the water. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. A "haul-out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of

young (Harvey 1987). A colony may be a collection of haul-out sites within a limited geographic area. Drakes Estero and Estero de Limantour encompass a complex of eight subsites where seals haul out (Fig. 1), which are referred to collectively as the Drakes Estero/Limantour colony. Seals used the subsites at various times of the year depending upon their reproductive status, molting condition, and the level of disturbance encountered (Allen Miller 1988). Within a day, seals shifted to adjacent sandbars when crowding occurred or when the tide rose limiting the amount of haul out space. At rising tides, seals also floated over submerged sandbars until the sand bars reemerged with receding tides.

All subsites were used during the breeding and molt seasons, and some were used regularly year-round. Females with pups disproportionately used the sand bars exposed at low tide in the upper and middle portions of the Estero that are isolated from the mainland, and consequently from humans and predators. Limantour Spit was mostly used by non-breeding seals during the breeding season (Allen Miller 1988). Subsites in the lower estero, which are generally closer or attached to the mainland, have historically suffered higher annual human disturbance rates during the breeding season when compared to the isolated island sandbars of the upper estero (Becker et al. 2009).

Human access to the seal haul-out sites within Drakes Estero was limited because it is part of a national park and a congressionally designated wilderness area. During the breeding season (1 March--1 July), no motorized boats were allowed within the Estero except for those from a commercial mariculture operation. Non-motorized boats, primarily Kayaks, were allowed until 1996, but thereafter were excluded during the breeding season to avoid seal disturbance. Research and rescue boats may enter the estero

in rare instances. Three of the subsites where seals haul out are proximate to the commercial mariculture operation (OB, UEN and UEF). Subsite OB was within the mariculture lease but was not used much for culture in the recent past (~1999-2004), portions of subsite UEN were within or adjacent to the lease, and subsite UEF was in a navigational channel that bisects a gap in the mariculture lease where mariculture boats traversed Drakes Estero (Fig. 1). The mariculture operation raised oysters and the California Department of Fish and Game (CDFG) produced an annual report on oyster harvest production. No annual report or data is available on manila clams produced (Kirsten Ramey, CDFG, E-mail: Jan. 14, 2010).

Datasets

Disturbance data - Survey methods are described in Becker et al. (2009). Disturbance rate was derived from the number of human related disturbances (park visitors, kayaks, airplanes, mariculture activity, etc.) that resulted in a head alert, a flush or a flush of seals into the water during March-May of each year, divided by the number of surveys conducted during that time period. Surveys were typically of similar duration throughout the study period (~2 hr), except for three longer surveys (5-9 hrs) during 1982-83. We also compared (with Spearman tests) daily and hourly disturbance rate between the years 1982 – 2009 (15 years surveyed) to ensure that variation in survey length during 1982-83 did not affect realized disturbance rate.

Intra-colony data - When assessing *intra-colony* variation in use (rather than population size), we used the daily counts (converted to binomial proportions when modeled) at each

subsite for all surveys during the peak breeding season (April 15 – May 15 of each year). For data from 1997 – 2009, QA/QC was identical to that used in Becker et al. (2009). We augmented the NPS seal count database with additional subsite data from 1) the years 1982 - 1983, 1986 – 1987, 1989, and 1991 - 1993 derived from field notes of SGA which were reviewed twice before transcribing the data to spreadsheets for analysis, and 2) annual maximum breeding season pup and adult colony counts derived from tables in Allen and Huber (1984a, 1984b), for a total of 21 years between 1982 and 2009. Oyster harvest data was obtained from the California Department of Fish and Game (1982 – 2006), the National Research Council (2007 – 2008), and was roughly estimated as 204,000 kg (450,000 lbs) for 2009[2], based on recent harvest values for 2007-2008.

Regional data - We used the maximum counts of pups and adults from the maximum total count of the day during the peak breeding season. Values for Drakes Estero were compared (again, in a binomial proportion) with pooled maximum counts (of pups and adults) at the other six colonies in the region (Tomales Bay, Tomales Point, Point Reyes Headlands (only one count per survey day at this site), Double Point, Bolinas Lagoon, and Duxbury Reef) (Fig. 1).

Analyses

Subsite scale: Subsite counts and pup:adult ratios related to disturbance rate - Linear mixed-effect models (the "lmer" function in R) were used with subsite as a random effect to test if spring anthropogenic (March – May) disturbance rate (explanatory variable) was

[2] Actual harvest values are determined from tax records and the 2009 harvest should be available in mid-2010 (Pers. Comm., Tom Moore, Cal. Dept. of Fish & Game).

related to annual maximum seal counts, maximum pup counts, and pup:adult ratios (response variables) within subsites and across all subsites between 1997 - 2009. Some upper estero subsites (OB, UEN, UEF) were occasionally pooled in the 1982-1993 field note data, so we therefore did not use those years for this within subsite analysis. However, this pooling did not affect data when pooling the total upper estero versus lower estero seals when analyzed at the colony scale (next section). The counts were modeled as quasi-Poisson, and the ratio model as binomial. Random intercept, random intercept and slope, and null models were compared with AIC and likelihood ratio tests, and were checked to ensure randomly distributed residuals.

Colony scale: shifts in haul-out (subsite) use in Drakes Estero related to mariculture, ENSO, disturbance rate, and regional population size - These models were designed to test if variation in the proportion of seals using the upper (near mariculture) versus lower (away from mariculture) estero were related to ENSO events, oyster harvest level, the spring (March – May) pooled disturbance rate (disturbances / # surveys) in either the upper or lower estero (Fig. 1), or the pooled maximum annual seal counts of all other Point Reyes area colonies (regional population size). We used a two-step process for modeling. Using the 15 year dataset, we used generalized linear mixed models (GLMMs) to asses for effects on seal distribution between the near (upper) and far (lower) mariculture areas of the estero due to *a priori* combinations of ENSO, binary high/low oyster harvest, anthropogenic disturbance rates, and regional counts (pup and total counts). We then tested models for the full time series (all 21 years) without regional

counts and disturbance covariates using generalized estimating equations (GEEs) (Venables and Ripley 2002, Faraway 2006, Zuur et al. 2009).

Binomial and quasibinomial GLMMs were ranked using AIC with the "lmer" and "glmmML" packages in R. Both of these packages report rounded AIC values. GLMMs were used rather than GEEs for this step because GLMMs allow calculation of AIC to compare non-nested models. Since regional population size and oyster harvest were correlated, they could neither be modeled together nor compared via likelihood ratio tests in nested models. Similarly, regional population size was tested *a priori* with disturbance measures, but not with ENSO since there is no reason to believe that ENSO should interact with regional population or size differently at different colonies. Year was considered a random effect.

We expanded and improved the analysis in Becker et al. (2009) in three significant ways. First, the GEEs explicitly model the temporal autocorrelation of multiple harbor seal counts taken during the breeding season within each year. GEEs are therefore a form of mixed-effects (or hierarchical) modeling (Gelman and Hill 2009). The GEEs also allow flexible distributions for the entire dataset and for the within year counts, neither of which were normally distributed. Second, the GEEs and GLMMs were run as binomial models comparing the three subsites near mariculture (OB, UEN, UEF) against the five subsites farther away from mariculture (A, A1, L, DEM, DBS). Third, the aforementioned inclusion of spring (March – May) anthropogenic disturbance rates for the upper and lower estero and regional population size (pups or total seals) were included as covariates for step one of the analysis for 1982 - 1983 and 1997 - 2009.

We modeled "years since ENSO" as *log(years since ENSO+1)* because both observational and theoretical evidence suggest that any ENSO effects should taper off and not be linear. Annual changes in the areal extent of sandbars in Drakes Estero and other regional colonies are not available and were therefore not modeled. However, dramatic changes in the size and access of subsite A were documented and we explicitly modeled that process in the following "*regional scale*" section.

GEEs were run in the software R 2.9.2 using the "geeglm" function in the "geepack" library with year as the grouping variable to account for within year autocorrelation of counts at the same subsite. The correlation structure was set as autoregressive since the counts were during the one month peak pupping period (April 15 – May 15) in each year and counts closer together should have higher correlation since seal counts generally rise, peak, and decline during this time.

Nested models (e.g., ENSO + oyster vs. ENSO only) were tested for differences with likelihood ratio tests with the simplest adequate (difference not less than $P < 0.05$) model retained. We then transformed the final model logit coefficients (Crawley 2007) to calculate the proportional change in seals using the three subsites near mariculture model, and multiplied the proportion by the mean seal count (pups and total) in the estuary during the time series to estimate a change in the number of seals using those subsites due to any significant factors.

Regional Scale: Drakes Estero compared to surrounding colonies - We examined regional anthropogenic effects during the breeding season by comparing maximum seal counts (pups and total) in Drakes Estero, and all other Point Reyes colonies combined

(Tomales Bay, Tomales Point, Point Reyes Headlands, Double Point, Bolinas Lagoon, and Duxbury Reef) (Fig. 1). We examined several variables, as well as a null model, in relation to the annual maximum proportion of seals (total seals and pups only) using Drakes Estero compared to the proportion using the other six Point Reyes area colonies (Fig. 4A). These included:

- *Year*, to account for any linear time trends.
- *Proportion of Drakes Estero seals using haul out subsite A*, a major pupping subsite in Drakes Estero that attached to the mainland and exposed to predators around 2004. This should account for variation in the importance of this site through time.
- *Maximum annual count of seals at nearest colony (Double Point)*. Seals are thought to transit easily between Double Point and Drakes Estero, and in 2003 an elephant seal likely displaced numerous harbor seals from Double Point to Drakes Estero.
- *Annual spring (March-May) human related disturbance rate (disturbances/survey) in Drakes Estero*. This includes disturbances by hikers, kayakers, dogs, airplanes, and mariculture. Kayaks have been prohibited from the estero during the breeding season since 1996.
- *Years since the last major ENSO* (1982-83 and 1997-98). Strong ENSO events appear to depress reproductive success and thus may influence habitat choice.

- *Regional annual maximum count (less Drakes Estero).* Density-dependent effects could alter spatial use of Drakes Estero, especially if all haul-out sites are not equally desirable.
- *Annual oyster harvest* (Table 1) as a measure of mariculture activity and equipment placement in the estero.
- *Five-year and six-year periods of lowest oyster harvest* (2000-2004 and 1999-2004) (Table 1). This binary value may be useful for analyses for two reasons. First, the oyster harvest metric might not be linearly related to actual harvest activity near the seal haul-outs, and using a binary measure eliminates assumptions of such a relationship. Second, we do not have an official estimate for 2009 yet; the 2008 estimate departed from the actual harvest by 12%, indicating that some caution is needed when using estimates. While the use of total annual oyster harvest in the estuary was negatively correlated (when modeled with ENSO) with nearby seal haul out use (Becker et al. 2009, NRC 2009), total oyster harvest is surely not a perfect measure of activity near the seals (NRC 2009). The number and distribution of mariculture equipment (bags) on sandbars near seals for extended time periods is another potential measure. Bags need to be tended, potentially causing disturbance, and the simple presence of the bags themselves may cause seal displacement. We did have to make a decision as to where the cut point was for high/low and we did this based on the inferences in Table 1 regarding increased presence of oyster

equipment at sites near seal haul out sites and an apparent break point of around 138,000 lbs of oysters.

Aerial images confirm that oyster bags were present on top of and adjacent to seal haul out sites in 2005 – 2009. Personal observations (DTP) during regular fieldwork indicate that there were few or no bags on the upper seal islands from 2002-2004. We infer from the oyster harvest records that there were few or no bags in 2000-2001 since the harvest was lower than 2002-2004, and conversely that there likely was infrastructure from 1997-1998 when harvest was higher. The year 1999 is difficult to categorize based on the available data. Thus, we modeled the oyster harvest covariate for 1999 as both a high and low oyster harvest year (Table 1).

Modeling the pups and the total population was done separately because there is potential to have a greater disturbance/displacement effect on females with pups that 1) may be more sensitive to disturbance, or 2) seek out more isolated haul out sites (Allen Miller 1988, Allen and Huber 1984a Nordstrom 2002). We did not combine any covariates in a single model if the variance inflation factors (VIFs) were above 3 (Zuur et al. 2009). VIFs were calculated from models without the complementary covariate. For example, the VIF for low/high oyster was calculated without "oyster", since these would never be used in the same model. We also tested for interannual autocorrelation in the proportion of pups and total seals in Drakes Estero using detrended time series and the autocorrelation and partial autocorrelation functions in R.

We used binomial generalized linear models (GLM) which modeled the probability that any random seal is found in Drakes Estero (success) versus somewhere else in Point Reyes (failure). We bound "Drakes Estero" and "non-Drakes Estero" seal

maximum counts for each breeding season into a single matrix (pups or total) for use as the dependent variable in this model. Because of over-dispersion (variance larger than expected for binomially distributed data), we used a quasi-binomial family to assess *P* values and over-dispersion, and the binomial distribution to derive log-likelihoods to rank models using an over-dispersion adjusted Akaike's Information Criteria for small sample sizes (QAICc; Burnham and Anderson 2002). We also bootstrapped (refit the model with data from each year sampled at random with replacement) the best ranking models 2000 times to gain unbiased standard errors for the oyster harvest variable (Crawley 2007). Bootstrapping should also uncover any highly leveraged effects from one or two years of data. We report models and QAICc values for both the oyster harvest and the low/high oyster models, but only consider the 2000-2004 low/high variable when reporting Akaike weights and model averaging. Final model coefficients were calculated from the weighted (by Akaike weights) model coefficients of the best performing models (i.e., lowest 4 QAICc units). These weighted coefficients were then back transformed from binomial logits to proportions and multiplied by the mean number of pups or total seals in the Point Reyes area seal population during the study period. All analyses were done in R 2.9.2 (R Development Core Team 2009).

Results

During 1982 – 2009, the mean number of breeding season harbor seals hauled out in Drakes Estero was 775 ± 269 total seals and 180 ± 94 pups. The mean of the maximum annual breeding season counts in Drakes Estero were 1052 ± 279 total seals (range: 656-1644) and 302 ± 102 pups (range: 122-486). The other regional colonies had a combined

mean maximum breeding season count of 2499 ± 369 total seals (range: 1728-3125) and 710 ± 167 pups (range: 366-962). Oyster harvest experienced a low period from ~2000-2004 (Table 1, Fig 6B) and manila clam harvest levels are unknown. Daily maximum Drakes Estero seal breeding season counts varied throughout the study period, with upper estero seals showing a peak during 2002 – 2004 (Fig. 4). Annual maximum counts of harbor seals in Drakes Estero also peaked around 2002 – 2004, while the regional population size (less Drakes Estero) peaked from about 2000 – 2005 with two very high years in 2002 and 2004 (Fig. 5). Pup counts in Drakes Estero climbed from 2000-2004, while those in the rest of the region slowly declined (Fig. 5). Excluding the period from 2000 – 2004, the pup counts between Drakes Estero and the region appeared to have similar trends.

Subsite Scale: Seal counts, pup:adult ratios and disturbance rate – During 1997 – 2009, the upper intertidal sandbars (OB, UEN, UEF) generally had higher pup:adult ratios than the sandbars attached to the mainland or near the mouth of the estero (L, DEM, DBS: Fig. 2). Subsite A, while showing a high pup:adult ratio, lost nearly all of its productivity since attaching to the mainland in 2004, but subsite A1 was still the one major subsite away from mariculture that maintained a high pup ratio and high overall pup production each year. Lower estero subsites DBS and L (attached to the mainland), and DEM (at the mouth of the estero in high current), tended to have either low pup:adult ratios *or* relatively low absolute numbers of pups produced each year.

Annual human disturbance rate during spring (March-May) of each year (1982-83 and 1997-2009) had a similar pattern whether using daily or hourly rate (r_s = 0.99, n =

15) and so we used daily rate in all subsequent models and calculations. There were 153 spring anthropogenic disturbance events during this time. The daily disturbance rate averaged about 0.71 ± 0.41 for each year, with about 23% of disturbances being seal head alerts, 10% flushes without entry into the water, and 67% flushes into water. Neither subsite pup counts ($P > 0.38$) nor total seal subsite counts ($P > 0.28$) were related to spring anthropogenic disturbance rates in Drakes Estero (Figs 3A & B). When using a random intercepts (fixed slopes) model, spring disturbance rate appeared to be negatively related to reduced pup:adult ratios at seal haul outs within Drakes Estero ($n = 104$, groups = 8, $P < 0.001$, AIC = 889.3) (Fig. 3C). However, the random intercepts and random slopes model had a lower AIC (882.0), was a better fit in a likelihood ratio test ($X^2 = 9.2$, $P < 0.001$), and indicated no effect ($P > 0.32$) of spring disturbance rate on pup:adult ratios. The null model was a much poorer fit than either of the disturbance models (AIC = 910.5). Since "flushes" and "flushes into water" represented the majority of disturbances (~77%), removing the "head alerts" from the analysis should not alter the results. Based on this, we conclude that there is not a robust, detectable relationship between spring anthropogenic disturbance rate and pup:adult ratios. Further, individual subsite based binomial GLMs for the years 1997 – 2009 indicated that subsite pup:adult ratio trends with disturbance rate were not significant (Fig. 3C).

Colony Scale: Drakes Estero subsite models – Binomial GLMMs found that high-low oyster harvest and ENSO best explained the proportion of seals (pups and total) using the upper estero (Table 2a). Both the "lmer" and "glmmML" functions in R reported similar AIC rankings, as did quasibinomial and binomial distributions (for "lmer" only). Upper

estero disturbance rate was somewhat important in explaining pup presence in the upper estero, but this model was not a significantly better fit than the oyster + ENSO model alone (likelihood ratio test: $X^2 = 2.97$, $P < 0.08$). Regional population size was not important in explaining the proportion of seals using upper Drakes Estero with ΔAIC values of 9 (total seals) and 17 (pups) from the top ENSO + Oyster models.

Since disturbance rate and regional population size were not important in these 1982-83 and 1997 – 2009 models. We used GEEs to analyze the full time series including 1986-1987, 1989, and 1991-1993 for the relationship between the proportion of seals using the upper estero and just oyster harvest and ENSO as covariates. ENSO and oyster harvest (high/low) were not collinear ($P > 0.89$). The GEE showed that both ENSO and oyster harvest continue to explain seal use at sites closest to mariculture activity (Table 2b). Residual plots versus model predictions showed no model fitting issues with the GEE model. Within year autocorrelation was moderate (0.45 - 0.60), indicating that GEEs are an appropriate tool for this dataset. A nested likelihood ratio test indicated the Oyster + ENSO binomial model was a better fit over the ENSO only binomial model for both pups ($X^2 = 4.6$, $p < 0.03$) and total seals ($X^2 = 9.5$, $P < 0.002$). After accounting for the ENSO effect and not including the non-significant anthropogenic disturbance terms, the best GEE models estimated 14 ± 4 fewer pups and 59 ± 15 fewer total seals in the three "near mariculture" subsites during the higher oyster harvest years (Table 2b).

Regional Scale: Drakes Estero compared to surrounding colonies - The proportion of pups and adult seals using Drakes Estero versus the other Point Reyes colonies varied throughout the study period, with a peak from 2003-2004. The pup and adult time series

were generally similar, with the exception of 1997, when relative pup presence in Drakes Estero was low, but adult use was high (Fig. 6A). Because 1997 was an outlier for the adult and/or pup proportion of seals in Drakes Estero, we weighted the total seal count data for 1997 by the ratio of the proportion of pups to adults in that year (~0.3) (Venables and Ripley 2002). We felt this was reasonable (and preferable to omitting the data) since there was an anomalous harbor seal die-off of mostly adult females which began during the breeding season in 1997 that did not appear to affect pups, and appears to have affected other colonies (specifically Double Point) more than Drakes Estero (D. Grieg and F. Gulland, The Marine Mammal Center, pers. comm. & NPS unpubl. data), although the sampling from that study was not random.

Oyster harvest was alternately classified as low for both the 2000 – 2004 and 1999 – 2004 periods (Fig. 6B). Seal use of subsite A in Drakes Estero was high from 1982 – 2004, and dropped rapidly thereafter when the sandbar connected to the mainland. Seal use of Double Point increased from 1997 – 2002, dropped rapidly in 2003 due to an aggressive elephant seal (see Hayward 2003), and then rebounded in 2004 – 2005, followed by another smaller decline after 2005.

Spearman rank correlations indicated no issues with collinearity among the variables in the models tested (Table 3a). Variance inflation factors (VIF) also found no evidence of collinearity as long as year or ENSO were not modeled with subsite A (Table 3b). The detrended proportion of pups and total seals using Drakes Estero did not exhibit interannual autocorrelation or partial autocorrelation at any lag distance. Quasi-binomial GLMs showed that models of the proportion of seals in Drakes Estero were moderately over-dispersed for the seal pup global model (4.5) and somewhat more over-dispersed for

the total seal count global model (8.6). We used these values to calculate the QAICc for all the competing models. Binomial models almost always have some degree of over-dispersion with count data because there is no variance parameter in the model (Gelman and Hill 2009).

Among the models tested for pups, the two and three-way combinations of *low oyster* + *Double Point* + *subsite A* (always containing low oyster) models had an Akaike weight of 0.77), and the r^2 for the top model had a good fit (r^2 = 0.46 - 0.63) (Table 4). Annual change at Double Point, disturbance rate, ENSO, and year were poor predictors of seal use of Drakes Estero. ENSO appeared once in model 6, but we did not include it in the multimodel averages since the Akaike weight was only 0.09 and the weighted coefficient would have overlapped with a slope of zero. Similar patterns occurred for the total seal count models, with the exception of ENSO which did not appear at all in the top models (Table 4). Low/high oyster harvest alone had an r^2 of 0.26 and 0.29 for pups and total counts, respectively and a significant ($P < 0.05$) over-dispersion corrected P-value. Bootstrapped estimates of model coefficients were similar to those in Table 4 and the oyster harvest standard errors were smaller than those reported by model fitting alone, indicating robust and conservative estimates from the GLM (Table 5). After removing the effects of Double Point and subsite A, the best fit weighted coefficients suggest that there were about 65 ± 18 fewer seal pups and 192 ± 58 fewer seals overall using Drakes Estero (Table 5, Figs. 7 & 8) during high oyster harvest years.

Discussion

Long-lived, slow reproducing species that invest their energetic resources in long-term survival rather than rapid reproduction tend to have pronounced physiological costs

(increased heart rates and overall energetic costs) associated with human induced disturbance (Bisson *et al.* 2008, Ellenberg *et al.* 2006). Harbor seals have both a long lifespan (~20-25 years), and a single pup per year, suggesting that they are a candidate for realizing significant stress due to disturbance and might respond defensively (by moving) rather than quickly assimilating and continuing reproduction as is the case with short-lived, rapidly reproducing songbirds (Bisson *et al.* 2008). Our findings support those of Frid and Dill (2002) whereby long-term, chronic disturbance or displacement stimuli (in this case mariculture activity including equipment on haul out sites) is related to a habitat shift and subsequent reduced access to subsites in the estero. Conversely, shorter term disturbance stimuli (primarily park visitors) were not related to reduced pup:adult ratios at subsites in the estero, or strongly to detectable patterns in intra-estero (upper versus lower) or inter-colony proportional use by seals. Rather, pup:adult ratios at subsites appear to be strongly driven by their physical isolation from the mainland (Nordstrom 2002). Oyster harvest and ENSO were the primary variables associated with temporal variation in spatial use by seals in Drakes Estero. Our prediction that regional population size would be an important factor in partially explaining the proportion of Drakes Estero seals using the upper estero was not supported. Regional population size and human disturbance rate were also unimportant in explaining seal use of Drakes Estero in relation to the rest of the colonies. Instead, oyster harvest, internal subsite, and nearby colony dynamics were consistently important.

These analyses address suggestions of the NRC (2009) for research into factors driving seal spatial patterns in Drakes Estero. Although the results are correlational, we propose that the variation in oyster harvest paired with *a priori* multiple competing

mechanistic hypotheses represents a robust "natural" experiment which can be used to draw reasonable inferences. Oyster harvest was a human induced rather than a natural covariate, and so there is no reason to believe that oyster harvest is mechanistically correlated with some other unmeasured, non-anthropogenic parameter that also influences seal distribution. The apparently random correlation between oyster harvest and regional population size warrants some caution when interpreting the *colony scale* results. The fit of the oyster harvest models, though, were so much more parsimonious than those of regional population size (lower by 9-16 AIC units), that the pattern appears quite robust to both statistical methodology and length of the time series. Similarly, in our analysis of the 1997 – 2007 Drakes Estero data (Becker *et al.* 2009), we reported that the 2008 seal counts at one subsite appeared to deviate from the inverse relationship with oyster harvest found for the 1997 – 2007 models. This was based on preliminary information that oyster harvest increased in 2008 along with actual seal counts at one subsite (OB). The 2008 actual oyster production estimate, however, actually *declined* by 12% from 2007 to 2008), and is thus still consistent with the reported model for 1997 - 2007. Further, Becker *et al.* (2009) modeled counts in the estero rather than proportional shifts, so further comparisons are not informative here.

Our results do not indicate that the seals are lost from the overall Point Reyes area population (although that is possible), but rather assume a closed population within each year both within the estero (for the colony scale analysis) and between the estero and other Point Reyes area colonies (for the regional analysis). The use of regional population size as a covariate should account for any density-dependent effects and seals typically do not move between colonies during the breeding season (Lowry et al. 2005).

We focused on low versus high oyster production, but also report nearly identical results when using the continuous linear covariate of oyster harvest. While the binary oyster harvest variable required some inferences (Table 1), it is also somewhat more conservative than the continuous covariate because it does not assume a linear relationship between oyster harvest and seal response. This binary model is more appropriate if the simple presence of oyster equipment caused seal displacement, rather than the frequency of visits. Additionally, the oyster harvest value does not represent activities that may be due to cultivation of manila clams versus oysters in the estero. Any relationships between clam and oyster harvest are currently unknown to us, so a low/high metric may again avoid over-interpreting the impacts of the specific annual oyster harvest. A final benefit of using the high / low oyster metric is that it virtually eliminates the possibility of model errors if the actual 2009 oyster harvest is dramatically higher or lower than our estimate.

There are some inherent difficulties in the use of disturbance rates to infer effects on seals (Frid and Lawrence 2002, Hayward *et al.* 2005, NRC 2009). Johnson and Acevedo-Gutiérrez (2007) reported that disturbance rates of seals in Canada were related to frequency of powerboats nearby, but not the number of seals present. The NRC (2009) also noted that many disturbances related to mariculture in Drakes Estero likely go undetected, especially since about 50% of harbor seal surveys are on weekends and more visitors are out on weekends, while the oyster harvest work occurs primarily daily, but less frequently on Sundays (NRC 2009). Further, surveys may miss any disturbances on the ebb tide that might prevent seals from hauling out (NRC 2009). Nonetheless, we believe that because the survey methodology is standardized, it should represent an index

of annual changes. Similarly, the NRC suggested that additional disturbances by oyster boats during high tide might deter seals from using the upper sandbars when tides receded. However, since we did not partition mariculture and non-mariculture related human disturbance in this paper, these unrecorded and undetected disturbances (of all anthropogenic kinds) would be unlikely to alter our results.

The proportional reduction in seal use was generally larger for the upper estero (-0.08 pups and -0.08 total) versus the estero as a whole (-0.07 pups and -0.05 total counts). However, these proportional values, when scaled up from the Drakes Estero population to the entire Point Reyes regional population, suggests more individual seals were displaced from the overall estero than those simply displaced from the upper estero alone. It is possible that the combined effects of the loss of subsite A, impacts at Double Point, increased oyster activity in the upper estero and other unknown factors, led to the pronounced reduction in counts for the entire estero. Specifically, our findings are consistent with a scenario where subsite A lost habitat in 2003-4, which could have *increased* the proportion of seals using the upper estero. Increasing mariculture activity during 2005 – 2009, though, may have displaced seals away from the upper estero, and without access to subsite A, the overall proportion of seals using Drakes Estero therefore declined. Similarly, prior to 2000 when oyster harvest was generally high and subsite A was an isolated sandbar, the proportion of seals using the upper estero was also low. The additive processes among subsite A, Double Point, and oyster harvest fits a model where seal resilience in the ecosystem is a function of both natural and anthropogenic influences. In a similar scenario, Kent and Crabtree (2008) found that an Australian sea lion (*Neophoca cinerea*) reserve was ineffective because it did not provide suitable

habitat. They concluded that "because environmental conditions are variable over time, a fixed sanctuary zone will only aid in reducing impacts when conditions are suitable in that zone." Similarly, Stevens and Boness (2003) reported an ENSO related decline and recovery pattern in southern fur seals (*Arctocephalus australis*) in Peru. After the 1997-98 ENSO induced a decline in fur seals, the seals returning in 1999 avoided haul-out sites with higher human disturbance. In Drakes Estero, suitable conditions for females with pups may now be more limiting due to variable environmental conditions such as the loss of subsite A, mariculture equipment on the upper estero subsites, and the generally poor suitability of lower estero sites. The estero contains a dynamic system of sandbars and there will surely be additional changes in the future that both create and remove desirable seal habitat.

Subsite (or colony) recolonization may take years, while abandonment due to chronic displacement / disturbance may be rapid (Gerrodette and Gilmartin 1990). Such a decline was noted with abandonment of harbor seal colonies in San Francisco Bay (Allen 1991, Bartholomew 1949). Similarly, Hog Island in Tomales Bay (Fig. 1) was mostly abandoned by harbor seals in the early-1990s coincident with increasing numbers of boaters landing on the east side of the island (Allen and King 1993). Prohibition of boat landings coincided with a gradual resumption of use by seals (NPS Compendium; Unpubl. NPS data). The decline at subsites OB, UEF and UEN in the upper Drakes Estero follows this pattern, whereby after oyster harvest declined around 1999-2000, it took a few years (until 2002) for the proportion of Drakes Estero seals using the area to greatly increase, and then the counts (and proportion of seals using the subsites) rapidly declined again with increased mariculture in 2005. The *a priori* modeling suggested that

an ENSO effect may have explained some of the delayed recolonization in the upper estero, but perhaps simple time delayed movement into the area is also partially responsible (and also density dependence from the concurrent regional population increase). Such a model would then have a lag effect for recolonization as oyster harvest declined, but no lag as it increased, similar to seal response to subsite A attachment to the mainland and exposure to predators.

Additional processes occurring at other colonies in the San Francisco Bay Area could also affect the patterns we observed. This might include excessive disturbance, as well as immigration to or emigration from the entire study area. However, the fact that our modeled covariates (oyster harvest, double point, and subsite A) explain much of the intra- and inter-colony patterns observed, suggests that these are not likely to be spurious correlations.

Conclusion - Our results highlight the importance of building and preserving resilience in natural systems and the sensitivity of K-selected species to chronic disturbance or displacement. Gill (2007) concluded that (in birds), "declines in survival or fecundity will result from density-dependence and not directly through disturbance. Efforts to manage disturbance in order to maintain populations must therefore be based on an understanding of the density-dependent consequences of avoidance of disturbed areas." Our data and analyses are consistent with natural and anthropogenically (mariculture) driven seal colony dynamics both within Drakes Estero and between Drakes Estero and other colonies in the Point Reyes region. Encroachment of mariculture or other persistent activities on preferred pupping sandbars may displace seals but not

have a detectable effect on the colony or the region until natural fluctuations occur which further limit habitat, and cause additional competition for limited space resources.

While density dependence (in the form of regional population size) is likely an important component, it did not fully explain the spatial patterns observed at the colony and subsite scales. Although pup:adult ratios were higher at isolated sandbars presumably because of lower exposure to short-term disturbances, the apparent lack of spatial redistribution at the subsite, colony and regional scales due to short-term anthropogenic disturbance warrants further study since pinniped disturbances are a common concern. At a scale even larger than the Point Reyes region, seals transit between San Francisco Bay and the Point Reyes region (Kopec and Harvey 1995, Grigg et al. 2009), thus anthropogenic impacts on the Marin Coast may indirectly affect the mobility of seals displaced at other colonies in San Francisco Bay or elsewhere. While such a signal would be extremely difficult to detect, this concern may be particularly true for Drakes Estero which supports one of the largest breeding colonies in the state and the largest in the San Francisco Bay region (Lowry et al. 2005).

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Monitoring Program at Point Reyes National Seashore. This paper has gone through the NPS peer-review process; however, the analyses and conclusions presented here are the work of the authors and do not represent a policy of National Park Service.

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Table 1. Sources and inferences for level of oyster harvest activity on or near subsites OB, UEF, and/or UEN. Data from. CDFG and NRC. "Analysis scale" summarizes the years where complete seal count or disturbance data available and subsequently modeled in each of the three scales of analysis presented. Data sources: A&H: Allen and Huber 1984a, 1984b; SGA: Sarah G. Allen field notes; NPS: NPS pinniped database.

				Analysis scale			
Year	Oyster harvest (lbs)	Inferred level of mariculture use of sandbars near seals	Source(s) of inference	Haul-out site	Intra-colony	Regional	Seal data source
1982	360,004	high	harvest data		x	x	SGA / A&H
1983	440,139	high	harvest data		x	x	SGA / A&H
1986	437,043	high	harvest data		x		SGA
1987	634,869	high	harvest data, aerial image of bags		x		SGA
1989	549,953	high	harvest data		x		SGA
1991	442,745	high	harvest data		x		SGA
1992	606,484	high	harvest data		x		SGA
1993	662,388	high	harvest data		x		SGA
1997	476,791	high	harvest data	x	x	x	NPS
1998	292,188	high	harvest data, higher than 2005	x	x	x	NPS
1999	125,749	modeled high & low	slightly higher than 2000-2004, declining	x	x	x	NPS
2000	34,094	low	lower than 2002-2004	x	x	x	NPS
2001	65,676	low	lower than 2002-2004	x	x	x	NPS
2002	78,064	low	DTP, pers. obs, harvest data	x	x	x	NPS
2003	118,643	low	DTP, pers. obs, harvest data	x	x	x	NPS
2004	96,754	low	DTP, pers. obs, harvest data	x	x	x	NPS
2005	138,958	high	aerial image of bags, increasing activity	x	x	x	NPS
2006	291,538	high	increasing harvest, bags in '05	x	x	x	NPS
2007	468,000	high	aerial image of bags	x	x	x	NPS
2008	438,000	high	aerial image of bags	x	x	x	NPS
2009	450,000*	high	aerial image of bags	x	x	x	NPS

*Harvest estimate based on 2007-2008. Official data likely available in mid-2010. Only affects inferred mariculture level if harvest was less than ~138,000 lbs.

Table 2a. Direct comparison of rounded delta AIC values from binomial GLMMs explaining the proportion of pups or total seals using the upper estero for the years 1982-83 and 1997-2009. "Oyst": high/low oyster value; "Oyster": continuous oyster value; "ENSO": El Nino; "up dist": spring upper estero disturbance rate; "lo dist": spring lower estero disturbance rate; "Regional pop"; annual maximum regional population size (total or pups respectively, less Drakes Estero). Models less than 4 AIC units from the best model are shaded grey.

	ΔAIC	
Model	**Pups**	**Total**
Oyst+ENSO	1	0
Oyster+ENSO	3	2
Oyst+ENSO+up dist	0*†	4
Oyst+ENSO+up dist+lo dist	1	6
ENSO+up dist	4	6
ENSO+up dist+lo dist	4	6
Regional pop	17	9
Regional pop+up dist	18	11
Regional pop+lo dist	17	11
Regional pop+up dist+lo dist	16	13
Oyst	20	18
Null	14	19
up dist+lo dist	17	19

*Pup model upper estero disturbance coefficient = -0.62 ± 0.35.
†Likelihood ratio test indicates that *Oyst+ENSO+up dist* is not a better fit than *Oyst+ENSO* alone (X^2 = 2.97, P < 0.08).

Table 2b. Coefficients, proportional change, and effect size from binomial generalized estimating equation (GEE) for proportion of Drakes Estero Seals using the upper (OB, EUF + EUN) versus lower estero based on the 21 year time series. Effect size is proportion * mean Drakes Estero population size for time series and can be interpreted as the change from the long-term average number of seals. The mean of the maximum seal counts for 1982 - 2009 was 775 total and 180 for pups.

	Pups				Total seals			
Model	**Coefficient**	**Proportion**	**Effect size**	**P**	**Coefficient**	**Proportion**	**Effect size**	**P**
Intercept	-1.39 ± 0.34			< 0.001	-1.50 ± 0.25			< 0.001
log(ENSO + 1)	0.65 ± 0.20			< 0.001	0.52 ± 0.14			< 0.001
Oyster high/low	-0.41 ± 0.19	-0.08 ± 0.03	-14 ± 4	< 0.03	-0.44 ± 0.14	-0.08 ± 0.02	-59 ± 15	< 0.003

Table 3a. Spearman rank correlations between independent variables. Significant ($P < 0.05$) correlations have an asterisk. N = 15. If adjusted for multiple comparisons using Holm's method, only the three oyster values are correlated. Oyster harvest (categorical or continuous) and annual regional population size had an r_s of ~0.78 ($P < 0.001$), and were also not used in the same model.

	Low oyster harvest 2000-2004	Low oyster harvest 1999-2004	Spring Disturbance rate	Proportion of seals at subsite A	Maximum counts at Double Point
Low oyster 1999-2004	0.87*				
disturbance rate	0.23	0.13			
Prop. seals at subsite A	-0.11	-0.17	-0.10		
Counts at Double Point	0.46*	0.50*	-0.21	0.29	
Year	0.00	0.09	-0.02	-0.92*	-0.24

Table 3b. Variance inflation factors from full models. VIFs of less than 3 represent no functional collinearity within the models (Zuur et al. 2009).

	Variance inflation factor	
Covariate	**Pups**	**Total**
Oyster harvest	1.39	1.27
Low oyster 2000-2004	1.17	1.12
Prop. seals at subsite A	1.23	1.05
Counts at Double Point	1.21	1.21
ENSO	1.09	1.06
Disturbance rate	1.13	1.14

Table 4. *A priori* models ranked by delta QAICc for the proportion of Point Reyes seal pups and total seals using Drakes Estero. Δi indicates QAICc distance from the best model and wi indicates model weight. Modeling oyster harvest as a continuous variable or low oyster during 1999-2004 gives similar results (see appendix). Models ranking within the lowest 4 QAICc units (in grey) were used for multimodel inference in table 5. Oyst: low oyster harvest from 2000-2004; DP: Double Point Counts; A: proportion of Drakes Estero seals using subsite A; Dist: anthropogenic disturbance rate.

Age class	Model	Δi	wi	r^2
Pup	Oyst + Double Point (DP)	0.0	0.35	0.51
	Oyst + DP + A	1.3	0.18	0.63
	Oyst + A	1.4	0.18	0.46
	Oyst + ENSO	2.6	0.09	0.42
	Oyst	3.3	0.06	0.26
	Year	5.0	0.03	0.20
	Oyst + Dist	5.6	0.02	0.32
	Oyst + DP + Dist + A	6.3	0.01	0.66
	DP + Year	6.4	0.01	0.29
	DP	7.3	0.01	0.12
	Null	7.7	0.01	0.00
	Regional pup count	10.3	0.00	0.02
Pup + Adult	Oyst + Double Point (DP)	0.0	0.55	0.54
	Oyst + DP + A	2.4	0.16	0.61
	Oyst + A	3.9	0.08	0.42
	Oyst	4.3	0.06	0.29
	Oyst + Dist	4.5	0.05	0.41
	Oyst + DP + Dist + A	6.1	0.02	0.67
	Oyst + ENSO	6.3	0.02	0.35
	Regional total count	7.9	0.01	0.19
	Year	8.5	0.01	0.17
	DP + Year	9.6	0.00	0.25
	DP	10.4	0.00	0.11

Table 5. Multimodel weighted coefficients of all models within 4 QAICc of the best model for pups and total seals in Drakes Estero (see table 4). Models represent an Akaike weight (wi) of 0.87 for both pups and total. Number in parentheses after the "low oyster" coefficients represent the bootstrapped standard error estimate of 2000 replicates. Proportional change represents change in use of Drakes Estero. Effect size is based on mean seal counts of all Point Reyes area colonies during the study period.

	Logit Coefficients		Proportional change		Effect Size	
Variable	**Pups**	**Total**	**Pups**	**Total**	**Pups**	**Total**
Intercept	-0.26 ± 0.19	-0.37 ± 0.16				
Low oyster (low/high)	-0.27 ± 0.08 (0.05)	-0.23 ± 0.07 (0.03)	-0.07 ± 0.02	-0.05 ± 0.02	-65 ± 18	-192 ± 58
Double Point (per 100 seals)	-0.04 ± 0.02	-0.04 ± 0.02	-0.010 ± 0.005	-0.010 ± 0.005	-10 ± 5	-36 ± 18
Subsite A (low to high)	-0.43 ± 0.22	-0.11 ± 0.07	-0.09 ± 0.05	-0.03 ± 0.02	-91 ± 51	-106 ± 71
Oyster (per 100,000 lbs)*	-0.06 ± 0.02	-0.08 ± 0.03	-0.019 ± 0.006	-0.020 ± 0.007	-19 ± 6	-71 ± 25

*not multimodel: from Oyster + Double Point count model.

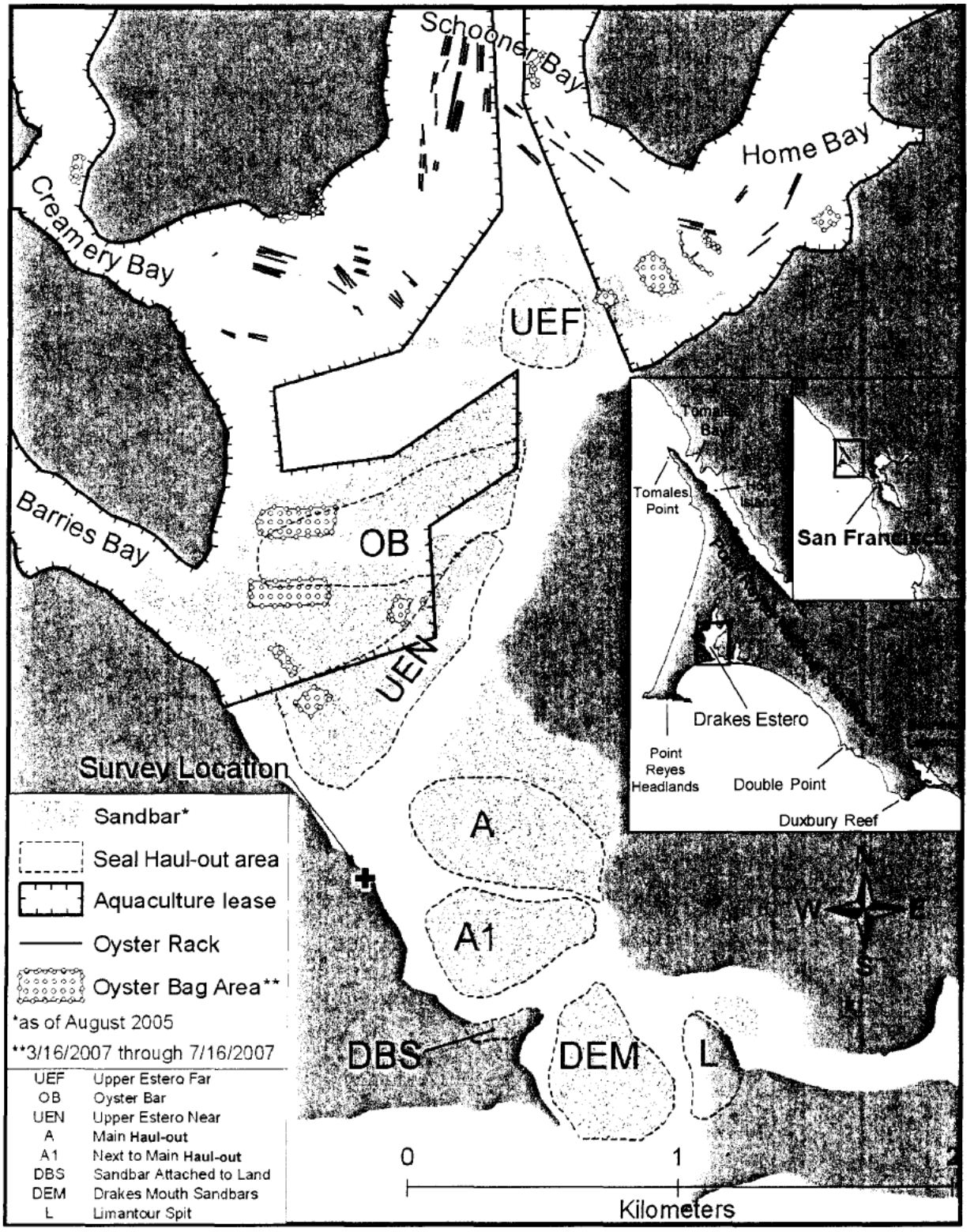

Figure 1. Drakes Estero and the eight labeled seal haul out subsites. Subsites UEF, OB, and UEN are considered "near" mariculture, while A, A1, DBS, DEM, and L are considered "away" from mariculture. Inset shows all the Point Reyes area colonies: Tomales Bay, Tomales Point, Point Reyes Headlands, Drakes Estero, Double Point, Duxbury Reef, and Bolinas Lagoon. Figure modified from Becker et al. (2009).

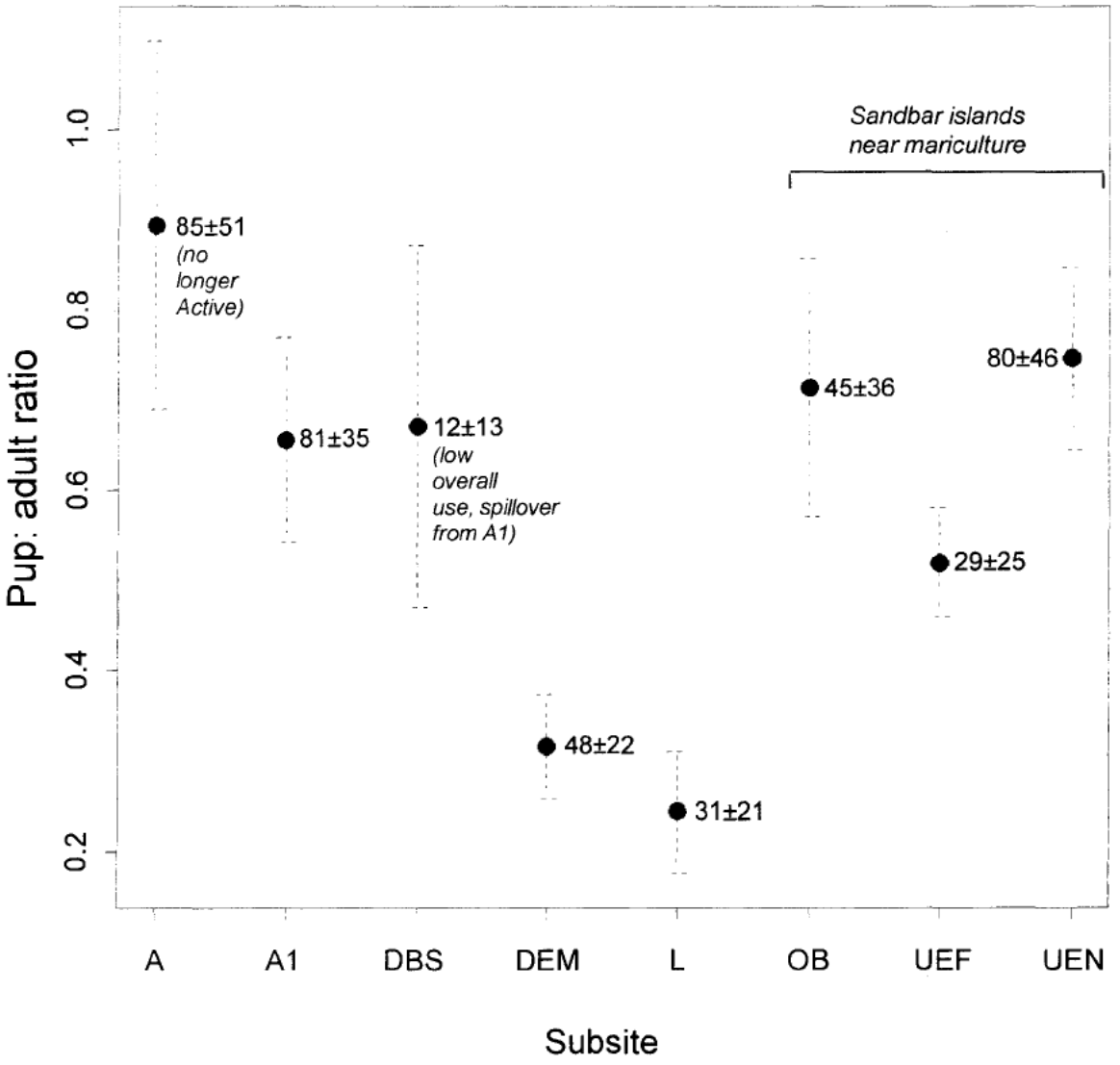

Figure 2. Mean (± SE) of maximum annual pup:adult ratios by subsite in Drakes Estero, 1997 - 2009. Numbers next to points represent the mean (±SD) of the maximum annual pup counts at that subsite from 1997 – 2009. The ratios at the estero mouth (DEM and L) are lower than the other six subsites and UEF is lower than A. DBS is adjacent to A1 has very low seal counts and pup production (~12/yr) indicating it is a minor site that appears to catch spillover seals when A1 gest crowded. Since 2004, seals have abandoned subsite A due to attachment to the mainland and subsequent predator and human access.

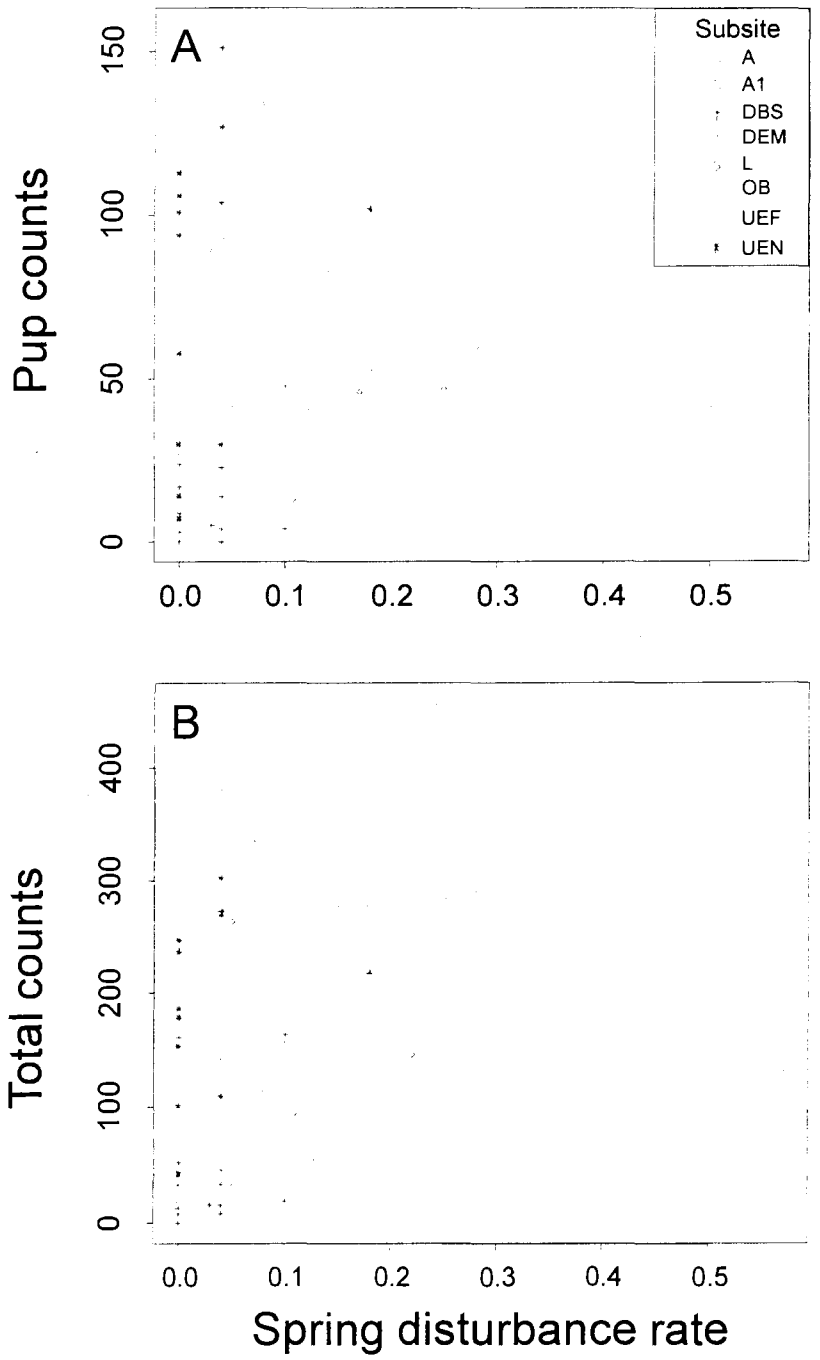

Figure 3 A & B. There is no significant relationship between Spring anthropogenic disturbance rate and (A) maximum annual pup counts at individual Drakes Estero subsites ($P > 0.38$) or (B) maximum annual total counts at individual Drakes Estero subsites ($P > 0.28$) for 1997 – 2009. Analyses were done with subsite as a random effect allowing random intercepts.

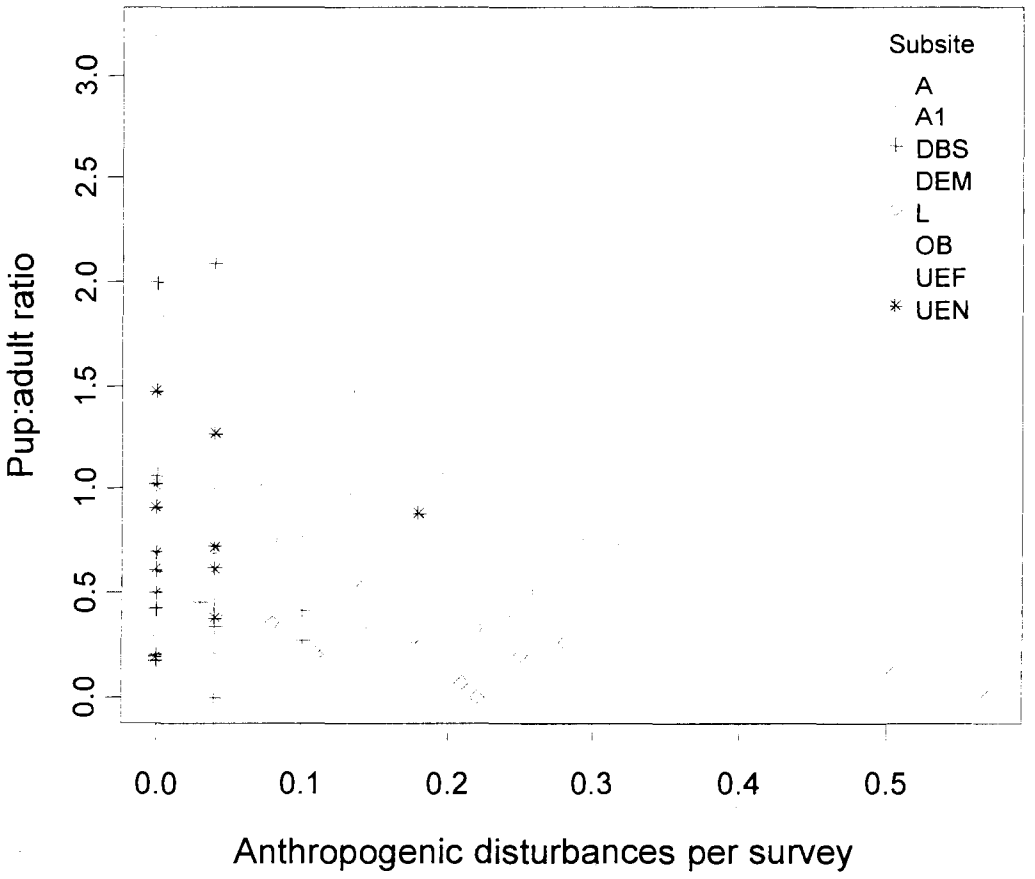

Figure 3C. The pup:adult ratio has no detectable relationship with anthropogenic disturbance rate either at the subsite level or the estero level.

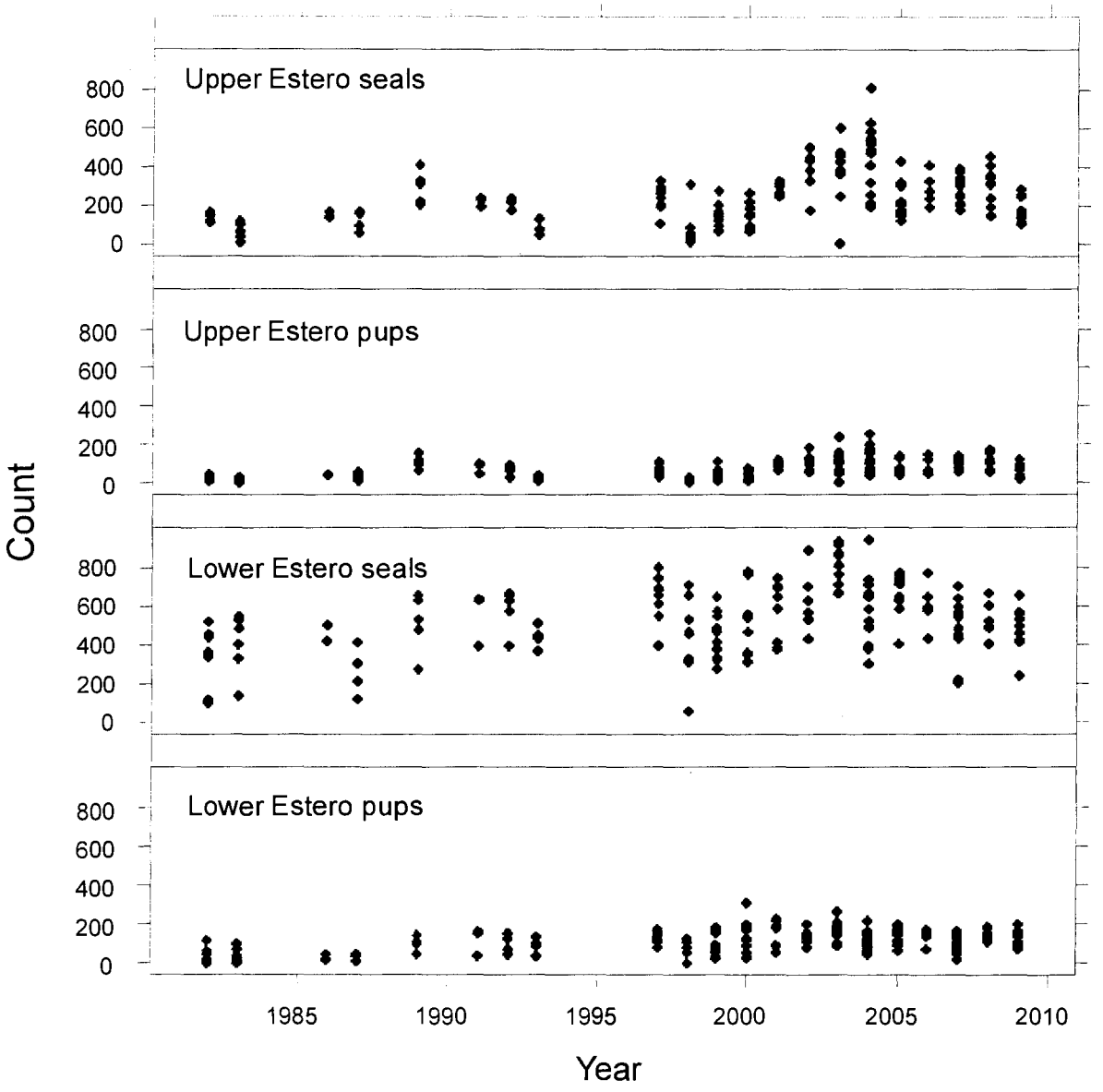

Figure 4. Daily maximum counts of harbor seals in Drakes Estero during April 15 – May 15, between 1982 and 2009.

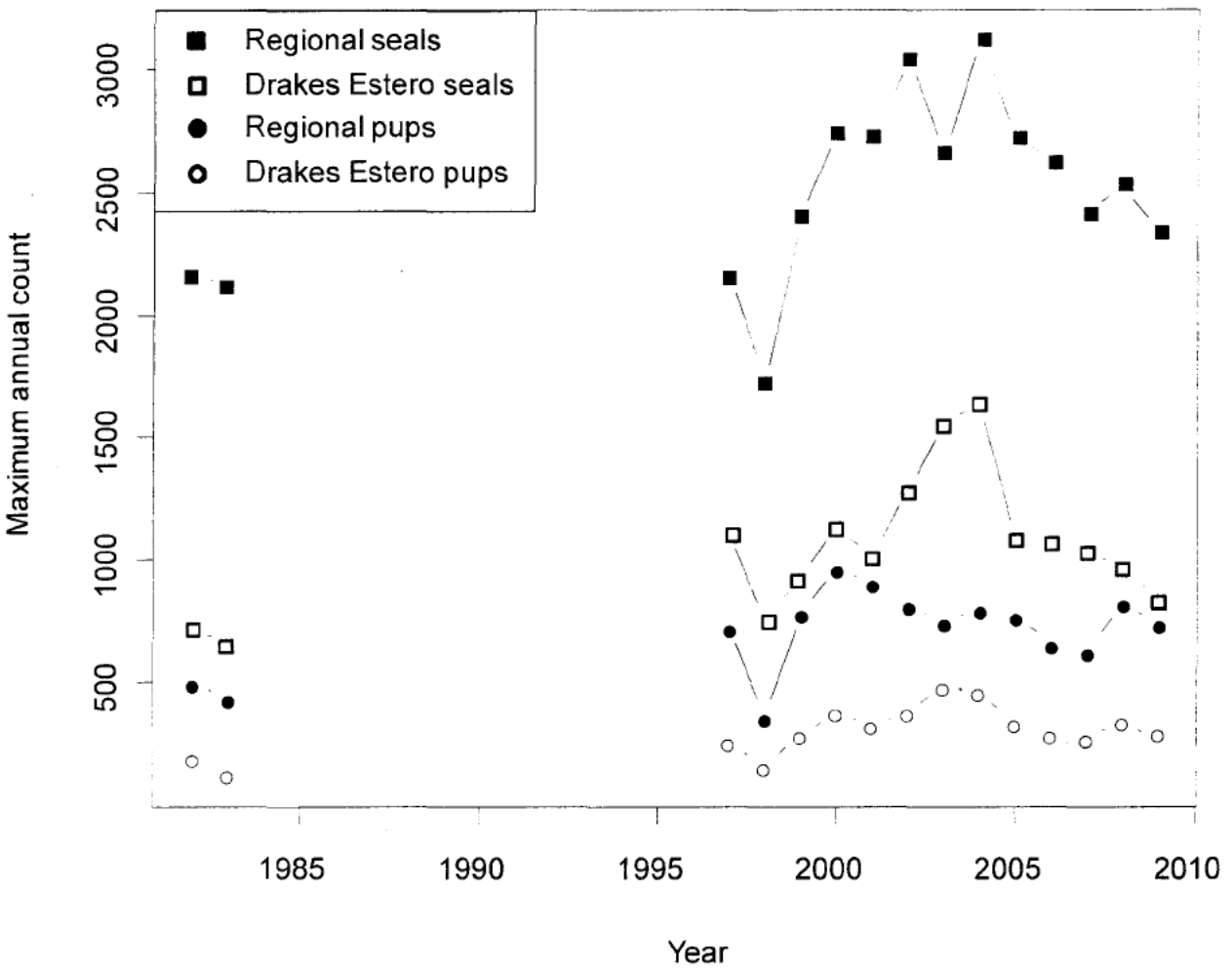

Figure 5. Annual maximum counts of harbor seals in Drakes Estero and the Point Reyes region (less Drakes Estero) during April 15 – May 15, between 1982 and 2009. Regional surveys were not conducted between 1984 and 1996.

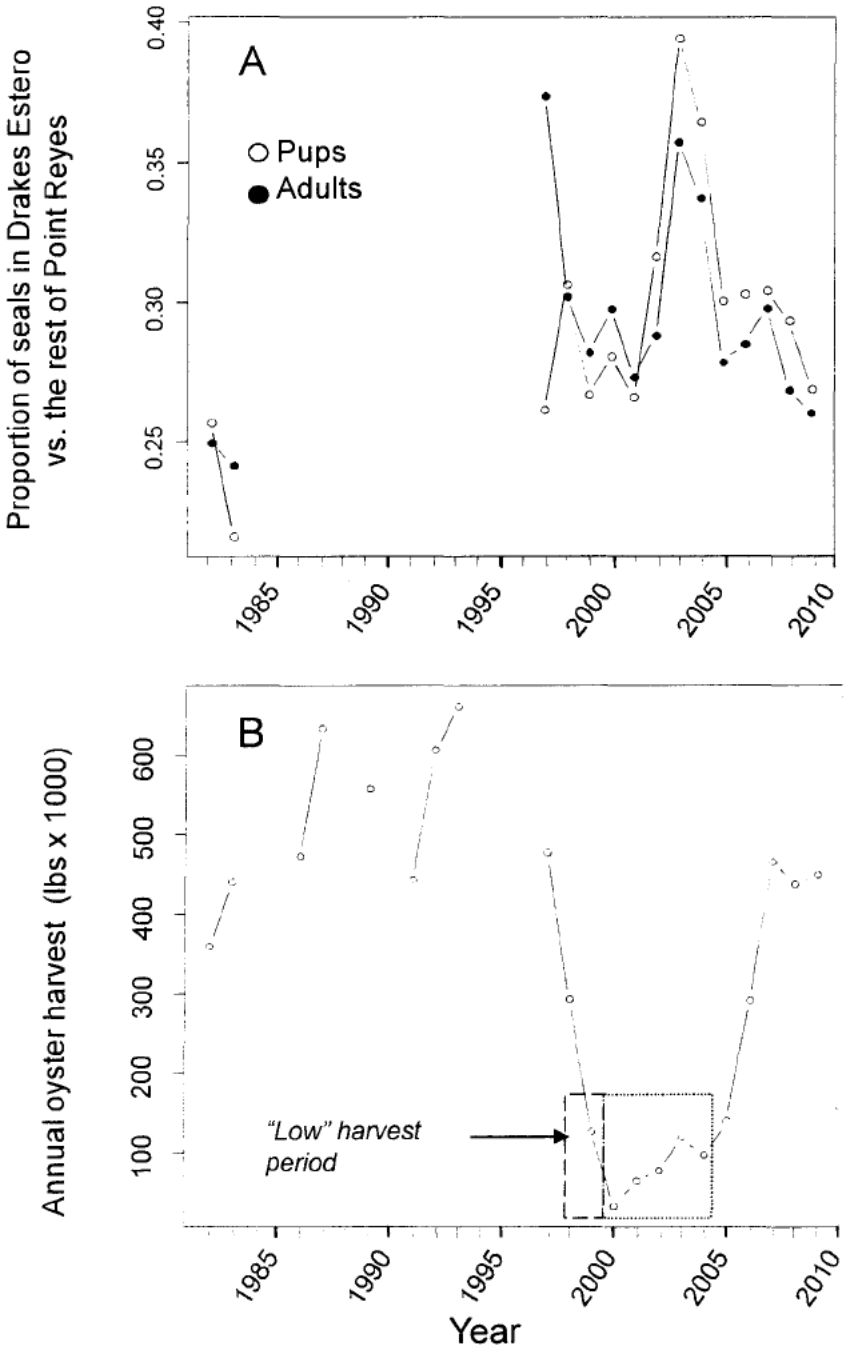

Figure 6. 1982 – 2009 time series of (A) proportion of Point Reyes region pup and adult harbor seals in Drakes Estero during the breeding/pupping season and (B) oyster harvest in Drakes Estero. Due to uncertainty in classification (Table 1), 1999 was modeled as both a "high" and "low" oyster harvest year. The 2009 oyster harvest is estimated based on 2007-2008 harvest.

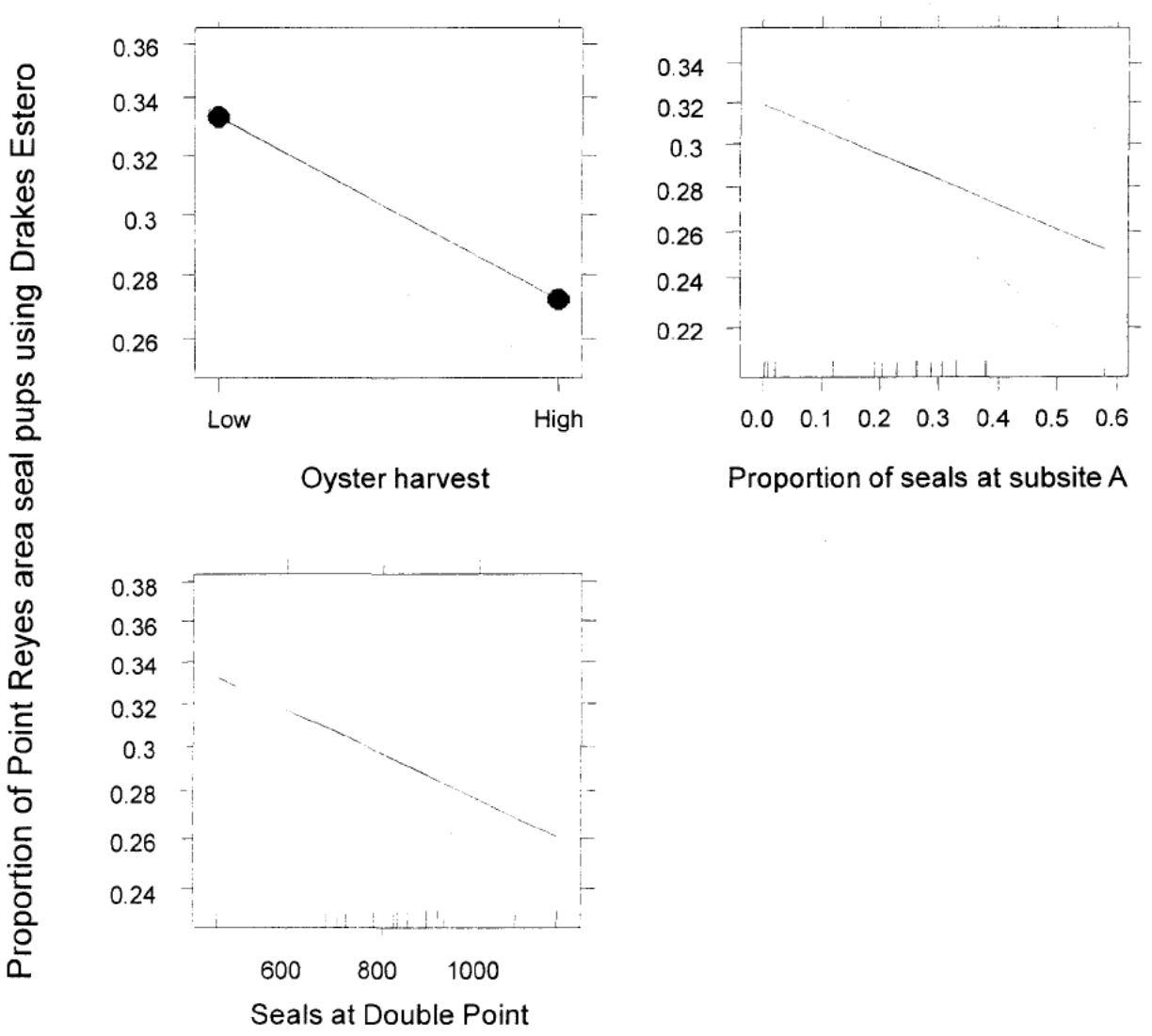

Figure 7. Model effects plots with standard errors for the proportion of Point Reyes area seal *pups* using Drakes Estero. Plots derived from the best model containing all three terms (oyster harvest, subsite A and double point. Multi-model averaged results are similar, but not identical (Table 5).

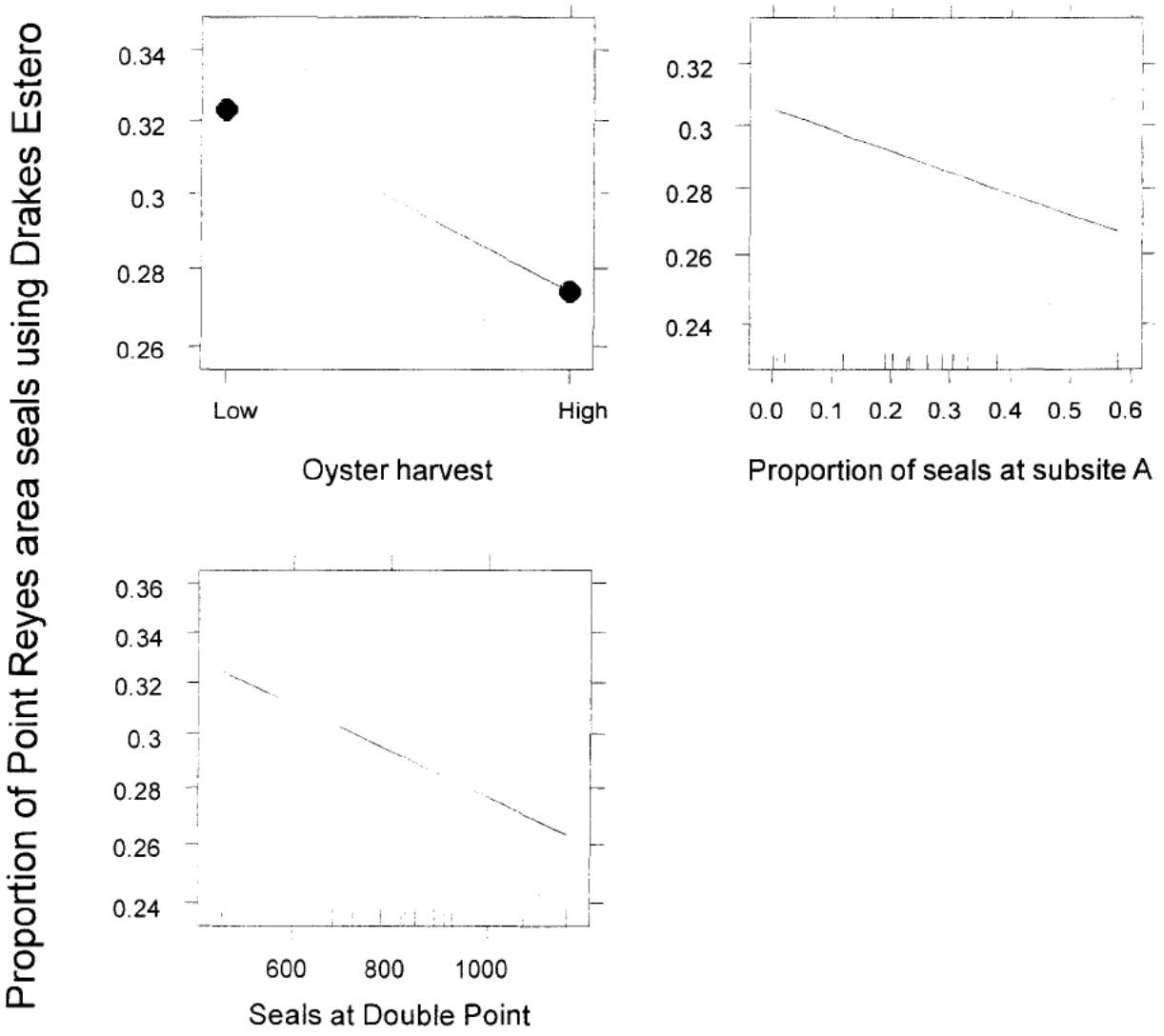

Figure 8. Model effects plots with standard errors for the proportion of Point Reyes area *seals* using Drakes Estero. Plots derived from the best model containing all three terms (oyster harvest, subsite A and Double Point). Multi-model averaged results are similar, but not identical (Table 5).

Supplement to Table 4. This table includes information in Table 4 and additional details of models tested. *A priori* models ranked by QAICc for the proportion of Point Reyes area seals using Drakes Estero. An "x" indicates the coefficient was selected in the model. Δi indicates QAICc distance from the best model and wi indicates model weight. "Low oyster 1999-2004" and "Oyster harvest" are only included for reference and not included in Akaike weights. Models ranking within the lowest 4 QAICc units are shaded grey and used for multimodel inference in table 5.

		Oyster related			Nearby colonies		Internal colony effects							
Age class	Model	Low oyster 2000-2004	Low oyster 1999-2004	Oyster harvest	Total regional counts	Double Point counts	Drakes Estero disturbance rate	Seals at A in Drakes Estero	ENSO	Year	Null	Δi	wi	r^2
Pup	1	x				x						0.0	0.35	0.51
	2			x		x		x				1.3		0.63
	3	x				x		x				1.3	0.18	0.63
	4	x						x				1.4	0.18	0.46
	5			x		x						1.5		0.46
	6	x							x			2.6	0.09	0.42
	7		x			x						3.3	.	0.40
	8	x										3.3	0.06	0.26
	9			x				x				3.4	.	0.40
	10		x					x				4.2	.	0.36
	11									x		5.0	0.03	0.20
	12	x					x					5.6	0.02	0.32
	13		x									6.3	.	0.16
	14	x				x	x	x				6.3	0.01	0.66
	15					x				x		6.4	0.01	0.29
	16			x								6.5	.	0.15
	17					x						7.3	0.01	0.12
	18										x	7.7	0.01	0.00
	19								x			7.7	0.01	0.11
	20							x				8.2	0.01	0.09
	21					x			x			9.1	0.00	0.19
	22			x			x					9.2	.	0.19
	23					x		x				9.8	0.00	0.17
	24				x							10.3	0.00	0.02
	25						x					10.6	0.00	0.01
	26					x	x					11.0	0.00	0.13
	27				x			x				11.9	0.00	0.10
Pup + Adult	1	x				x						0.0	0.55	0.54
	2	x				x		x				2.4	0.16	0.61
	3			x		x						2.5	.	0.47
	4		x			x						2.5	.	0.47
	5			x		x		x				3.8	0.09	0.57
	6	x						x				3.9	0.08	0.42
	7	x										4.3	0.06	0.29
	8	x					x					4.5	0.05	0.41
	9		x					x				6.0	.	0.36
	10	x				x	x	x				6.1	0.02	0.67
	11	x							x			6.3	0.02	0.35
	12		x									6.8	.	0.22
	13			x				x				7.5	.	0.32
	14				x							7.9	0.01	0.19
	15									x		8.5	0.01	0.17
	16			x								8.8	.	0.16
	17					x				x		9.6	0.00	0.25
	18			x			x					9.6	.	0.24
	19					x						10.4	0.00	0.11
	20				x			x				10.5	0.00	0.22
	21										x	10.9	0.00	0.00
	22							x				11.7	0.00	0.07
	23						x					12.4	0.00	0.05
	24								x			12.6	0.00	0.05
	25					x		x				13.0	0.00	0.15
	26					x	x					13.2	0.00	0.14
	27					x			x			13.4	0.00	0.14

OFFICE OF INSPECTOR GENERAL
U.S. DEPARTMENT OF THE INTERIOR

EVALUATION REPORT

Interior Lacks a Scientific Integrity Policy

Report No. WR-EV-MOA-0014-2009

April 2010

United States Department of the Interior

OFFICE OF INSPECTOR GENERAL
Washington, DC 20240

APR 2 8 2010

Memorandum

To: Secretary Salazar

From: Mary L. Kendall
Acting Inspector General

Subject: Evaluation Report Titled "Interior Lacks a Scientific Integrity Policy"
(Report No. WR-EV-MOA-0014-2009)

This memorandum transmits our report detailing the results of our evaluation of the Department of the Interior's (Interior) scientific integrity policies. Specifically, our objective was to determine whether codes of conduct for scientific research and publication exist and in what form. We reviewed all scientific integrity policy documents within Interior issued in the years 2000 through 2009.

We found that Interior has no comprehensive scientific integrity policy and only one of its bureaus has such a policy. In addition, we found that Interior has no requirement to track scientific misconduct allegations. Without policies to ensure the integrity of its scientific research, Interior runs the risk that flawed information will reach the scientific community and general public, thereby breaching the public's trust and damaging Interior's reputation. The time for a comprehensive scientific integrity policy at Interior is, therefore, long overdue.

The report contains two recommendations, which, if implemented, will serve to assure accuracy and accountability in Interior's science and protect against misconduct.

Should you have any questions about this report, please do not hesitate to contact me at (202) 208-5745.

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Acronyms

U.S. Department of the Interior ..... Interior
Research and Development Council ..... Council
Office of Management and Budget ..... OMB
U.S. Fish and Wildlife Service ..... FWS
U.S. Geological Survey ..... USGS
National Park Service ..... NPS
Office of Inspector General ..... OIG
White House's Office of Science and Technology Policy ..... OSTP
U.S. Department of Health and Human Services ..... HHS

Synopsis

The Department of the Interior (Interior) has never had, and currently operates without, a scientific integrity policy. Further, it has no requirement to track allegations of scientific misconduct, and its discipline and adverse action policy is deficient to the point that scientific misconduct deeds could go unpunished. Without sound policies to protect the scientific community and general public from potentially flawed scientific research, data, and publications, Interior's reputation and its public trust are at risk.

Interior's mission is, in part, to protect and manage the Nation's natural and cultural resources. This responsibility includes producing accurate and reliable information about those resources. Scientific research and development programs are essential for carrying out this mission. To this end, Congress appropriates billions of dollars for Interior's scientific endeavors. In fiscal years 2008 and 2009, Congress set aside more than $1.4 billion for Interior scientific research projects. Given the emphasis on Interior's science programs, a comprehensive policy should be in place to ensure sound scientific practices. To date, Interior has never had a comprehensive scientific integrity policy.

In this report, we make two recommendations, which, when implemented, will serve to assure accuracy and accountability in Interior's science and protect against misconduct.

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Introduction

The mission of the Department of the Interior (Interior) is, in part, to protect and manage the Nation's natural resources and cultural heritage and to develop and use scientific information about those resources. To this end, Interior funds a variety of scientific research studies. Without sound policies to protect the scientific community and general public from potentially flawed scientific research, data, and publications, Interior's reputation and its public trust are at risk.

Background

Congress appropriates billions of dollars for federal scientific research and development. In fiscal years 2008 and 2009 alone Congress appropriated to Interior more than $1.4 billion for scientific research projects. The Research and Development Council (Council) uses investment criteria created by the Office of Management and Budget (OMB) to evaluate program relevance, quality, and performance.

Figure 1. Atlantic Salmon Smolt. These salmon are one of the species Fish and Wildlife Service has targeted for recovery.

Science projects are conducted both internally by employees and externally by contractors. Interior science projects include, but are not limited to, oil spills, geologic hazards, acid mine drainage, Everglades restoration, geologic studies, desalination, climate change and biological research.

For many years Interior has advocated the importance of scientific integrity. In its current strategic plan, Interior has touted that "Integrity must remain the foundation of all Department of the Interior science: impartiality, honesty in all aspects of scientific enterprise, and a commitment to making that information available to the public as a whole." The Secretary stated that one of his priorities "will be to lead the Interior Department with openness in decision-making, high ethical standards, and respect for scientific integrity."

Scientific integrity is necessary for Interior to ensure the science it uses fulfills its mission. Interior has already found itself in situations which illustrate the need for an Interior-wide scientific integrity policy. One example is a case that garnered media and congressional scrutiny when the then Deputy Assistant Secretary for Fish, Wildlife and Parks was found to have unduly influenced a critical habitat designation. The fallout resulted in having to republish the corrected designation, but even more damaging was the effect on the public's trust in Interior. In another example, a National Park Service (NPS) senior science advisor for Point Reyes National Seashore misrepresented research regarding sedimentation, failed to provide information sought after from a Freedom of Information Act request, and misinformed individuals in a public forum regarding sea life data, which put into question NPS' scientific integrity.

Figure 2. Pine Rocklands, some of which are located in Everglades National Park, restoration has been the objective of some Fish and Wildlife Programs.

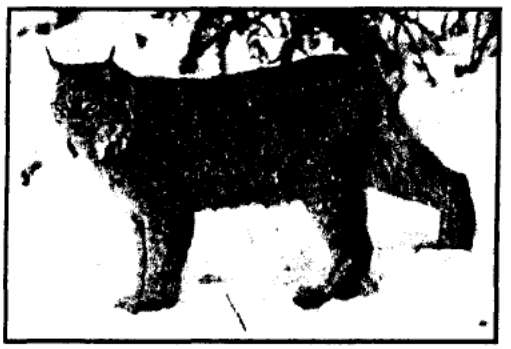

Figure 3. The Canada Lynx was listed as threatened under the Endangered Species Act in 2000.

In yet another example, the Office of Inspector General (OIG) conducted an investigation of scientific misconduct by Fish and Wildlife Service (FWS) biologists who submitted unauthorized samples that could have tainted the results of a Canada Lynx Survey.

Findings

Interior has never had a comprehensive scientific integrity policy, or any requirement to track scientific misconduct allegations. A decade ago, the White House's Office of Science and Technology Policy (OSTP) required all executive office agencies to implement scientific integrity policies that would address scientific misconduct.[1] Further, in a 2002 investigative report, OIG recommended that Interior develop a code of scientific ethics. Despite this, Interior has failed to implement a comprehensive scientific integrity policy. The lack of a comprehensive policy leaves not only Interior, but those who rely upon its scientific information, vulnerable to tainted data and misinformed decisions and, as a consequence, could have a negative effect on public trust.

No Comprehensive Scientific Integrity Policy

Failed Draft Policy

Interior has no comprehensive scientific integrity policy. In 2007, the Secretary convened the Research and Development Council made up of representatives from each bureau, which replaced Interior's Science Board. The purpose of the Council was to assist in the planning, coordinating, and assessing of agency strategic science priorities, and to provide a forum for discussion of research and development activities to enhance scientific innovation and the effective use of science for decisions made by Interior officials. This Council drafted a policy for the Departmental Manual titled, "Integrity of Scientific Activities and Code of Scientific Conduct." Unfortunately, this policy was never finalized. According to Interior officials, a decision was made to delay the adoption of the policy. This was due to several reasons, such as the bureaus' inability to reach consensus and the impending administration change.

Regardless of the reasons for failure, Interior has not implemented a comprehensive scientific integrity policy, despite having been aware of the requirements to have such a policy for more than a decade. (See Figure 4.)

[1] See appendix 2 for detailed information about federal policies regarding the establishment of scientific integrity requirements

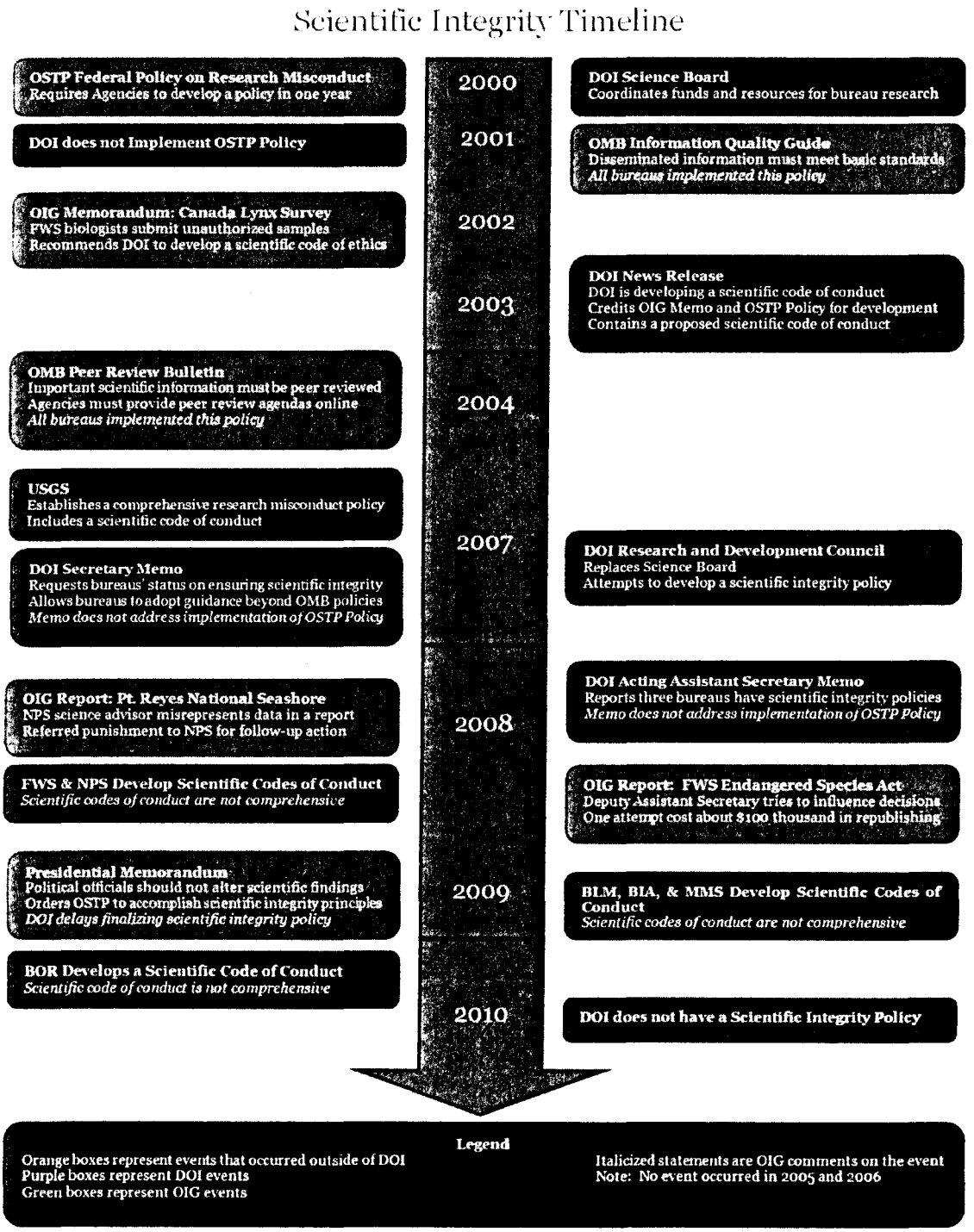

Figure 4. Timeline of the Department's Scientific Integrity from 2000 through 2010

Responsibility Delegated to the Bureaus

In 2007, Interior issued a memorandum that required Bureau directors to determine whether individual bureaus needed to implement new guidance beyond what was required by OMB. The memo, however, failed to refer to the 2000 OSTP policy on scientific research misconduct, which required new policy.

An October 2008 memo from the Acting Assistant Secretary for Water and Science to the Secretary stated that 3 bureaus (U.S. Geological Survey (USGS), FWS, and Office of Surface Mining) have "fully implemented scientific integrity guidance documents." USGS, however, was the only bureau to have implemented a comprehensive scientific integrity policy. Other bureaus developed a scientific code of conduct, but the policies did not address the research misconduct requirements outlined by OSTP. Further, the bureau policies fail to address many scientific integrity issues. (See Appendix 3.)

No Requirement to Track Misconduct Allegations

With the exception of the USGS policy, Interior has no policy in place to consistently address scientific misconduct allegations. At National Park Service (NPS) allegations are handled at the field office level and are never escalated to the attention of higher level management. One of the elements incorporated into the USGS scientific integrity policy is a reporting requirement, which provides that all service-wide research misconduct allegations be reported annually.

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Promising Practices

Many executive office agencies and other respected science institutions, including Stanford University, Purdue University, National Science Foundation, Department of Transportation, Department of Energy, and Department of Health and Human Services (HHS), have implemented comprehensive scientific integrity policies covering all employees and contractors to protect agency-produced science. We found that more than half of the President's 15 cabinet offices have scientific integrity policies in place. (See Figure 6.)

Whitehouse Cabinet Level Departments with Scientific Integrity Policies

Departments
Agriculture
Education
Energy
Health and Human Service
Homeland Security
Labor
Transportation
Veteran Affairs

Figure 6. This table lists the cabinet offices that have scientific integrity policies.

At Interior, USGS scientific integrity policy is the only one that meets OSTP requirements. USGS accomplished this, in part, by setting forth rights and responsibilities of individuals involved in scientific research along with providing detailed processes on how to conduct inquiries and investigations into allegations of scientific misconduct and the requirements for reporting them. Furthermore, the policy provides timelines to ensure a speedy process. This policy, however, could be improved by adopting other Federal agencies' processes. For example, HHS has procedures for handling allegations of research misconduct as well as practices to deter it. If an incident of research misconduct is found to have occurred, a summary of the case is posted on the HHS website for public viewing. In addition, HHS proactively attempts to prevent research misconduct by providing training and programs, for both internal and external research, to teach responsible research protocol and promote research integrity. HHS also provides newsletters and annual reports on research misconduct. All of these things help provide the public with an assurance that research done within HHS is of the highest level of integrity. (See Appendix 4.)

Conclusions

Because science is an essential component in Interior's decision-making and mission accomplishment, Interior has the responsibility to ensure its scientific integrity. To date, Interior has no comprehensive policy that serves to assure accuracy and accountability in its science and protect against misconduct. Past examples of lapses in scientific integrity illustrate the need for appropriate policies and controls commensurate with the level of importance that science plays in Interior.

An Interior-wide comprehensive scientific integrity policy is long overdue and should not be relegated to the bureaus. We found that the policy created by USGS supplemented by HHS's processes to track and report misconduct can serve as a model for Interior. We have outlined the components of the USGS and HHS policies in Appendix 4 of this memorandum.

Recommendations

We recommend to the Secretary that Interior:

1. Develop and implement an Interior-wide comprehensive scientific integrity policy that addresses required elements of the OSTP scientific misconduct policy, to include provisions for both internal and external scientific research, applicable to all agents, appointees, employees and contractors involved in researching and publishing scientific results of any kind, include a misconduct allegation reporting requirement, and a range of disciplinary actions.
2. Designate a responsible official to guide the development and implementation of an Interior-wide scientific integrity policy and to oversee the bureaus implementation and application of the policy.

Appendix 1

Objective, Scope and Methodology

The objective of our evaluation was to research existing Federal and Interior guidance related to scientific integrity and to determine whether codes of conduct for scientific research and publication exist and in what form. The Codes of Conduct for the purposes of our review includes any measures and or policies that ensures the integrity of scientific research. Our scope included all documents relating to Interior's scientific research policy from calendar years 2000 through 2009. In addition, we:

- reviewed all applicable laws, rules and regulations and Interior and bureau policies related to scientific research;
- interviewed Interior and bureau officials regarding scientific integrity policy;
- reviewed bureaus' scientific budget justifications for fiscal years 2008 and 2009; and
- reviewed the OMB guidance from 2001 and 2004 regarding Information Quality and Peer reviews and OSTP policy from 2000 regarding scientific research misconduct.

Our review did not include determining the extent or effectiveness of the Information Quality Guide, Peer Review processes, or scientific integrity policies from other agencies.

Appendix 2

Governmentwide Scientific Integrity Requirements

The Federal government has long advocated the highest level of integrity in all aspects of the executive branch's involvement with scientific processes. We found three Federally-issued directives that serve to ensure scientific integrity. Two directives issued by the Office of Management and Budget (OMB) on information quality (issued in 2001) and peer review (issued in 2004), which serve to ensure that Federally funded information released to the public is accurate and reliable. All Interior bureaus implemented the OMB directives. The third directive was issued by the White House's Office of Science and Technology Policy (OSTP) in 2000, which required all executive office agencies to implement scientific integrity policies that would address research misconduct. For more than three decades OSTP has directed agencies in developing and implementing sound science and technology policies.

OSTP requires a research misconduct policy for each Federal agency. The research misconduct policy should include the following:

- A definition of research misconduct and the elements of a research misconduct finding;
- Instructions for handling research misconduct allegations and adjudication, including standards for objectivity and timeliness;
- Safeguards for informants and subjects of allegations; and
- Possible administrative actions for research misconduct findings.

In March 2009, President Obama issued a memorandum that required each agency to have appropriate scientific integrity rules and procedures and that when scientific or technological information is considered in policy decisions it must be subject to well established scientific processes. The memorandum went on to state that agencies are required to have procedures to identify and address instances when information may be compromised.

Appendix 3

Scientific Research Misconduct Policy Comparison

White House's Office of Science and Technology Policy *Policy on Research Misconduct Requirements*	DOI	BIA	BLM	BOR (Temporary Release 1-11-2010)	FWS	MMS	NPS	OSM	USGS (Issued 1/2007)
Misconduct Defined	✗	✗	✗	✗	✗	✓	✗	✗	✓
Requirements for Findings of Research Misconduct *(significant departure from accepted practices of relevant research community; intentional, knowing, reckless; and, proven by preponderance of evidence)*	✗	✗	✗	✗	✗	✗	✗	✗	✓
Responsibilities of Federal Agencies and Research Institutions **Referral of Allegations* **Response to Allegations* **Inquiry* **Investigation* **Adjudication* **Agency follow-up to Institutional Action* **Institutional Notification of the Agency*	✗	✗	✗	✗	✗	✗	✗	✗	✓
Guidelines for Fair and Timely Procedures: **Safeguards for Informants* **Safeguards for Subjects of Allegations* **Objectivity and Expertise* **Timeliness* **Confidentiality*	✗	✗	✗	✗	✗	✗	✗	✗	✓
Agency Administrative Actions **Seriousness of the Misconduct* **Possible Administrative Actions*	✗	✗	✗	✓	✓	✗	✗	✗	✓
Scientific Code of Conduct Statements	✗	✓	✗	✓	✓	✓	✗	✗	✓

✗ - indicates lack of policy

✓ - indicates policy in place

Appendix 4

A Model Policy Based on USGS and HHS Policies

Integrated Comprehensive Scientific Integrity Policy		
	USGS	HHS
Scientific Research Conduct Guidelines - Provides guidance to employees who engage in scientific activities to promote scientific integrity	✓	✓
Review Panel - Responsible for conducting an investigation - Appointed and must not have a conflict of interest with the investigation	✓	✓
Policy to Handle Allegations of Misconduct - Criteria necessary to establish research misconduct - Initial inquiry to determine if an investigation is warranted - Investigation, if warranted, to determine if research misconduct has occurred - Handled in a manner to protect the rights of all involved as much as possible - Completed in a timely manner	✓	✓
Disciplinary Actions - Includes all employees and contractors - Includes possible disciplinary actions	×	✓
Record Keeping - Number of allegations of scientific misconduct - Whether scientific misconduct was found - Disciplinary actions taken	✓	✓
Public Viewing - Incidents of research misconduct are available for public viewing via agency website	×	✓
Education - Provides regular training on research misconduct - Distributes newsletters on a regular basis regarding research misconduct	×	✓
Allegation Reporting Process	✓	✓

× - indicates lack of policy

✓ - indicates policy in place

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Report Fraud, Waste, Abuse, and Mismanagement

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Washington Metro Area 703-487-5435

By Fax: 703-487-5402

By Internet: www. doioig.gov/hotline

Frost, Gavin

From: Secretary of the Interior
Sent: Tuesday, February 01, 2011 9:13 AM
Subject: Secretary's Priority Message - New Scientific Integrity Policy

February 1, 2011

MEMORANDUM

TO: All Department of the Interior Employees

FROM: Secretary /s/

SUBJECT: New Scientific Integrity Policy

I am pleased to share with you a new policy meant to ensure and maintain the integrity of scientific and scholarly work used for decision making in the Department. The Policy includes the designation of a Departmental Science Integrity Officer and represents the first time scientific integrity guidelines have been adopted Department-wide by a Federal agency.

The Policy calls for use of science and scholarship to inform management and public policy decisions and establishes scientific and scholarly ethical standards, including codes of conduct, a process for the initial handling of alleged violations, and clear guidance on how employees can participate as officers or members on the board of directors of non-Federal organizations and professional societies.

By establishing this policy, the Department exceeds the expectations set forth by the Presidential Memorandum on Scientific Integrity, dated March 9, 2009, and meets the call for ensuring the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes as laid out in the Office of Science and Technology Policy (OSTP) 2010 guidance memo on scientific integrity.

This policy applies to all Department employees, including political appointees, when they engage in, supervise, manage, or influence scientific and scholarly activities, or communicate information about the Department's scientific and scholarly activities, or utilize scientific and scholarly information in making agency policy, management or regulatory decisions. Further, it applies to all contractors, cooperators, partners, permittees, and volunteers who assist with developing or applying the results of scientific and scholarly activities.

We recognize that science and scholarship play an important role in enhancing our effectiveness and establishes credibility and value with all sectors of the public, both nationally and internationally. This new policy will help to ensure that we remain steadfast in our efforts to have high-quality science and scholarship informing our decisions and advancing the Department's mission in the best interests of the American people.

Important links:
Integrity of Scientific and Scholarly Activities Policy on ELIPS
Memorandum to Heads of Agencies and Departments on WhiteHouse.gov
oneINTERIOR – the DOI Intranet

(NOTE TO SUPERVISORS: Please ensure that all employees without e-mail access receive a paper copy of this distribution.)

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Department of the Interior
Departmental Manual

Effective Date: 1/28/11
Series: Departmental Management
Part 305: Departmental Science Efforts
Chapter 3: Integrity of Scientific and Scholarly Activities

Originating Office: Office of the Deputy Secretary

305 DM 3

3.1 **Purpose.**

A. This chapter establishes Departmental policy on the integrity of scientific and scholarly activities the Department conducts and science and scholarship it uses to inform management and public policy decisions. Scientific and scholarly information considered in Departmental decision making must be robust, of the highest quality, and the result of as rigorous scientific and scholarly processes as can be achieved. Most importantly, it must be trustworthy. It is essential that the Department establish and maintain integrity in its scientific and scholarly activities because information from such activities is a critical factor that informs decision making on public policies. Other factors that inform decision making may include economic, budget, institutional, social, cultural, legal and environmental considerations.

B. This chapter also establishes scientific and scholarly ethical standards, including codes of conduct, and a process for the initial handling of alleged violations. This chapter is not intended to, and does not create any right or benefit, substantive or procedural, enforceable by law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees or agents, or any other person.

3.2 **Background**. The Presidential Memorandum on Scientific Integrity dated March 9, 2009, and the Office of Science and Technology Policy (OSTP) 2010 guidance memorandum on scientific integrity call for ensuring the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes. The 2002 Office of Management and Budget (OMB) Information Quality Guidelines, and the 2005 OMB Information Quality Bulletin for Peer Review provide additional guidance for ensuring information quality. The Secretary issued Order No. 3305, *Ensuring Scientific Integrity within the Department of the Interior,* on September 29, 2010, directing the establishment of a Departmental Manual Chapter that sets forth principles of scientific and scholarly integrity and clarifies the roles and responsibilities of all Department of the Interior (DOI) employees in upholding these principles.

3.3 **Scope**. This chapter establishes requirements for the professional conduct and management of scientific and scholarly activities, and the use of scientific and scholarly information, by and on behalf of the Department. The requirements contained in this chapter are in addition to and do not supersede the Standards of Ethical Conduct for Employees of the Executive Branch, DOI Supplemental Standards, any of the Criminal Conflict of Interest Statutes (18 U.S.C. §§ 201-209), or law enforcement actions and/or investigations and inspections for regulatory compliance. As of the effective date, this policy applies to:

A. All DOI employees, including political appointees, (hereafter employees) when they

engage in, supervise, manage, or influence scientific and scholarly activities, or communicate information about the Department's scientific and scholarly activities, or utilize scientific and scholarly information in making agency policy, management or regulatory decisions.

B. All contractors, cooperators, partners, permittees, leasees, and grantees who assist with developing or applying the results of scientific and scholarly activities.

C. All volunteers who assist with developing or applying the results of scientific and scholarly activities.

3.4 **Policy.** The Department supports a culture of scientific and scholarly integrity. Science and scholarship play a vital role in the Department's mission, providing one of several critical inputs to decision making on conservation and responsible development of natural resources, preservation of cultural resources, and responsibilities to tribal communities. The Department recognizes the importance of scientific and scholarly information and science and scholarship as methods for maintaining and enhancing our effectiveness and establishing credibility and value with all sectors of the public, both nationally and internationally. The Department is dedicated to preserving the integrity of the scientific and scholarly activities it conducts, and activities that are conducted on its behalf. It will not tolerate loss of integrity in the performance of scientific and scholarly activities or in the application of science and scholarship in decision making. The Department will:

A. Use clear and unambiguous codes of conduct for scientific and scholarly activities to define expectations for those covered by this policy.

B. Facilitate the free flow of scientific and scholarly information, consistent with privacy and classification standards, and in keeping with the Department's Open Government Plan.

C. Document the scientific and scholarly findings considered in decision making and ensure public access to that information and supporting data through established Departmental and Bureau procedures—except for information and data that are restricted from disclosure under procedures established in accordance with statute, regulation, Executive Order, or Presidential Memorandum.

D. Ensure that the selection and retention of employees in scientific and scholarly positions or in positions that rely on the results of scientific and scholarly activities are based on the candidate's integrity, knowledge, credentials, and experience relevant to the responsibility of the position.

E. Ensure that public communications policies provide procedures by which scientists and scholars may speak to the media and the public about scientific and scholarly matters based on their official work and areas of expertise. In no circumstance may public affairs officers ask or direct Federal scientists to alter scientific findings.

F. Provide information to employees on whistleblower protections.

G. Communicate this policy and all related responsibilities to contractors, cooperators, partners, permittees, leasees, grantees, and volunteers who assist with developing or applying the results of scientific and scholarly activities on behalf of the Department, as appropriate.

H. Encourage the enhancement of scientific and scholarly integrity through appropriate, cooperative engagement with the communities of practice represented by professional societies and organizations.

I. Examine, track, and resolve all reasonable allegations of scientific and scholarly

misconduct while ensuring the rights and privacy of those covered by this policy and ensuring that unwarranted allegations do not result in slander, libel, or other damage to them.

J. Facilitate the sharing of best administrative and management practices that promote the integrity of the Department's scientific and scholarly activities.

3.5 **Definitions**.

A. Conflict of Interest. Any personal, professional, financial, or other interests that conflict with the actions or judgments of those covered by this policy when conducting scientific and scholarly activities or using scientific and scholarly data and information because those interests may:

(1) Significantly impair objectivity; or

(2) Create an unfair competitive advantage for any person or organization, or

(3) Create the appearance of either (1) or (2).

B. Contractors, Cooperators, Partners, Permittees, Leasees, and Grantees. Groups, organizations, or individuals who provide goods or services to, or otherwise interact with the Department under terms specified in a written agreement (such as a cooperative agreement, grant, or memorandum of understanding), contract, lease, or permit.

C. Decision Makers. Departmental employees who may:

(1) Develop policies or make determinations about policy or management;

(2) Make determinations about expenditures of Departmental funds;

(3) Implement or manage activities that involve, or rely on, scientific and scholarly activities; or

(4) Supervise employees who engage in scientific and scholarly activities.

D. Employees Who Engage in Scientific and Scholarly Activities.

(1) Individuals who conduct or directly supervise scientific and/or scholarly activities, including but not limited to proposing, performing, or reviewing inventory, monitoring, research, and assessment, or in reporting results of these activities; and

(2) Individuals who directly supervise or personally perform work involving the compilation and translation of scientific and scholarly data or information into formats used by the Department's decision makers and other non-scientist or non-scholar personnel.

E. Fabrication. Making up data or results and recording or reporting them. (Federal Policy on Research Misconduct, 65 FR 76260-76264, December 6, 2000.) Fabrication does not include documented use of modeling or statistical techniques.

F. Falsification. Manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. (Federal Policy on Research Misconduct, 65 FR 76260-76264, December 6, 2000.)

G. Plagiarism. The appropriation of another person's ideas, processes, results, or words without giving appropriate credit. (Federal Policy on Research Misconduct, 65 FR 76260-76264, December 6, 2000.)

H. Reporting. Dissemination of scientific and scholarly activities and results.

I. Scientific Method. A method of research in which a problem is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested.

J. Scientific and Scholarly Activities. Activities involving inventorying, monitoring, experimentation, study, research, modeling, and scientific and scholarly assessments are scientific and scholarly activities. These activities are conducted in a manner specified by documented protocols and procedures and include any of the physical, biological, cultural, or social sciences as well as landscape architecture, engineering, mathematics, and statistics that employ the scientific method.

K. Scientific and Scholarly Assessment. Scientific and scholarly information constructed to evaluate a body of scientific and scholarly knowledge, typically by analyzing and synthesizing multiple factual inputs, data, models, assumptions, and/or by applying best professional judgment to bridge and/or characterize uncertainties in the available information.

L. Scientific and Scholarly Integrity. The condition resulting from adherence to professional values and practices, when conducting and applying the results of science and scholarship, that ensures objectivity, clarity, reproducibility, and utility and that provides insulation from bias, fabrication, falsification, plagiarism, outside interference, censorship, and inadequate procedural and information security.

M. Scientific and Scholarly Misconduct.

(1) Fabrication, falsification, or plagiarism in proposing, performing, or reviewing scientific and scholarly activities, or in the products or reporting of the results of these activities. (Federal Policy on Research Misconduct, 65 FR 76260-76264, December 6, 2000.) Misconduct also includes: (a) intentionally circumventing policy that ensures the integrity of science and scholarship, and (b) actions that compromise scientific and scholarly integrity. Scientific and scholarly misconduct does not include honest error or differences of opinion.

(2) Fabrication, falsification, or plagiarism in the application of scientific and scholarly information to decision making, policy formulation, or preparation of materials for public information activities.

(3) A finding of scientific and scholarly misconduct requires that:

(a) There be a significant departure from accepted practices of the relevant scientific and scholarly community.

(b) The misconduct be committed intentionally, knowingly, or recklessly.

(c) The allegation be proven by a preponderance of evidence.

N. Scientific and Scholarly Product. The results of scientific and scholarly activities including the analysis, synthesis, compilation, or translation of scientific and scholarly information and data into formats used in the Department's decision-making processes or publications.

O. Professional Judgment. An authoritative evaluation that is characterized by or conforms to the technical and ethical standards of a discipline, and requires specialized knowledge or applicable academic preparation.

P. Volunteer. A person who provides, under the terms of a Volunteer Agreement, uncompensated hours of service to the Department for civic, charitable, or humanitarian reasons. A volunteer is not subject to the wage, hour, and compensation provisions of the Fair Labor Standards Act.

Q. Volunteer Agreement. The official Department document that must be reviewed and signed by the volunteer or volunteer group leader and the appropriate agency representative, before work can begin. The agreement statement of work will include the requirements of this chapter and describes the activity(ies) and circumstances under which the volunteer work is performed.

R. Supervisors and Managers. Employees who manage the people, funds and resources of the Department.

3.6 Responsibilities.

A. Deputy Secretary is responsible for:

(1) Providing leadership for the Department on scientific and scholarly integrity.
(2) Ensuring Departmental compliance with this policy.

(3) Designating the duties of Departmental Scientific Integrity Officer (DSIO) to a senior career staff person with scientific and/or scholarly credentials.

(4) Serving as the "Office of Primary Responsibility" for revisions to the policy in this chapter.

B. Office of the Executive Secretariat and Regulatory Affairs:

(1) Serving as the neutral point of contact for receiving allegations of misconduct against DOI employees.

(2) Referring allegations to the DSIO or appropriate Bureau Scientific Integrity Officer (BSIO).

C. Departmental Scientific Integrity Officer is responsible for:

(1) Providing Department-wide leadership for implementing this chapter.

(2) Serving as Scientific Integrity Officer for the Office of the Secretary.

(3) Implementing this chapter as it pertains to bureaus and offices of the Department.

(4) Reviewing bureau implementation procedures for consistency with this policy.

(5) Ensuring the integrity and consistency of the process across the Department.

(6) Coordinating with the appropriate Human Resources Offices.

(7) Providing additional guidance for implementing and updating this chapter, as needed.

(8) Conducting a review of allegations and submitted materials received from the Office of the Executive Secretariat and Regulatory Affairs (OES) to determine whether an inquiry is warranted and appropriate next steps, following the procedures described in Section 3.8 below.

(9) Keeping the Deputy Secretary informed on the status of the implementation of this chapter.

D. Assistant Secretaries are responsible for:

(1) Providing leadership for their bureaus/offices on scientific and scholarly integrity.

(2) Ensuring their bureaus and offices comply with this policy.

(3) Reviewing bureau/office-specific guidance, as appropriate.

E. Heads of Bureaus are responsible for:

(1) Providing leadership for the bureau on scientific and scholarly integrity.

(2) Designating a BSIO who will report to the Bureau Head or appropriate senior executive and will coordinate bureau level allegations of scientific and scholarly misconduct with the DSIO.

(3) Ensuring bureau compliance with this policy.

(4) Developing bureau-specific guidance, as appropriate.

(5) Providing bureau employees with the policy and guidance.

(6) Ensuring employees and volunteers are aware of their responsibilities and comply with the policy and any bureau-specific guidance.

(7) Ensuring that contractors, cooperators, partners, permittees, leasees, and grantees covered under the scope of this chapter are aware of their responsibilities for complying with the principles of this policy and any bureau-specific guidance.

F. Bureau Scientific Integrity Officers are responsible for:

(1) Implementing this chapter as it pertains to the bureau.

(2) Keeping the bureau head or appropriate senior executive informed on the status of the implementation of this chapter.

(3) Coordinating with the appropriate servicing human resources officer.

(4) Conducting a review of allegations and submitted materials received from the

Office of the Executive Secretariat and Regulatory Affairs to determine whether an inquiry is warranted and appropriate next steps, following the procedures described in Section 3.8 below.

(5) Coordinating with the DSIO on all submitted allegations and subsequent actions to ensure integrity and consistency of the process across the Department.

G. Managers and Supervisors are responsible for:

(1) Implementing this chapter as it pertains to their area of management or supervision.

(2) Taking appropriate administrative and disciplinary action.

(3) Consulting, as appropriate, with the DSIO, BSIO, Servicing Human Resources Officer (SHRO), Ethics Officer, Administrative Office or Contracting Office, Office of Inspector General (OIG), Office of the Solicitor (SOL) and Office of Collaborative Action and Dispute Resolution (CADR).

(4) Complying with this chapter, 370 DM 752 on Discipline and Adverse Actions, and established collective bargaining agreements.

(5) Ensuring that all contracts, written agreements, cooperative agreements, grants, permits, and leases, covered under the scope of this chapter and under their purview include the requirements of this policy in their performance work statement.

H. Employees and Volunteers are responsible for:

(1) Being aware of and upholding the principles contained in the Code of Scientific and Scholarly Conduct contained in this chapter, as well as principles of ethical conduct set forth in the Standards of Ethical Conduct for Employees of the Executive Branch (5 CFR 2635).

(2) Complying with the policy and any additional bureau/office-specific guidance.

(3) Reporting to the appropriate officials, as described in Section 3.8 of this chapter, knowledge of scientific misconduct that is planned, is imminent, or has occurred.

(4) Ensuring that any contractors, cooperators, partners, permittees, leasees, and grantees covered under the scope of this chapter with whom they are executing contracts, written agreements cooperative agreements, grants, leases or permits are aware of their responsibilities for complying with this policy and bureau/office-specific guidance.

(5) Upholding the employee responsibilities and conduct contained in Part 370 DM.

I. Contractors, Cooperators, Partners, Permittees, Leasees, and Grantees are responsible for abiding by the principles contained in this policy regarding the integrity of the Department's scientific and scholarly activities, as specified in written agreements or statements of work.

J. Scientific and Scholarly Misconduct Review Panel members are responsible for:

(1) Impartially examining allegations of scientific and scholarly misconduct, as requested.

(2) Preparing and submitting a report of findings to DSIO/ BSIO and responsible manager/supervisor.

(3) Complying with personnel requirements including established collective bargaining agreements and/or representational rights.

3.7 Code of Scientific and Scholarly Conduct.

A. All Departmental Employees, and all Volunteers, Contractors, Cooperators, Partners, Permittees, Leasees, and Grantees as described in section 3.3 (Scope) of this chapter, will abide by the following code of scientific and scholarly conduct to the best of their ability.

(1) I will act in the interest of the advancement of science and scholarship for sound decision making, by using the most appropriate, best available, high quality scientific and scholarly data and information to support the mission of the Department.

(2) I will communicate the results of scientific and scholarly activities clearly, honestly, objectively, thoroughly, accurately, and in a timely manner. (b) (5)

(3) I will be responsible for the resources entrusted to me, including equipment, funds, my time, and the employees I supervise.

(4) I will adhere to the laws and policies related to protection of natural and cultural resources and to research animals and human subjects while conducting science and scholarship activities.

(5) I will not engage in activities that put others or myself in an actual or apparent conflict of interest.

(6) I will not intentionally hinder the scientific and scholarly activities of others or engage in scientific and scholarly misconduct.

(7) I will clearly differentiate among facts, personal opinions, assumptions, hypotheses, and professional judgment in reporting the results of scientific and scholarly activities and characterizing associated uncertainties in using those results for decision making, and in representing those results to other scientists, decision makers, and the public.

(8) I will protect, to the fullest extent allowed by law, the confidential and proprietary information provided by individuals, communities, and entities whose interests and resources are studied or affected by scientific and scholarly activities.

(9) I will be responsible for the quality of the data I use or create and the integrity of the conclusions, interpretations, and applications I make. I will adhere to appropriate quality assurance and quality control standards, and not withhold information that might not support the conclusions, interpretations, and applications I make.

(10) I will be diligent in creating, using, preserving, documenting, and maintaining scientific and scholarly collections, records, methodologies, information, and data in accordance with federal and Departmental policy and procedures.

B. In addition, for Scientists and Scholars:

(1) I will place quality and objectivity of scientific and scholarly activities and reporting of results ahead of personal gain or allegiance to individuals or organizations.

(2) I will maintain scientific and scholarly integrity and will not engage in fabrication, falsification, or plagiarism in proposing, performing, reviewing, or reporting scientific and scholarly activities and their products.

(3) I will fully disclose methodologies used, all relevant data, and the procedures for identifying and excluding faulty data.

(4) I will adhere to appropriate professional standards for authoring and responsibly publishing the results of scientific and scholarly activities and will respect the intellectual property rights of others.

(5) I will welcome constructive criticism of my scientific and scholarly activities and will be responsive to their peer review.

(6) I will provide constructive, objective, and professionally valid peer review of the work of others, free of any personal or professional jealousy, competition, non-scientific disagreement, or conflict of interest. I will substantiate comments that I make with the same care with which I report my own work.

C. In Addition, for Decision Makers:

(1) I will do my best to support the scientific and scholarly activities of others and will not engage in dishonesty, fraud, misrepresentation, coercive manipulation, censorship, or other misconduct that alters the content, veracity, or meaning or that may affect the planning, conduct, reporting, or application of scientific and scholarly activities.

(2) I will offer respectful, constructive, and objective review of my employees' scientific and scholarly activities and will encourage their obtaining appropriate peer reviews of their work. I will respect the intellectual property rights of others and will substantiate comments that I make about their work with the same care with which I carry out and report the results of my own activities.

(3) I will adhere to appropriate standards for reporting, documenting and applying results of scientific and scholarly activities used in decision making and ensure public access to those results in accordance with Departmental policy and established laws.

3.8 Procedures for Reporting and Resolving Allegations Regarding Loss of Scientific and Scholarly Integrity.

The Department is dedicated to preserving the integrity of the scientific and scholarly activities it conducts, and are conducted on its behalf. It will not tolerate loss of integrity in the performance of scientific and scholarly activities or in the application of science and scholarship in decision making. This section outlines procedures for reporting and resolving allegations in a timely and fair manner (see Appendices A-1 and A-2).

A. Reporting an Allegation. Allegations of scientific and scholarly misconduct with respect

to DOI employees, volunteers, contractors, cooperators, partners, permittees, leasees, and grantees must be submitted in writing. The Department will consider allegations submitted within 60 days of discovery of alleged misconduct. Allegations may be submitted by individuals or entities, internal or external to the Department. Misconduct includes intentional fabrication, falsification, or plagiarism and is not the result of honest error or difference of opinion, such as with a scientific and scholarly process or a management decision. Cases of fraud, waste, and abuse should be directly referred to the Office of Inspector General.

An initial notice of an allegation of scientific and scholarly misconduct should be submitted to the OES and contain the following information:

(1) The name, affiliation, and signature of the person(s) submitting the allegation and the name and organization of the person(s) alleged to have committed the misconduct.

(2) Upon receipt of the above information, OES will open a file to track the allegation. The following additional information is required within 10 days of submission of the information in paragraph (1).

(3) A description of the allegation that includes the date, circumstances, and location of the alleged misconduct.

(4) Any documents or other relevant items (such as data, scientific papers, memos, etc.) with annotation showing specifically how the item relates to the allegation.

(5) An explanation of how the allegation relates to scientific and scholarly misconduct and demonstrating the impact of the alleged misconduct.

(6) A statement explaining any conflict(s) of interest the person making the allegation has with the subject(s), entity(ies), or situation(s), named in the allegation.

Allegations may be returned if they do not contain the above information.

B. Inquiry into an allegation of scientific and scholarly misconduct. The OES will refer allegations to the DSIO or the appropriate BSIO. Allegations related to bureau heads or offices within the Office of the Secretary will be referred to the DSIO. Allegations related to the bureaus will be referred to the appropriate BSIO.

(1) Where a union holds an exclusive recognition, managers and supervisor are reminded to fulfill their labor-management obligations, as appropriate, prior to implementing this policy.

(2) Particular attention should be given to any applicable collective bargaining agreement containing language which conflicts with this policy.

(3) Such language prevails over this policy until the contract is renegotiated or unless otherwise agreed to by the parties. The bureau Human Resources Office should be contacted for assistance.

C. The DSIO or BSIO will conduct a review of the allegations and submitted materials to determine whether an inquiry is warranted. Allegations that have been previously resolved will not be reopened unless substantial new information is submitted. If the DSIO or BSIO determines that the

allegation does not warrant investigation, or that the allegation was previously investigated, the DSIO o(b) (5) BSIO will dismiss the allegation and inform the submitter.

D. If the DSIO or BSIO determines that an inquiry is warranted:

(1) If Employees and/or Volunteers are the Subject of the Allegation:

(a) The DSIO or BSIO will contact the responsible manager(s) of the subject of the allegation (henceforth referred to as the "subject") to inform the manager (s) that an allegation of scientific and scholarly misconduct has been filed. For employees and volunteers, the responsible manager will normally be the supervisor, except when it is ascertained that the supervisor may have a conflict of interest, in which case an appropriate responsible manager will be assigned.

(b) The DSIO or BSIO working with the responsible manager and an assigned Servicing Human Resources Officer (SHRO), will conduct an inquiry to determine if the allegation is covered under the provisions of this chapter and will provide consistency, oversight, and guidance throughout the entire process.

(c) The subject will be notified in writing (Appendix B - Sample Notification of Allegation of Scientific Misconduct) that an allegation of scientific and scholarly misconduct has been filed against them. The notification shall be conducted privately and preferably in person. At the time of notification, the manager will ensure that all original records and materials relevant to the allegation are immediately secured.

(d) Throughout the inquiry and fact finding, confidentiality must be maintained and identities of the subject of the allegation and person submitting the allegation will be protected.

(2) If Contractors, Cooperators, Partners, Permittees, Leasees, or Grantees are the Subject of the Allegation:

(a) The DSIO or BSIO will contact the appropriate federal official responsible for the activities of the contractors, cooperators, partners, permittees, leasees, or grantees that are the subject of the inquiry to inform the official that an allegation of scientific and scholarly misconduct has been filed. The appropriate official could be the Contracting Officer or Financial Assistance official (CO/FA) or permit/lease manager. The DSIO or BSIO working with the appropriate official shall notify the subject's organization (or the subject in the case of a single independent contractor, cooperator, partner, permittee, leasee, or grantee) of the allegation to request investigation and remedy.

(b) Throughout the inquiry and fact finding, confidentiality must be maintained and identities of the subject of the allegation, their organization, and person submitting the allegation will be protected.

E. Potential outcomes of inquiry into an allegation of scientific and scholarly misconduct.

(1) Employees and Volunteers:

(a) If the DSIO or BSIO working with the manager establishes through the inquiry that no misconduct has occurred, the case will be dismissed and closed. The DSIO or BSIO working with the manager will issue a memorandum to the subject with a copy to the DSIO (if from the

BSIO) explaining that the case is dismissed (Sample Closure Memorandum - Appendix C).

(b) If during the inquiry the DSIO or BSIO working with the manager determines that an incident occurred but (1) was not intentional or reckless and therefore not misconduct, or (2) that misconduct occurred, however there is no need for further fact finding; the DSIO or BSIO will work with the manager and SHRO to determine appropriate corrective action, as necessary. The DSIO or BSIO and manager will meet with the subject to explain any actions that will be taken concerning this incident, close the case, and report resolution of the case to the DSIO (if from the BSIO).

(c) If the DSIO or BSIO working with the manager determines that there appears to be merit to the allegation, and that a formal review and further fact finding by a panel of experts is required to determine the validity of the allegation and the extent and nature of the alleged misconduct, then the DSIO or BSIO will notify the manager and the subject(s) and a panel will be established as follows.

(i) In the case of an allegation against a bureau employee, the bureau head will then establish a Scientific and Scholarly Integrity Review Panel (SIRP). The bureau head may not influence the panel process or results. The BSIO will have oversight over the panel and inform the DSIO of the resolution.

(ii) In the case of an allegation against a bureau head or an Office of the Secretary employee, the DSIO will inform the relevant Assistant Secretary or the Deputy Secretary, as appropriate. Either the Assistant Secretary or the Deputy Secretary, or designee, will establish a SIRP. The DSIO will have oversight over the panel.

(2) Contractors, Cooperators, Partners, Permittees, Leasees, and Grantees:

(a) If the DSIO or BSIO working with the appropriate CO/FA official establishes that no misconduct has occurred then no further action will be taken against the subject's organization. The appropriate CO/FA official will issue a memorandum to the subject's organization with a copy to the BSIO and DSIO explaining that no further action will be taken, and that the case will be closed.

(b) If the DSIO or BSIO working with the appropriate CO/FA official determines that there appears to be merit to the allegation, the subject's organization will be requested to investigate the matter and provide the results to the government, certifying that the results of the investigation are true and accurate to the best knowledge of the organization. Penalties for falsifying results of an investigation may include, but not be limited to, termination of the contract or agreement or suspension and/or debarment from future federal awards.

(c) If no misconduct is reported by the subject's organization and the DSIO or BSIO working with the appropriate CO/FA official accepts this report, no further action will be taken against the subject's organization. Working with the appropriate CO/FA official, a memorandum will be issued to the subject's organization with a copy to the BSIO and DSIO explaining that no further action will be taken concerning this allegation, and that the case will be closed. The DSIO or BSIO working with the appropriate CO/FA official has the authority to question the organization's report until all issues have been satisfactorily addressed, after which the DSIO or BSIO will close the case.

(d) If misconduct is reported by the subject's organization, the DSIO or BSIO, working with the appropriate CO/FA official will decide the course of action with regard to the

organization to include, but not be limited to, acceptance of the organization's resolution of the misconduct, issuing a poor performance review, termination of the contract/agreement or initiation of debarment procedures. The BSIO will report resolution of the case to the DSIO.

F. Formal Review and Fact Finding by Scientific and Scholarly Integrity Review Panel (Employees and Volunteers Only).

(1) Guidance for establishment and operations of the Scientific and Scholarly Integrity Review Panel (SIRP) are provided in Appendix D.

(2) The SIRP Chair will notify the subject that a SIRP will be convened to conduct fact finding related to the allegation of scientific and scholarly misconduct; advise the subject on his/her rights and responsibilities during this process, and ask the subject to sign an Employee/Volunteer Information and Acknowledgement Form - Appendix E. The subject will be entitled to have a representative if desired; however legal fees are the responsibility of the subject.

(3) The SIRP will provide a report as outlined in Appendix D. The report produced by this panel falls under the Privacy Act, and will constitute pre-decisional, deliberative material containing analysis and recommendations related to Agency policy. These reports are intended to provide advice, recommendations, and opinions which are part of the deliberative, consultative, decision-making processes of the Department.

(4) Within 30 calendar days of the completion of the fact finding report, the Chair of the SIRP shall forward the report to the appropriate bureau head(s), BSIO(s), and the DSIO. The DSIO or BSIO, as appropriate, will work with the responsible manager and SHRO to determine corrective or disciplinary action. If the SIRP determines there is no misconduct, the manager will issue a memorandum to the subject with a copy to the DSIO or BSIO explaining that no further action will be taken concerning this allegation and that the case will be closed (Appendix C).

G. Corrective and Disciplinary Actions (Employees and Volunteers Only).

(1) If the incident that led to the allegation of misconduct is determined to have resulted in an impact to the integrity of the science or scholarship, the manager will take steps to correct the loss of integrity and to prevent future occurrences of the sequence of events that led to the impact to integrity.

(2) For employees, if the allegation is determined to have merit either as a result of the inquiry led by the DSIO or BSIO or as a result of further fact finding by an SIRP, the responsible manager and SHRO will work together to determine the appropriate action to be taken using the Departmental Manual chapter 370 DM 752 - Discipline and Adverse Actions, and any union contracts, as applicable.

(3) For volunteers, if the allegation is determined to have merit either as a result of the inquiry led by the DSIO or BSIO or as a result of further fact finding by an SIRP, the manager will determine appropriate action which may include loss of privileges or termination of their volunteer service agreement.

H. Appeal Rights (Employees and Volunteers Only). If disciplinary action is taken against an employee, they may have appeal rights under Departmental Manual chapter 370 DM 752 - Discipline and Adverse Actions, and any union contracts, as applicable. Employees should contact their SHRO for additional information.

I. Resources for Federal Employees and Volunteers.

(1) The Department's COnflict REsolution PLUS (CORE PLUS) system for managing conflict in the workplace, jointly managed by the Office of Collaborative Action and Dispute Resolution and its counterparts in the bureaus, provides managers and employees with tools and assistance to address science and scholarship integrity issues and concerns. CORE PLUS assistance may include, but is not limited to, facilitating consultation to help define issues or specific concerns, providing training on effective communication and conflict management, coaching parties in their attempts to resolve conflicts on their own, facilitating meetings, mediating (when it is appropriate and the parties are willing to participate), or securing the services of other alternative dispute resolution practitioners, such as ombudsman assistance, acceptable to all parties.

(2) The informal conflict management and alternative dispute resolution processes available through CORE PLUS do not take the place of any other avenue of redress available to managers and employees. See 370 DM 770.

3.9 Participation as an Officer or Member on the Board of Directors of Professional Societies or other non-Federal Organizations.

The Department encourages the enhancement of scientific and scholarly integrity through engagement with the communities of practice represented by professional societies. The Department encourages employees to participate in outside professional organizations in order to enhance their professional development, especially when that participation advances the Department's mission, programs, and operations. Department scientists, scholars, and other professionals should engage in scientific, scholarly, and other activities with these professional networks in accordance with the following guidelines.

A. An employee's service as an officer or as a member on the board of directors (or in any position that creates a fiduciary duty under State or other applicable law) of a non-Federal organization may create an actual or apparent conflict of interest or may affect the employee's ability to act impartially. Employees in these positions must avoid any activity that may create the potential for preferential treatment, improper official endorsement, inappropriate use of official time, actual or apparent loss of impartiality, disclosure of non-public information, or any situation that would adversely affect the public's confidence in the Department. Employees wishing to serve in an official capacity in any position that creates a fiduciary duty to a non-Federal organization are required to complete, prior to serving in such a role, the waiver, memorandum of understanding (MOU), and recusal memorandum described below.

B. Employees serving in their official capacity on advisory committees, working groups, or other positions that do not create a fiduciary duty to a non-Federal organization must comply with all applicable ethics statutes and regulations during the period of their service. Employees should consult with an ethics counselor to ensure compliance with these statutes and regulations and should obtain supervisory approval to ensure bureau or Departmental interest in the employee's participation. They are not, however, required to complete the waiver, MOU, and recusal memorandum described below.

(1) Service in a Personal Capacity as an Officer or Member of a Board of Directors or in any Position that Creates a Fiduciary Duty. Employees serving in their personal capacity as an officer or member on the board of directors of a non-Federal organization or in any position that creates a fiduciary duty must adhere to all applicable ethics statutes and regulations and should consult with their Bureau's Deputy Ethics Counselor or the Departmental Ethics Office to ensure their compliance.

Failure to comply could result in violation of the Federal criminal conflicts of interest statute (18 U.S.C. § 208) or violation of the Standards of Ethical Conduct for Executive Branch Employees (5 C.F.R. 2635).

(2) Service in an Official Capacity as an Officer or Member of a Board of Directors or in any Position that Creates a Fiduciary Duty. Departmental employees may participate in their official capacity as an officer or member on the board of directors of non-Federal organizations or in any position that creates a fiduciary duty when the Department or their Bureau has determined that such participation is in the best interest of the Federal Government. In order to avoid any actual or apparent conflicts of interest, employees could, in an alternative, serve as a designated non-voting liaison, representing the Department or their bureau. When serving in their official capacity as an officer or on the board of directors of a non-Federal organization or in any position that creates a fiduciary duty to that organization, Department employees must adhere to the following requirements:

(a) Prior to service as an officer or member of the board of directors of a non-Federal organization or in any position that creates a fiduciary duty, employees must receive a Conflicts of Interest Waiver (Appendix F). Waivers shall only be granted by the Designated Agency Ethics Official or a bureau head and will not be granted retroactively. To initiate the waiver process, Departmental employees should contact the Departmental Ethics Office or their Deputy Ethics Counselor.

(b) Employees must execute a written MOU (Appendix G), acknowledging that their primary duty of loyalty is to the U.S. Government should the interests of the Government conflict with the interests of the non-Federal organization. The MOU must be signed by the executive director or an officer of the non-Federal organization and by the Designated Agency Ethics Official or Bureau Head.

(c) Employees must execute a Recusal Memorandum (Appendix H) in which they acknowledge that they may not be involved in any official government matter that would affect the financial interest of the non-Federal organization, including the following: decisions or discussions pertaining to grants, contracts, cooperative research and development agreements (CRADAs), or other support; the preparation of requests from the non-Federal organization to obtain Federal funds or manpower to support its activities; approval of Federal travel authorizations to travel on behalf of the non-Federal organization; or fundraising and lobbying on behalf of the non-Federal organization.

3.10 **Authorities.**

A. Statutes and Regulations.

(1) 5 U.S.C. 301 allows the head of an executive department to prescribe regulations for the conduct of its employees.

(2) 43 CFR 20.501 requires employees of the Department to comply with all Federal statutes, Executive Orders, Office of Government Ethics and Office of Personnel Management regulations, and Departmental regulations.

(3) 43 CFR 20.502 states that employees are required to carry out the announced policies and programs of the Department.

(4) 56 FR 28012-28018 is the Federal Policy for the Protection of Human Subjects, which provides guidelines for all research involving human subjects conducted, supported or otherwise

subject to regulation by any federal department or agency.

(5) 7 USC, 2131-2159 is the Animal Welfare Act as Amended, which requires that minimum standards of care and treatment be provided for certain animals bred for commercial sale, used in research, transported commercially, or exhibited to the public.

(6) 43 CFR 20.502(a) states that an employee is subject to appropriate disciplinary action if he or she fails to comply with any lawful regulations, orders, or policies.

(7) 18 U.S.C. 208 and 5 CFR 2635 Subparts D and E state that department scientists and scholars are subject to requirements pertaining to conflict of interest and appearance of a lack of impartiality.

B. Departmental Manual - 370 DM 752.

C. Standards of Ethical Conduct for Employees of the Executive Branch, 5 CFR 2635.

D. Federal Policy on Research Misconduct, 65 FR 76260-76264, December 6, 2000.

E. Whistleblower Protection Act, 5 USC, 2302(b)(8).

Appendix B

Sample Notifications of Allegation of Scientific Misconduct

TO: Subject

FROM: DSIO or BSIO

CC: DSIO and Manager

SUBJECT: Allegation of Scientific Misconduct

An allegation of scientific misconduct has been filed with the Department of the Interior regarding the following: *Insert as specific and detailed a description of the allegation as possible here, but do not disclose the name of the person who filed the allegation.*

This allegation has not yet been investigated or determined to have merit. However, pursuant to the Department of the Interior's scientific integrity policy, I will be conducting an inquiry to determine its merits. Under the Department's procedures, you must preserve and provide to my office all original research records and materials relevant to the above allegation.

An interview will be scheduled with you to discuss the allegation and will be part of the official record. You may also provide for the record a written response to the allegation.

Once an inquiry into this matter is concluded, I will inform you in writing that: (1) a review of this matter has dismissed the allegation and the matter is closed; (2) a review of this matter has verified that scientific misconduct has taken place and you will be contacted about possible additional action; or (3)

the allegation has been referred to a Scientific Integrity Review Panel (SIRP) for further fact-finding. If the matter is referred to an SIRP, the Chairperson of the Panel will notify you of your rights concerning their review, your obligations during their investigation, and your opportunity to respond to the allegation.

For Volunteers:
If a Panel conducts fact-finding into this allegation, I will review their findings to determine the appropriate action necessary to resolve this matter. You will be advised of the action to be taken.

If conflict arises as this process proceeds or if the action was not deliberate and was more about a disagreement or difference of opinion, I may utilize the Department's CORE PLUS system for managing conflict in the workplace. The CORE PLUS system is jointly managed by the Office of Collaborative Action and Dispute Resolution and its counterparts in the bureaus, and provides managers and employees with tools and assistance to address science and scholarship integrity issues and concerns. CORE PLUS assistance may include, but is not limited to, consultation to help define issues or specific concerns, providing training on effective communication and conflict management, coaching parties in their attempts to resolve conflicts on their own, facilitating meetings, mediating (when it is appropriate and the parties are willing to participate), or securing the services of other alternative dispute resolution practitioners, such as ombuds assistance, acceptable to all parties.

I have attached a copy of the DOI Manual chapter xxxxx on Scientific Integrity. Please review it carefully and let me know if you have any questions about this process.

Appendix C

Sample Closure Memorandum

TO: Subject

FROM: DSIO or BSIO

CC: DSIO and Manager

SUBJECT: Resolution of Allegation of Scientific Misconduct

I am pleased to inform you that, after an inquiry into the allegation of scientific misconduct that was filed against you, I have found no merit in the charge. (*Insert as specific and detailed a description of the allegation as possible but do not disclose the name of the person who filed the allegation*). As a result, the concerns of this allegation are considered closed. I appreciate your cooperation in this important process.

Appendix D

Scientific and Scholarly Misconduct Review Panel

PURPOSE

A Scientific Integrity Review Panel (SIRP) will be established by the Head(s) of a Bureau(s) for Bureau related allegations of misconduct or by the DSIO for allegations of misconduct against the Bureau Head or Office of the Secretary. The SIRP will conduct fact finding and review allegations of misconduct reported against DOI employees and volunteers. The panel shall address the materiality or significance of the alleged misconduct and explain why the conduct does or does not constitute a serious deviation from accepted practices under institutional or general scientific and scholarly standards. To fully understand the severity of alleged misconduct, an effort to determine deliberate intent should be included in the investigation. Scientific and scholarly misconduct is the result of a deliberate action by an employee or volunteer that compromises the scientific integrity of the conduct, production, or use of scientific and scholarly activities and assessments. Misconduct includes intentional fabrication, falsification, or plagiarism and is not the result of honest error or difference of opinion with a scientific and scholarly process or a management decision.

Three criteria are necessary to establish research misconduct (Federal Policy on Research Misconduct):

(1) There is a significant departure from accepted practices of the relevant research community, and
(2) The misconduct is committed intentionally or knowingly or recklessly, and
(3) The allegation is proven by a majority of evidence.

COMPOSITION OF THE PANEL

The SIRP shall consist of a Chairperson and at least three subject matter experts that may come from any part of the Department as appropriate. The Bureau Head(s) or DSIO, or a designee in consultation with the BISO and appropriate senior management as needed shall appoint the panel members based on the specific discipline or a specific area of expertise that is required to understand the probable nature of the alleged misconduct. The Chairperson, with the concurrence of the Bureau Head (s) or DSIO, will select additional panel members as needed. The Bureau Head(s) or DSIO may replace any panel member at any time. Depending on the Bureau's needs, this may be a standing committee.

Panel members shall have appropriate expertise to evaluate the allegations of scientific misconduct. The integrity and fairness of the peer-evaluation process is paramount, every effort will be made to maintain a balance of subject matter expertise at, appropriate grade levels among panel members.

SERVICING HUMAN RESOURCES OFFICE, ETHICS OFFICE, OR ADMINISTRATIVE ASSISTANCE

The Chairperson of the Panel will set the specific dates, time, and place for the panel to meet. The servicing human resources officer will serve as an ad hoc member of the panel and along with the, BSIO or DSIO, and the Bureau or Department Ethics office, will provide support or advice to the panel as necessary.

PANEL OPERATIONS AND RESPONSIBILITIES

The Chairperson of the Panel will ensure that information concerning the case is distributed to panel members at least two weeks prior to the meeting date.

The Panel, at its discretion, will conduct fact-finding and may utilize one or both of the following methods: (1) Securing and reviewing documentary evidence including all original experimental records, protocols, and data; (2) Interviewing relevant persons, whether in person, or by telephone; and securing written statements from the interested parties, as necessary.

The Chairperson of the Panel shall advise panel members of the extreme importance of confidentiality of materials and discussions relating to the alleged scientific misconduct. There is to be no release of information by panel members pertaining to any allegation. All discussions by the panel shall be safeguarded and not shared outside of the Scientific Integrity Review Panel.

The Scientific Integrity Review Panel will arrive at a consensus decision, if possible, about whether or not misconduct has occurred. Consensus decision means that all panel members, including the Chairperson, agree in general with a decision; this is distinct from a majority-rule decision. In the consensus-based process, panel members work together to develop a finding with which all of the members of the panel can agree. The Chairperson will determine if consensus has been reached by asking all panel members if they agree with the finding. If consensus is reached, then the Panel shall write a report of their findings that contains: a summary of the findings, the basis for determining whether or not scientific misconduct occurred, and an assessment of the seriousness and extent of any misconduct found that is in violation of the DOI Policy on Integrity of Scientific and Scholarly Activities.

The Panel will take the time necessary to address all of the relevant issues associated with the allegation in order to reach a consensus finding. If after all efforts are exhausted, the Panel is still unable to reach consensus about whether or not misconduct has occurred, then a majority decision will be made. In this case, the panel report will include majority and minority findings.

The report produced by this panel will constitute pre-decisional, deliberative material containing analysis and recommendations related to Agency policy. These reports are intended to provide advice, recommendations, and opinions which are part of the deliberative, consultative, decision-making processes of the Department of the Interior. At a minimum the report will include: (1) Summary of the alleged misconduct, (2) Summary of the fact finding activities of the panel, (3) Discussion and conclusion as a result of the fact finding and (4) Appendices as needed containing supporting documents and written statements. The report and supporting documents constitute the record of the panel activities and will be kept according to the appropriate records disposition schedule by the appropriate DSIO or BSIO.

Within 30 calendar days of the completion of the review and fact finding, the Chairperson of the Panel

shall forward the completed report to the BISO, DSIO, and responsible manager.

Appendix E

Employee and Volunteer Information and Acknowledgement Forms

EMPLOYEE INFORMATION AND ACKNOWLEDGMENT FORM

The Chairperson of the Scientific Integrity Review Panel will ensure that the subject of the allegation initials each statement below and returns the original signed/dated form to the Chairperson. A copy of the completed form will be provided to the subject of the allegation.
The employee acknowledges that:

I have been informed and I understand this is a formal review and fact-finding process involving matters relating to my official duties as a Federal employee.

I have been informed and I understand that, as a Federal employee, I am required to cooperate with this formal process and provide truthful answers.

I have been informed and I understand that if I refuse to cooperate and answer questions during this formal process, my refusal to cooperate can be a basis for disciplinary action, which may result in my removal from Federal service.

I have been informed and I understand that if I provide information during this formal process that I know to be false at the time I provided the information, my providing false information can be a basis for disciplinary action that may result in my removal from Federal service and also can be a basis for criminal prosecution.

I understand that I will have the opportunity to respond to the allegation and to present evidence to the Scientific Misconduct Review Panel orally and/or in writing and that I may have representation at my own expense.

I understand that I may have rights as an employee during this process, and that my servicing Human Resources Office can inform me of these rights.

Signature: _____ Date: _____
Name (please print): _____
Position Title, Series and Grade: _____
Duty Station: _____

PRIVACY ACT NOTICE. Pursuant to the Privacy Act of 1974, as amended, 5 U.S.C. § 552a, you are advised of the following:

1. Authority. Solicitation of this information is authorized by 5 U.S.C. 301 that allows the head of an executive department to prescribe regulations for the conduct of its employees and other authorities cited at 305 DM 3.10.

2. Principal Purpose. The principal purpose for soliciting the information is to implement the Policy on Integrity of Scientific and Scholarly Activities of the Department of the Interior at 305 DM 3.

3. Routine Uses. Routine uses of the solicited information are the same as those listed in the system

notice OPM/GOVT-1.

4. Effect of Noncompliance. Failure to provide the solicited information may result in disciplinary action, including the removal from Federal service.

VOLUNTEER INFORMATION AND ACKNOWLEDGMENT FORM

The Chairperson of the Scientific Integrity Review Panel will ensure that the subject of the allegation initials each statement below and returns the original signed/dated form to the Chairperson. A copy of the completed form will be provided to the subject of the allegation.

The Volunteer acknowledges that:

I have been informed and I understand this is a formal review and fact-finding process involving matters relating to my official duties as a DOI volunteer.

I have been informed and I understand that if I refuse to cooperate and answer questions during this formal process, my refusal to cooperate may result in termination of my volunteer agreement.

I have been informed and I understand that if I provide information during this formal process that I know to be false at the time I provide the information; my providing false information can be a basis for termination of my volunteer agreement.

I understand that I will have the opportunity to respond to the allegation and to present evidence to the Scientific Integrity Review Panel orally and/or in writing and that I may have representation at my own expense.

Signature: _____ Date: _____

Name (please print): _____

Office: _____

PRIVACY ACT NOTICE. Pursuant to the Privacy Act of 1974, as amended, 5 U.S.C. § 552a, you are advised of the following:

1. Authority. Solicitation of this information is authorized by 5 U.S.C. 301 that allows the head of an executive department to prescribe regulations for the conduct of its employees and other authorities cited at 305 DM 3.10.

2. Principal Purpose. The principal purpose for soliciting the information is to implement the Policy on Integrity of Scientific and Scholarly Activities of the Department of the Interior at 305 DM 3.

3. Routine Uses. Routine uses of the solicited information are the same as those listed in the system notice INTERIOR/DOI-05.

4. Effect of Noncompliance. Failure to provide the solicited information may result in termination of your volunteer agreement.

Appendix F

Conflict of Interest Waiver Request Template

Memorandum

To: [Name of Bureau Ethics Counselor]

From: [Deputy Ethics Counselor]

Subject: Conflict of Interest Waiver for [Employee Name]

The purpose of this memorandum is to request that you grant [Employee Name] a waiver of the criminal conflict of interest provisions that may apply to [his or her] service in an official capacity as [an officer or a member of the board of directors, or other position] of the [name of outside non-profit organization] [abbreviation]. [Employee Name]'s official [Department or bureau] duty is to serve as the [title]. As such, [he or she] [explain the employee's duties, including information that shows how they relate to service in the outside organization (may require more than one sentence)].

The criminal conflict of interest statute, 18 U.S.C. § 208(a), requires that an employee refrain from participating personally and substantially in an official capacity in any particular matter that will have an effect on the financial interests of any organization in which the individual serves as an officer, director, trustee, or employee.

In the absence of: (1) specific statutory authority placing a federal employee in an officer or director position in an ex officio capacity; (2) a release of fiduciary obligations by the organization (if permitted by state law); or (3) a waiver of the requirements of 18 U.S.C. § 208(a), the statute effectively would preclude [Employee Name]'s service, as an official duty activity, as [officer, director or other position] with the [name of outside non-profit organization].

[Describe the position in the outside organization and the outside organization]. [Describe the relationship of the outside organization to [Department or bureau] programs and operations.]

A memorandum of understanding between the [Department or bureau] and the [name of outside non-profit organization] concerning the service of [Employee Name] is attached.

Inasmuch as [Employee Name]'s appointment with the [name of outside non-profit organization] is not pursuant to a statute or release of fiduciary obligations, [he or she] has requested that you, as the official to whom waiver authority is delegated, authorize [his or her] participation in certain particular matters that may affect the financial interests of the [name of outside non-profit organization]. Under 18 U.S.C. § 208(b)(1), a waiver may be granted if the official to whom waiver authority is delegated determines that the disclosed financial interest is "not so substantial as to be deemed likely to affect the integrity of the employee's services to the Government."

In the course of [his or her] assigned duties, the following types of particular matters potentially could come before [Employee Name] for [his or her] personal and substantial participation:

(1) particular matters of general applicability, such as legislation, regulation, or policy that may affect the financial interests of the [name of outside non-profit organization] as a member of a class of similarly situated entities;

(2) matters that affect the financial interests of the [name of outside non-profit organization] through investigation or regulation of the [name of outside non-profit organization];

(3) particular matters involving specific parties, such as grants, contracts, or application approvals that specifically involve the [name of outside non-profit organization] or otherwise affect its financial interests; or

(4) other miscellaneous matters involving the conduct of the [name of outside non-profit organization] and [Department or bureau] support.

While performing the usual and customary duties of the position of [officer, director or other position] with an outside organization as an official [Department or bureau] activity, any actions taken either in the Federal workplace or at the organization that affect the financial interests of the outside organization are deemed official matters to which 18 U.S.C. § 208(a) applies. For example, such actions may include:

(a) requesting that official travel funds be spent or other government resources be utilized for the employee to conduct the affairs of the organization;

(b) signing a training authorization to use [Department or bureau] funds to pay for an employee to attend a conference or other meeting of the organization;

(c) speaking as an official duty activity at a conference or other meeting of the organization;

(d) providing advice and consultation with respect to, or otherwise conducting, the business affairs of the organization including voting on matters that come before the [name of outside non-profit organization] officers and board members.

While the financial impact may be insignificant, under well-settled precedent, 18 U.S.C. § 208(a) has no de minimis aspect.

I believe that a waiver under 18 U.S.C. § 208(b)(1) to allow [Employee Name] to serve as an [officer or a member of the board of directors, or other position] for [name of outside non-profit organization] in [his or her] official capacity is justified for the following reasons:

First, because [Employee Name] will serve as [position with the outside non-profit organization] as an official duty activity, and [Employee Name]'s position in the outside organization is fully known to the [Department or bureau], the risk that the integrity of the services that the government expects from [Employee Name] would be affected by [his or her] service is greatly diminished. Moreover, the [Department or bureau] has already determined that, to a significant degree, the interests of the [Department or bureau] and the interests of the [name of outside non-profit organization] are consonant. The [Department or bureau] expects that the interests of the [Department or bureau] and the interests of the [name of outside non-profit organization] can both be furthered through the performance of [Employee Name]'s official duties and service with the [name of outside non-profit organization].

Second, most, if not all, of the particular matters in which [Employee Name] would participate would not have a significant effect on the financial interest of the [name of outside non-profit organization] because of the limits in this request set forth below. [Employee Name] will have no involvement in any [Department or bureau] grants, contracts, cooperative agreements, or other Federal support (financial or otherwise) to the [name of outside non-profit organization] other than the use of travel or training funds

solely for [Employee Name]'s service with the [name of outside non-profit organization]. [Employee Name] will not participate in investigations of the activities of the [name of outside non-profit organization], other than as a provider of information or testimony. [Employee Name] will not participate in developing regulations that would impact the [name of outside non-profit organization] or be involved in enforcing regulations pertaining to the [name of outside non-profit organization].

Contradictory with Limitations 1
Accordingly, if approved, the requested waiver will permit [Employee Name] to serve as an [officer or a member of the board of directors, or other position] in [name of outside non-profit organization] and permit participation in [his or her] capacity with the [name of outside non-profit organization] in particular matters that will affect the financial interests of the [name of outside non-profit organization], EXCEPT the particular matters listed below that might have a direct and predictable effect on the financial interests of the [name of outside non-profit organization] as to which [Employee Name] has committed to recuse [himself or herself].

LIMITATIONS:

[Employee Name] may not participate in any of the following particular matters because they may affect the financial interests of the [Department or bureau] and the [name of outside non-profit organization] or otherwise violate Federal laws or regulations:

1. Any involvement or participation in decisions pertaining to [Department or bureau] grants, contracts, cooperative agreements [list any other types of agreements that the [Department or bureau] might have with the outside non-profit organization], or other support to include personnel and equipment to the [name of outside non-profit organization], except the actions specifically permitted above, that is:

> "(a) requesting that official travel funds be spent or other government resources be utilized for the employee to conduct the affairs of the organization;
>
> (b) signing a training authorization to use [Department or Bureau] funds to pay for an employee to attend a conference or other meeting of the organization;
>
> (c) speaking as an official duty activity at a conference or other meeting of the organization;
>
> (d) providing advice and consultation with respect to, or otherwise conducting, the business affairs of the organization including voting on matters that come before the [name of outside non-profit organization] officers and board members."

2. Any involvement or participation in any regulatory or investigatory matters on behalf of any Department or agency of the U.S. Government involving the [name of outside non-profit organization] other than as a provider of information or testimony.

3. Preparation or presentation of requests from the [name of outside non-profit organization] to obtain any Federal funds, manpower, or any other form of Federal support on its behalf to support [name of outside non-profit organization] activities, except as permitted in 1.(a) through (c) above.

4. Lobbying on behalf of the [name of outside non-profit organization] in any manner to a Member of Congress, a jurisdiction, or an official of any government as prohibited by 18 U.S.C.

§ 1913. This includes the use of money appropriated by any enactment of Congress to pay for any personal service, advertisement, telegram, telephone, letter, printed or written matter, or other device, intended or designed to influence in any manner a Member of Congress, a jurisdiction, or an official of any government, to favor, adopt, or oppose, by vote or otherwise, any legislation, law, ratification, policy, or appropriation, at any time unless specifically authorized by Act of Congress. This does not prevent employees of the United States or of its departments or agencies from communicating to Members of Congress or other officials, at his request, or to Congress or such official, through the proper official channels regarding requests for any legislation, law, ratification, policy, or appropriations which they deem necessary for the efficient conduct of the public business.

5. Approval of Federal travel authorizations to travel on behalf of the [name of outside non-profit organization].

6. Participation in fundraising activities of the [name of outside non-profit organization].

A copy of the recusal memorandum is attached. In this manner, [Employee Name]'s service with the [name of outside non-profit organization] is severed from his service as the [Employee's Department or bureau duty title] on particular matters where both the [name of outside non-profit organization] and the [Department or bureau] may have financial interests, thereby avoiding any potential that [he or she] could act contrary to interests of the [Department or bureau] for the benefit of the [name of outside non-profit organization].

[Employee Name] understands and agrees that, as an official duty activity, no separate compensation or reimbursements may be received from the [name of outside non-profit organization] in connection with his or her service. Travel, lodging, per diem or other incidental expenses incurred by [Employee Name] on behalf of the [name of outside non-profit organization], if any, may be accepted by the [Department or bureau] under 31 U.S.C. § 1353 as appropriate. Acceptance of [Employee Name] travel expenses, if any, from the [name of outside non-profit organization] shall be accomplished via a Form DI-2000 which must be approved by the [Departmental or bureau] Ethics Office prior to the travel, or when circumstances do not permit prior approval, within seven days of conclusion of the travel.

3 Attachments:
1. MOU between the [Department or bureau] and the [name of outside non-profit organization], dated
2. [Employee Name] Recusal letter, dated
3. Form DI-2000, *Acceptance of Travel Expenses from a Non-Federal Source*

DECISION:

_____ Waiver granted, subject to the terms and conditions stated above, based on my determination, made in accordance with 18 U.S.C. § 208(b)(1), that the disclosed financial interests are not so substantial as to be deemed likely to affect the integrity of the service which the government may expect from the employee.

_____ Waiver denied.

_____ Date:
[Name]
[Departmental or Bureau Ethics Counselor]
[Name of Department or bureau]

I have read and fully understand ALL of this 18 U.S.C. § 208(b)(1) waiver decision and its limitations. I agree to fully comply with its limitations and acknowledge my understanding and compliance by signing below:

_____
[Employee Name] Date:
[Title]
[Department or bureau]

Appendix G

Memorandum of Understanding Template

Memorandum of Understanding
between the
(U.S. Department of the Interior or bureau)
and the
(Organization name)

1. This Memorandum of Understanding sets forth the agreement between the (Department or bureau) [abbreviation] and the (organization name) [abbreviation] concerning the service of (employee name) as an [officer or member of a board of directors] of the (organization name) as a part of (his or her) official government duties through [month/year]. (Employee name) will be serving as _____. It is estimated that the amount of official time (employee name) will spend on this activity will be approximately (number) hours per month.

2. Before (employee name) performs any duties as an [officer or member of a board of directors] of the (organization name) as part of (his or her) official duties (he or she) must be granted a waiver under the Federal conflict of interest statute, 18 U.S.C. § 208. Waivers that permit an employee to serve as an officer or a member of a board of directors are limited and enable (employee name) to serve as an [officer or board member] of the (organization name) in (his or her) official capacity as a [Department or bureau] employee without violating 18 U.S.C. § 208. However, even if an 18 U.S.C. § 208 waiver is granted, (employee name) may not make or participate in any official decisions on behalf of the (Department or bureau) regarding any request from the (organization name) for public funds or support. (Employee name) may not take any actions that violate Federal, state or local law. Requests for public funds or support include, but are not limited to grants, cooperative agreements, contracts or any other action where the (organization name) is requesting any form of support from the Department of the Interior or one its bureaus. To ensure that no conflicts of interest arise, the (organization name) agrees that it will notify the (Department or bureau) Ethics Office if it intends to seek public funds or support from the Department of the Interior or one of its bureaus. Notice will be provided to: [Department or bureau] Ethics Office [address]. The (organization name) also understands that if it elects to request public funds or support from the Department of the Interior or one of its bureaus, (employee name) may be directed to resign as an [officer or board member] in the (organization name) in (his or her) official capacity.

3. The primary beneficiary of (employee name)'s service as an [officer or board member] in the (organization name) is intended to be the (Department or bureau). It is expected that the benefits to the (Department or bureau) will include, but not be limited to the following:

a. acquisition of state-of-the-art technical information about (name subjects).

b. knowledge about organizational arrangements and relationships of organizations with which the (Department or bureau) interacts, in order to enhance the working relationships between the (Department or bureau) and such other organizations;

c. improved understanding of current issues in the (name the field of endeavor) that concern (Department or bureau) missions and operations;

d. utilization of professional networks and channels to disseminate information relevant to the accomplishment of (Department or bureau) missions; and

e. utilization of other mechanisms to facilitate accomplishment of (Department or bureau) missions, functions and processes, such as meetings, conferences, symposia, and publications.

4. In order to avoid the possibility of an actual or potential use of public office for private gain, when [name of employee] uses official time to serve as an [officer or board member] in the (organization name), the following principles will apply:

a. Federal employees may not represent anyone other than the United States before an agency or court in connection with any particular matter in which the United States is a party or has a direct and substantial interest. (18 U.S.C. § 205)

b. When serving as an officer or member of a board of directors of a non-Federal organization in an official capacity, Federal employees must refrain from any involvement or participation in or taking any official action on behalf of the Department of the Interior or its bureaus on any application or request for public funds or other support by the (organization name). (18 U.S.C. § 208)

c. If a Federal employee's participation in a project undertaken in conjunction with a private organization was done as a part of (his or her) official duties, the Federal employee is prohibited from receiving any supplementation of his/her Federal salary. (18 U.S.C. § 209)

d. Federal employees are prohibited from using appropriated funds, official time or Government equipment to instigate or generate lobbying activity on any issue pending before or of interest to the Congress or an official of any government. (18 U.S.C. § 1913)

e. Federal employees are prohibited from being involved in the fundraising activities of the (organization name).

f. Federal employees may not utilize official Government postage, stationery, envelopes, or labels for other than official Government business. (18 U.S.C. § 1719)

The relationship between the (organization name) and the (Department or bureau) addressed in this document is intended to enhance service to the American public through more efficient applications of (Department or bureau) programs. All actions should be directed toward attainment of that mutually beneficial goal.

5. Under Federal law, a Federal employee serving in (his or her) official capacity owes (his or her) first duty of loyalty to the Government of the United States. By signing this memorandum of understanding, the (organization name) acknowledges and consents to the fact that since (employee name) is acting as an [officer or a member of a board of directors] in (organization name) in (his or her) official capacity as a (Department or bureau) employee, (employee name) will owe (his or her) first duty of loyalty to the United States Government and specifically the (Department or bureau) before that of the (organization name) if those interests ever conflict. Consequently, to the fullest extent permitted by state law, the (organization name) agrees to waive any fiduciary duty owed by (employee name) to the (organization name) as an [officer or a member of a board of directors] in the (organization name) when (employee name) acts in the interests of the United States Government. This waiver is limited to actions taken in the interests of the United States Government by (employee name) as an [officer or a member of a board of directors] in the (organization name) while acting in (his or her) official capacity. (Employee name) retains a fiduciary duty to act in the best interests of the (organization name) except when in conflict with the interests of the United States Government.

6. The (organization name) agrees to provide (employee name) liability insurance coverage for any acts performed as an [officer or board member] in the (organization name) equivalent to liability coverage provided to other [officers or board members] of the (organization name). The (organization name) agrees to hold the United States harmless for acts taken by (employee name) in (his or her) official [Department or bureau] capacity as an [officer or board member] in the (organization name).

The foregoing is not intended to impose on the (organization name) any obligations or restrictions other than those set forth above. The (organization name) has an obligation to respect the limitations described above on the activities and function of (employee name) and benefits which may be received by the (Department or bureau). This agreement does not constitute a representation or warranty by the (organization name) as to the benefits which the (Department or bureau) will receive in fact from (employee name)'s service as an officer or member of the board of directors in the (organization name). Nor does the (organization name) assume any obligation to inquire into or enforce (employee name)'s compliance with paragraph 4 above.

_____ Date:

[Name]
[Official Department or Bureau Position]
[Departmental or Bureau]

_____ Date:

[Name]
[Position]
[Organization name]

Appendix H

Recusal Memorandum Template

MEMORANDUM

TO: [Supervisor Name and Title]

Date

FROM: Name, Title and address [employee signs here]

SUBJECT: Notice of Recusal by [Employee name]

1) This is to notify you that I have an interest in the [name of outside non-profit organization] [abbreviation] because I have been elected as [officer or board of director position] with the [name of outside non-profit organization] through [end date month/year]. **I will not be serving as [officer or board of director position] in an official [Department or Bureau] capacity unless and until I am granted a waiver of the conflict of interest statute**, 18 U.S.C. § 208(b)(1), by the Director of the [Department or bureau].

2) Even though a waiver granted to me pursuant to 18 U.S.C. § 208(b)(1) by the Director of the [Department or bureau] will allow me to serve as [officer or board of director position] and act on [name of outside non-profit organization] matters utilizing limited Government time and resources, I will not involve myself with the following:
   a. Any [Department or bureau] grants, contracts, cooperative agreements or other agreements with the [name of outside non-profit organization];
   b. Providing support to the [name of outside non-profit organization], including personnel or equipment from or to the [name of outside non-profit organization];
   c. Directing a subordinate to speak at any conference or other meeting of the [name of outside non-profit organization];
   d. Participating in investigations of the activities of the [name of outside non-profit organization], other than as a provider of information or testimony;
   e. Developing regulations that would impact the [name of outside non-profit organization] or enforcing regulations pertaining to the [name of outside non-profit organization];
   f. Preparation or presentation of requests from the [name of outside non-profit organization] to obtain any Federal funds, manpower, or any other form of Federal support to support [name of outside non-profit organization] activities. A waiver will permit me to request official travel authorizations to attend and/or to be a speaker or presenter at meetings or conferences of the [name of outside non-profit organization] but approval of my travel authorization requests must be based on a determination by my travel approval authority that my attendance or presentation at the meeting or conference of the [name of outside non-profit organization] is in the best interests of the [Department or bureau];
   g. Lobbying on behalf of the [name of outside non-profit organization] in any manner to a Member of Congress, a jurisdiction, or an official of any government as prohibited by 18 U.S.C. § 1913. This includes the use of money appropriated by any enactment of Congress to pay for any personal service, advertisement, telegram, telephone, letter, printed or written matter, or other device, intended or designed to influence in any manner a Member of Congress, a jurisdiction, or an official of any government, to favor, adopt, or oppose, by vote or otherwise, any legislation, law, ratification, policy, or appropriation, at any time unless specifically authorized by Act of Congress. This does not prevent employees of the United

States or of its departments or agencies from communicating to Members of Congress or other officials, at his request, or to Congress or such official, through the proper official channels regarding requests for any legislation, law, ratification, policy, or appropriations which they deem necessary for the efficient conduct of the public business;

h. Participation in fundraising activities of the [name of outside non-profit organization]; or

i. Approval of Federal travel authorizations of [Department or bureau] employees to attend meetings or conferences of the [name of outside non-profit organization].

3. I have retained a copy of this recusal memorandum for my records and distributed it as listed below.

Copy to: [Departmental or bureau] Ethics Office

Implementation Grant finalists an opportunity to assemble and submit a more detailed application.

The notice providing information regarding the application process, funding criteria and eligibility requirements can be found using the Department of Housing and Urban Development agency link on the Grants.gov/Find Web site at *http://www.grants.gov/search/agency.do.* A link to Grants.gov is also available on the HUD Web site at *http://www.hud.gov/offices/adm/grants/fundsavail.cfm.* The Catalogue of Federal Domestic Assistance (CFDA) number for the Choice Neighborhood Initiative Program is 14.889. Applications must be submitted electronically through Grants.gov.

FOR FURTHER INFORMATION CONTACT: Questions regarding specific program requirements should be directed to the agency contact identified in the program NOFA. Questions regarding the 2010 General Section should be directed to the Office of Departmental Grants Management and Oversight at 202–708–0667 (this is not a toll-free number) or the NOFA Information Center at 1–800–HUD–8929 (toll-free). Persons with hearing or speech impairments may access these numbers via TTY by calling the Federal Information Relay Service at 1–800–877–8339.

Dated: August 26, 2010.

Barbara S. Dorf,

Director, Office of Departmental Grants, Management and Oversight, Office of the Chief of the Human Capital Officer.

[FR Doc. 2010–21734 Filed 8–30–10; 8:45 am]

BILLING CODE 4210–67–P

DEPARTMENT OF THE INTERIOR

Office of the Secretary

Proposed Scientific Integrity Policy of the Department of the Interior

AGENCY: Office of the Secretary, Interior.

ACTION: Notice and request for comments.

SUMMARY: We, the Department of the Interior, are proposing and seeking comment on a Department-wide policy to ensure the integrity of scientific activities in the Department.

DATES: Submit comments by September 20, 2010.

ADDRESSES: Send comments to: *DOI_Science_Integrity@ios.doi.gov.*

FOR FURTHER INFORMATION CONTACT: Alan D. Thornhill, 1849 C Street, NW., MS 5428, Washington, DC 20240–0002, 202–208–6249.

SUPPLEMENTARY INFORMATION: In his March 9, 2009, memorandum on Scientific Integrity, the President states that, "Each agency should adopt * * * procedures * * * to ensure the integrity of scientific and technological information and processes on which the agency relies in its decision making or otherwise uses or prepares." Interior has developed draft policies and standards for ensuring accuracy and integrity in all scientific activities conducted in the Department. After public comment, revision, and approval, we plan to incorporate these procedures into the Department Manual.

You may submit comments on any part of these proposed procedures by e-mail, letter, or in person at the address in the **ADDRESSES** section of this notice. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

The Department of the Interior proposes the following procedures for ensuring scientific integrity as a new chapter in the Department Manual:

3.1 Purpose

A. This chapter establishes:

(1) A Departmental policy on integrity of scientific activities and a code of scientific conduct;

(2) Ethical standards for Department of the Interior (DOI) employees who conduct or supervise scientific activities for the Department, or who compile and translate scientific information into formats used by the Departmental management; and

(3) A process for initial handling of violations of the scientific conduct code.

B. Administrative rules and laws pertaining to activities such as falsification of government formats, sexual harassment, civil rights, acceptance of gifts, nepotism, disclosure of financial interest, conflict of interest or outside employment are neither altered nor superseded by the existence of this chapter.

3.2 Scope

This chapter applies to:

A. All employees and contractors who engage in scientific activities; and

B. All volunteers who assist with scientific activities. (Volunteers are required to provide unbiased and objective information to their supervisors. All information collected by a volunteer is considered provisional until verified by the supervisor or other designee.)

3.3 Policy on Integrity of Scientific Activities

The Department:

A. Is dedicated to preserving the integrity of scientific activities conducted on its behalf and will not tolerate misconduct in the performance of scientific activities;

B. Will take appropriate action to protect the public from the effects of inaccurate information produced through scientific activities;

C. Will investigate, to the maximum extent of the law, each allegation of misconduct while ensuring the rights and privacy of any party against whom the allegation is made.

D. Will take appropriate disciplinary action, which may include termination of employment, in accordance with DOI personnel policies for non-compliance with the Code of Scientific Conduct in section 3.4.

3.4 Code of Scientific Conduct

Each person covered by section 3.2 must adhere to the following code of scientific conduct:

To the best of my ability I will do all of the following:

- I will act in the interest of the advancement of science and contribute the best, highest quality scientific information for the Department of the Interior.
- I will conduct, process data from, and communicate the results of scientific activities honestly, objectively, thoroughly, and expeditiously.
- I will be responsible for the resources entrusted to me, including equipment, funds, my time, and my employees' time. I will promptly and accurately collect, use, and report all financial resources under my control; and promptly, thoroughly, and accurately report all scientific work.
- I will fully disclose all research methods used, available data, and final reports and publications consistent with applicable laws and policy.
- I will respect, to the fullest extent permitted by law, confidential and proprietary information provided by communities, Indian Tribes, and individuals whose interests and resources are studied or affected by scientific activities or the resulting information.
- I will neither hinder the scientific activities of others nor engage in dishonesty, fraud, deceit, misrepresentation, coercive manipulation, or other scientific or research misconduct.
- I will welcome constructive criticism of my scientific activities, will welcome and participate in appropriate peer reviews, and will critique others' work respectfully and objectively. I will substantiate comments that I make with the same care with which I report my own work.
- I will be diligent in creating, using, preserving, documenting, and maintaining collections and data. I will adhere to established quality assurance and quality control programs. I will follow the Department's records retention policies and comply with Federal law and agreements related to use, security, and release of confidential and proprietary data.
- I will adhere to appropriate standards for reporting the results of scientific activities and will respect the intellectual property rights of others.
- I will, to the extent possible and practical, differentiate among facts, opinions,

hypotheses, and professional judgment in reporting the results of scientific activities to others, including scientists, decision makers, and the public.

- I will be responsible for the quality of any data I collect or any interpretations I make, and for the integrity of conclusions I draw in the course of my scientific activities.
- I will place quality and objectivity of scientific activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations.

3.5 Employee Responsibilities

A. All employees must comply with:

(1) The Federal Policy for the Protection of Human Subjects, published at 56 FR 28012–28018 (June 18, 1991);

(2) The Standards of Ethical Conduct for Employees of the Executive Branch in 5 CFR 2635; and

(3) All Federal statutes, Executive Orders, Presidential Memoranda, Office of Government Ethics and Office of Personnel Management regulations, and Departmental regulations and policies (as required by 43 CFR 20.501 and 20.502).

B. All employees must immediately report through official channels or directly to the Office of Inspector General (OIG):

(1) Any known, suspected, or alleged fraud, waste, abuse, or mismanagement affecting the Department; and

(2) Any serious integrity matter that affects the integrity of the Department.

C. Employees who engage in scientific activities must comply with the Code contained in section 3.4.

D. Employees who are involved in the conduct and reporting of scientific activities must comply with the Federal Policy on Research Misconduct, published at 65 FR 76260–76264 (December 6, 2000).

3.6 Bureau and Office Responsibilities

Each bureau and office must:

A. Establish procedures to ensure adherence to the requirements of this chapter; and

B. When investigating allegations of misconduct under this chapter, ensure that investigators have adequate scientific expertise, provide for due process, and be consistent with the Federal Policy on Research Misconduct.

3.7 Legal Effects of This Chapter

This chapter:

A. Is intended to improve the internal management of the Department of the Interior;

B. Does not create any right or benefit, substantive or procedural, enforceable by law by any person against the United States, its agencies, its officers or employees, or any other person; and

C. Does not replace the Standards of Ethical Conduct at 5 CFR 2635 and other relevant ethical obligations of Department of the Interior scientists.

3.8 Allegations of Misconduct

A. Establishing a Finding of Scientific Misconduct

Before taking disciplinary action under this section, a supervisor must establish a finding of scientific misconduct. A finding of scientific misconduct requires that:

(1) There is a notable departure from accepted practices of the scientific community for maintaining the integrity of the scientific or research record;

(2) The misconduct is committed intentionally, knowingly, or in reckless disregard of accepted practices; and

(3) The allegation is established by a preponderance of evidence.

B. Disciplinary Action

(1) Once a supervisor has verified an employee's misconduct under section 3.8A, the supervisor will administer disciplinary action in accordance with DOI personnel policies and using for guidance the Departmental Manual chapter on "Discipline and Adverse Actions" 370 DM 752. Supervisors should:

(i) Select the penalty they believe necessary to correct the misconduct and to discourage repetition; and

(ii) Evaluate each situation to ensure that the actions proposed and taken are reasonable.

(2) When there is a significant unauthorized departure from accepted practices, or repeated violations of a less serious nature, supervisors may propose and decide on appropriate penalties, including termination of employment.

(i) If a supervisor is considering a formal disciplinary action, the supervisor must immediately consult the Human Resources office.

(ii) The Human Resources office may consult with the Office of the Solicitor (SOL) on proposed disciplinary actions and must consult with SOL on all proposed disciplinary actions that are appealable to the Merit Systems Protection Board.

(3) All responses to allegations of misconduct, from inquiry to confirmation to adjudication and appeal, must be consistent with the guidelines and principles in the Federal Policy on Research Misconduct, Departmental policy, and 370 DM 752.

C. Appeal Rights

For disciplinary actions up to and including a 14-day suspension, employees not covered by a collective bargaining agreement have the right to appeal through the Administrative Grievance Procedure. Employees covered by a collective bargaining agreement have the right to appeal through a Negotiated Grievance Procedure (NGP). For suspensions of more than 14 days, up to removal from Federal service, employees have the right to appeal to the Merit Systems Protection Board or through an applicable NGP (5 CFR 752). Neither temporary employees, probationary employees, contractors, nor volunteers have any appeal rights.

3.9 Authorities

A. Statutes and Regulations

(1) 5 U.S.C. 301 allows the head of an executive department to prescribe regulations for the conduct of its employees.

(2) 43 CFR 20.501 requires employees of the Department to comply with all Federal statutes, Executive Orders, Office of Government Ethics and Office of Personnel Management regulations, and Departmental regulations.

(3) 43 CFR 20.502 states that employees are required to carry out the announced policies and programs of the Department.

(4) 43 CFR 20.502(a) states that an employee is subject to appropriate disciplinary action if he or she fails to comply with any lawful regulations, orders, or policies.

B. Federal Policy on Research Misconduct, 65 FR 76260–76264, December 6, 2000

C. Standards of Ethical Conduct for Employees of the Executive Branch, 5 CFR 2635

3.10 Definitions

A. Conflict of Interest

Any financial or other interest which conflicts with the actions or judgments of an employee when conducting scientific activities because it:

(1) Could significantly impair the employee's objectivity; or

(2) Could create an unfair competitive advantage for any person or organization.

Department of the Interior scientists are also subject to conflict of interest and appearance of a lack of impartiality requirements at 18 U.S.C. 208 and 5 CFR 2635 Subparts D and E.

B. Decision Makers

Departmental employees who:

(1) Are not engaged in scientific activities;

(2) Communicate, recommend, or decide policy or management;

(3) Communicate, recommend, or decide expenditure of Departmental funds; and

(4) Rely in part on scientific products, or on documents compiled and translated from scientific products, to ensure that agency actions are supported by evidence and have a rational basis, and are not arbitrary or capricious.

During the conduct of Departmental business, decision makers may be involved in editing of documents for clarification of major points to aid decision making. Such editing is beyond the scope of this chapter.

C. Employees Who Engage in Scientific Activities Are

(1) Individuals who conduct or directly supervise scientific activities, including but not limited to proposing, performing, or reviewing research, or in reporting research results; and

(2) Individuals who directly supervise or personally perform work involving the compilation and translation of scientific information into formats used by the Department's decision makers.

D. Fabrication

Making up data or results and recording or reporting them.

E. Falsification

Manipulating research materials, equipment, or processes; or changing or omitting data or results such that the research is not accurately represented in the research record.

F. Plagiarism

The appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

G. Reporting

Dissemination or disclosure of the results of scientific activities. Dissemination and disclosure may be oral or in any media, including print and digital media.

H. Research

All basic, applied, and demonstration research in all fields of science, engineering, and mathematics, including social, behavioral and economic research.

I. Research Misconduct

Fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or differences of opinion. (This definition is quoted from The Federal Policy on Research Misconduct (65 FR 76260–76264).)

J. Science

Knowledge obtained and tested through use of the scientific method. Science may also include the observation and classification of facts with the goal of establishing verifiable knowledge derived through induction and hypothesis.

K. Scientific Activities

Activities involving inventorying, monitoring, experimentation, study, research, modeling, and scientific assessment. Scientific activities are conducted in a manner specified by standard protocols and procedures and include any of the physical, biological, or social sciences as well as engineering and mathematics that employ the scientific method. Inspections for regulatory compliance and resulting records are not included because they are covered by separate requirements.

L. Scientific Assessment

Evaluation of a body of scientific or technical knowledge which typically synthesizes multiple factual inputs, data, models, assumptions, and/or implies best professional judgment to bridge uncertainties in the available information.

M. Scientific Method

A method of research in which a problem is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested.

N. Scientific Misconduct

Fabrication, falsification, or plagiarism in proposing, performing or reviewing scientific activities and their products.

O. Scientific Product presents the results of scientific activities including the synthesis, compilation, or translation of scientific information into formats used in the Department's decision-making process.

Appendix

Commentary to Explain and Clarify the Intent of the Basic Elements of the Code

A. *Scientific Excellence, Integrity, and Conflict of Interest.* Honesty and integrity of Department employees subject to the Code are vital to the public interest and critical to conducting the Department's mission. Scientific activities provide data to inform many of the Department's decision-makers regarding the stewardship of our Nation's land, energy, mineral, water, air, biological, and cultural resources. Employees subject to the Code must avoid conflicts of interest that occur when personal interest or gain interferes with or could be construed to interfere with the objectivity of their actions or judgments. They are obligated to be thorough in documenting their work to ensure that the details of their methods are described adequately enough to allow other scientists to critically evaluate or reproduce their results. They will use the best available and practicable practices, protocols, methodologies and technologies available to them when conducting scientific activities as well as in the review, use and dissemination of scientific information. This Code does not suggest that it is unethical to use novel investigative approaches, employ unusual methods of analysis, exclude data known to be faulty for identifiable material reasons, or interpret data in a new or unique way. However, novel methods and data modifications should be fully documented in the research record to avoid misinterpretation of any such departure from standard protocols or methodology.

B. *Abuse of Resources.* Department employees subject to the Code will ensure appropriate use of resources in the conduct of scientific activities, including equipment, funding, staff time, information resources, and any privately owned or Federal property through the awareness of the requirements of applicable laws and regulations. Most importantly, employees will use resources wisely, efficiently, respectfully, and prevent abuse of cultural and natural resources during the conduct of scientific activities. Employees must strive to select methods and materials that, to the best of current knowledge, minimize or eliminate adverse impacts to cultural or natural resources or their future examination, scientific investigation, treatment or function. Professional standards for non-invasive or non-destructive testing/sampling will be followed when studying cultural materials. Animals used for research purposes are public resources, and employees will obey public laws concerning treatment of laboratory animals. Public Law (Pub. L. 99–198), The Food Security Act of 1985, and Federal regulation (9 CFR Part 3) primarily apply to treatment of laboratory animals. Scientists should follow public laws (including Pub. L. 99–108, as applicable) and regulations for activities involving animals in the wild and should consider, where appropriate, guidelines regarding treatment of wild animals published by professional wildlife or scientific societies.

C. *Research Involving Human Subjects.*

(1) Department employees subject to the Code conduct scientific activities among groups, including but not limited to hikers, campers, hunters and anglers, present-day ethnic or occupational communities, and Indian Tribes. These consultations must meet compliance requirements for planning, the Native American Graves Protection and Repatriation Act of 1990 (Pub. L. 101–601), historic preservation, and subsistence uses. Such persons involved in scientific activities must be treated with professionalism and respect. To this end, the Department adopted the common rule published as Federal Policy for the Protection of Human Subjects (56 FR 28012–28018, June 18, 1991). Exempted from this rule is human subjects research involving the use of educational tests, survey procedures, interview procedures or observation of public behavior unless the information obtained is recorded in such a manner that human subjects can be identified, and/or disclosure could place subjects at risk of criminal or civil liability. Many information collections are regulated under the Paperwork Reduction Act of 1995 (5 CFR 1320), and applicable Departmental procedures should be followed (381 DM 11, 12). Exempted from this rule is observation of human public behavior that involves no data collection from subjects.

(2) Before initiating new scientific activities with any group, Department employees subject to the Code should be familiar with the laws, regulations, and policies (including those that are bureau-specific) governing privacy and freedom of information, ethnographic research guidelines, and types of release and consent forms, as provided information might not be protected from release. Department employees will ensure that the research methods are made clear to participants, that permission is obtained to use interview materials, tapes, photographs, maps and any other materials, and that participants know the legal limits of confidentiality.

D. *Hindering scientific and information gathering activities; failing to protect proprietary and confidential information; engaging in dishonesty, fraud, deceit, misrepresentation; or engaging in or knowingly permitting other scientific, research, or professional misconduct.*

(1) Inappropriately hindering scientific activities by Departmental employees subject to the Code is not tolerated by the Department. This includes actions such as biased review of scientific proposals or manuscripts; physical disruption of another scientist's experiments, field surveys, or database; denial of reasonable access to resources or data needed by other scientists to perform their work; or failure to provide information that other Departmental employees need to duplicate scientific activities or verify their accuracy. Scientific staff will allow management and others appropriate access to resources entrusted to them, unless doing so would violate legal, regulatory or policy restrictions, compromise the scientific validity of their activities or substantially interfere with their performance. Employees are expected to understand existing rules and guidelines regarding the need to make data gathered with Federal dollars accessible. Reasonable judgments to delay public access depend upon individual circumstances when premature release would compromise validity or decision-making ability. Specifically, this applies to work in progress where data have not gone through a planned

quality control/quality assurance protocol that is part of the research design. Therefore, this Code does not attempt to provide universal guidelines for making such case-by-case determinations.

(2) Requirements related to use, security and release of proprietary data are sometimes covered by law, regulation or policy and may be established through an agreement with the originator of the data. These agreements are usually established on a case by case basis. Employees will adhere to these agreements to the extent permitted by law, or policy. The Code prohibits denying other scientists reasonable access to published scientific information for the purpose of enhancing one's interests.

(3) Falsification and fabrication of data and results by Departmental employees are not tolerated by the Department and would be a violation of the Code by employees subject to it.

E. *Participating in Review Processes and Offering Fair and Objective Opinions.*

(1) Peer review is an important element in the creation and use of scientific information. In all cases, external (to the Department) scientific review of scientific activities, information, inventory or monitoring data to be published or used in decision-making is beneficial and, in some cases, it is essential. All employees subject to the Code must know, understand and adhere to Departmental and bureau specific guidelines related to peer review of scientific activities. Open and honest debate is essential for the advancement of science, and peer review is an important part of that debate. The peer-review process should be free of personal and professional jealousies, competitions, non-scientific disagreements, and conflicts of interest.

(2) Reviewers should focus on the logical and scientific validity of the research findings, rather than personal feelings, or interactions (past or current) between the reviewer and the author/investigator. Authors/investigators should address reviewers' comments in a thorough manner, and should document appropriately how they responded to those comments. It is the responsibility of prospective reviewers to disqualify themselves, if the review cannot be done in an objective manner (5 CFR 2635.502). Reviewers should not instigate changes to any scientific study by its authors through intimidation, either implied or stated. Reviewers should document in writing all changes made to the manuscripts or proposals to conduct scientific studies in writing.

F. *Integrity in the Collection and Preservation of Data.*

(1) Quality control and assurance, including protocols, standards, and methodologies, should be routinely established for activities pertaining to the conduct of scientific inquiry and the collection of data. Persons engaged in scientific activities and their managers must know and follow established programs, protocols, standards, and methodologies for the activities they conduct to inform Departmental decisions. Preservation of collections and records created during the conduct of scientific activities is controlled by Federal law (44 U.S.C. chaps. 21, 29, 31, and 33) and Departmental regulations and policies (36 CFR 1228.1–1228.282; 381 DM 11, 12; 384 DM 2, 3, and 4) and bureau regulations and policies. This is important for substantiating scientific activities and supporting subsequent decisions that are influenced by the results. Employees subject to this Code must follow these laws, regulations and policies. Collections made for retention include, but are not limited to, cultural objects in archeological collections and non-cultural biological, geological, and paleontological samples.

(2) Documents that should be retained for the scientific record vary according to the nature of the study and include: study plans; methodology; primary data, such as laboratory notebooks, original data, metadata, and quality assurance/quality control information; and formal data sets, analyses and products. These items may be in any medium, including printed and electronic media. Failure to retain data in accordance with law, regulations and policy is not tolerated by the Department.

G. *Responsible Authorship and Dissemination of Information.*

(1) Authorship of a scientific product must be based on a major intellectual contribution (as part of conception, design, data collection, data analysis, or interpretation) and a significant contribution to its preparation (writing, reviewing, or editing). Authorship includes the responsibility for ensuring that the work reported meets scientific criteria and ethical standards. Conferring authorship to individuals engaged in scientific activities without their knowledge or consent is strictly prohibited by the Code.

(2) Scientific knowledge is cumulative and is built on the contributions of numerous scientists over many years. Recognition of other contributors often takes the form of credits in a publication through an acknowledgment or citation. However, only authors whose substantive comments have been received and incorporated prior to submission should be listed in acknowledgments. Authors will cite or acknowledge any scientific work or the source of any idea that is not regarded as common knowledge among specialists in the particular field and that substantially contributes to a scientific activity and its interpretation and result. The Code prohibits plagiarism or theft of ideas, data or unpublished findings. Departmental employees subject to this Code will acknowledge and, to the extent permitted by law, protect the intellectual efforts of others and the confidentiality of information provided by human subjects. However, when Departmental employees are preparing documents required by the National Environmental Policy Act (NEPA) and the considerations in this paragraph are in conflict with the regulations and guidance of the Council on Environmental Quality regarding the publication of information under NEPA, the regulations and guidance of the Council shall govern.

(3) Duplicative publication is not tolerated by the Department. This does not suggest that it is inappropriate to publish more than one manuscript based on a single scientific activity. In some cases, the same scientific activity may be of interest to separate audiences having different technical specialties or to journals having different readerships. Prior publication of portions of an original idea should always be referenced in later publications. Publishing parts of another paper, or publishing another paper with only minor changes, should only be done to reach different or larger audiences and with the knowledge and consent of the publisher. Employees subject to the Code will accept professional responsibility associated with authorship and know that the interpretation and results of their work are used to inform important decisions in the public interest. Repetitive publication of findings in popular literature does not constitute duplicative publication.

(4) In order to ensure that the Department's decision making is based on the best available science, the Code requires a scientific product to be subject to the required level of review. Public release of a scientific product without the required level of review or without the inclusion of appropriate disclaimers could be considered misconduct.

(5) Additionally, in support of the Department's interest in protecting its decision making, the Code prohibits changing conclusions, deletion of data, or knowingly omitting data from reports and testimony for purposes of misrepresentation or manipulation. At the same time, the Code prohibits suppressing data collection, scientific studies, or publication of results by scientists or their supervisors for the purpose of manipulating Departmental decisions. These actions are not tolerated by the Department. They are violations of the Federal Policy on Research Misconduct because they wrongly characterize results and manipulate results so that research is not accurately represented. Scientific conclusions may only be changed in light of new data or new analyses. Scientists should not succumb to coercion to change data. If an employee subject to the Code believes that he or she has been subjected to coercion, it should be reported immediately to the respective supervisor, bureau, or Departmental ethi

Laura Davis,

Associate Deputy [redacted] (b) (5)

[FR Doc. 2010–21591 Filed 8–30–10; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS-R9-IA-2010-N188; 96300-1671-0000-P5]

Proposed Information Collection; OMB Control Number 1018-0093; Federal Fish and Wildlife License/Permit Applications, Management Authority

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice; request for comments.

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BP Energy Environment Regulatory Affairs

What's Missing From Interior's New Scientific Integrity Policy?

by **Kate Sheppard** Tue Aug. 31, 2010 11:48 AM PDT

The Department of Interior issued a new draft policy on scientific integrity on Tuesday, a long overdue addition to the agency's manual outlining the rules and regulations for employees when it comes to ensuring that their decisions are based on sound science. It's certainly a step in the right direction, given such a policy didn't even exist previously. But there are still concerns that the policy doesn't go far enough in reforming an agency known for ignoring (or outright manipulating) scientific findings.

In the wake of the BP disaster, Interior has come under increased scrutiny when it comes to its enforcement and oversight activities. The Minerals Management Service, now renamed the Bureau of Ocean Energy Management, Regulation and Enforcement, has been singled out for the bulk of the criticism. As the agency's Inspector General pointed out in April, in its not-so-subtly-titled report "Interior Lacks a Scientific Integrity Policy," DOI's other divisions have also fallen down on the job when it comes to upholding sound scientific practices. At fault, the IG says, has been the lack of a policy on the subject. From the report:

> We found that Interior has no comprehensive scientific integrity policy and only one of its bureaus has such a policy. In addition, we found that Interior has no requirement to track scientific misconduct allegations. Without policies to ensure the integrity of its scientific research, Interior runs the risk that flawed information will reach the scientific community and general public, thereby breaching the public's trust and damaging Interior's reputation. The time for a comprehensive scientific integrity policy at Interior is, therefore, long overdue.

take action **NOW!**
Protect Wolves from Shoot-on-Sight "Management"

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The report offered a few examples illustrating why the lack of a policy is problematic. In one case, a deputy assistant secretary for Fish, Wildlife and Parks "was found to have unduly influenced a critical habitat designation." In another, a National Park Serve senior science adviser for Point Reyes National Seashore "misrepresented research regarding sedimentation, failed to provide information sought after from Freedom of Information Act request, and misinformed individuals in a public forum regarding sea life data, and put into question NPS' scientific integrity."

The IG's office recommended that the agency develop and implement an Interior-wide, comprehensive scientific integrity policy, one that covers "all agents, appointees, employees and contractors involved in researching and publishing scientific results of any kind." Now, the watchdog group Public Employees for Environmental Responsibility says the draft policy DOI produced only includes about half the rules that are needed. While agency scientists would be disciplined for things like falsifying data and not disclosing or avoiding conflicts of interest, there are a number of concerns. Chief among them is that the draft policy only applies to employees, contractors, and volunteers, excluding supervisors and appointees. Which is pretty key—most of the officials responsible for suppressing or altering scientific data have been political appointees.

"The scientists within Interior are not the ones rewriting documents inappropriately. Scientific misconduct stems from Interior's political appointees and hand-picked senior managers but these folks are not covered by the policy," said PEER Executive Director Jeff Ruch. "Interior's approach to scientific integrity in essence penalizes the victims and gives a free ride to the perpetrators... Reform at Interior needs to start at the top."

The policy will be open for public comment for the next 20 days. It's also worth noting that President Obama issued a directive in March 2009 calling for a new scientific integrity policy covering all the federal agencies, an attempt to reform the tattered reputation agencies earned under the Bush administration for burying or manipulating incovenient science. Each agency was also supposed to write its own policies, and today's DOI draft is in response to that directive. And while the White House Office of Science and Technology Policy was supposed to deliver the overarching policy for all agencies by July 2009, it still has yet to be completed.

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Proposed Scientific Integrity Policy for the U.S. Interior Department

Comments submitted by

Public Employees for Environmental Responsibility (PEER)

September 7, 2010

These comments are submitted on behalf of Public Employees for Environmental Responsibility (PEER), a service organization dedicated to protecting those who protect our environment. We provide legal defense to federal, state, local and tribal employees dedicated to ecologically responsible management against the sometimes onerous repercussions of merely doing their jobs. Headquartered in Washington, D.C., PEER has a network of state and regional offices. Most of our staff and board members are themselves former public employees.

On a daily basis, public servants in crisis contact PEER. A typical federal employee request for assistance involves a scientist or other specialist who is asked to distort or hide data or factual analysis in order to support a politically pre-determined result, such as a favorable recommendation on a project. It is in this context that PEER hears from scientists working within Interior Department (DOI) agencies such as the U.S. Fish & Wildlife Services (FWS), Bureau of Land Management (BLM), National Park Service (NPS) and the agency formerly known as the Minerals Management Service (MMS).

Summary

The proposed DOI scientific integrity policy published in the *Federal Register* on August 31, 2010 does not come close to coherently addressing the pattern of serious scientific misconduct exhibited during recent years within DOI. The DOI proposal explicitly exempts from coverage political manipulation of technical work by top officials. Despite citing President Obama's March 9, 2009 memorandum on the subject, the DOI proposal fails to incorporate nearly every critical element outlined in that presidential directive.

Agency scientists are already subject to discipline for the acts of scientific misconduct defined in the DOI proposal. Moreover, the core "Code of Scientific Misconduct" in the proposal was lifted verbatim from a proposal floated by the Interior Secretary Gale Norton (see below). In sum, the DOI proposal raises significant doubt that Interior decision-makers are sincerely interested in or genuinely understand the nature and resolution of engrained scientific integrity breakdowns within their agency.

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Our comments are organized in the following order:

I. Omissions in the Draft DOI Policy of Elements Contained within the President's March 9, 2009 Executive Memorandum on Scientific Integrity;

II. Critical Flaws in the Draft DOI Policy

III. Suggested Implementing Strategies and Measures to Gauge Effectiveness

Preliminary Observation on Origin of the Proposed DOI Code of Scientific Conduct – the Great Lynx Hair Hoax

In December, 2001, the *Washington Times* ran a story about lynx biologists in Washington State. The story implied that a number of biologists, employees of the U.S. Forest Service, U.S. Fish and Wildlife Service and the Washington Department of Fish and Wildlife had conspired to defraud the public by planting lynx hairs into a wide ranging habitat survey to back a secret environmental agenda.

Before agency scientists had a chance to respond, a number of politicians – including Interior Secretary Gale Norton – jumped into the fray, demanding hearings, investigations and even termination of the scientists involved.

The biggest victim in this political quagmire has been the truth. A review of the record of this case demonstrates conclusively that this has been more a matter of political posturing than scientific wrongdoing. The biologists had sent blind samples of known lynx hairs to test the accuracy of federal laboratories, not "false samples" intended to "defraud" the public.

Subsequent investigations vindicated the scientists involved. An internal Forest Service investigation and then y an investigation by the Washington State Senate cleared the scientists of wrongdoing; a third investigation by The Wildlife Society (TWS), an international association for wildlife professionals, found that the biologists' intentions were fully "consistent with TWS Code" and fully exonerated them.

Without waiting for independent investigations, DOI officials, including the Secretary, had already stated that agency scientists were "out of control" and Secretary Norton subsequently issued a Code of Scientific Conduct – the same one that is copied in the latest DOI proposal – via a press release. Secretary Norton's code was never formally included within the departmental manual.

Nonetheless, the fact that the current DOI would look to the handiwork of Secretary Norton on the issue of scientific integrity is troubling, given the scandalous track record compiled on this issue by DOI under her tenure. While the DOI is not constrained from plagiarizing the work of earlier officials, its choice in this instance is questionable. It also suggests that current DOI officials were not inclined to undertake a fresh, thoughtful

examination of the issues and instead reached out thoughtlessly to grasp whatever was "on the shelf" and ready for rapid publication.

I. Omissions in the Draft DOI Policy of Elements Contained with the President's Memorandum on Scientific Integrity.

The President's March 9, 2009 memorandum specified six aims for incorporation into formal policy, which are quoted below in italicized bold print. Unfortunately, nearly every aspect of these enumerated elements is absent from the DOI proposal:

"(a) The selection and retention of candidates for science and technology positions in the executive branch should be based on the candidate's knowledge, credentials, experience, and integrity"

The DOI policy does not address this topic. This omission is especially significant because it is common for DOI scientists to be supervised by non-scientists who substantively edit the scientists' work.

Further, DOI agencies routinely promote or reward the very officials who perpetrate the distortions of scientific work. The reason behind this perverse dynamic seems evident – managers who dissemble to achieve a pre-determined result are simply doing the bidding of the agency's top political appointees.

To convey just how widespread this culture promoting management manipulation of science has become inside DOI, consider two recent examples:

- One of the rare instances in which FWS has admitted that it committed scientific fraud involves use of skewed biology in assessing the habitat needs and population of the endangered Florida panther. The central figure in this episode was Jay Slack, the Field Supervisor of the FWS South Florida Field Office in Vero Beach. Mr. Slack fired the FWS biologist, Andrew Eller, who had challenged the fraud. Following a whistleblower complaint waged by PEER, Mr. Eller was restored to FWS in a courthouse steps settlement. Shortly thereafter, Mr. Slack received a Meritorious Service Award. Six months later in February 2006, Slack was promoted to serve as Deputy Regional Director of the FWS Mountain-Prairie Region, responsible for the eight-state area. He now heads the FWS training academy.

- An April 2010 report by the Government Accountability Office found that MMS scientists are subjected to management practices that "hindered their ability to complete sound environmental analyses" in reviewing Alaskan offshore drilling projects. The report confirms scientists' accounts channeled through PEER that Interior managers routinely "suppressed" critical findings on issues ranging from the likelihood of oil spills to acoustic damage to whales to introduction of invasive species. Despite ample evidence of management interference in the

scientific work of the MMS Alaska office, not a single manager was disciplined or moved. In fact, the same practices are continuing today in the MMS successor agency, the Bureau of Ocean Energy Management Regulation and Enforcement (BOEM).

"(b) Each agency should have appropriate rules and procedures to ensure the integrity of the scientific process within the agency"

The proposed DOI policy does not apply to agency managers or bar alteration of scientific reports by non-scientists for political reasons. Nor do the rules address the integrity of the scientific process, except to threaten punishment for scientists who engage in gross misconduct that a) is already grounds for discipline; and b) does not match the threats to scientific integrity historically experienced by DOI.

The main reason the Bush administration was able to politically manipulate science was that there is no rule against it. The DOI proposal would not change that – in fact, it would codify that political rewrites of scientific material would be beyond sanction.

Moreover, when there were agency protocols that might have inhibited inappropriate tampering, that stricture could be set aside without consequence. The DOI proposal would not change this condition – political appointees and non-scientist mangers could inappropriately change technical documents or scientific processes without consequence.

In 2005, PEER in partnership with the Union of Concerned Scientists surveyed more than 1,400 FWS biologists, ecologists and botanists working in field offices across the country to obtain their perceptions of scientific integrity within the agency. The survey had a 30% rate of return and produced some of the following results:

- Nearly half of all respondents whose work is related to endangered species scientific findings (44%) reported that they "have been directed, for non-scientific reasons, to refrain from making jeopardy or other findings that are protective of species." One in five agency scientists said they have been "directed to inappropriately exclude or alter technical information from a FWS scientific document";

- More than half of all respondents (56%) cited cases where "commercial interests have inappropriately induced the reversal or withdrawal of scientific conclusions or decisions through political intervention"; and

- More than a third (42%) said they could not openly express "concerns about the biological needs of species and habitats without fear of retaliation" in public while nearly a third (30%) felt they could not do so even inside the confines of the agency. Almost a third (32%) felt they are not allowed to do their jobs as scientists.

In essays submitted on the topic of how to improve integrity at FWS, biologists wrote the following:

- "We are not allowed to be honest and forthright, we are expected to rubber stamp everything. I have 20 years of federal service in this and this is the worst it has ever been."

- "I have never seen so many findings and recommendations by the field be turned around at the regional and Washington level. All we can do at the field level is ensure that our administration record is complete and hope we get sued by an environmental or conservation organization."

- "Recently, [Interior] officials have forced changes in Service documents, and worse, they have forced upper-level managers to say things that are incorrect...It's one thing for the Department to dismiss our recommendations, it's quite another to be forced (under veiled threat of removal) to say something that is counter to our best professional judgment."

Today, many of the same FWS managers who implemented these policies and practices are still in place. With the exception of this DOI proposed policy (which, as discussed above, is a Bush-era policy), no new marching orders have been issued to change these conditions.

In order to have meaningful procedures to protect scientific integrity there must be an enforcement mechanism. PEER recommends that DOI adopt formal and enforceable rules that ban the manipulation of science – rules which at a minimum:

1. Forbid alteration of the substance of technical documents for non-technical reasons unless the basis is included as a part of the document;

2. Ensure that the originating scientist or technical specialist is allowed to see and comment upon "final" work product; and

3. Display any changes in the original work with an explanation for those changes as part of the official record.

The transparency aspects of these rules will also deter political manipulations of scientific findings and conclusions.

"(c) When scientific or technological information is considered in policy decisions, the information should be subject to well-established scientific processes, including peer review where appropriate, and each agency should appropriately and accurately reflect that information in complying with and applying relevant statutory standards"

While the proposed DOI policy references a requirement that scientists shall "welcome and participate in appropriate peer reviews" (without defining what an inappropriate peer

review might be), the policy does not require or encourage peer or other independent reviews of scientific or technical information used in departmental decision-making.

One overarching barrier to peer review of science-related information inside DOI is that its outsized deference to industry claims of proprietary information precludes outside review. In 2010, for example, MMS issued a new code of scientific conduct that promotes secrecy at the expense of scientists being able to obtain independent review of industry submittals. The "Integrity and Code of Conduct for Science, Scientific Assessment, and Other Similar Technical Activities" was unveiled by the MMS in an all-employee e-mail on January 8, 2010. It covers that agency's branch for Offshore Energy and Minerals Management and remains in effect within BOEM. The code forbids disclosure of any information by scientists contrary to –

> "agreements between MMS and its partners [i.e., oil companies] relating to use, security, and release of sensitive, confidential, proprietary, and administratively controlled, deliberative or personally identifiable information and data provided to the MMS."

This scientific code leaves the oil industry in charge of what information the public may see about development of the Arctic, since the vast majority of data consists of industry submittals, estimates and monitoring reports.

This problem is aggravated by the proposed DOI policy which requires that all scientists accord deference to the "confidential and proprietary" status of any material "to the fullest extent...."

As the BP spill in the Gulf of Mexico demonstrates, DOI is inappropriately and dangerously dependent upon the oil and gas industry for technical information and DOI is unable to verify the accuracy of this critical information. PEER recommends that DOI, as part of any scientific integrity policy, redefine proprietary information to a) greatly reduce the scope of any such claims; and b) allow outside review of critical industry safety and environmental technical material, regardless of its proprietary status.

Peer review and other normal processes for scientific integrity are also problematic in DOI, in part because official policies generally restrain agency scientists from interacting with outsiders. For example, the FWS on May 5, 2004 held an all-staff "Town Meeting" to tout its "scientific excellence." That afternoon, all employees were supposed to take part in an "interactive discussion" via telephone conference, Internet connection or satellite download with then-Director Steve Williams. At that meeting, Mr. Williams announced that FWS would begin concerted interaction with professional societies. He was then asked by a participant whether he would address the Interior ethics guidelines which still discourage agency scientists from more than passing involvement with associations dedicated to raising and protecting scientific standards. The ethics guidelines classify these professional societies as the sources of potential conflict of interest. Ironically, agency lawyers are free to participate in state bar or legal association activities but scientists have no comparable freedom.

PEER recommends that –

- **Participation by DOI Scientists in Professional Societies Should be Allowed and Encouraged.** Anything that increases the transparency of agency scientific decision-making, particularly by involving knowledgeable, credible and disinterested outside specialists contributes to the factors safeguarding scientific integrity. The Secretary should make explicitly clear that DOI employee involvement with professional organizations dedicated to improving the quality of science is not a real or apparent conflict of interest but is just the opposite – an activity which furthers the agency mission. The stillborn 2005 FWS initiative on professional openness should be revived and applied to all DOI agencies by a) directing agency ethics offices to encourage rather than discourage staff involvement in professional societies; and b) promoting, through resolution, appropriation language or other mechanism, federal participation and partnerships with outside scientific bodies.

As discussed above, many of the breaches in scientific integrity during the past administration were intended to circumvent statutory requirements in environmental and other laws. In order for agencies to "appropriately and accurately reflect that information in complying with and applying relevant statutory standards," there must be sanctions against officials, including political appointees, who deviate from that standard.

PEER recommends that following an adverse court ruling or administrative finding concerning misapplication of scientific material or a scientific standard, the Interior Office of Inspector General should prepare a report concerning which scientific or technical information has been misapplied against a statutory standard. Following that report, each DOI agency should be required to identify the responsible official and take appropriate disciplinary action.

If there is no punishment for deviating from established standards, those standards will be of questionable worth.

"(d) Except for information that is properly restricted from disclosure under procedures established in accordance with statute, regulation, Executive Order, or Presidential Memorandum, each agency should make available to the public the scientific or technological findings or conclusions considered or relied on in policy decisions"

The DOI proposed policy makes no provision to increase the transparency of or public access to scientific information.

Over the past decade, PEER has surveyed and interviewed thousands of DOI biologists, ecologists and botanists working in field offices across the country to obtain their perceptions of scientific integrity within their agencies. One of the most disturbing findings from this outreach is that DOI scientists are generally unsure about what they

could or could not say or write to colleagues in academia or other agencies. As a result, the natural give-and-take of scientific development is stunted by politically-inspired public communication policies that require that all communications be officially vetted.

The net effect of these explicit and implicit constraints is that dialogue among scientists, both within and outside government, is stunted and furtive. The DOI policy should address this aspect of integrity.

During the Bush administration, Julie MacDonald, a DOI deputy assistant secretary with no scientific training, routinely rewrote FWS scientific studies on endangered species. After her role generated scandal, congressional hearings and lawsuits (some of which is still ongoing), on August 19, 2009 FWS announced a new policy:

- Articles and papers by FWS scientists will no longer have to undergo "policy review" by agency management prior to being submitted for publication either inside or outside the Service. The announcement states that the reason for the change is "to get our employees out from underneath an ill-defined, cumbersome, and potentially stifling process of 'policy review'";

- Studies not officially endorsed by the Service must bear a simple one-sentence disclaimer that their contents "do not necessarily represent the views of the U.S. Fish and Wildlife Service"; and

- FWS started two peer-reviewed journals as outlets for publishing scientific and technical articles relating to agency decisions.

While this effort aimed at "encouraging and empowering employees to publish and to do so using their official agency and office affiliation" should itself be encouraged, there remain gray areas of danger for scientists:

- It is not clear whether previous FWS directives barring disclosure of "draft" documents have been rescinded, meaning that scientists could be punished for prematurely submitting unapproved manuscripts;

- Conflict of interest strictures restraining interaction between agency scientists and professional societies or conservation groups remain in place; and

- Most significantly, scientific disclosures do not enjoy any legal protection against agency retaliation and so scientists who publish articles not favorably received could find their careers derailed.

Disturbingly, the proposed DOI policy may undo this recent FWS publication rule. The proposed policy states in section F4 of the Appendix that:

> "Public release of a scientific product without the required level of review or without the inclusion of appropriate disclaimers could be considered misconduct."

Apart from the fact that the black letter of the proposed rules contains no such prohibition, it is precisely the opposite direction that a cogent scientific integrity policy should take as it undermines transparency, peer review and other features that deter actual misconduct.

Rather than retard the FWS free publication effort, DOI should extend and expand this important FWS transparency initiative:

1. **Un-Gag the Scientists.** The rights of DOI scientists to speak or write should not vary from agency to agency. The Secretary should ban any DOI agency from adopting gag orders and allow all departmental scientists to freely communicate and argue about science – both on the job and off;

2. **Secure Agency Scientists' Ability to Publish.** Non-FWS agencies lack clear guidelines for how scientists may publish on their own in peer reviewed journals or other publications. Every agency should have uniform, clear and non-restrictive guidelines that allow DOI specialists to write articles, for peer-reviewed journals, books and other media;

3. **Open Communication with Congress.** If DOI scientists and other specialists are allowed to speak with reporters or outside colleagues, they certainly should be able to communicate with Congress. Congress already prohibits the executive branch from using any appropriated funds to gag or restrain communication between Congress and civil servants. But this prohibition lacks any enforcement mechanism. The Secretary should provide the enforcement mechanism by adopting rules which explicitly allow DOI scientists and technical specialists to communicate findings directly to Congress.

"(e) Each agency should have in place procedures to identify and address instances in which the scientific process or the integrity of scientific and technological information may be compromised"

This is yet another facet of President Obama's directive that is largely ignored by the DOI proposed policy. DOI makes no effort to empirically identify where its scientific processes break down, let alone address how to fix those breakdowns.

One overarching problem is that DOI agencies often fail to spell out scientific processes, as the GAO report this year on the MMS Alaska office underlined. In the absence of firm processes, science can easily be manipulated without recourse.

Here is a glaring example of "gaming" the DOI scientific system to achieve a pre-ordained result. On January 27, 2005, FWS Southwest Regional Director Dale Hall issued a policy forbidding agency biologists from using wildlife genetics to protect and aid recovery of endangered and threatened species. The policy, in essence, sought to

prevent listing recommendations under the Endangered Species Act for several species by changing the scientific processes that allow consideration of unique genetic lineages.

In a March 11, 2005 letter, Ralph Morgenweck, the FWS Mountain-Prairie Regional Director, wrote to Hall sharply rebuking the policy for contradicting the purposes of the Endangered Species Act and running counter to best available science, stating:

> "I have concerns that the policy could run counter to the purpose of the Endangered Species Act to recover the ecosystems upon which endangered and threatened species depend. It also may contradict our direction to use the best available science in endangered species decisions in some cases."

In his letter, Morgenweck cited several examples where genetic diversity has been critical to species' survival because it allows wildlife to adapt to emerging threats, diseases and changing conditions. By prohibiting consideration of individual or unique populations, Hall's policy allows FWS to declare wildlife species secure based on the status of any single population. The agency can then pronounce species recovered even if a majority of populations were on the brink of extinction and authorizes the agency to approve development projects that extirpate individual populations.

Shortly thereafter, Dale Hall was nominated and confirmed as FWS Director. Ralph Morgenweck was removed from his position, internally exiled and ultimately retired. The Hall no-genetics rule was never rescinded.

DOI agencies need to adopt specific scientific protocols by regulation, subject to the provisions of the National Environmental Policy Act, so that scientific processes cannot be altered or suspended at management whim.

Moreover, to prevent inappropriate alteration or suppression of DOI scientific reports, PEER strongly recommends adoption of policies which require that any internal alterations of agency scientific or technical reports should become part of the public record, so that the evolution of official findings can be traced. In particular, alterations by political appointees of scientific documents should be reported to the Congress with a required written explanation for the basis of the alteration.

If changes to scientific conclusions must be explained in the clear light of day, many distortions should be deterred. Conversely, if agency leaders believe that the changes their political appointees make are appropriate, they should not mind sharing that justification.

"(f) Each agency should adopt such additional procedures, including any appropriate whistleblower protections, as are necessary to ensure the integrity of scientific and technological information and processes on which the agency relies in its decision-making or otherwise uses or prepare."

The DOI proposed policy does not come close to addressing legal protections for its scientists. To the contrary, the proposed policy takes a punitive approach in spelling out how they may be better punished, rather than protected.

The need for such protections is clear. DOI scientists who disclose information that is at odds with agency policy risk career-ending reprisal. Compounding the risks is the relative delicacy of scientific careers, which may be derailed by agency actions that would not trouble other professionals.

In some scientific disciplines (particularly those within DOI), the "publish or perish" dynamic means that if an agency prevents the submission of manuscripts to peer reviewed journals the scientist is put at a (sometimes fatal) competitive disadvantage. Being denied permission to attend a professional conference or present a paper at such a conference can cause grievous career harm. When administered as punishments these tactics can be quite devastating, but they do not rise to the legal standard of a "personnel action" within federal civil service law and thus are very difficult to challenge or review.

On the other hand, some agency tactics for punishing scientists who disclose inconvenient truths are far from nuanced:

- One Bureau of Reclamation biologist represented by PEER was sent home on paid administrative leave for nine months. His supposed offense was sending e-mails to federal agencies and an environmental group pointing out problems in Bureau filings and reports. The biologist was also the agency NEPA (National Environmental Policy Act) coordinator whose job it is to keep stakeholders informed. Originally, Reclamation proposed to fire him for being "subversive" and revealing "administratively controlled information" but ultimately the Bureau withdrew those charges and instead proposed dismissal on the grounds of causing "embarrassment" for putting the agency in a "negative light." For good measure, the Bureau also dismissed his wife from her temporary clerk-typist position. This case was settled before it went to hearing.

- A FWS biologist who protested diversion of critical habitat found her e-mail privileges "suspended" until the end of the fiscal year; and

- A BLM biologist who raised concerns about growing damage caused by off-road vehicles was abruptly removed from that program and re-assigned to a position with no duties in an office that had no phone or computer.

Unfortunately, wronged federal scientists who seek vindication face steep challenges. Under the current federal civil service law, federal scientists have scant legal protection. The practice of "good science" is not recognized as protected activity under the federal Whistleblower Protection Act, unless 1) the scientist is reporting a falsification or other distortion that violates a law or regulation; or 2) the scientific manipulation creates an imminent danger to public health or safety.

Absent those unusual circumstances, a disclosure of a skewed methodology, suppression of key data or the alteration of a data-driven recommendation is treated as if it were a policy dispute or difference of opinion, for which the disclosing scientist has no legal protection.

On top of that, constitutional free speech protections are now unavailable for scientists who speak as government employees. On May 30, 2006, Justice Samuel Alito cast his first deciding vote in Garcetti v. Ceballos (126 S. Ct. 1951) which held that public servants have no First Amendment rights in their role as government employees. The central premise of this ruling is that public employees *per se* have no free speech status because their speech is owned by the government. The court held that civil servants enjoy First Amendment rights only when they act outside their work role and go public. Thus, under the Supreme Court's formulation, pursuing scientific integrity at work is afforded no constitutional defense against on-the-job retaliation.

The only protection the Court identified for public servants is whistleblower legislation. Unfortunately, the federal Whistleblower Protection Act has also been interpreted to exclude disclosures made within the scope of duty. Thus, internal agency communications often lack any legal protection whatsoever – constitutional or statutory.

The only body of law that protects government scientists is the handful of environmental statutes, such as the federal Clean Air Act, that protect disclosures made by any employee, public or private sector, that further the implementation of those acts. However, several key laws, such as the Endangered Species Act and the National Environmental Policy Act, have no such whistleblower provision. Moreover, the Bush administration has ruled that all but two of the six environmental laws with such whistleblower provisions are off-limits to federal employees under the doctrine of sovereign immunity—based on the old English common law maxim that "The King Can Do No Wrong."

PEER recommends that the Secretary should adopt department-wide rules that –

1. Prohibit adverse personnel actions or other discrimination in retaliation for voicing a reasonable scientific or technical finding, disagreement or distinction;

2. Protect DOI employees who report accurate information by making honesty an official policy of federal service; and

3. Extend coverage of the Whistleblower Protection Act to scientists by ensuring that rules promoting scientific integrity and disclosures of deviations are official policies. The Whistleblower Protection Act protects reports of any violation of agency policy – thus, policies which cover scientists and specialists who are doing their jobs of generating or ensuring accurate scientific and technical information must be codified as a rule, regulation or, optimally, law.

II. Critical Flaws in the Draft DOI Policy

Initially, it should be stressed that DOI and other federal scientists are already subject to discipline for "fabrication, falsification or plagiarism" (the actions the proposed policy defines as "scientific misconduct.") In some circumstances, federal employees may also be subject to criminal prosecution for falsification or fabrication, for example submitting a false official statement in violation 18 U.S.C. § 1001.

In light of the fact that this new policy fails to provide meaningful new protections for scientific integrity, its flaws should be judged with an extra degree of criticality because the proposed policy carries the potential to be counterproductive in the following ways:

A. Exempting Political Appointees and Senior Managers Confers Immunity for Misconduct

Significantly, the rules do not apply to agency managers or bar alteration of scientific reports by non-scientists for political reasons. In fact, the DOI goes farther by stating that "editing of documents...to aid decisionmaking...is beyond the scope of this chapter." This exemption appears to provide backhanded legitimization of political manipulation of science.

Given its recent history, the failure by DOI to recognize political alteration of scientific documents by agency managers is staggering.

B. Punishing Whistleblowers

The thrust of the proposed DOI policy is to punish scientists. For example, the proposal makes aspirational standards such as "I will welcome constructive criticism" into a code provision that serves as the basis for discipline under section 3.5 C.

Scientific whistleblowers who defend their concerns can then be faulted for not backing down in the interests of being "constructive" or failing to "differentiate between facts, opinions, hypotheses, and professional judgments" or some other value-laden, imprecise criteria contained within the new code.

The net effect of making vague subjective standards the basis for discipline is that this code can be used by managers to silence or punish scientists who are considered to be going off the reservation.

Similarly, the proposed code will leave controversial agency scientists vulnerable to petty charges concerning equipment usage and other non-integrity related issues that are also covered in the code.

In addition, section 3.5 B requires scientists to report any "serious integrity matter that affects the integrity of the Department" – a circular directive that is enforced by disciplinary penalties. Yet, the policy does not provide any protection for scientists who report integrity problems with their superiors against later retaliation by those superiors.

These sweeping provisions place actual or suspected whistleblowers at risk for being charged as accessories for conduct they opposed but did not oppose loudly enough.

C. Prohibiting Disclosures of Imminent Dangers and Environmental Damages
The proposed policy prohibits disclosure of "confidential and proprietary information" (terms it does not define) and bars reporting of this information "to the fullest extent permitted by law." This curious wording appears to forbid any disclosure under any circumstances, even if otherwise protected by the Whistleblower Protection Act.

At the same time, the proposed code requires scientists to "fully disclose all...available data," leaving the scientist to resolve yet another conflicting directive that subjects him or her to discipline at either prong of the dilemma.

D. Putting Scientists in an Impossible Situation
As a matter of course, DOI scientists are required to abide by DOI procedures and directives as well as obey lawful orders from the agency's chain of command. Yet, the proposed DOI policy requires scientists to "place quality and objectivity of scientific activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations" – individuals or organizations which include DOI managers and agencies.

In the event of a conflict between a scientist's chain of command and scientific objectivity, what is the scientist supposed to do? On one hand, he or she risks discipline for insubordination for defying supervisors and on the other risks discipline for subjugating objectivity to institutional loyalty.

Federal service is hard enough, especially in scientific disciplines, without being subjected to conflicting mandates without clear procedures for distinguishing the proper course.

E. Imposing Unrealistic Reporting Requirements
Under section 3.5 B of the proposed policy all DOI covered employees "must immediately report through official channels or directly to the Office of Inspector General (OIG)" any "suspected or alleged fraud, waste, abuse or mismanagement affecting the Department" (emphasis added). This reporting standard is so sweeping that it would cause any half-way observant scientist to spend half his or her time on the OIG hotline. However, given that a scientist would be subjected to discipline for not reporting any alleged abuse or waste, no matter how trivial or improbable, this overly inclusive provision cannot lightly be ignored.

Moreover, in the event that a problem arises, all scientists who were not involved but "suspected" the existence of a problem would be in danger of disciplinary action. This would create the perverse result of one rotten apple getting the entire barrel punished.

F. Conflating Serious Misconduct and Trivial Actions

Section 3.10 N defines "scientific misconduct" as "fabrication, falsification or plagiarism" yet the policy covers a broad range of other conduct, including loss of equipment or unintentional financial paperwork errors. As drafted, all covered conducted could be punished as a breach of "scientific integrity" rules, thus creating the prospect that DOI scientists could be stigmatized for petty actions with no bearing on the person's integrity.

G. Inappropriately Including Volunteers

Incredibly, the proposed DOI policy exempts political appointees and top managers but includes unpaid volunteers (section 3.2B). It is not clear why volunteers are included or how their violations would be punished.

III. Suggested Implementing Strategies and Measures to Gauge Effectiveness

Since the proposed DOI policy is a punitive approach directed against its non-management employees, the only strategy it puts forth is investigation followed by disciplinary action when charges are "verified."

This narrow, misdirected approach should be replaced by affirmative measures that encourage transparency and integrity and whose contributions can be measured. PEER recommends that DOI –

A. Follow the Lawsuits

The most efficient way to identify scientific misconduct is to examine federal lawsuit rulings (or forced settlements) against an agency. In matters in which a legal-scientific standard is at issue, as in most environmental lawsuits, in order to prevail, the plaintiffs must in essence demonstrate an act of scientific misconduct by agency management, under a standard that the government has been "arbitrary and capricious." When a federal judge finds an agency guilty of violating science-based laws under the highest standard in civil jurisprudence this cannot be explained away as mistakes or misunderstandings.

For example, when federal courts rule that DOI managers have acted in an "arbitrary and capricious manner" in failing to implement the Endangered Species Act or acted unreasonably in violation of the National Environmental Policy Act, once DOI decides not to appeal that ruling and it becomes final, DOI should conduct a scientific integrity autopsy of the overruled federal action. At the root of these court rulings is scientific misconduct by DOI managers. A review of such adverse court decisions over the past decade should be followed by identifying any responsible mangers still within federal service and taking appropriate action so that they do not supervise scientists or technical specialists.

Departmental officials responsible for making decisions so contrary to the overwhelming weight of scientific or technical information that they violate federal law should be disciplined and/or removed. Currently, these law violations are not even recorded in the manager's personnel file.

B. Evaluate Managers by Their Promotion of Scientific Integrity
Federal managers must be held to account for their decisions which are found to foster improper scientific procedures, suppression or other practice. Achievement of improved scientific integrity should be integrated into the official performance evaluation s for all relevant DOI managers, including non-scientists who oversee scientists.

To the extent that managers suffer no negative career consequences for their documented malfeasance, then any new integrity standards will be meaningless.

C. Go to the Top
It is also vital that the Secretary make clear that DOI political appointees will not be immune from discipline for violating scientific integrity procedures.

Even under its current Secretary, DOI tends to want to sweep scientific problems or disagreements under the rug. A telling example involves Grand Canyon Nation Park and the flow regime of the Colorado River. In a scathing January 15, 2009 memo, Grand Canyon Superintendent Steve Martin assails Reclamation's Environmental Assessment (EA) and misrepresentations by the government in defending it against a lawsuit filed by the Grand Canyon Trust, a non-profit seeking to restore Colorado River flows to more closely resemble the river's natural rhythms to benefit Grand Canyon wildlife.

Martin, a former NPS Deputy Director, called Reclamation's work "perhaps the worst EA I have seen for an action of this importance" because it finds no significant environmental impact for a course of action which, among other defects –

- Is rooted in a "lack of scientific veracity" that "continues to misinterpret key scientific findings related to the humpback chub, [and the] status of downstream resources in Grand Canyon";

- Suffers from a "failure to address NPS concerns that actions under the EA's five-year plan would impair the resources of Grand Canyon"; and

- Based the DOI position in court upon a "mistreatment and disregard of science" that "significantly impairs Grand Canyon resources."

Interior Secretary Ken Salazar has promised that agency "decisions are based on sound science and the public interest" and will reflect "high ethical standards" but has ignored this controversy. If Secretary Salazar really means to improve scientific integrity within DOI, he needs to start right here. Further avoidance of squarely taking on these public scientific integrity controversies makes a mockery out of this DOI proposed policy and its successors.

D. Gauge the Effectiveness of Strategies to Promote Scientific Integrity.
DOI must do more than simply promulgate a code. The Department needs to change its culture and create a new ethic of transparency and open scientific debate.

In order to bring about these institutional changes PEER recommends that DOI begin to implement scientific processes to measure how well the department fosters scientific integrity, including steps whereby –

- DOI should regularly survey government scientists and specialists to determine their perceptions about the effectiveness of quality control policies. In addition, employee unions or other representatives of specialists should be allowed input into the survey instrument to ensure that the questions posed touch upon actual concerns of subject employees; and

- The Office of the Solicitor should be asked to provide annual analysis of court rulings involving DOI application of science-based statutes. After first establishing a baseline, it would be possible to see if DOI was winning or losing a higher percentage or number of cases – and by which agencies. This analysis of court rulings and the underlying information on which it is based should be made public in a way to facilitate independent review, critique and re-analysis of the data.

- DOI should partner with scientific professional societies to review and, where appropriate, participate in processes designed to promote scientific integrity and data quality.

Above all, the key measure of effectiveness will be the willingness of this administration to publicly call out deviations in scientific integrity committed under its own watch.

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NATIONAL PARK SERVICE

U.S. DEPARTMENT OF THE INTERIOR

Interim Guidance Document Governing Code of Conduct, Peer Review, and Information Quality Correction for National Park Service Cultural and Natural Resource Disciplines

/s/ Herbert C. Frost
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Natural Resource Stewardship and Science

January 31, 2008

This guidance document will remain in effect until amended or superseded.

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Interim Guidance Document Governing Code of Conduct, Peer Review, and Information Quality Correction for National Park Service Cultural and Natural Resource Disciplines

Contents:

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I. BACKGROUND AND PURPOSE

I.a. Background

Sound management and interpretation of National Park System resources and National Park Service technical assistance programs depend on authoritative information from scientific and scholarly activities. Peer review provides the appropriate process for ensuring technical quality and accuracy of these activities, which include inventory, monitoring, research, assessment, and management projects. This peer review must be applied appropriately at all stages, which may include proposals at the funding decision point, detailed proposals or plans of action at the point of initiating an activity, progress of an activity at key points during its duration, and results and draft reports of accomplishments of the activity.

The scientific and scholarly guidance presented in this document ensures that the review requirement is met using a consistent, conscientious, and appropriate level of effort. Such technical peer review is essential to demonstrate the professional stature and ensure the accountability of the National Park Service's acquisition and application of scientific and scholarly information. Such scientific peer review complements, and is part of, administrative review.

I.b. Purpose

NPS issues this guidance to ensure that NPS scientific and scholarly activities comply with the OMB Final Information Quality Bulletin for Peer Review (70 FR 2664-2677), the Department of the Interior draft 305 DM 4 Peer Review, NPS Director's Order 11B: Ensuring Quality of Information Disseminated by the National Park Service, and the Secretary of the Interior's December 21, 2007 memorandum "Ensuring Integrity in Scientific Activities". This guidance is expected to:

A. Enhance the quality, objectivity, utility, and integrity of scientific and scholarly information generated or supported by the NPS;

B. Increase the credibility of decisions to which these and other scientific information contributes; and

C. Extend application of the concepts of the OMB Final Information Quality Bulletin for Peer Review (70 FR 2664-2677), henceforth referred to as the OMB Peer Review Bulletin, to information disseminated by the Service that is neither a highly influential scientific assessment nor influential scientific information.

I.c. Policy

The NPS shall ensure appropriate peer review of all scientific and scholarly information prior to use in decision-making, regulatory processes, or dissemination to the public and regardless of media (i.e., print, digital, audiovisual, or Web). Any information that the NPS determines to be either "influential scientific information" and/or "highly influential scientific assessment" will require more specific, independent peer review consistent with the OMB Peer Review Bulletin. NPS will place these guidelines, its peer review agendas for influential scientific information and highly influential scientific assessment (as defined by the OMB Peer Review Bulletin), and its information quality correction site on a publicly available webpage. These guidelines become effective on an interim basis February 1, 2008.

I.d. Scope

These guidelines apply to all scientific and scholarly information and assessments produced, used, or sponsored by the NPS. The guidelines identify the ethical standards within which employees and volunteers will conduct NPS-sponsored scientific and scholarly activities. The peer review component of these guidelines applies to scientific and scholarly activities. It does not apply to policy or management decisions, although it does apply to the underlying scientific and scholarly information that, along with other factors, informs a decision maker. For example, proposed management options associated with Environmental Impact Statements (EIS) or other parts of the NEPA process would not be subject to peer review whereas consolidated technical components of an EIS that present a scientific or scholarly evaluation or other related products or analytical models are subject to peer review. These guidelines do require that all scientific and scholarly information disseminated to the public in any format meets the requirements of D.O. 11B: Ensuring Quality of Information Disseminated by the National Park Service.

I.e. What Is "Peer Review"?

Peer review is the critical evaluation of the scientific or scholarly merits of an activity conducted by impartial subject-matter experts who are not directly associated with the activity. Peer review may be formal or informal. It may be authored or anonymous. It may involve open exchange of views and ideas between reviewers and managers of the activities being reviewed during the process of the review, or it may consist of reviewers conducting their observations and writing their reports without any contact with those managers. No matter how it is conducted, it must be objective to achieve its purpose of ensuring that the quality, objectivity, utility, and integrity of scientific and scholarly information meets scientific, scholarly, and technical community standards.

Peer review may be conducted by scientists and scholars from the National Park Service, other federal or state agencies, universities, or other organizations. Peer reviewers may submit their comments separately to the National Park Service or they may submit their comments jointly as part of a team report, subject to appropriate provisions of the Federal Advisory Committee Act.

Peer review is different from public comment and other stakeholder processes, which are not addressed in this document. The selection of peer reviewers is based on their demonstrated expertise, independence, and lack of conflict of interest.

I.f. What is Administrative Review?
The scientific and scholarly peer review process outlined here does not eliminate the need for administrative review of scientific and scholarly activities by managers. Managers conduct administrative review to ensure that:

- proposed activities are compatible with Park Service policies and regulations;
- proposed activities are pertinent to park purposes, programs, and needs; and
- personnel, logistical (e.g., housing, permits, and transportation), and supplementary (e.g., equipment and supplies) operating needs are identified and authorized prior to commencement of a project.

II. AUTHORITY TO ISSUE THIS REFERENCE MANUAL

II.a. Guidance for Science, Peer Review, and Information Quality

- 305 DM 2 requires that science must be integrated into and used in setting regulatory and management policies in the Department and its bureaus;
- DOI Information Quality Guidelines establish policy to ensure and maximize the objectivity, utility, and integrity of information disseminated to the public by the Department. These guidelines implement the Information Quality Act (P.L. 106-554 Section 515) and associated OMB Guidelines (67 FR 8452-8460);
- E.O. 12866 establishes a government-wide policy that each agency shall base its regulatory decisions on the best reasonably obtainable scientific, technical, economic and other information; and
- OMB Final Information Quality Bulletin for Peer Review (70 FR 2664-2677) establishes government-wide requirements for the peer review of "influential scientific information" and "highly influential scientific assessments." It also establishes requirements for posting peer review plans on a website and annual reporting of associated peer review activities to the OMB.

II.b. Guidance for Scientific Code of Conduct

- 5 U.S.C. 301 allows the head of an executive department to prescribe regulations for the conduct of its employees;
- 43 CFR 20.501 requires employees of the Department to comply with all Federal statutes; Executive Orders; and Office of Government Ethics, Office of Personnel Management, and Departmental regulations;
- 43 CFR 20.502 states that employees are required to carry out the announced policies and programs of the Department;
- 43 CFR 20.502(a) states that an employee is subject to appropriate disciplinary action if he or she fails to comply with any lawful regulations, orders, or policies;
- Federal Policy on Research Misconduct, 65 FR 76260-76264, December 6, 2000; and
- Standards of Ethical Conduct for Employees of the Executive Branch, 5 CFR 2635.

II.c. General Authority

- 16 U.S.C. 1 through 4 (the National Park Service Organic Act).

II.d. Other Relevant Policy and Guidance

- NPS Management Policies 2006
  Chapter 1, The Foundation, Sections 1.8 (Managing Excellence); 1.9.4 (Public Information and Media Relations);

  Chapter 2, Park System Planning, Sections 2.1.2 (Scientific, Technical, and Scholarly Analysis), 2.1.3 (Public Participation); 2.3.1.4 (Science and Scholarship);

  Chapter 4, Natural Resource Management, Sections 4.1.2 (Natural Resource Information); 4.2 (Studies and Collection); 4.8.2.1 (Paleontological Resources and Their Contexts); 4.8.2.2 (Caves);

  Chapter 5, Cultural Resource Management, Sections 5.1.1 (National Park Service Research); 5.2.3 (Confidentiality); 5.3.5.3.2 (Sacred Sites); 5.3.5.5.4 (Acquisition, Management, Disposition, and Use); 5.3.5.5.6 (Archives and Manuscripts);

  Chapter 7, Requirements for All Interpretive and Educational Services, Section 7.5.4 (Research and Scholarship);

  Chapter 8, Use of the Parks, Sections 8.5 (Use by American Indians and Other Traditionally Associated Groups); 8.11 (Social Science Studies);

  Chapter 10, Commercial Visitor Services, Section 10.2.4.9 (Natural and Cultural Resource Management Requirements).
- DO #11B Ensuring Quality of Information Disseminated by the National Park Service;
- DO #12 Environmental Impact Analysis;
- DO #19 Records Management; and
- DO #78 Social Science, Section III.1 (Peer Review).

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III. CODE OF SCIENTIFIC AND SCHOLARLY CONDUCT

To enhance their contribution to quality, objectivity, utility, and integrity of such information, all NPS employees working with scientific and scholarly information will, in performing their duties:

- act in the interest of the advancement of knowledge and contribute the best, highest quality scientific and scholarly information for the NPS;
- conduct, process data from, and communicate the results of scientific and scholarly activities honestly, objectively, thoroughly, and expeditiously;

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- be responsible for the entrusted resources, including equipment, funds, work time, employee work time, and prompt and accurate use and reporting of financial resources and scientific and scholarly work;
- fully disclose all [redacted] data, and final reports and publications in a timely manner and consistent with applicable laws and policy;
- respect, to the fullest extent permitted by law, confidential and proprietary information regarding interests and resources that are studied or affected by scientific or scholarly activities or the resulting information;
- neither hinder the scientific or scholarly activities of others nor engage in dishonesty, fraud, deceit, misrepresentation, coercive manipulation, or other scientific or scholarly misconduct;
- welcome constructive criticism of scientific and scholarly activities, welcome and participate in appropriate peer reviews, critique others' work respectfully and objectively, and substantiate comments with care;
- be diligent in creating, using, preserving, documenting, and maintaining collections and data, ensuring established quality assurance and quality control programs, follow the NPS's records retention policies, and comply with Federal law and agreements related to use, security, and release of confidential and proprietary data;
- adhere to appropriate standards for reporting the results of scientific and scholarly activities, including respecting the intellectual property rights of others;
- to the extent possible and practical, differentiate among facts, opinions, hypotheses, and professional judgment in reporting the results of scientific and scholarly activities to others, including scientists, decision makers, and the public;
- be responsible for the quality of collected data and interpretations, and for the integrity of conclusions drawn in the course of scientific and scholarly activities; and
- place integrity, utility, and objectivity of scientific and scholarly activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations.

IV. INFORMATION QUALITY

IV.a. Administrative Record

Whenever the NPS relies on **influential** scientific information (including a **highly influential** scientific assessment) to support a regulatory action or policy decision, it shall include in the administrative record for that action a certification explaining how the NPS has complied with the requirements of the OMB Peer Review Bulletin and the Information Quality Act.

IV.b. Information Quality Correction Procedures

IV.b.1. Complaints About Quality of Scientific and Scholarly Information

Persons who have complaints about NPS-provided scientific and scholarly information may avail themselves of any of the four methods outlined in D.O. 11B for notifying the NPS of their complaints. These four methods include informally discussing their complaint in person with park or program office staff, informally directing complaints about the quality of disseminated information to the superintendent of the park or manager of the program office responsible for disseminating the information, formally directing complaints about the quality of disseminated information by mail to the NPS Washington Administrative Program Center, or formally directing complaints to the Correspondence Control Unit by e-mail.

Persons submitting a formal request for correction of such information must submit all information identified in D.O. 11B, the technical components of which include the specific reasons for believing the information fails to meet OMB, DOI, or NPS standards, along with any supporting documentation; a detailed description of the specific material in question, including where the material is located (that is, publication title, date, and publication number, if any; the website and web page address; or other source where the material exists); and the specific recommendations for corrective action.

Upon receipt of a formal request for correction of information, NPS shall post the request on the appropriate park or program office Information Quality web page with a link to the NPS web page (www.nps.gov/notices.htm). All interim and final responses also shall be posted on the appropriate web page at the time they are sent to the complainant.

IV.b.2. Processing Complaints

The CCU will route formal complaints it receives regarding scientific or scholarly information to the park or office that disseminated the information and track response to assure that the response complies with the requirements of Director's Order 11B. The park or office receiving the complaint, regardless of the manner of receipt, will notify the complainant of receipt within 10 working days. The disseminating office will evaluate the complaint within 60 calendar days of the day it is received by the NPS, in accordance with the OMB guidelines, and notify the complainant as to whether the information has been corrected, deleted, or confirmed to be accurate. The Service will respond to additional complaints on the same subject according to the processes delineated in D.O. 11B.

IV.b.3. Appeals Process

If a complainant does not receive the notice or the response within the time frames described above, or wishes to appeal a determination of merit or wishes to appeal the proposed correction of information, the complainant may appeal to the Director, National Park Service. Appeals must follow the requirements in D.O. 11B. All appeal requests shall be posted on the park or program office Information Quality web page upon receipt, with a link to the NPS Information Quality web page.

If the Director determines that an appeal of a determination has merit or the proposed correction of information has merit, the affected program office or park will be notified. The challenged information will be withdrawn, to the extent practicable, from the public domain and will not be used in any NPS decision-making process until it is corrected. The Director will make a decision on the final appeal within 60 calendar days.

V. THRESHHOLDS FOR PEER REVIEW

V.a. When is Peer Review Required?

Although peer review generally benefits all scientific and scholarly activities, existing workloads do not permit conducting the same intensity of peer review in every case. As a result, supervisors apply professional judgment to each activity to determine what level of peer review is required at any step in the implementation process. In general the need for peer review should be decided by a supervisor or program leader at least one level above the person who conducts the work. The following factors are examples of considerations used in making this professional judgment:

- the amount of funding involved;
- the number of researchers involved;
- the length of time involved;
- whether or not the activity involves significant experimentation or use of new technology or methods;

- the degree to which the information may contradict prior findings and results or is likely to be precedent-setting;
- potential for the activity to have applicability to other similar projects;
- the geographical scale involved;
- specific properties of, and values assigned to, natural and cultural resources involved;
- the potential for risk to both target and non-target resources;
- the potential for risk to visitor enjoyment or park operation;
- whether the act of conducting the activity or the probable results of the activity have potential to generate broad implications beyond the project itself;
- the probable degree of controversy likely to be associated with the activity or the management, regulatory, or policy decision that it informs;
- the potential for societal and resource impacts associated with management, regulatory, or policy decisions that the information might influence; and/or
- the presence of legal mandates or unusual, unanticipated, or time-sensitive requirements that might preclude carrying out peer review.

V.b. Scientific and Scholarly Information Not Requiring Peer Review.
Activities that generally do **not** require independent peer review are those that are unlikely to be controversial or of a sensitive nature; involve routine, well-established practices; and pose no unacceptable impact to resources, visitor enjoyment, or operations. In such cases, administrative, NEPA, and Section 106 review may provide a sufficient alternative to peer review. When in doubt, however, it is better to conduct peer reviews.

Other information that does not require peer review under this guidance includes:

A. Items found in the list of exemptions under Section IX of the OMB Peer Review Bulletin:

- related to certain national security, foreign affairs, or negotiations involving international trade or treaties where compliance with this Bulletin would interfere with the need for secrecy or promptness;
- disseminated in the course of litigation, adjudication or a permit proceeding (including a registration, approval, licensing, or a site-specific determination), unless the agency determines that peer review is practical and appropriate and that the influential dissemination is scientifically or technically novel or likely to have precedent-setting influence on future adjudications and/or permit proceedings;
- a health or safety dissemination where the agency determines that the dissemination is time-sensitive (e.g., findings based primarily on data from a recent clinical trial that was adequately peer reviewed before the trial began);
- an agency regulatory impact analysis or regulatory flexibility analysis subject to interagency review under Executive Order 12866, except for underlying data and analytical models used;
- routine statistical information released by federal statistical agencies (e.g., periodic demographic and economic statistics) and analyses of these data to compute standard indicators and trends (e.g., unemployment and poverty rates);
- accounting, budget, actuarial, and financial information, including that which is generated or used by agencies that focus on interest rates, banking, currency, securities, commodities, futures, or taxes; or
- information disseminated in connection with routine rules that materially alter entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof.

B. Information published either in a peer-reviewed journal listed on the Thomson Scientific Master Journal List or in an official report of the National Academies of Sciences.

C. Routine statistical data used to compute standard indicators and trends that are gathered using methods based on well-established, peer-reviewed protocols and are analyzed and interpreted within the guidelines of the protocols.

D. An Environmental Impact Statement prepared as part of the NEPA process, except for underlying scientific and scholarly products and analytical models that provide information serving as the principal basis for a decision. In such cases, peer review that was conducted must have been appropriate to the context in which the information will be used or an additional peer review will be required.

E. Information performed by other federal agencies following the requirements of the OMB Peer Review Bulletin.

VI. PEER REVIEW POLICIES AND INSTRUCTIONS

VI.a. The Peer Review Process

The peer review process begins when the project manager (or supervisor) of a scientific or scholarly information activity, such as a proposal, nomination, progress report, review of previous studies, or product, identifies the need for peer review. Project managers or supervisors may be program scientists or scholars, resource managers, science coordinators, or other professionals.

The submission, which may be in the form of a proposal, study plan, inventory and monitoring plan, conceptual model, protocol, interim report, draft report, database, action plan, or scientific assessment should be peer reviewed in accordance with the following peer review process prior to funding, authorization, execution, publication, or incorporation into a decision:

A. The project manager assigns the submission to a peer review manager, who is not the performer of the activity but may be the project manager, to provide appropriate technical oversight and ensure appropriate quality performance throughout the life of the activity. The project manager consults appropriately with park, regional office, and Washington office experts to obtain advice on selecting the best-qualified peer review manager. For some activities, a park resource management specialist may be the most appropriate peer review manager. For other activities, the peer review manager might come from other NPS offices at the regional, network, or national level. The peer review manager ensures that an appropriate critical review process is conducted of the activity, determines validity of reviewer comments received, ensures that valid comments are incorporated into the activity, and ensures that records of the reviews, revisions, and approvals are properly filed and archived. The peer review manager may also serve as the contracting/agreement officer's technical representative.

B. The peer review manager identifies the structure of the peer review and recruits one or more highly qualified individuals with technical expertise in the specific appropriate disciplines to provide peer review of each relevant component of the activity. Peer reviewers may be from within or outside the Park Service. Peer reviewers may have neither direct involvement with the activity nor a direct stake in the outcome of the review. The peer review manager may obtain recommendations for appropriately skilled reviewers from other knowledgeable people, in addition to using competent reviewers known to the peer review manager. Depending on the nature of the peer review, the peer review manager may serve as one

peer reviewer if otherwise qualified. The reviewers carry out their tasks independently, without interaction among themselves, or together, depending on the structure of the review process.

The peer review manager may determine that an alternative peer review process may be accepted whenever it can be demonstrated that a reputable scientific body has already completed a formal peer review on a scientific or scholarly activity or product. (See Section IV.b. Scientific and Scholarly Information Not Requiring Peer Review.) Documentation of reliance on this alternative review process should be included in the peer review file.

C. The peer review manager ensures that peer review adequately addresses the technical merits of the methods, the professional techniques, data analysis, conclusions, and suggested management outcome scenarios and that activities requiring significant data analysis or sampling design receive additional review by peer reviewers with expertise in statistics and experimental design.

D. Because reviews of funding proposals must be performed in a timely manner, given the necessity to obligate funds within a given fiscal year and the short time usually available for obligating funds the peer review manager should schedule peer reviews to allow enough time for the development of cooperative agreements or contracts, including solicitor review. Therefore, it is critical that reviewers be selected who can provide fast turnaround as well as scientifically sound reviews.

E. Proposals solicited through competitive procurement or cooperative agreement processes will be subjected to a technical review process selected by the contracting/agreement officer upon recommendation of the contracting/agreement officer's technical representative. Typically, the peer review panel and the technical review panel are one and the same.

F. The peer review manager will negotiate with the performer of the activity regarding revisions to the information as recommended by peer reviews, will ensure that the project manager is notified of these recommended revisions, and will maintain a record of the reviews, activity revisions, and approvals in accordance with NPS records disposition requirements.

G. Once all appropriate changes and modifications have been completed in response to peer review comments, the peer review manager recommends technical acceptance of the activity in a written record documenting the process. The project manager has the final authority to either approve or reject an activity.

In those cases where peer reviewers recommend rejection of the activity, the peer review manager should write a summary of the reasons for the recommendation and be prepared to supply the author with reviewer comments.

VI.b. Peer Review Objectives

The peer review manager should define clearly the objectives of each peer review using questions that all reviewers are given and are expected to answer Examples of potential peer review questions include:

- Are purpose for and methodology underlying the activity clearly presented, appropriate, and valid?
- Are appropriate field, laboratory, library, and statistical methods used for data collection, analysis, and characterization of uncertainty, and are they sufficiently described to allow for replication?
- Does the communication plan address communication needs and audiences appropriately?
- Is the combination of involved scientific, scholarly, or technical disciplines sufficient to adequately measure and test the hypothesis or to meet the activity's stated objectives?
- Is the work original?
- Does the activity address significant, new, or novel circumstances?
- Does the activity include an appropriate literature review that puts the work in the context of previous work?
- Are conclusions reasonable and supported by data and other evidence and are alternative conclusions or counter arguments taken into account?
- Is written information well-written, logical, and understandable?
- What are the strengths, limitations, and potential usefulness to park managers and others of the activity?
- Does the performer of the activity have a level of recognized authority, technical and project management experience, and past record of success in the field of effort to adequately accomplish the stated objectives?

VI.c. Number of Peer Reviewers

One or more qualified individuals with technical expertise in the appropriate discipline(s) should be asked to provide peer review of informative scientific or scholarly information. Each review of "Influential Scientific Information" and "Highly Influential Scientific Assessment" must include a minimum of two independent peer reviewers. (See VI.k for procedures governing reviewer selection.)

VI.d. Peer Review Structure

Peer reviews may be structured in various ways, ranging from one or more individual reviewers (probably the most appropriate model for most NPS endeavors) to review panels or advisory committees. The choice will depend on the novelty and complexity of the scientific information and whether the desired result is individual reviews or a consensus among reviewers. In determining the structure of a given review, the NPS must observe the requirements of the Federal Advisory Committee Act (FACA), where applicable. If the review does not involve convening a group of reviewers as a committee, the review is probably not subject to FACA. Consensus panels may not be subject to FACA if established, controlled, and managed by an outside organization, such as a contractor.

VI.e. Peer Review Manager

In general, reviews for information that will benefit from peer review but are not deemed "influential" or "highly influential" will be managed by a park, region, or other office peer review manager following the guidelines in this document. The peer review manager for "influential" and "highly influential" NPS scientific or scholarly information activities will be selected by the responsible Senior Executive Service (SES) manager.

VI.f. Required Disclaimer

The peer review manager must ensure that each product distributed for peer review under this chapter is imprinted with the following disclaimer:

This information is distributed solely for the purpose of pre-dissemination peer review under applicable information quality guidelines. It has not been formally disseminated by the National Park Service. It does not represent and should not be construed to represent any

National Park Service determination or policy.

VI.g. Disposition of Peer Review Comments
The peer review manager must make all review comments available to the authors of the work being reviewed, usually without identifying the reviewer's identity. Authors may disagree with peer reviewer comments on scientific or scholarly grounds. Where comments of a substantial nature are not incorporated in a revision:

A. The author should document the decision not to incorporate the comments; and

B. The peer review manager should document appropriately the comments, how the author responded to the comments the author used, the reasons for the author not incorporating comments the author rejected, and the peer review manager's concurrence with the decision.

VI.h. Peer Review Costs
Traditionally, peer review is carried out at no cost. The NPS recognizes that increasing demands for reviewer time and associated travel may occasionally necessitate payment for reviewer time and for associated travel, especially for review of "influential" and "highly influential" activities.

VI.i. Peer Review Confidentiality
Peer review must be conducted in a manner that respects confidential business information and intellectual property. Reviewers must agree to not disclose or divulge any results or conclusions, or make any public statements regarding the reviewed information before it is published and released.

VI.j. Peer Review Documentation
Each peer review manager must maintain a written administrative record for all formal peer reviews.

A. Documentation must be sufficient for an uninvolved person to understand the process used and any changes made as a result of the review.

B. Peer review records will be appropriately maintained under direction of the responsible SES manager, who should describe where and how long each administrative record remains in the working files and identify the archives where the record will be stored.

C. At a minimum, the records must include:
- The name and position of the responsible peer review manager;
- The name, affiliation, and pertinent qualifications of each peer reviewer;
- Applicable confidentiality and conflict of interest documentation for each peer reviewer (see Appendix B);
- The objectives and structure of the peer review;
- A copy of all peer reviewer comments, and
- Explanation of how peer review comments were addressed.

VI.k. Selection of Peer Reviewers

A. Peer reviewers must be true peers who are selected on the basis of their relevant scientific, scholarly, and technical expertise and their objectivity. They must not be associated directly with the work being reviewed. Reviewers should represent a range of viewpoints, especially where legitimate scientific controversy exists. Reviewers should be able to ensure that the information is effectively presented with the intended audience in mind and be cognizant of controversial or high-visibility issues that may be relevant to public policy;

B. Potential reviewers may be recommended by NPS staff members, scientific and professional societies, members of the public, or authors of scientific and scholarly products, but actual selection of reviewers rests solely with the peer review manager and should be based on specific criteria for peer reviewers. Supervisors of potential NPS reviewers are expected to encourage their employees to serve whenever feasible.

C. Peer review managers should use the widest range of sources of scientific, scholarly, and technical expertise as is practical and appropriate for an information's expected degree of influence. Sources may include other federal and state agencies, Tribal governments, professional societies, colleges and universities, private companies, non-profit organizations, and the National Research Council, a part of the National Academies.

D. If standing panels are created to perform consistent peer review, membership should rotate across the pool of qualified reviewers.

E. For all **influential scientific information** (including highly influential scientific assessments), peer review managers must ensure that all reviewers comply with federal ethics requirements and must adopt or adapt the National Academy of Sciences policy for committee selection with respect to evaluating the potential for conflicts (e.g., those arising from investments; employer and business affiliations; grants, contracts and consulting income). The NAS policy is available at: http://www.nationalacademies.org/coi/bi-coi_form-0.pdf. All peer reviewers for **influential** NPS information products must agree to be bound by the strictest scientific ethics and sign the NPS Conflict-of-Interests and Confidentiality statement (see Appendix B). For scientific information relevant to specific regulations, the NPS shall examine a reviewer's financial ties to regulated entities (e.g. businesses), other stakeholders, and the NPS.

F. For **highly influential scientific assessments**, the use of formal peer reviewers employed by the National Park Service is prohibited unless the reviewer is employed only for the purpose of conducting the peer review (i.e., special government employees). (This restriction does not exclude informal, internal reviews in addition to the formal peer review process.)

i. The only exception to this prohibition would be the rare case where the NPS determines, using the criteria developed by the National Academy of Sciences for evaluating use of "employees of sponsors," that a premier government specialist is not in a position of management or policy responsibility and possesses essential expertise that cannot be obtained elsewhere.

ii. To be eligible for this exception, the specialist must be employed by a different park, region, or office of the NPS than is disseminating the scientific information. The use of such an exception must be documented in writing and approved, on a non-delegable basis, by the Secretary or Deputy Secretary prior to the specialist's appointment. In addition, peer review managers shall avoid repeated use of the same reviewer on multiple assessments unless his or her participation is essential and cannot be obtained elsewhere.

VI.l. Peer Reviewer Anonymity
Peer review managers should clearly inform prospective peer reviewers whether –

A. Reviewer names will be disclosed and comments will be specifically attributed;

B. Reviewer names will be disclosed but comments will not be specifically attributed;

C. Reviewer names will not be disclosed but comments will be disclosed; or

D. Neither reviewer names nor comments will be disclosed.

To the extent information about a peer reviewer (name, credentials, affiliation) will be disclosed along with his or her comments or analysis (see also Section VI.q), the peer review manager must comply with the requirements of the Privacy Act, 5 U.S.C. § 522a as amended, and OMB Circular A-130, Appendix I, 61 Fed. Reg. 6428 (February 20, 1996) to establish appropriate routine uses in a published System of Records Notice.

VI.m. Standards Governing Peer Reviewers' Conduct
The peer review manager must ensure that each potential peer reviewer has been asked to disclose any personal information or situation that may create or appear to create a conflict of interest. Prospective formal peer reviewers sign a statement disclosing any potential conflicts of interest (see Appendix B). Each peer review manager must provide appropriate documentation in the administrative record. Conflict of Interest statements are subject to the confidentiality policy stated in Section VI.l.

VI.n. Public Participation
Whenever feasible and appropriate, the peer review manager must make a draft of each **highly influential scientific assessment** available to the public for comment at the same time it is submitted for peer review (or during the peer review process).

A. The office producing the assessment will add an explicit prefatory statement to the disseminated material that states the material being disseminated to the public is concurrently being submitted for peer review and, therefore, may be subject to change and then reiterate this prefatory statement when sponsoring any public meeting where interested members of the public can provide the peer reviewers with oral presentations on scientific or scholarly issues of concern to the public.

B. When employing a public comment process as part of the peer review, the peer review manager shall, whenever practical, provide peer reviewers with access to public comments that address significant scientific, scholarly, or technical issues. To ensure that public participation does not cause undue delay, the peer review manager shall specify time limits for public participation throughout the peer review process.

VI.p. Peer Review Plans for Influential Scientific and Scholarly Information
Each SES manager will post a list of the manager's Park, Region, or Office's planned and ongoing ***influential*** scientific and scholarly information along with associated peer review plans on an Information Quality webpage accessible to the public. This webpage shall be updated at least every six months. The webpage will provide contact addresses to allow the public to comment on the adequacy of the peer review plans. Each peer review plan shall include:

A. The title, subject and purpose of the planned scientific information along with an electronic link to the information (when available) and a contact person.

B. The timing of the review (including deferrals).

C. The structure of the review (e.g., individual letters, panel) including the number of planned reviewers and the primary disciplines or expertise needed.

D. The method for reviewer selection and whether the public can nominate prospective reviewers.

E. Whether there will be opportunities for the public to comment on the information to be peer reviewed, and if so, how and when these opportunities will be provided.

F. Whether the agency will provide significant and relevant public comments to the peer reviewers before they conduct their review.

VI.q. Peer Review Reports for Scientific and Scholarly Information
The peer review manager shall prepare a report that describes the nature of the review along with findings and conclusions. The report shall either include a verbatim copy of each reviewer's comments (with or without specific attribution) or represent the views of the group as a whole, including any dissenting views. The report shall contain the names of reviewers and their organizational affiliations. Reviewers must be notified in advance regarding the extent of disclosure and attribution. For influential scientific information (including highly influential scientific assessment), NPS shall disseminate the peer review report (including the peer reviewer information) on a webpage accessible to the public. In addition, where scientific or scholarly information is specifically used to inform a rulemaking, the peer review report shall be discussed in the preamble to that rulemaking and included in the administrative record for any related NPS action.

VI.r. NPS Annual Peer Review Report
With respect to influential scientific information and highly influential scientific assessments, each SES manager shall provide appropriate information for compilation into the Service's report to the Office of the Secretary by December 1 of each year. This information should include the following:

A. The number of peer reviews conducted for **influential scientific information** and **highly influential scientific assessments**;

B. The number of times alternative procedures (e.g., relying on refereed journal reviews) were invoked;

C. The number of times waivers or deferrals were invoked (and in the case of deferrals, the length of time elapsed between the deferral and the peer review);

D. Any decision to appoint a reviewer pursuant to any exception to the applicable independence or conflict of interest standards, including determinations by the Secretary under provisions of the OMB Peer Review Bulletin;

E. The number of peer review panels that were conducted in public and the number that allowed public comment;

F. The number of public comments provided on the agency's peer review plans; and

G. The number of peer reviewers that the agency used that were recommended by professional societies.

The Associate Director, Natural Resource Stewardship and Science, will consolidate the SES managers' reports into the Service report and will submit the Service report to the Department.

VII. RESPONSIBILITIES

VII.a. The Director

The Director addresses appeals of responses to information quality complaints. The Director may waive or defer some or all of the peer review requirements where warranted by a compelling rationale. If the Director defers the peer review requirements before dissemination, peer review must be conducted as soon as practicable.

VII.b. Associate and Regional Directors

The Associate and Regional Directors are responsible for ensuring that their staffs implement these policies and procedures.

VII.c. Senior Executive Service Official Responsible for Conducting Scientific Reviews

The Senior Executive Service manager directly responsible for a park, region, or directorate will designate an official (the SES manager) to have overall responsibility for implementation of these guidelines. Where the responsibility for a specific action or actions may not be delegated to a subordinate, this should be so stated.

VII.d. Project Manager

The project manager, as the overseer of an activity, applies these guidelines to determine whether or not the activity requires peer review and, for an activity that does require peer review, is the person who designates the peer review manager and who oversees implementation of these guidelines with respect to the specific activity.

VII.e. Peer Review Manager

The peer review manager:

A. Determines what level of peer review is required;

B. Establishes the peer review process by setting objectives, structure, and timeframe for completing the review, as appropriate, by:
   i. Submitting the information to an appropriate refereed journal or other, credible, professional peer review program.
   ii. If the information is deemed "influential" or "highly influential," conducting a formal peer review using the process outlined in this guidance.
   iii. If the information is not deemed "influential" or "highly influential," continuing a peer review process according to these guidelines.

C. Provides review findings to authors.

D. Ensures that the authors address comments adequately and fairly.

E. Ensures that proper records are kept.

F. Oversees independent entities or contractors commissioned to manage the peer review process.

VII.d. Parks and Offices Responsible for Releasing Information to the Public

Parks and offices responsible for releasing information to the public must follow the requirements of D.O. 11B by:

A. Ensuring that the information they release to the public, in any manner and at each appropriate stage of information development, is developed from reliable sources and meets Service standards for information quality.

B. Documenting the quality of all information that they release to the public, including information on the internet.

C. Notifying formal complainants of the receipt of their complaint within 10 working days of their receipt of the complaint from the Correspondence Control Unit.

D. Responding to formal complaints about information quality within 60 calendar days from receipt of a complainant in CCU.

E. Responding accurately and appropriately to informal complaints about information quality.

VII.e. The NPS Correspondence Control Unit (CCU) in the Washington Administrative Program Center is responsible for:

A. Routing public complaints they receive about information quality to the information disseminating office.

B. Reminding offices of their deadlines to respond to pending complaints forwarded by the CCU.

C. Generating annual reports to the Department of the Interior of the number, nature, and resolution of complaints received by the CCU.

VII.f. Chief, Office of Policy

The Chief, Office of Policy ensures that Servicewide information quality policies and procedures are available on the web, including links to regional, network, office, and park information quality web pages that are maintained by the respective officials responsible for conducting scientific reviews.

VIII. DEFINITIONS

The following definitions apply to this document:

Conflict of Interest. Any financial or other interest which conflicts with the actions or judgments of a reviewer because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization. National Park Service employees must avoid conflicts of interest and the appearance of a lack of impartiality, in accordance with 18 U.S.C. 208 and 5 CFR 2635 Subparts D and E.

Dissemination. NPS initiated or sponsored distribution of information to the public. Dissemination does not include distribution limited to government employees or NPS contractors or grantees; intra- or inter-agency use or sharing of government information; and responses to requests for agency records under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act, or other similar law. This definition also does not include

distribution limited to correspondence with individuals or persons, press releases, archival records, public filings, subpoenas or adjudicative processes.

Fabrication. Making up data or results and recording or reporting them.

Falsification. Manipulating research materials, equipment, or processes; or changing or omitting data or results such that the research is not accurately represented in the research record.

Highly Influential Scientific or Scholarly Assessment. A scientific or scholarly assessment that could have a potential impact of more than $500 million in any year, or is novel, controversial, or precedent-setting or has significant interagency interest. Such an assessment is a subset of "influential scientific or scholarly information."

Independent peer reviewer. An internal or external peer reviewer who the NPS determines to meet the requirements of section II (3)(c) of the OMB Final Information Quality Bulletin for Peer Review (70 FR 2664-2677), and is not associated with the information under review –

1. by direct involvement in its development;
2. indirectly, by significant consultation during development or by supervising the personnel who conducted it; or
3. by significant personal relationship to persons directly involved in development of the information.

Influential Scientific or Scholarly Information. Scientific or scholarly information that the Service reasonably can determine will have or does have a clear and substantial impact on important public policies or private sector decisions but that does not meet the definition of "highly influential scientific assessment." Influential scientific information is a subset of "informative scientific information." Information is influential in determining important policies or decisions if the same decision would be difficult to reach in the absence of the information. Information has a clear and substantial impact when the specific information serves as the principal basis for a decision that affects significant numbers of private sector entities outside parks or not associated with NPS assistance activities.

Information. Any communication or representation of knowledge (e.g., fact or data), in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audiovisual forms. This definition includes information that an office disseminates from a web page, but does not include the provision of hyperlinks to information that others disseminate. This definition does not include opinions, where the office's presentation makes it clear that what is being offered in someone's opinion rather than fact or the office's views.

Informative Scientific or Scholarly Information. Scientific or scholarly information that serves to inform scientific, scholarly, and management awareness and decision-making generally but that does not provide the sole or major component of information used in decision-making and does not, by itself, lead to a change in the direction of decision-making or to a decision that creates a clear and substantial impact on important public policies or private sector decisions.

Integrity. Systematically and objectively developed and maintained information that is protected from unauthorized access or revision to ensure that the information reflects the circumstances of its acquisition and is not compromised through corruption or falsification.

Inventory. Process of acquiring, managing, and analyzing information on park resources, including but not limited to the presence, distribution, and condition of plants, animals, soils, water, air, natural features, biotic communities, cultural resources, and natural and cultural resource processes.

Mitigation. Maintenance of the existing form and integrity of natural and cultural resource systems or system components, consistent with park management objectives, in the face of harm or potential harm from human activities within or outside the park. Mitigation is also the conversion of a resource, altered by human activity, to a more functional or desired state consistent with management objectives. As such, mitigation encompasses preservation and restoration activities.

Monitoring. Systematic collection and analysis of natural and cultural resource data at regular intervals, in perpetuity, to predict or detect natural and human-induced changes, and to provide the basis for appropriate management response.

Resource Management. Understanding of natural and cultural resource processes and human-induced effects; mitigation of potential and realized effects; monitoring for ongoing or future trends; protecting existing natural physical, biological, and cultural resources, systems, and processes; and interpreting these resources, systems, and processes to people. This function can be broken down into seven major activities: research, inventory, monitoring, mitigation, protection, interpretation, and administration.

Objectivity. "Objectivity" involves two distinct elements, presentation and substance. It includes whether disseminated information is being presented in an accurate, clear, complete, and unbiased manner. This involves whether the information is presented within a proper context. In addition, "objectivity" involves a focus on ensuring accurate, reliable, and unbiased information. In a scientific, financial, or statistical context, the original and supporting data shall be generated, and the analytic results shall be developed, using sound statistical and research methods.

Peer Review. A quality control process in which the scientific merit of scientific information is critically evaluated by independent peers, meaning persons who are not associated directly or indirectly with the information under review and whose background and expertise puts them on par technically and scientifically with the authors of the information.

Plagiarism. The appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

Quality. An encompassing term comprising utility, objectivity, and integrity. Therefore, the guidelines sometimes refer to these three statutory terms, collectively, as "quality."

Reporting. Dissemination or disclosure of the results of scientific or scholarly activities. Dissemination and disclosure may be oral or in any media, including print and digital media.

Research. Investigation aimed at the discovery and interpretation of facts, the revision of accepted theories in light of new facts, or the development of practical applications of such new revised theories.

Research Misconduct. Fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct does not include honest error or differences of opinion. (This definition is quoted from The Federal Policy on Research Misconduct [65 FR 76260-76264].)

Science. Knowledge obtained and tested through the use of the scientific method. Science may also include the observation and classification of facts with the goal of establishing verifiable knowledge derived through induction and hypothesis.

Scientific or Scholarly Activities. Activities involving inventorying, monitoring, experimentation, study, research, modeling, and scientific assessment. Scientific or scholarly activities are conducted in a manner specified by standard protocols and procedures and include any of the physical, biological,

cultural, or social sciences as well as landscape architecture, engineering, and mathematics that employ scientific or scholarship methods. Inspections for regulatory compliance and resulting records are not included, even though they may require use of complementary methods.

Scientific or Scholarly Assessment. Scientific or scholarly information constructed to provide an evaluation of a body of scientific or technical knowledge, typically by synthesizing multiple factual inputs, data, models, assumptions, and/or by applying best professional judgment to bridge uncertainties in the available information.

Scientific or Scholarly Information. Scientific and scholarship outputs that consist of proposals, hypotheses, models, written documents, records of all kinds, and assessments. This definition does not include opinions, where the presentation of an output makes clear that what is being offered is someone's opinion rather than fact or the agency's views. Scientific or scholarly information includes all of the following:

(1) Factual inputs, data, models, analyses, technical information, or scientific or scholarly assessments based on the behavioral, cultural, and social sciences, health and medical sciences, life and earth sciences, engineering, or physical sciences.

(2) Any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audiovisual forms.

(3) Information that an agency disseminates from a web page, but does not include the provision of hyperlinks to information that others disseminate.

Scientific Method. A method of research in which a question is identified, relevant data are gathered, a hypothesis is formulated from these data, and the hypothesis is empirically tested.

Scientific or Scholarly Misconduct. Fabrication, falsification, or plagiarism in proposing, performing or reviewing scientific or scholarly activities and their products.

Utility. Usefulness of the information to its intended users, including the public. In assessing the usefulness of information that the NPS disseminates to the public, the office needs to consider the uses of the information not only from the perspective of the office, but also from the perspective of the public. As a result, when transparency of information is relevant for assessing the information's usefulness from the public's perspective, the office must take care to ensure that transparency has been addressed in its review of the information.

IX. LEGAL EFFECT

(b) (5) These guidelines are intended only to improve the internal management of the National Park Service relating to information quality. Nothing in these guidelines is intended to create any right or benefit, substantive or procedural, enforceable by law or equity by a party against the United States, its agencies, its offices, or any other person. These guidelines do not provide any right to judicial review.

(b) (5)

(b) (5)

APPENDIX A

NATIONAL PARK SERVICE PEER REVIEW TEMPLATE

The following material provides potential questions and rankings that may be appropriate to ask peer reviewers to address. The peer review manager should not feel constrained by these suggestions and should add, modify, or delete questions or text, as appropriate to the specific informative or influential scientific or scholarly product under review.

The disclaimer at the foot of each page is required by OMB Final Information Quality Bulletin for Peer Review (70 FR 2664-2677).

Thank you for agreeing to provide your experience and expertise in evaluating this information for the National Park Service. Your efforts help enhance the quality of this NPS generated scientific/scholarly product and increase the credibility of decisions managers may make based on this information. Your review ranking and comments will be provided to the author(s) and others preparing this material. However, your name will remain confidential unless you specifically give permission to provide your name or we specifically tell you that your name will not remain confidential.

TITLE OF PRODUCT: _____

REVIEWER # _____

I GIVE PERMISSION TO INCLUDE MY NAME ON REVIEWS PROVIDED TO THE AUTHOR(S) *(OPTIONAL STATEMENT)* Signed by

_____

1. Are the purpose and methodology of this information clearly presented, appropriate and valid? Are appropriate methods used for data collection, analysis, and characterization of uncertainty, and are they sufficiently described to allow for replication?

Strongly disagree ↔ Strongly agree*

1 2 3 4 5

Methodology is appropriate and valid

*Double click on each box to select 'checked' as the default value

Comments:

---

2. Is the work novel? Does the information present significant, new or novel findings?

Strongly disagree ↔ Strongly agree*

1 2 3 4 5

The work and findings are significant

The work and findings are new

The work and findings are novel

*Double click on each box to select 'checked' as the default value

Comments:

---

3. Does this information include an appropriate literature review that puts the work in the context of previous work?

Strongly disagree ↔ Strongly agree*

1 2 3 4 5

An appropriate literature review is included

*Double click on each box to select 'checked' as the default value

Comments:

---

4. Are the conclusions reasonable and supported by the data and other evidence? Are alternative conclusions or counter arguments discussed and taken

into account?

Strongly disagree ↔ Strongly agree*

1 2 3 4 5

Conclusions are reasonable & supported

*Double click on each box to select 'checked' as the default value

Comments:

---

5. Is the information well-presented, logical, and understandable?

Strongly disagree ↔ Strongly agree*

1 2 3 4 5

Paper is well-presented

*Double click on each box to select 'checked' as the default value

Comments:

---

6. Please comment on the strength and limitations of the overall product and its potential usefulness to managers and others.

Strongly disagree ↔ Strongly agree*

1 2 3 4 5

Product is strong & useful to managers & others

*Double click on each box to select 'checked' as the default value

Comments:

---

7. Other concerns or comments?

This information is distributed solely for the purpose of pre-dissemination peer review under applicable information quality guidelines. It has not been formally disseminated by the National Park Service. It does not represent and should not be construed to represent National Park Service determination or policy.

APPENDIX B

CONFLICT-OF-INTERESTS AND CONFIDENTIALITY STATEMENT FOR INFLUENTIAL NPS SCIENTIFIC INFORMATION REVIEWERS

1. POTENTIAL CONFLICTS-OF-INTERESTS: As a National Park Service scientific information reviewer, you must declare any potential conflict situations. Please read the examples of potentially biasing affiliations or relationships on the second (or back) page and identify any concerns to the NPS peer review manager.
2. YOUR OBLIGATION TO MAINTAIN CONFIDENTIALITY: A peer reviewer for a potentially influential NPS information product must agree to be bound by the strictest scientific ethics. For this reason, you must not copy, quote, or otherwise use or disclose to anyone any material revealed during this review process. If you believe a colleague can make a substantial contribution to the review, please obtain permission of the NPS peer review manager *before* disclosing any portion of the contents of the material under review.
3. AVAILABILITY OF THE REVIEWERS NAMES AND IDENTITIES: *Unless otherwise agreed upon*, the National Park Service will be free to provide a list of peer reviewer names and affiliations to the author and the public. The NPS may, also, provide the author and the public with access to the reviewer's comments and rankings, either verbatim or in a summary report. The Park Service may or may not directly attribute comments, reviews, or rankings to a specific reviewer.

YOUR CERTIFICATION

YOUR POTENTIAL CONFLICTS

I have read the list of affiliations and relationships that could prevent my participation in matters involving such individuals and institutions. To the best of my knowledge, I have no affiliation or relationship that would prevent me from performing my review duties. I understand that I must contact the NPS peer review manager if a conflict exists or arises during my service. I further understand that **I must sign and return this Conflict Statement to the peer review manager before I may serve.**

MAINTAINING THE CONFIDENTIALITY OF OTHERS

I will not divulge or use any confidential information that I may become aware of during my service.

YOUR IDENTITY AS A REVIEWER

I understand my identity as a reviewer of specific NPS scientific or scholarly products and/or my comments may be made available to the author and the public. Unless I am told otherwise, I understand my comments will **not** be directly attributed to me.

Reviewer's Name (Please print or type) _____

Reviewer's Signature _____ Date _____

Name of product: _____

Reviewer's Position and Affiliation _____

CONFLICT-OF-INTERESTS FOR INFLUENTIAL NPS SCIENTIFIC PRODUCTS REVIEWERS

(First bullet in Item 3 of this section explains the role of the italicized entries)

I. YOUR AFFILIATIONS WITH THE PRODUCT'S AUTHOR(S)/CREATOR(S) INSTITUTION

You may have a conflict if you have/hold/are:

- *Current employment at the park, division, or institution (including consulting or advisory arrangement);*
- *Previous employment with the park, division, or institution within the last 12 months;*
- *Being considered for employment at the park, division, or institution;*
- *Formal or informal re-employment arrangement with the park, division, or institution;*
- *Ownership of securities of firms involved in the product;*
- *Any office, governing board membership, or relevant committee chairpersonship with the park, division, institution, or their cooperating associations;*
- *Current enrollment as a student at the institution (applicable when an author/creator is affiliated with an educational institute);*
- Received and retained an honorarium or award from the institution within the last 12 months.

I. YOUR RELATIONSHIP WITH AN AUTHOR, INVESTIGATOR, PROJECT DIRECTOR, OR OTHER PERSON WHO HAS A PERSONAL OR FINANCIAL INTEREST IN THE PRODUCT.

- Known family relationship as spouse, child, sibling, or parent;
- *Business or professional partnership;*
- Past or present association as thesis advisor or thesis student;
- Collaboration on a project or on a book, article, report, or paper within the last 48 months.
- Co-editing of a journal, compendium, or conference proceedings within the last 24 months.

3. YOUR OTHER AFFILIATIONS OR RELATIONSHIPS

- Interests of the following persons are to be treated as if they were yours: An affiliation or relationship of your spouse, of your minor child, of a relative living in your immediate household or of anyone who is legally your partner that you are aware of, *that would be covered by any italicized items above*.
- Other relationship, such as close personal friendship, that you think might tend to affect your judgment or be seen as doing so by a reasonable person familiar with the relationship.

APPENDIX C

Dear XXXXXXX,

The National Park Service relies on both internal and external reviewers to ensure the quality of NPS generated and sponsored scientific and scholarly information products and to validate the credibility of decisions land managers may make based on these documents. We invite you, as a specialist to review the following information product, _____, as we believe you can provide important experience and knowledge about this topic. The XX page manuscript will be accompanied by a form that asks you to rank the paper on six qualities and provide any additional comments you believe will be helpful. We ask that reviews be returned by _____.

I will be coordinating the reviews. Please let me know if you are able to assist us in this important task and I will e-mail you the material. Please indicate to me and provide a mailing or delivery address if you prefer receiving a paper copy of the manuscript and review form.

We recognize that professional reviews take time from your busy schedule and appreciate your willingness to consider helping with this important process.

Sincerely,

reference the "Tokeland Cow Dip Pit CERCLA Site" and EPA Docket No. CERCLA–10–97–0043 and should be addressed to Ms. Shillcutt at the above address.

FOR FURTHER INFORMATION CONTACT: Jennifer Byrne, Assistant Regional Counsel, EPA Region 10, Office of Regional Counsel, 1200 Sixth Avenue, Seattle, Washington 98101, telephone number (206) 553–0050.

Dated: November 21, 2000.

Charles E. Findley,

Acting Regional Administrator, Region 10.

[FR Doc. 00–30909 Filed 12–5–00; 8:45 am]

BILLING CODE 6560–50–U

OFFICE OF SCIENCE AND TECHNOLOGY POLICY

Executive Office of the President; Federal Policy on Research Misconduct; Preamble for Research Misconduct Policy

AGENCY: Office of Science and Technology Policy.

ACTION: Notification of Final Policy.

SUMMARY: The Office of Science and Technology Policy (OSTP) publish[ed] request for public comment on a proposed Federal research miscond[uct] policy in the October 14, 1999 **Federal Register** (pp. 55722–55725). OSTP received 237 sets of comments before the public comment period closed on December 13, 1999. After consideration of the public comments, the policy was revised and has now been finalized. This notice provides background information about the development of the policy, explains how the policy has been modified, and discusses plans for its implementation.

EFFECTIVE DATE: December 6, 2000.

FOR FURTHER INFORMATION CONTACT: Holly Gwin, Office of Science and Technology Policy, Executive Office of the President, Washington, DC 20502. Tel: 202–456–6140; Fax: 202–456–6021; e-mail: hgwin@ostp.eop.gov.

SUPPLEMENTARY INFORMATION: Advances in science, engineering, and all fields of research depend on the reliability of the research record, as do the benefits associated with them in areas such as health and national security. Sustained public trust in the research enterprise also requires confidence in the research record and in the processes involved in its ongoing development. For these reasons, and in the interest of achieving greater uniformity in Federal policies in this area, the National Science and Technology Council (NSTC) initiated discussions in April 1996 on the development of a research misconduct policy. The Office of Science and Technology Policy (OSTP) provided leadership and coordination. The NSTC approved the proposed draft policy in May 1999, clearing the way for the October 14, 1999 **Federal Register** notice. Public comments in response to that notice have been reviewed. The purpose of this notice is to provide information about the policy as it has now been finalized.

This policy applies to federally-funded research and proposals submitted to Federal agencies for research funding. It thus applies to research conducted by the Federal agencies, conducted or managed for the Federal government by contractors, or supported by the Federal government and performed at research institutions, including universities and industry.

The policy establishes the scope of the Federal government's interest in the accuracy and reliability of the research record and the processes involved in its development. It consists of a definition of research misconduct and basic guidelines for the response of Federal agencies and research institutions to allegations of research misconduct. [(b) (5)] he Federal agencies that conduct or port research will implement this cy within one year of the date of lication of this notice. An NSTC interagency research misconduct policy implementation group has been established to help achieve uniformity across the Federal agencies in implementation of the research misconduct policy. In some cases, this may require agencies to amend or replace extant regulations addressing research misconduct. In other cases, agencies may need to put new regulations in place or implement the policy through administrative mechanisms.

The policy addresses research misconduct. It does not supersede government or institutional policies or procedures for addressing other forms of misconduct, such as the unethical treatment of human research subjects or mistreatment of laboratory animals used in research, nor does it supersede criminal or other civil law. Agencies and institutions may address these other issues as authorized by law and as appropriate to their missions and objectives.

Summary of Comments

The Office of Science and Technology Policy received 237 comments on the proposed Federal Research Misconduct Policy. Letters were signed by individuals, and by representatives of universities, university associations, Federal agencies, and private entities. Comments are available for review. Comments that resulted in a modification of the policy are summarized below. A section that addresses other questions raised by the comments follows the summary of modifications.

Uniform Federal Policy

Issue: Many comments recommended various mechanisms to ensure uniform implementation of this policy.

Response: An NSTC research misconduct policy implementation group has been formed to foster uniformity among the agencies in their implementation of the policy.

Section I: Research Misconduct Defined

Issue: A number of comments suggested that the definition of fabrication be modified to read as follows: "Fabrication is making up data or results and recording or reporting them." (Italicized words are suggested addition.) This change is to clarify that the raw data collected or generated in the research process can be fabricated just as can the results of the research.

Response: This change was accepted.

Issue: A number of commenters interpreted the definition of plagiarism to imply that using material gathered during the peer review process was acceptable as long as it is cited.

Response: The policy is intended to address the problem of reviewers who take material from the peer review process and use it without attribution. This constitutes plagiarism. We have deleted the phrase "including those obtained through confidential review of others' research proposals and manuscripts" to avoid any appearance of condoning a breach of confidentiality in the peer review process.

Issue: Despite general support for the rationale for the phrase "does not include honest error or honest differences of opinion," several comments requested various clarifications.

Response: This phrase is intended to clarify that simple errors or mere differences of judgment or opinion do not constitute research misconduct. The phrase does not create a separate element of proof. Institutions and agencies are not required to disprove possible "honest error or differences of opinion." The phrase has been retained, with the deletion of the second "honest" of the phrase as redundant.

Issue: A number of comments raised questions about what fields of research are included in the definition of research. For example, some readers were unsure about the applicability of

the policy as written to medicine or the social sciences.

Response: The policy applies to research funded by the Federal agencies. In order to be responsive to specific inquiries about what fields of research are covered by the policy, an illustrative, non-exclusive list of selected fields of research is now included in the policy itself.

Section II: Findings of Research Misconduct

Issue: Several comments stressed the need for greater precision in the phrase "significant departure from accepted practices of the scientific community."

Response: This phrase is intended to make it clear that behavior alleged to involve research misconduct should be assessed in the context of community practices, meaning practices that are generally understood by the community but that may not be in a written form. For clarification purposes and in order to be more comprehensive, the term "scientific community" has been modified to read "relevant research community." The policy is not intended to ratify those "accepted practices" but rather to indicate that these may vary among different communities.

Issue: Several comments requested clarification regarding the level of intent that is required to be shown in order to reach a finding of research misconduct.

Response: Under the policy, three elements must be met in order to establish a finding of research misconduct. One of these elements is a showing that the subject had the requisite level of intent to commit the misconduct. The intent element is satisfied by showing that the misconduct was committed "intentionally, or knowingly, or recklessly." Only one of these needs to be demonstrated in order to satisfy this element of a research misconduct finding.

Section III: Responsibilities of Federal Agencies and Research Institutions

Issue: Some comments indicated that this section could be incorrectly construed to require appeal of the agency misconduct finding back to the institution.

Response: The policy has been clarified to affirm that each agency should establish an appeals process for persons found by the agency to have engaged in research misconduct. The subject of the agency finding cannot appeal the agency decision back to the institution, although some institutions do offer an appeal of the institutional finding at the institutional level.

Section IV: Guidelines for Fair and Timely Procedures

Issue: The comments indicated some uncertainty about to whom the actions section applied.

Response: The actions delineated are those that may be taken by the Federal agencies if research misconduct has been shown to have occurred. The section has thus been renamed "Agency Administrative Actions."

Issue: The suggestion was made that publications based on false or fabricated data, or including such data, should be required to be officially withdrawn.

Response: Correction of the research record has been added to the list of possible actions to be taken if a researcher is found to have engaged in research misconduct.

Issue: The suggestion was made that safeguards for informants and subjects of allegations be made more explicit.

Response: More explicit safeguards have been added to the policy for both informants and subjects.

Other Comments

Several comments and clarifications are addressed in the following question and answer format rather than through modification of the policy.

Will agencies be required to announce the details of their implementation plans? Yes. Agencies will announce the details of their implementation plans, including those plans that do not require formal rulemaking.

What types of misconduct are covered by this policy? This policy is limited to addressing misconduct related to the conduct and reporting of research, as distinct from misconduct that occurs in the research setting but that does not affect the integrity of the research record, such as misallocation of funds, sexual harassment, and discrimination. This policy does not limit agencies or research institutions from addressing these other issues under appropriate policies, rules, regulations, or laws. In addition, should the behavior associated with research misconduct also trigger the applicability of other laws (including criminal law) this policy is not intended to limit agencies or research institutions from pursuing these matters under separate authorities.

Does this policy address misrepresentation of a researcher's credentials or publications? Yes, misrepresentation of a researcher's qualifications or ability to perform the research in grant applications or similar submissions may constitute falsification or fabrication in proposing research.

Are authorship disputes covered by this policy? Authorship disputes are not covered by this policy unless they involve plagiarism.

Does research misconduct include the mistreatment of human subjects or animals in research? This policy addresses activity that occurs in the course of human subjects or animal research that involves research misconduct as defined by the policy. Thus, falsification, fabrication, or plagiarism that occurs during the course of human or animal research is addressed by this policy. However, other issues concerning the ethical treatment of human or animal subjects are covered under separate procedures and are not affected by this policy.

Why doesn't the policy provide immunity for research misconduct investigative committees? Providing immunity to research misconduct investigative committees and other participants in institutional and agency research misconduct proceedings would require significant statutory or regulatory initiatives which will be explored separately from this policy.

Aren't there circumstances when omission of data or results is appropriate? A number of commenters suggested that there are circumstances when it may be appropriate to omit data in reporting research results. It is not the intent of this policy to call accepted practices into question. However, the omission of data is considered falsification when it misleads the reader about the results of the research.

Does this policy supersede institutional policies regarding research misconduct? Non-federal research institutions have authority to establish policies for research and employee misconduct that serve their own institutional purposes. However, the Federal research misconduct policy (as implemented by the agencies) provides the relevant guidance to institutions for purposes of Federal action.

Does this policy supersede other agency policies, procedures, rules, and regulations? Agencies must comply with all relevant Federal personnel policies and laws in responding to allegations of research misconduct. However, personnel actions may not adequately protect the public from the consequences of falsified, fabricated or plagiarized research. For example, Federal personnel policies may permit termination of an employee who commits research misconduct, but may not address the problem of research misconduct or seek to prevent it from recurring. The administrative actions available under the Federal research misconduct policy, such as debarment from federal funding, supervision and certification of research, and correction

of the literature, are designed to specifically address the problems raised by research misconduct.

Must all three elements in the Finding of Research Misconduct section be present for there to be a finding of research misconduct? Yes.

Who makes the final determination about whether or not there is a finding of research misconduct? The Federal agency will make the final decision about whether to make an agency finding of research misconduct. However, within its own internal jurisdiction, a non-Federal research institution may establish policies and take actions as appropriate to its needs and as consistent with other relevant laws.

Shouldn't the burden of proof be more stringent, e.g., require "clear and convincing evidence" to support a finding of research misconduct? While much is at stake for a researcher accused of research misconduct, even more is at stake for the public when a researcher commits research misconduct. Since "preponderance of the evidence" is the uniform standard of proof for establishing culpability in most civil fraud cases and many federal administrative proceedings, including debarment, there is no basis for raising the bar for proof in misconduct cases which have such a potentially broad public impact. It is recognized that non-Federal research institutions have the discretion to apply a higher standard of proof in their internal misconduct proceedings. However, when their standard differs from that of the Federal government, research institutions must report their findings to the appropriate Federal agency under the applicable Federal government standard, i.e., preponderance.

Why don't the Federal agencies conduct all inquiries and investigations? Research institutions are much closer to what is going on in their own institutions and are in a better position to conduct inquiries and investigations than are the Federal agencies. While the Federal agencies could have taken on the task of investigating all allegations of research misconduct, or established a separate agency for this purpose, this would have involved a substantial new Federal bureaucracy, which is not thought desirable. An agency may take steps, as appropriate, should a research institution demonstrate a lack of commitment to the policy's guidelines.

How will a lead agency be identified? If more than one Federal agency has jurisdiction over allegations of research misconduct, those agencies should work together to designate a lead agency.

What criteria will be used for selecting the research institution that will handle the response to the allegation of research misconduct? In most cases, agencies will rely on the researcher's home institution to respond to allegations of research misconduct. However, in cases where the subject has switched institutions, it may be more appropriate for the institution where the alleged research misconduct occurred to respond to the allegation. The institution where the questioned research was conducted may have better access to the evidence and witnesses and therefore will have the capability to undertake a more efficient and thorough response.

Shouldn't the policy be more explicit about time lines for a response to allegations of misconduct? In establishing reasonable time lines the Federal agencies must balance the interests of concluding the process expeditiously while ensuring it has been conducted fairly and thoroughly. This will allow flexibility for the research institutions while at the same time ensuring that the process does not extend for an unreasonably long period. Research institutions should have the option to request reasonable extensions of agency timelines in individual cases.

What can informants or subjects of allegations expect with regard to confidentiality? The policy strives for confidentiality for all involved to the extent consistent with a fair and thorough process and as allowed by law, including applicable Federal and state freedom of information and privacy laws.

Should the policy punish informants who act in bad faith or individuals who harass informants? The principal aim of this policy is to communicate to the research community those behaviors that constitute research misconduct and to take actions where research misconduct is found to have occurred. As employers and managers of the research, non-Federal research institutions may adopt policies to address the consequences of false, malicious, or capricious allegations and to respond to retaliation against informants. Agencies may also address this issue in their implementation of this policy.

How should the "seriousness" of the research misconduct be evaluated and how will this relate to any actions taken? In determining what action to take, agencies should fully consider the level of intent of the misconduct, the consequences of the behavior, and other aggravating and mitigating factors.

Next Steps

(b) (5)

The Federal agencies have u year from the date of publication of this notice to implement the policy. An interagency implementation group has been established under the auspices of the National Science and Technology Council to assist agencies in their implementation process and to strive for the highest level of uniformity possible and as appropriate in their implementation plans.

Federal Policy on Research Misconduct [1]

I. Research [2] Misconduct Defined

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

- Fabrication is making up data or results and recording or reporting them.
- Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.[3]
- Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
- Research misconduct does not include honest error or differences of opinion.

II. Findings of Research Misconduct

A finding of research misconduct requires that:

- There be a significant departure from accepted practices of the relevant research community; and
- The misconduct be committed intentionally, or knowingly, or recklessly; and
- The allegation be proven by a preponderance of evidence.

(b) (5)

[1] No rights, privileges, benefits o ons are created or abridged by issuance of cy alone. The creation or abridgment of rights, privileges, benefits or obligations, if any, shall occur only upon implementation of this policy by the Federal agencies.

[2] Research, as used herein, includes all basic, applied, and demonstration research in all fields of science, engineering, and mathematics. This includes, but is not limited to, research in economics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.

[3] The research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronic, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

III. Responsibilities of Federal Agencies and Research Institutions [4]

Agencies and research institutions are partners who share responsibility for the research process. Federal agencies have ultimate oversight authority for Federally funded research, but research institutions bear primary responsibility for prevention and detection of research misconduct and for the inquiry, investigation, and adjudication of research misconduct alleged to have occurred in association with their own institution.

• *Agency Policies and Procedures.* Agency policies and procedures with regard to intramural as well as extramural programs must conform to the policy described in this document.

• *Agency Referral to Research Institution.* In most cases, agencies will rely on the researcher's home institution to make the initial response to allegations of research misconduct. Agencies will usually refer allegations of research misconduct made directly to them to the appropriate research institution. However, at any time, the Federal agency may proceed with its own inquiry or investigation. Circumstances in which agencies may elect not to defer to the research institution include, but are not limited to, the following: the agency determines the institution is not prepared to handle the allegation in a manner consistent with this policy; agency involvement is needed to protect the public interest, including public health and safety; the allegation involves an entity of sufficiently small size (or an individual) that it cannot reasonably conduct the investigation itself.

• *Multiple Phases of the Response to an Allegation of Research Misconduct.* A response to an allegation of research misconduct will usually consist of several phases, including: (1) an *inquiry*—the assessment of whether the allegation has substance and if an investigation is warranted; (2) an *investigation*—the formal development of a factual record, and the examination of that record leading to dismissal of the case or to a recommendation for a finding of research misconduct or other appropriate remedies; (3) *adjudication*—during which recommendations are reviewed and appropriate corrective actions determined.

[4] The term "research institutions" is defined to include all organizations using Federal funds for research, including, for example, colleges and universities, intramural Federal research laboratories, Federally funded research and development centers, national user facilities, industrial laboratories, or other research institutes. Independent researchers and small research institutions are covered by this policy.

• *Agency Follow-up to Institutional Action.* After reviewing the record of the investigation, the institution's recommendations to the institution's adjudicating official, and any corrective actions taken by the research institution, the agency will take additional oversight or investigative steps if necessary. Upon completion of its review, the agency will take appropriate administrative action in accordance with applicable laws, regulations, or policies. When the agency has made a final determination, it will notify the subject of the allegation of the outcome and inform the institution regarding its disposition of the case. The agency finding of research misconduct and agency administrative actions can be appealed pursuant to the agency's applicable procedures.

• *Separation of Phases.* Adjudication is separated organizationally from inquiry and investigation. Likewise, appeals are separated organizationally from inquiry and investigation.

• *Institutional Notification of the Agency.* Research institutions will notify the funding agency (or agencies in some cases) of an allegation of research misconduct if (1) the allegation involves Federally funded research (or an application for Federal funding) and meets the Federal definition of research misconduct given above, and (2) if the institution's inquiry into the allegation determines there is sufficient evidence to proceed to an investigation. When an investigation is complete, the research institution will forward to the agency a copy of the evidentiary record, the investigative report, recommendations made to the institution's adjudicating official, and the subject's written response to the recommendations (if any). When a research institution completes the adjudication phase, it will forward the adjudicating official's decision and notify the agency of any corrective actions taken or planned.

• *Other Reasons to Notify the Agency.* At any time during an inquiry or investigation, the institution will immediately notify the Federal agency if public health or safety is at risk; if agency resources or interests are threatened; if research activities should be suspended; if there is reasonable indication of possible violations of civil or criminal law; if Federal action is required to protect the interests of those involved in the investigation; if the research institution believes the inquiry or investigation may be made public prematurely so that appropriate steps can be taken to safeguard evidence and protect the rights of those involved; or if the research community or public should be informed.

• *When More Than One Agency is Involved.* A lead agency should be designated to coordinate responses to allegations of research misconduct when more than one agency is involved in funding activities relevant to the allegation. Each agency may implement administrative actions in accordance with applicable laws, regulations, policies, or contractual procedures.

IV. Guidelines for Fair and Timely Procedures

The following guidelines are provided to assist agencies and research institutions in developing fair and timely procedures for responding to allegations of research misconduct. They are designed to provide safeguards for subjects of allegations as well as for informants. Fair and timely procedures include the following:

• *Safeguards for Informants.* Safeguards for informants give individuals the confidence that they can bring allegations of research misconduct made in good faith to the attention of appropriate authorities or serve as informants to an inquiry or an investigation without suffering retribution. Safeguards include protection against retaliation for informants who make good faith allegations, fair and objective procedures for the examination and resolution of allegations of research misconduct, and diligence in protecting the positions and reputations of those persons who make allegations of research misconduct in good faith.

• *Safeguards for Subjects of Allegations.* Safeguards for subjects give individuals the confidence that their rights are protected and that the mere filing of an allegation of research misconduct against them will not bring their research to a halt or be the basis for other disciplinary or adverse action absent other compelling reasons. Other safeguards include timely written notification of subjects regarding substantive allegations made against them; a description of all such allegations; reasonable access to the data and other evidence supporting the allegations; and the opportunity to respond to allegations, the supporting evidence and the proposed findings of research misconduct (if any).

• *Objectivity and Expertise.* The selection of individuals to review allegations and conduct investigations who have appropriate expertise and have no unresolved conflicts of interests help to ensure fairness throughout all phases of the process.

• *Timeliness.* Reasonable time limits for the conduct of the inquiry, investigation, adjudication, and appeal

phases (if any), with allowances for extensions where appropriate, provide confidence that the process will be well managed.

• *Confidentiality During the Inquiry, Investigation, and Decision-Making Processes.* To the extent possible consistent with a fair and thorough investigation and as allowed by law, knowledge about the identity of subjects and informants is limited to those who need to know. Records maintained by the agency during the course of responding to an allegation of research misconduct are exempt from disclosure under the Freedom of Information Act to the extent permitted by law and regulation.

V. Agency Administrative Actions

• *Seriousness of the Misconduct.* In deciding what administrative actions are appropriate, the agency should consider the seriousness of the misconduct, including, but not limited to, the degree to which the misconduct was knowing, intentional, or reckless; was an isolated event or part of a pattern; or had significant impact on the research record, research subjects, other researchers, institutions, or the public welfare.

• *Possible Administrative Actions.* Administrative actions available include, but are not limited to, appropriate steps to correct the research record; letters of reprimand; the imposition of special certification or assurance requirements to ensure compliance with applicable regulations or terms of an award; suspension or termination of an active award; or suspension and debarment in accordance with applicable government-wide rules on suspension and debarment. In the event of suspension or debarment, the information is made publicly available through the List of Parties Excluded from Federal Procurement and Nonprocurement Programs maintained by the U.S. General Services Administration. With respect to administrative actions imposed upon government employees, the agencies must comply with all relevant federal personnel policies and laws.

• *In Case of Criminal or Civil Fraud Violations.* If the funding agency believes that criminal or civil fraud violations may have occurred, the agency shall promptly refer the matter to the Department of Justice, the Inspector General for the agency, or other appropriate investigative body.

VI. Roles of Other Organizations

This Federal policy does not limit the authority of research institutions, or other entities, to promulgate additional research misconduct policies or guidelines or more specific ethical guidance.

Barbara Ann Ferguson,

Assistant Director for Budget and Administration, Office of Science and Technology Policy.

[FR Doc. 00-30852 Filed 12-5-00; 8:45 am]

BILLING CODE 3170-01-P

FEDERAL COMMUNICATIONS COMMISSION

Notice of Public Information Collection(s) Being Reviewed by the Federal Communications Commission

November 27, 2000.

SUMMARY: The Federal Communications Commission, as part of its continuing effort to reduce paperwork burden invites the general public and other Federal agencies to take this opportunity to comment on the following information collection(s), as required by the Paperwork Reduction Act of 1995, Public Law 104-13. An agency may not conduct or sponsor a collection of information unless it displays a currently valid control number. No person shall be subject to any penalty for failing to comply with a collection of information subject to the Paperwork Reduction Act (PRA) that does not display a valid control number. Comments are requested concerning (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimate; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology.

DATES: Written comments should be submitted on or before January 5, 2001. If you anticipate that you will be submitting comments, but find it difficult to do so within the period of time allowed by this notice, you should advise the contact listed below as soon as possible.

ADDRESSES: Direct all comments to Judy Boley, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, DC 20554 or via the Internet to *jboley@fcc.gov.*

FOR FURTHER INFORMATION CONTACT: For additional information or copies of the information collection(s), contact Judy Boley at 202-418-0214 or via the Internet at *jboley@fcc.gov.*

SUPPLEMENTARY INFORMATION:

OMB Control No.: 3060-0951.

Title: Service of Petitions for Preemption, 47 CFR 1.1204(b) Note and 1.1206(a) Note 1.

Form No.: N/A.

Type of Review: Extension of a currently approved collection.

Respondents: Individuals or households; businesses or other for-profit, not-for-profit institutions and state, local or tribal government.

Number of Respondents: 125.

Estimated Time Per Response: 15 minutes.

Frequency of Response: On occasion reporting requirement and third party disclosure requirement.

Total Annual Burden: 30 hours.

Total Annual Cost: N/A.

Needs and Uses: These provisions supplement the procedures for filing petitions seeking Commission preemption of state and local government regulation of telecommunications services. They require that such petitions, whether in the form of a petition for rulemaking or a petition for declaratory ruling, be served on all state and local governments. The actions for which as cited as a basis for requesting preemption. Thus, in accordance with these provisions, persons seeking preemption must serve their petitions not only on the state or local government whose authority would be preempted, but also on other state or local governments whose actions are cited in the petition.

OMB Control No.: 3060-0937.

Title: Establishment of a Class A Television Service, MM Docket No. 00-10.

Form No.: N/A.

Type of Review: Extension of a currently approved collection.

Respondents: Businesses or other for-profit.

Number of Respondents: 1,000 respondents; 19,370 responses.

Estimated Time Per Response: .166 hours to 52 hours.

Frequency of Response: Recordkeeping requirement, on occasion and quarterly reporting requirement and third party disclosure requirement.

Total Annual Burden: 396,251 hours.

Total Annual Cost: $2,284,000.

Needs and Uses: The Community Broadcasters Protection Act directed the Commission to make Class A television licensees subject to the same operating requirements as that of full-service broadcast stations. The Commission has

DIRECTOR'S ORDER #11B: Ensuring Quality of Information Disseminated by the National Park Service

Approved: /s/ Fran P. Mainella, Director

Effective Date: 10/16/02

Sunset Date: Effective until amended or rescinded

Contents:

I. Background and Purpose
II. Authority to Issue this Director's Order
III. Information Quality Standards
IV. Policies and Instructions
V. Responsibilities
VI. Definitions
VII. Legal Effect

I. BACKGROUND AND PURPOSE

In Section 515(a) of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554; HR 5658), Congress directed the Office of Management and Budget (OMB) to issue government-wide guidelines that "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies. The guidelines require also that administrative mechanisms be established to allow affected persons to seek and obtain correction of information maintained and disseminated by the agency when that information does not comply with guidelines issued by the Office of Management and Budget. The purpose of this Director's Order is to establish National Park Service (NPS) guidelines to comply with these requirements.

A notice published by the Office of Management and Budget (OMB) in the Federal Register, issued February 22, 2002, Vol. 67, No. 36, page 8452, directed Federal agencies to issue and implement guidelines to ensure and maximize the quality, objectivity, utility and integrity of Government information disseminated to the public. The NPS is issuing these guidelines in order to comply with this direction. This document is the basis for the NPS's policy.

The NPS disseminates a wide variety of information to the public regarding the national parks, natural and cultural resources, geographic and spatial data, and commemorative events. Such information takes the form of brochures, research and statistical reports, policy and regulatory information, and general reference information. All offices should evaluate and identify the types of information

disseminated that will be subject to these guidelines.

II. AUTHORITY TO ISSUE THIS DIRECTOR'S ORDER

The authority to issue this Director's Order is contained in the 1916 NPS Organic Act (16 U.S.C.1 through 4), delegations of authority contained in Part 245 of the Department of the Interior Manual, and the Department of the Interior's information quality guidelines.

III. INFORMATION QUALITY STANDARDS

The National Park Service disseminates organizational information, natural and cultural resource information, and budget information. Organizational information includes general descriptive information about the NPS and its component parks and offices. Examples include the parks' history, functions, and legislative authorities; organizational charts, the offices within the parks and their functions; the parks' strategic and performance plans and their budgetary information; and information pertaining to the parks' history, natural and cultural resources and administrative processes. All information disseminated by the NPS must comply with basic standards of quality to ensure and maximize the objectivity, utility, and integrity of information disseminated to the public.

A. Reliable Data. The National Park Service will ensure that information it releases will be developed from reliable data sources and will otherwise ensure information quality at each stage of information development. The NPS's methods for producing quality information will be made transparent, to the maximum extent practicable, through accurate documentation, use of appropriate internal and external review procedures, consultation with experts and users, and verification of the quality of the information disseminated to the public. The NPS will also keep users informed about corrections and revisions.

Information will be developed only from reliable data sources based on accepted practices and policies utilizing accepted methods for information collection and verification. It will be reproducible to the extent possible. Influential information will be produced with a high degree of transparency about data and methods. The information should include all pertinent information to allow the public to understand the park's legislative authorities, mission, activities, organization, strategic plan, performance plan, and performance accomplishments.

B. Accuracy and Timeliness. All information will be accurate, timely, and reflect the most current information available. All information sources will be documented. Where appropriate, it will provide users with additional documentation or with method(s) to access supporting documentation by reference (e.g., citations) or by electronic means (e.g., "links").

C. Compliance with Laws, Regulations and Policy. All information will comply with current NPS and Departmental policies and guidelines that govern information dissemination to the public. The information will also comply with the requirements of applicable public laws, such as the Government Performance and Results Act of 1993, and implementing rules, regulations, directives and instructions issued under

the authority of such laws. To the maximum extent possible, information will be made available on Service websites for easy access by the public.

In addition to these standards, the information quality standards as described by OMB's final guidelines and the Department of the Interior's guidelines are incorporated by reference as NPS policy and standards.

D. Third Party Information Under the Guidelines. If NPS relies upon technical, scientific, or economic information submitted or developed by a third party, that information is subject to the appropriate standards of objectivity and utility. These standards of these guidelines apply not only to information that NPS generates, but also to information that other parties provide to NPS, if NPS disseminates or relies upon this information.

E. Paperwork Reduction Act. NPS's components will make use of OMB's Paperwork Reduction Act (PRA) clearance process to help improve the quality of information that NPS collects and disseminates to the public. All proposed collections of information that are disseminated to the public should demonstrate in their PRA clearance submissions to OMB that the proposed collection of information will result in information that will be collected, maintained, and used in a way consistent with the DOI and OMB Quality Information guidelines.

IV. POLICIES AND INSTRUCTIONS

A. Information Approval. All information disseminated to the public must be approved by the appropriate program and/or regional office prior to its dissemination and must satisfy OMB and Departmental guidelines. The approval process will include documentation of the specific information quality standards used in producing the information in a way to substantiate the quality, utility, objectivity, and integrity of the information in a manner that conforms to OMB and Departmental guidelines.

B. Documentation. Offices may issue documentation for standard types of information that they disseminate and reference these in subsequent approvals. These standards must be approved by the originating office and the documentation retained by the office as long as the standard is active.

C. Complaints About Information Quality. Affected persons may avail themselves of four methods for notifying the NPS of complaints:

1. Informally discuss their complaint in person with park or program office staff, providing information in the form of written documents or oral presentations.
2. Informally direct complaints about the quality of disseminated information to the superintendent of the park or manager of the program office responsible for disseminating the information.
3. Formally direct complaints about the quality of disseminated information by mail to the NPS Washington Administrative Program Center, attention: Correspondence Control Unit (CCU), 1201 Eye Street NW, Washington, DC 20005. The complainant should use the subject: "Complaint About Information Quality" so that it may be clearly recognizable to those managing

the process.
4. Formally direct complaints by e-mail to Ms. Doris Lowery at doris_lowery@nps.gov. The complainant should use the subject: "Complaint About Information Quality" so that it may be clearly recognizable to those managing the process.

A request for formal informational correction must include the following:

1. A written statement that the person is seeking correction of information disseminated by the National Park Service and the specific reasons for believing the information fails to meet OMB or DOI standards, along with supporting documentation, if any.
2. Name, mailing address, telephone number, email address (if applicable) and organizational affiliation, if any, of the individual making the complaint. Organizations submitting a complaint should identify one individual to serve as the primary contact.
3. A detailed description of the specific material in question, including where the material is located (that is, publication title, date, and publication number, if any, or the website and web page address).
4. A description of how the person submitting the complaint is affected by the informational error.
5. The specific recommendations for corrective action.

D. Processing Complaints. The CCU will route complaints they receive to the park or office that disseminated the information and track response to assure that it complies with the requirements of this Director's Order. The park or office receiving the complaint, regardless of the manner of receipt, will notify the complainant of receipt within 10 working days. The disseminating office will evaluate the complaint within 60 calendar days of the day it is received by the NPS, in accordance with the OMB guidelines, and notify the complainant as to whether the information has been corrected, deleted, or confirmed to be accurate.

A second complaint received before the issuance of a 60 calendar day notice for an overlapping complaint under review will be treated with simultaneous consideration, and the second complainant will be notified within 10 working days that an analysis is in progress and advised of its status. The earlier and later complaints will be combined, and a combined 60 calendar day finding will be issued based on the date of the first complaint.
If the second identical complaint on the same subject is received after a 60 calendar day notice has been issued, then the second complaint will require a new and separate review, however recent. Unless substantial new information has been submitted, the 60 calendar day finding for the earlier complaint shall suffice and should be relatively easy to produce.

E. Comments Associated with Structured Reviews. The NPS conducts a substantial amount of business through processes which involve a structured opportunity for public review and comment on proposed documents prior to their issuance in final form. These activities include rulemakings and analyses conducted under the National Environmental Policy Act (NEPA). In these instances, requests made under these guidelines for corrections of information in draft documents will

generally be treated as a comment on the draft document and the response will be included in the final document.

In the case of rulemaking and other public comment procedures where the NPS disseminates a study analysis or other information prior to the final agency action or information product, requests for correction will be considered prior to the final agency action or information dissemination in those cases where the agency has determined that an early response would not unduly delay issuance of the agency action or information, and the complainant has shown a reasonable likelihood of suffering actual harm from the agency's dissemination if the agency does not resolve the complain prior to the final agency action or information product.

In cases where a request pertains to a final document, the NPS will first determine whether the request pertains to an issue discussed in the draft document upon which the requester could have commented. If the NPS determines that the requester had the opportunity to comment on the issue at the draft stage and failed to do so, it may consider the request to have no merit. If information which did not appear in the draft document is the subject of a request for correction, the NPS will consider that request. If the NPS determines that the information does not comply with the guidelines issued by the Department or OMB, such that the non-compliance with the Department or OMB guidelines presents significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts, the NPS will use existing mechanisms to remedy the situation, such as re-proposing a rule or supplementing a NEPA analysis.

F. Exemptions. Information specifically not subject to these guidelines includes:

1. **Press Releases** - These guidelines do not apply to press releases, fact sheets, press conferences or similar communications in any medium that announce, support the announcement, or give public notice of information NPS has disseminated elsewhere.
2. **Public Filings** - Information in public filings (such as public comments received by NPS in rulemaking proceedings), except where NPS distributes information submitted by a third party in a manner that suggests that NPS endorses or adopts the information, or indicates in its distribution that it is using or proposing to use the information to formulate or support a regulation, guidance, or other NPS decision or position.
3. **Exclusion for Agency Employed Scientist, Grantee, or Contractor** - Dissemination of information by an agency-employed scientist, grantee, or contractor is not subject to the guidelines, namely those situations in which they publish and communicate their research findings in the same manner as their academic colleagues, therefore not implying official agency endorsement of their views or findings.
4. **Testimony and Other Submissions to Congress** - Information presented or submitted to Congress which is simultaneously disseminated or previously disseminated to the public is exempt from these Data Quality Guidelines.
5. **Inadvertent or Unauthorized Disclosure of Information intended Only for Inter-agency and Intra-agency Use or Communication** - Documents in working form which are generated in day-to-day internal conduct of NPS and other Government business are exempt from these Guidelines.

6. **Correspondence with Individuals** - An exchange of information between two individuals is not considered to be a dissemination.
7. **Records Covered by Other Laws** - Responses to requests for NPS records under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act or similar laws are not included in these Guidelines.
8. **Archived Records and Information Disseminated Prior to October 1, 2002** - Archived records of information disseminated and subsequently archived are exempt from the Guidelines.

Note: Information disseminated prior to October 1, 2002, but not archived, and which is still being used in a decision making process, is not exempt from these guidelines.

G. Appeals Process. If a complainant does not receive the notice or the response within the time frames described above, or wishes to appeal a determination of merit, or wishes to appeal the proposed correction of information, the complainant may appeal to the Director, National Park Service. If that official determines that an appeal of a determination of merit or the proposed correction of information has merit, the affected program office or park will be notified. The challenged information will be withdrawn, to the extent practicable, from the public domain and will not be used in any Departmental, bureau, or office decision-making process until it is corrected. The Director, National Park Service, will make a decision on the final appeal within 60 calendar days.

H. Further Information. NPS personnel and the public should consult the website at www.nps.gov/notices.htm.

V. RESPONSIBILITIES

A. The Associate Director, Administration, through the Washington Administrative Program Center, is responsible for management and administration of the program.

B. Associate directors and research contractors are responsible for ensuring that their staffs implement these policies and procedures.

C. Managers are responsible for:

1. Ensuring that the information they release to the public, in any manner, is developed from reliable sources and ensuring information quality at each stage of information development.
2. Documenting the quality of all information that they release to the public, including information on the internet.
3. Notifying complainants of the receipt of their complaint within 10 working days of its receipt in the Correspondence Control Unit.
4. Responding to complaints about information quality within 60 calendar days from receipt of a complainant in CCU.

D. The CCU is responsible for:

1. Routing public complaints they receive about information quality to the information disseminating office.
2. Reminding offices of their deadlines to respond to pending complaints forwarded by the CCU.
3. Generating annual reports to the Department of the Interior of the number, nature, and resolution of complaints received by the CCU.

VI. DEFINITIONS

In complying with this Director's Order, the following definitions apply:

A. Quality - is an encompassing term comprising utility, objectivity, and integrity. Therefore, the guidelines sometimes refer to these four statutory terms, collectively, as "quality."

B. Utility - refers to the usefulness of the information to its intended users, including the public. In assessing the usefulness of information that the NPS disseminates to the public, the office needs to consider the uses of the information not only from the perspective of the office, but also from the perspective of the public. As a result, when transparency of information is relevant for assessing the information's usefulness from the public's perspective, the office must take care to ensure that transparency has been addressed in its review of the information.

C. Objectivity - involves two distinct elements, presentation and substance. "Objectivity" includes whether disseminated information is being presented in an accurate, clear, complete, and unbiased manner. This involves whether the information is presented within a proper context. In addition, "objectivity" involves a focus on ensuring accurate, reliable, and unbiased information. In a scientific, financial, or statistical context, the original and supporting data shall be generated, and the analytic results shall be developed, using sound statistical and research methods.

D. Integrity - refers to the security of information - protection of the information from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification.

E. Information - means any communication or representation of knowledge such as fact or data, in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audiovisual forms. This definition includes information that an office disseminates from a web page, but does not include the provision of hyperlinks to information that others disseminate. This definition does not include opinions, where the office's presentation makes it clear that what is being offered in someone's opinion rather than fact or the office's views.

F. Dissemination - means NPS initiated or sponsored distribution of information to the public. Dissemination does not include distribution limited to government employees or NPS contractors or grantees; intra- or inter-agency use or sharing of government information; and responses to requests for agency records under the Freedom of Information Act, the Privacy Act, the Federal Advisory Committee Act, or other similar law. This definition also does not include distribution limited to

correspondence with individuals or persons, press releases, archival records, public filings, subpoenas or adjudicative processes.

VII. LEGAL EFFECT

These guidelines are intended only to improve the internal management of the National Park Service relating to information quality. Nothing in these guidelines is intended to create any right or benefit, substantive or procedural, enforceable by law or equity by a party against the United States, its agencies, its offices, or any other person. These guidelines do not provide any right to judicial review.

---------- *End of Director's Order* ----------

The Code of Scientific Conduct.

To the best of my ability:

I will act in the interest of the advancement of science and contribute the best, highest quality scientific information for the Department of the Interior.

I will conduct, manage, analyze, judge, report, apply, review and communicate the results of scientific activities honestly, thoroughly, without conflict of interest, in a timely manner, and without succumbing to coercive manipulation.

I will be responsible for the resources entrusted to me, including equipment, my time, employees' time, and funds. I will be accountable for the prompt and accurate collection, use, and reporting of all financial resources and transactions under my control; and the prompt, thorough and accurate reporting of all scientific work.

I will fully disclose all research methods used, data (if available), and final reports and publications consistent with applicable laws and policy.

I will respect, to the fullest extent permitted by law, the confidential and proprietary information provided by local communities, Indian tribes, and other individuals whose interests and resources are studied or affected by the execution of scientific activities or the resulting information.

I will neither hinder the scientific activities of others nor engage in dishonesty, fraud, deceit, misrepresentation, or other scientific or research misconduct.

I will welcome constructive criticism of my scientific activities, will welcome and participate in appropriate peer reviews, critique others' work in a respectful objective manner, and substantiate review comments that I make with the same care with which I report my own scientific work.

I will be diligent in the creation, use, preservation, documentation, and maintenance of collections and data records; adhere to established quality assurance and quality control programs; follow the records retention policies of the Department; and comply with Federal law and established agreements related to the use, security, and release of confidential and proprietary data.

I will know, understand and adhere to standards of reporting of the results of scientific activities and respect the intellectual property rights of others.

I will, to the extent possible and practicable, differentiate among facts, opinions, hypotheses and professional judgment in disseminating scientific information to others, including scientists, decision makers and the public.

I will be responsible for the quality of any data I collect, interpretations I make, and the integrity of conclusions I draw in the course of my scientific activities.

I will place quality and objectivity of scientific activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations.

03/16/2004

United States Department of the Interior
Office of Inspector General

INVESTIGATIVE ACTIVITY REPORT

Case Title	Case Number
(b) (7)(C), (b) (6)	OI-CA-07-0297-I
Reporting Office	**Report Date**
Portland, OR	April 23, 2008

Report Subject
Information re: Departmental "Code of Scientific Conduct"

(b) (5)

Reporting Official/Title	Signature
Marc A. Tinsley / Resident Agent in Charge	Marc A. Tinsley

Authentication Number: A4EBFE7A8ECBD60B5F5422A255B85397

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(b) (5)

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National Park Service
Clarification of Law, Policy, and Science on Drakes Estero

September 18, 2007

The information provided in this document is a response to comments presented to the Marin County Board of Supervisors by Dr. Corey S. Goodman, a molecular biologist, in two letters (May 8, 2007 and May 29, 2007). We will present background on the legislative authority and responsibility of Point Reyes National Seashore, and we will respond to comments regarding the science presented by the park concerning oyster farming in Drakes Estero. Dr. Goodman's statements to the Marin County Board of Supervisors contain what we believe are a number of mischaracterizations. This document seeks to examine those points of disagreement, relying on expert opinion from nationally recognized ecologists, peer-reviewed published literature, and National Park Service studies.

We acknowledge the following scientists and experts in the field of marine ecology who reviewed this document for accuracy and completeness:

- Dr. James Byers of the University of New Hampshire,
- Dr. James Carlton of Williams College and Director of the Maritime Studies Program of Williams College and Mystic Seaport,
- Dr. Gary Fellers of the USGS-Biological Resources Division,
- Dr. Frances Gulland of The Marine Mammal Center and on the Scientific Advisory Committee of the US Marine Mammal Commission,
- Dr. Edwin Grosholz of UC Davis and Bodega Marine Laboratory,
- Dr. John Kelly, scientist at Cypress Grove Research Center, Audubon Canyon Ranch,
- Dr. Steven Morgan of UC Davis and Bodega Marine Laboratory,
- Dr. Ben Becker, Director of the Pacific Coast Science and Learning Center, Point Reyes National Seashore,
- David Press, Ecologist, Inventory and Monitoring Program, National Park Service,
- Gary Davis, Chief Scientist of the Oceans Program of the National Park Service, and
- Dr. David Graber, Chief Scientist of the Pacific West Region of the National Park Service.

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Background

Drakes Bay Oyster Company (DBOC) operates on land and within an estero owned by the United States of America and administered by the National Park Service as part of Point Reyes National Seashore, a unit of the National Park System. Much of DBOC's onshore operations occur on the approximately 1.5 acres delineated in a Reservation of Use and Occupancy (RUO) that expires in 2012; the remaining onshore operations and all of the operations in the waters of Drakes Estero occur on park property that is not part of the Reservation of Use and Occupancy. DBOC's operations are subject to the laws and policies governing units of the National Park System. These laws and policies provide the context for the scientific inquiry on the impacts of DBOC's operations. As summarized below, they set a high standard of protection for the natural environment-natural resources, processes, systems, and values—of Drakes Estero.

Park Law and Policy

Congress established Point Reyes National Seashore as a unit of the National Park System in 1962. In 1965, the State of California conveyed to the United States all right, title, and interest in the tidal and submerged lands within the park's boundaries, giving the National Park Service primary management authority over DBOC's oyster operations on these lands (California Department of Fish and Game letter, May 15, 2007). In 1976, Congress amended the park's enabling legislation to require that the park be administered "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area." Pub. L. No. 94-544 (Oct. 18, 1976), *codified at* 16 U.S.C. § 459c-6(a).

In 1976, Congress also designated certain areas of Point Reyes National Seashore as wilderness:

> ... [I]n furtherance of the purposes of the Point Reyes National Seashore Act and of the Wilderness Act,.. .the following lands.. .are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act: those lands comprising twenty-five thousand three hundred and seventy acres, and potential wilderness additions comprising eight thousand and three acres, depicted on a map..., to be known as the Point Reyes Wilderness.

Pub. L. No. 94-544 (Oct. 18, 1976) and Pub. L. No. 94-567 (Oct. 20, 1976), 16 U.S.C. § 1132 note. In 1985, Congress renamed the wilderness at Point Reyes National Seashore the "Phillip Burton Wilderness" in honor of the former Congressman. The wilderness designation encompasses much of the park's coastal land and water. In fact, Drakes Estero is part of the only federal marine estuarine wilderness along the Pacific coast from Washington to the Mexican border, and one of only 11 marine wilderness areas in the United States. The Congressional report accompanying the 1976 wilderness legislation states, "As is well established,.. .those lands and waters designated as potential

wilderness additions will be essentially managed as wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these lands and waters to wilderness status. H. Rep. No. 94-1680, at 3; *see also, NPS Management Policies* 1J 6.3.1 on "Wilderness Resource Management - General Policy." While most of Drakes Estero has now been designated or converted to wilderness status, the acreage containing DBOC's operations remains potential wilderness because of the nonconforming use associated with the Reservation of Use and Occupancy.

In addition to the Point Reyes National Seashore Act, 16 U.S.C. §§ 459c-459c-7, and the Wilderness Act, 16 U.S.C. §§ 1131-1136, the park is governed by the National Park Service Organic Act, as amended and supplemented, 16 U.S.C. §§ 1-4, which establishes as the "fundamental purpose" of units of the National Park System—

> .. .to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

Congress reinforced this fundamental purpose in 1978 with the so-called "Redwoods Amendment" championed by Congressman Phillip Burton:

> The authorization of activities shall be construed and the protection, management, and administration...shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress.

16 U.S.C. § la-1.

In addition to specific regulations applicable to units of the National Park System *(see, e.g.,* 36 C.F.R. Chapter 1), the National Park Service *Management Policies* (updated in 2006) provides direction for park management. Several sections are particularly relevant to the evaluation of the impacts of DBOC's operations on the park resources and values of Drakes Estero. For example, *Management Policies* makes clear that the laws governing units of the National Park System prohibit the "impairment" or "derogation" of park resources and values *(Management Policies* ¶ 1.4 on "Park Management"). *Management Policies* therefore directs park managers to prevent "unacceptable impacts" and to allow only "appropriate uses" in parks to assure that park resources and values are not impaired *(Id.* ¶ 1.4 on "Park Management," ¶ 1.5 on "Appropriate Uses). With respect to the management of natural resources like those in Drakes Estero—

> Natural resources will be managed to preserve fundamental physical and biological processes, as well as individual species, features, and plant and animal communities. The Service will...try to maintain all the components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those

> ecosystems. Just as all components of a natural system will be recognized as important, natural change will also be recognized as an integral part of the functioning of natural systems... .In managing parks to preserve naturally evolving ecosystems, and in accordance with the requirements of the National Parks Omnibus Management Act of 1998, the Service will use the findings of science and the analyses of scientifically trained resource specialists in decision-making.

Management Policies ¶ 4.1 ("General Management Concepts [for Natural Resource Management]").

Based on the laws and policies that govern park management, therefore, any changes from natural conditions are of concern and must be scrutinized carefully. This principle guides the National Park Service's scientific study and review of the impacts of DBOC's operations on Drakes Estero. "In cases of uncertainty as to the impacts of activities on park natural resources, the protection of natural resources will predominate." *Id.*

Of course, the National Park Service regulates activities to assure resource protection. For example, for the protection of the resources and values of Drakes Estero, the National Park Service does not allow power boats within Drakes Estero, except for the boats associated with the DBOC's Reservation of Use and Occupancy and rare NPS operations determined to be necessary under the "minimum requirement concept" for wilderness management *(see Management Policies* ¶ 6.3.5). All boats, except for the DBOC boats, are restricted within Drakes Estero during the harbor seal pupping season, March-June (Point Reyes National Seashore, Superintendent's Compendium).

Although the National Park Service is the primary agency responsible for the management of Drakes Estero, the NPS consults with appropriate state and federal agencies regarding park management issues. These consultations generally include the California Coastal Commission, the California Department of Fish and Game, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. As a unit of the National Park System, Point Reyes National Seashore is required to comply with the National Environmental Policy Act, the Clean Water Act, the Endangered Species Act, the Migratory Bird Treaty Act, the Marine Mammal Protection Act, the Coastal Zone Management Act, and other applicable law.

DBOC's Operations

As already described, DBOC is operating under a forty year Reservation of Use and Occupancy that expires in 2012. In 1972, Johnson Oyster Company sold its approximately 5 acres of onshore property to the United States and retained a right to use and occupy approximately 1.5 acres for 40 years. In 2005 Johnson Oyster Company assigned its right in the remaining years of the RUO to DBOC. According to its terms, the RUO is "for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items, the interpretation of oyster cultivation to the visiting public, and residential purposes reasonably incidental thereto..." The RUO

contains 18 paragraphs of terms and conditions, including requirements that DBOC comply with all applicable Federal, State, and County health, sanitation and safety standards as well as NPS rules and regulations. In 2005, before DBOC purchased the RUO from Johnson Oyster Company, the National Park Service notified DBOC that the operations would have to cease upon the RUO's expiration in 2012.

DBOC holds a state water bottom lease from the California Department of Fish and Game (CDFG) encompassing approximately 1,000 acres of DBOC's oyster cultivation operations in Drakes Estero. CDFG recently confirmed that, by virtue of California's 1965 conveyance to the United States of the tidal and submerged lands within park boundaries, "the mariculrure operation in question is properly within the primary management authority" of Point Reyes National Seashore (CDFG letter, May 15, 2007).

Oyster production and methods used within the estuary have varied over the past 50 years. The primary methods used, though, have been oyster racks (measuring around 10'x 100' each), stakes, and bags (measuring 1.5'x 3'). Most of the racks are distributed' in the upper body of the estuary. Nearly 1000 oyster bags have been distributed along the margins of the estuary and on intertidal sandbars in the middle of the bay and in Home and Creamery Bays. CDFG reports that oyster production levels were high between 1981 and 1998 (annual production ranged 3-9 million oysters per year) and reduced between 1999 and 2005 (annual production < 2 million oysters per year). In 2006 DBOC planted 9.8 million oysters as cultch on racks, 4 million juvenile oysters in bags, and 1 million manila clam seed in bags (Tom Moore, CDFG, email April 26, 2007).

General Comments

In response to the question of whether the oyster farm is harming Drakes Estero, the answer depends not only on the scientific evidence but also on the standard of harm, or duty of care that applies. National Park areas like Drakes Estero acquire one of the nation's highest duties of care. As described above, under the laws and policies that govern units of the National Park System, any changes from natural conditions -including the natural abundance, diversity and genetic and ecological integrity of the plant and animal species native to those ecosystems—is of concern. Scientific studies to date are inconclusive as to the extent to which oyster farming is altering natural resources within the Estero, but the presence of a reported nine million oysters and one million clams (CDFG, pers. com.) withinin area that would not have these resources naturally is itself enough to demonstrate an alteration of natural conditions. None of the Drakes Estero studies indicate that the operation "benefits" the estero, nor could they, as anthropogenic disturbance is contrary to NPS natural resource management principles and thus, by definition, degrades the natural values of the Estero. Additionally, we find in the broader scientific literature and from expert opinion that there are likely negative effects from the current level of operations in 2006 - 2007.

With regards to NPS studies within the estero, we wish to clarify points regarding the independence and quality of NPS data. Dr. Goodman questions the quality of the data collected by NPS biologists and others as not independent and not peer-reviewed through published scientific journals. It is true that much of the research within the NPS is

applied and often not published in scientific journals; nevertheless, research projects within the NPS are submitted to a rigorous peer-review process that includes scientists from the NPS, other agencies, and academia. An implementation plan is required before a project can begin which requires a detailed description and peer-review of the methods. The protocol development, although not as rigorous as the journal publication process, nevertheless does subject NPS applied research projects to a significant degree of review intended to insure the quality of the research and the integrity of the findings. The Point Reyes National Seashore Park News publication, "Drakes Estero — A Sheltered Wilderness Estuary," for example was reviewed by scientists from the U.S. Geological Survey and NPS.

Much of the research within Point Reyes National Seashore and other national parks across the nation is applied research that is designed to assist parks in specific management actions. For NPS and other Department of the Interior agencies, Congress specifically designates funds to conduct studies within parks to assist park managers in administering the parks so as to preserve and protect park resources and values for present and future generations. These studies rely on park biologists and on the expertise of both governmental and academic scientists to conduct the research. While the best available science is always sought, no land management agency has the luxury of supporting its management decisions strictly from published, peer-reviewed journals.

The claim that the NPS data collection lacked independence is simply mistaken. For example, Point Reyes National Seashore submitted a proposal to conduct a pilot study of the effects of oyster farming on Drakes Estero using a cooperative agreement with the University of California, Davis ("UC Davis"). The study methods were reviewed by UC Davis scientists, Drs. Deborah Elliott-Fisk and Peter Moyle. Dr. Elliott-Fisk is a wetland ecologist who was chair of the Department of Wildlife, Fish and Conservation Biology at UC Davis. Dr. Peter Moyle is a nationally recognized expert on fish. The proposal was subsequently funded by the NPS, but the research was conducted by the University of California faculty as an independent study.

With respect to individual biases in NPS research, we continue to believe that the studies conducted were not biased and there is no basis for such a claim. The NPS had no influence on the approach that Wechsler took in developing his Master's Thesis research, which was collaboration between him and his UC Davis thesis committee. Assertions that Wechsler's thesis hypothesis is biased are not true. Wechsler states "I hypothesized that adjacent to the Drakes Estero oyster racks: (a) fish species diversity would be reduced, (b) fish abundance would be reduced, (c) fish species richness would be decreased, and (d) a few tolerant species would dominate the fish community". In the next sentence, Wechsler goes on to state "Alternatively, since the presence of bivalve filter feeders may bolster productivity and provide aquatic habitat abundance, richness, and diversity of fishes may have increased." Clearly providing for alternative hypotheses, Wechsler is displaying a disinterested scientific approach. Thus, there is no evidence that any of the study results were influenced by NPS staff to reach predetermined conclusions that there were negative impacts from mariculture.

Lastly, Dr. Goodman's claim that Dr. Allen, who co-authored an article in the weekly newspaper, The Point Reyes Light, did not mention her employment with the NPS is also not true (Goodman letter May 8, 2007). Dr. Allen's affiliation and that of the other co-authors were provided to the editor of the paper. That the paper chose not to publish the information is not the responsibility of NPS, nor does it support an allegation of NPS bias.

Fish Community

Dr. Goodman's review of Wechsler's thesis does point out several inconsistencies between Wechsler's results and the Point Reyes National Seashore Park News publication, "Drakes Estero - A Sheltered Wilderness Estuary." When we become aware of errors, oversights, or new information, we update park publications, as we did with this publication while it was on the park website.

There is no evidence, though, that the oyster facility has positively impacted the richness of a number offish species (Goodman Letter May 8, 2007). Wechsler's thesis (2005) on the fish community of Drakes Estero clearly stated that his study "found no statistically significant differences in fish abundance or species richness among the sampling locations." Dr. Goodman's statement misinterprets the findings. The statement appears to be based on an insignificant increase of one species adjacent to the oyster racks and three species away from the racks compared to Estero de Limantour. Dr. Goodman incorrectly infers that increased richness, which is simply the total count of unique species, represents an improvement in this park ecosystem. Natural systems, however, have intrinsic levels of species richness and other measures of biodiversity, and divergences from those levels in either direction are generally considered a loss of naturalness.

Additionally, removing the oyster facility from Drake's Estero would not eliminate an important structural feature supporting the Estero's native fish biodiversity, and Wechsler does not report a statistical increase in biodiversity associated with the oyster racks. Although not statistically significant, Wechsler did indeed find that "species diversity and species richness were greatest at stations closest to the oyster racks." In addition, based on 4 out of 5 similarity indices "the fish assemblage adjacent to the racks was comprised of a group of species that diverged compositionally from the fish species captured in the reference site, which suggested that the racks favored structure-oriented and crevice dwelling fish." These are the elements of Wechsler's thesis that Dr. Goodman uses to support a claim of enhanced fish biodiversity.

Dr. Goodman mistakenly places importance on Wechsler's interesting but statistically insignificant results, and ignores Wechsler's data that suggest that oyster farming might harm the fish community. For example, counts of benthic oriented fish and schooling planktivorous fish were higher in Estero de Limantour than adjacent to the oyster racks and overall fish abundance was lowest adjacent to the oyster racks. The logic used to argue that oyster mariculrure benefits the fish community could just as easily be used to suggest that oyster mariculrure is detrimental to benthic oriented fish, schooling planktivorous fish, and overall fish abundance. All of these arguments would be an incorrect interpretation of statistically insignificant results.

To address the apparent disagreement on fish community effects, we recently conferred with Dr. Peter Moyle of UC Davis, a fish ecologist who served on the Wechsler thesis committee, and Dr. Edwin Grosholz of the UC Davis, an academic benthic ecologist. Dr. Moyle stated that "Jesse Wechsler's thesis did not demonstrate any negative impact of oyster racks on fish nor did it demonstrate any positive effects (Email to NPS, July 17, 2007)." Dr. Grosholz commented (Email to NPS, July 15, 2007) on Wechsler's thesis that "In summary, given that species diversity was never tested statistically and the tests of species number (richness) is strongly affected by sample size and incorrectly analyzed by date, there is little basis for concluding that the oyster racks had any affect on fish populations. By inspecting the data, it does appear that species identities do seem to shift, however no quantitative conclusions can be drawn from this analysis."

In summary then, Wechsler's thesis indicates that when he conducted his study prior to DBOC's operations, mariculture in Drakes Estero had no measurable effects on fish species abundance, diversity, or richness, but may have had an effect on fish composition. Similar results could have been found if other types of artificial reefs had been introduced to Drakes Estero. In Huntington Beach, California, for example, offshore oil rigs are popular scuba diving sites due to their large fish congregations and the interesting assemblage of marine invertebrates attached to the pilings. Oyster racks appeared to favor structure oriented fish; however, determining effects on fish composition within Drakes Estero by the current elevated level of oyster operations would require a more focused study.

Eelgrass

Dr. Goodman criticizes NPS for statements that eelgrass is impaired by the oyster operation, but he does not address evidence from the broader scientific literature on oyster operation effects on eelgrass or from preliminary studies in Drakes Estero showing reduced eelgrass growth below oyster racks and indirect effects from boat propeller damage.

Dr. Goodman correctly quotes Elliott-Fisk et al. (2005, page 28) "We found the oyster racks to have no pronounced impacts on the eelgrass beds, which existed both under and away from the racks as an incredibly rich habitat type." Elliott-Fisk, the primary author, apparently contradicted her research staff that published qualitative statements that eelgrass growth was very limited under the oyster racks (Harbin-Ireland 2004, Wechsler 2005). The NPS regrets that it did not discover the inconsistency between Elliott-Fisk's comment and the results reported by these two studies when reviewing the final draft of Elliott-Fisk et al. (2005). NPS acknowledges that eelgrass beds have expanded since the 1990s but, consistent with the results from these studies, NPS has also documented that eelgrass beds are locally affected by the oyster operation.

Dr. Goodman does not address the local direct damage of the oyster boats on the eelgrass (see aerial photographs R. Campbell, May 7, 2007 and Drakes Estero Site Visit Report 3/20/07). A site visit on March 20, 2007 documented that oyster structures (racks and floats) directly and adversely impacted 8.5 acres, or 1% of the 736 acres of eelgrass in the

estero. By simple measurement of high density boat tracks through eelgrass beds using GIS spatial analysis of aerial photographs, NPS conservatively documented a larger area of secondary impacts approaching 50 acres (NPS GIS map July, 2007). Numerous channels have been cut into the eelgrass beds by boat propellers. The long and short-term effects of these motorboat cuts in the eelgrass, if any, have yet to be determined; however, the main boat channel cutting through Schooner Bay is a clear example of boat traffic effect on eelgrass beds.

Dr. Grosholz provided expert opinion to the NPS on Dr. Goodman's statements regarding eelgrass (Email to NPS, July 15, 2007). Dr. Grosholz stated, "Dr. Goodman is correct to point out that we should base our decisions on the best science available, but curiously fails to cite any science at all on this point. He is correct that there is very little in the way of published literature, but what there is clearly indicates that oyster culture negatively affects eelgrasses. Everett et al. (1995) unambiguously demonstrates that oyster culture negatively effects eelgrass on a local scale. While this study takes place in Oregon, it involves the same species and same methods used in Drake's Estero. In the absence of a similar study in California, this is the best available science, period." Dr. Grosholz also states (Email to NPS, July 15, 2007)—

> Unfortunately, the evidence that Dr. Goodman provides has nothing to do with local impacts of oyster culture on eelgrass. The broad-scale increase of eelgrass beds in Drake's Estero is certainly good news! We all want to see increases in the coverage of this important and diverse community. It is equally possible that eelgrass would be even more abundant than the current level in Drake's Estero if oyster racks hadn't been present. In other words, we might have seen even greater recovery of eelgrass in the absence of oyster culture. The more relevant scale of analysis has to do with local impacts (scales of meters) of oyster racks on eelgrass. But the aerial photo data from CDFG has nothing to do with this. The aerial photos in this unpublished analysis are unlikely to have the necessary resolution, so the statement "eelgrass growing closer to and surrounding the oyster racks" has no quantitative support. Finally, the statement that eelgrass beds in California [have] "...otherwise been retreating and are in decline" is not supported by any published analysis I am aware of and no support for this statement is provided by Dr. Goodman. It's simply unsupported speculation and very misleading to imply that eelgrass is retreating everywhere in California except for Drake's Estero. Finally, the impacts of boat propellers on eelgrass due to the direct effects of physical damage and the indirect effects of increased turbidity remain an unquantified, but plausible mechanism and should be investigated.

The current level of impact to eelgrass beds by the oyster operation may or may not be significant to the overall persistence of eelgrass within Drakes Estero. The extent of indirect adverse impacts from boat operations or changes to water quality has not been measured and further research is clearly needed to determine the extent and persistence of these impacts. Nevertheless, the current level of impacts would not occur if the oyster

operations were reduced in or absent from Drakes Estero.

Sedimentation

NPS statements regarding sedimentation are challenged as not supported by published literature; however, there are several papers in the published literature regarding the negative effects of aquaculture operations on sedimentation from studies in other estuaries. Research in other estuaries has documented that the deposition from pseudofeces tends to be focused below and around mariculture structures (Cranford et al. 2003; Porter et al. 2004). Everett et al. (1995) who conducted a study in the Pacific Northwest noted that aquaculture techniques might have ecological impacts related to altered flow regimes and disturbance of the substrate.

Dr. Goodman correctly points out errors or oversights by NPS regarding interpretation of a report by a USGS researcher (Anima 1990). The researcher, Dr. Roberta Anima, conducted research in Drakes Estero in the late 1980s and provided both a report to the National Park Service (Anima 1990), and a U.S. Geological Survey report (Anima 1991). The NPS incorrectly interpreted the report by Dr. Roberta Anima (1990) that he had detected oyster pseudofeces in sediment core samples, that he estimated the amount of fecal matter produced by oyster rafts, and that he considered oyster farming as the primary source of sedimentation in the estero. NPS acknowledges the errors and clarifies here what Anima (1991) reported. Instead, Anima (1991; page 92) references another study - "Ito and Imai (1955) calculated that in Japanese waters a raft of oysters 60 m square would annually produce 0.6 to 1.0 metric tons (dry weight) of fecal material", and states "Because they are filter feeders, the oysters being grown and harvested in the estero play an important role in the deposition of fine grained sediment.. ..The combination of abundant native filter feeders and the introduced oyster raises questions of the impact the industry is having to the sedimentation rate of the lagoon."

Although Dr. Anima did not quantify sedimentation related to the oyster farming, he provided expert opinion in the report that the sediment material was likely resistant to erosion because oyster racks were located in the upper reaches of the estero where tidal action was limited. He goes on to say, "Areas adjacent to staked oyster beds have been observed to have higher accumulations of silt and clay sized material on the leeward and/or a down current direction from the beds" (Anima 1991; page 93). It should be noted that DBOC does not use the staked method but instead puts oysters in bags using similar habitat.

The Elliott-Fisk et al. (2005) report notes oyster feces are not a problem in Drakes Estero. But, as noted above, the Elliott-Fisk et al. (2005) research took place in the late 1990s when only 38 racks (45%) were active (CDFG landing reports), before the current higher level of oyster production in Drakes Estero. In March 2007, there were 65 active racks and several hundred oyster bags in Drakes Estero in locations where bags were not previously located. In addition, Dr. Goodman fails to note that this research was only a preliminary study; that the sediment analysis suffered from low sample size collected on only one occasion; and that despite suggestions that decomposing eelgrass was a key source of sediment organic matter, no quantifiable evidence was presented to support this

claim. Determining past and current effects of oyster operations on sedimentation rates within Drakes Estero would require a more focused, site-specific study.

Dr. Thompson, who works for the U.S. Geological Survey, Water Resources Division in Menlo Park, provided expert opinion that addressed the potential effects that racks and bags might have on the hydrodynamics of the estero. Both bags and racks have the potential to increase sedimentation and erosion, depending upon the placement and number of bags. She states "If the mass is high, bacterial reduction of the organics can reduce the oxygen content of the sediment...The sediment will become enriched and the sediment grain size may be reduced as the fecal pellets become incorporated into the sediment" (May 7, 2007 letter to NPS). The bags may create an anoxic zone by sedimentation and sequestering of oyster feces into the sediment under the bags, severely stressing the native invertebrate community beneath. Dr. Thompson stated that once bags are removed the organisms will likely recolonize the sediment. In parts of Drakes Estero near where oysters are cultivated in bags on the tidal flats, native clams can be found in extremely high densities - up to 250 per square meter (Press 2005). No studies to date have investigated the impacts of the several hundred newly placed oyster bags on the underlying sediment and associated invertebrate community of Drakes Estero.

Finally, Dr. Grosholz provided expert opinion that addressed the potential effects of the oyster bags. "There is likely to be immediate impacts, mostly negative, on suspension feeders and surface deposit feeders immediately under the bags due to increased sedimentation, physical obstruction, decreased particle size and associated increased hypoxia. There may be positive effects for species requiring hard substrate for attachment. There may also be disturbance created by boats including increased turbidity as props resuspend particles in the water column. However, there are no well documented studies of this at present" (Letter to NPS May 6, 2007). He further states, "Once again, the work of Everett et al. (1995) is perhaps the only published study from the western U.S. that explicitly measures the effects of oyster culture on carbon content, grain size and other sediment parameters on relevant scales. They found very significant effects of oyster culture on sedimentation occurring in a matter of weeks, though it is important to point out that the effects varied with culture method" (Letter to NPS July 15, 2007).

Dr. Grosholz concludes that "In summary, the U.S.G.S. report and the subsequent interpretations should not be the basis for drawing conclusions about the effects of oyster culture on sedimentation. As discussed in point 1, the peer-reviewed scientific literature demonstrates that oyster culture can significantly influence sedimentation rates with negative local effects on eelgrass beds" (Letter to NPS July 15, 2007).

Invasive Tunicate

Dr. Goodman asserts that the NPS is overstating the potential risk of invasive species generally, and the potential damage of the colonial tunicate *(Didemnum* sp. A) to Drakes Estero. Expert opinion and direct evidence in Drakes Estero, however, support the NPS concern regarding this invasive species.

Drs. Carlton and Grosholz stated that the *Didemnum* sp. A is not endemic to the region and they consider the species to be highly invasive (see below and Bullard 2007a). The species also is on the National Aquatic Nuisance Species Watch List for Washington State. Furthermore, an infestation *of Didemnum* sp. A was found on natural sandstone and mudstone habitats at Bull Point within Drakes Estero in May 2007, showing that the species can invade and survive on native habitat and not just oyster equipment in Drakes Estero. There has been no field research to determine the minimum spacing needed to ensure that *Didemnum* will not spread from known habitat to population regions previously thought to be inhospitable.

Although Dr. Goodman correctly states that the oyster farm may not be the original source of the introduction *of Didemnum* within the estero, the pervasive presence of *Didemnum* on the racks increases the likelihood of invading native habitat. Dr. Grosholz stated (Letter to NPS July 15, 2007)—

> No one knows the history of the introduction of this species at this site. However, Dr. Goodman errs in his discussion of the establishment of this species when he states that the larvae of this species "are endemic in the plankton". Just because other tunicates are widely distributed along the west coast doesn't mean that this species *of Didemnum* is everywhere... .In fact, the recent study by Bullard et al. (2007) of which Dr. Goodman's colleague Mary Carman is also a coauthor clearly shows more than a half-dozen sites on the west coast where this species of *Didemnum* has not yet colonized. The issue is not whether Drake's Estero will become overrun with *Didemnum* sp. A. Dr. Goodman is correct that this tunicate is unlikely to overrun eelgrass beds or the other soft substrate habitats in the Estero. However, there is some limited hard substrate in the Estero that now has this tunicate and this may be of some concern in the future. However, an equally important issue is the likelihood of further spread *of Didemnum* sp. A to other sites.

Dr. Grosholz recently expressed his concerns in a letter to the California DF&G Commission (June 1, 2007):

> The expansion of shellfish production will provide more substrate for *Didemnum* and increase the degree to which Drake's Estero might act as a source for this species. The second concern is that current culture methods that involve scraping off the tunicate from culture apparatus will result in the release of large numbers of fragments into the estuary. Both of these issues represent significant concerns that should be formally addressed in a detailed environmental review of this proposal.

In a laboratory study, Bullard et al. (2007b) demonstrated that damaged and torn fragments *of Didemnum* could survive and reattach to other substrates.

NPS also has conferred with several national and regional experts on the topic of invasive non-native marine species, including Drs. Janet Thompson of USGS, Edwin Grosholz of UC Davis, James Byers of University of New Hampshire, and James Carlton of Williams

College and Director of the Maritime Studies Program of Williams College and Mystic Seaport. Each is familiar with or has conducted research in Drakes Estero.

Dr. Thompson stated that "there are no examples of extirpating aquatic exotic animals once they have spread in a system.. ..The presence of hard structures such as racks supplies a habitat for epifauna that might be less likely to successfully invade this system." (Letter to NPS May 7, 2007). Consequently, the structures in the estero facilitate invasive species by providing an unnatural substrate.

Dr. Grosholz, in a recently published paper (Grosholz 2005), discovered that a non-invasive exotic species in Bodega Bay reached a tipping point, and became highly invasive based on the unintended effects of another newly invading species. This concept of "invasional meltdown" showed that additional invasive species can alter the system to the point where prior non-natives become highly invasive, thus having a far greater impact on the ecosystem. Specific to Drakes Estero, Dr. Grosholz stated as follows (Letter to NPS July 15, 2007):

> The extensive oyster racks permit the development of huge populations of many non-native species, not just *Didemnum* sp. A but other species with a much greater potential for larval dispersal. A recent study by Glasby et al. (2007) makes it clear how artificial structures disproportionately support non-native species at the expense of native species. Therefore, the extensive oyster racks in Drake's Estero potentially represent a large source of propagules that can increase the chance that *Didemnum* and other introduced species in Drake's Estero could be dispersed to other sites along the California coast by planktonic dispersal, attached to small boats or by the movement of shellfish products. However, it must be pointed out that there are no quantitative estimates of the magnitude of this risk.

Dr. Byers conducted his dissertation work on invasive aquatic species at Point Reyes in the 1990s. Dr. Byers stated (Email to NPS July 6, 2007; Byers 1999)—

> Nonindigenous oyster introduction has been an enormous vector of species introductions both globally and on the US West Coast. If there is no more oyster importation, one could argue that the damage in terms of hitchhiking nonindigenous species importation has already been done. However, even if new importation has abated, there still remains a large source pool of nonindigenous species that can invade nearby marine and estuarine habitats. For example, the Japanese mud snail *(Batillaria attramentaria)* was introduced to nearby Bolinas Lagoon not from an introduction directly from Japan, but from Japanese oysters from Drake's Estero that were outplanted to Bolinas Lagoon in 1955.

Dr. Carlton (Email to NPS July 16, 2007) states the following:

> The tunicate *Didemnum* now in Drakes Estero is not native to the Pacific coast of America, nor, indeed, to the Atlantic Ocean. It is not endemic to the world's

> oceans, and abundant historical, ecological, geographical, morphological, evolutionary, and genetic data now support that conclusion. The WHOI/USGS scientists at Woods Hole studying this species are keenly aware that it is not native to the Atlantic coast of America, which is one reason they are studying it and concerned about its aggressive and massive colonization of the Georges Bank fishing grounds. At this time, the trail appears to lead to Japan for the endemic region of this species.

Finally, invasive parasites that hitchhike on non-native species have recently been identified as another source of non-native species (http://sciencedailv.com/releases/2006/12/061219094419.htm. The Japanese mud snail was introduced into estuaries of North America via oyster farming (Carlton 1992). Recently researchers determined that the mud snail was also the host for an invasive trematode parasite that can infect native fish. The Japanese mud snail has been found in Drakes Estero (Byers 1999).

Leading experts in marine ecology consider nonnative invasive species, including *Didemnum* sp. A, as serious potential threats to the ecology of Drakes Estero.

Harbor seals

The overall population of harbor seals on the central California coast is healthy and has flourished over the past two decades (Sydeman and Allen 1999). However, Dr. Goodman incorrectly extrapolated from that regional trend that there are no local effects on seal numbers in Drakes Estero from the oyster farm because that regional study analyzes data from the Farallon Islands and Double Point, two completely different seal rookeries from Drakes Estero.

Dr. Grosholz also noted (Email to NPS July 6, 2007)

> Unlike the three previous claims where I would list myself an expert, I am not so with regard to marine mammals. However, reading the peer-reviewed paper by Sydeman and Allen, Dr. Goodman quotes "habitat saturation and/or prey limitation" is limiting harbor seal populations. But he fails to mention that later in the same paragraph, Sydeman and Allen state "We are unclear as to the limiting factors now affecting harbor seals in central California, but we suspect undisturbed habitat may be limiting breeding populations on the mainland." Why was this conclusion omitted from Dr. Goodman's analysis of this paper?

Finally, Dr. Goodman uses early reports that precede the current conditions within Drakes Estero to argue that the oyster operations are not disturbing the seals. His position relies solely on large, regional population patterns and ignores local occurrences of federally prohibited disturbance to harbor seals. Motorboats were rarely observed disturbing seals in Drakes Estero during the 1997 - 2006 breeding seasons (Manna et al. 2006). This is no longer true. During the 2007 harbor seal pupping season, the NPS documented 1) oyster boats disturbing mother seals with pups, and 2) oyster bags placed on sandbars where seals would normally give birth and nurse their pups (NPS Trip reports 4/13/2007 and 4/26/2007). Two oyster bag arrays (approximately 5 acres) were

within a regular harbor seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site (NPS Trip Report April 13, 2007). Over the past 20 years, harbor seals have consistently used tidal sandbars in the central bay of Drakes Estero during the breeding season where females can raise pups without disturbance (Allen 1988). Also, it is incorrect to interpret from the NPS reports (Vanderhoof et al. 2005, Manna et al. 2006) that the number of seal pups increased in Drake's Estero from 2005 to 2006, in contrast to the general trend. The pup count in Drakes Estero was 332 in 2005 and 347 in 2006, indicating no statistically significant difference between the two years. More focused analyses are required to determine if oyster operations are affecting seal distribution and productivity within Drakes Estero.

The overall Drakes Estero and regional population declined in 2007, but not necessarily in response to the oyster farming operations. The analysis for 2007 has not yet been completed to determine whether this decline is statistically significant. Other confounding oceanographic factors likely are affecting seal productivity in the region. However, the oyster operation has contributed to site-specific disturbance and displacement within the estero, where historically many females with pups occur. Chronic disturbance at other seal haul out sites in the region have resulted in reduced usage and even abandonment (Grigg et al. 2004), and previous elevated disturbances in Drakes Estero from all types of boats prompted the National Park Service to close the estero to all boats, excluding the non-conforming use by the oyster operation, during the harbor seal pupping season (March 1 through June 30; Point Reyes National Seashore, Superintendent's Compendium 2007).

Conclusions

Based on the laws and policies that govern park management, any changes from natural conditions are of concern and must be scrutinized carefully. This principle guides the National Park Service's scientific study and review of the impacts of DBOC's operations on Drakes Estero. Both law and policy direct the National Park Service to use the findings of science and the analyses of scientifically trained resource specialists in decision-making. The National Park Service evaluates impacts on natural resources by applying scholarly, scientific, and technical information and uses National Park Service knowledge and expertise that comply appropriately with professional standards. Technical reports, expert opinions, and other sources of scientific data also provide decision-makers with reliable and verifiable information.

No data have been presented to support the claim of ecological benefits to Drakes Estero from the DBOC. No peer-reviewed journal publications have been referenced and little expert opinion has been provided. However, there is strong evidence from the broader scientific literature on negative effects of oyster farming, some of which was referenced in the NPS documents. Research by Kelly et al (1996) on shorebirds of Tomales Bay, for example, suggested a significant net decline in shorebird use of intertidal areas developed for oyster farming. A recent article by Ruesink et al. (2005) reports that "oysters are ecosystem engineers that influence many ecological processes, such as maintenance of biodiversity, population and food web dynamics and nutrient cycling."

NPS has relied on peer-reviewed published papers, government reports, and both local and national expert opinion. The peer-reviewed literature is not conclusive about the extent to which oyster farming has a negative effect on native ecosystems. Nevertheless, some effects have been identified and the preponderance of evidence demonstrates that there are serious potential and real negative effects within Drakes Estero. Many articles and experts in the field of marine ecology indicate that oyster farming in Drakes Estero likely would negatively affect the estero ecology and also point to the need for further research. Because of the controversy regarding the level of effects of oyster farming on the ecology of Drakes Estero, the National Park Service is seeking guidance from the National Academy of Sciences. The National Academy of Sciences is highly regarded for providing independent and objective advice based on the highest scientific standards. If the Academy chooses to accept the NPS request, results likely would be available in 2008.

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Upon entering our campus from Lake Road, bypass the main entrance and take the second entrance into the campus. This is Rancher's Road. Follow Rancher's Road around to the back of the campus. When you come to a fork in the road, stay left onto the road. Keep following the road around to the back of the campus until you see the large parking lot on the left. This is the Le Grand Parking Lot which faces the back of the Science and Engineering Building.

Please look for the "tent like" sign with your name and affiliation on it. This is your designated parking space. Please park there as the parking staff will ticket any vehicle not in a designated spot and/or one that is not displaying a UCM Parking Decal. Parking Facilities staff usually establishes reserved parking beside the long green construction site fence line. Please look in this vicinity first for your specific parking spot.

Directions to Roger Bales' office -SE 202

Enter through the first set of double doors across from the Le Grand Parking Lot, before going through the second set of double doors, take a left and take the elevators to the 2nd Floor.

Exit the elevators to the right, go all the way down the hall until it ends, take a right, Professor Bales office is the fourth door on the left side of the hall.

Hello [redacted]
The parking spaces have been confirmed in the Le Grand Parking Lot. I have attached directions to the lot.
The room which has been reserved for you is in the Kolligian Library, KL324.
Please let me know if you have any questions.

Coty

From: Liz Soria [mailto:esoria3@ucmerced.edu]
Sent: Tuesday, December 07, 2010 9:57 AM
To: Coty Ventura; cgalvan3@ucmerced.edu
Subject: RE: 12-9-2010

Hi Coty,

Parking request fo[redacted]' and "Gavin Frost" has been processed and completed for the LE Grand lot on 12/9/10 from 7am-5p.m.

Any changes or questions please let us know.

Thank You,
Liz Soria

Elizabeth R. Soria
Transportation, Parking and Fleet services Tel 209.228.8277 | Fax: 209.228.4731 taps.ucmerced.edu

*****Please Note: Event Signage for Color/Black and White Prints will be changing effective 12/1/2010, please visit http://taps.ucmerced.edu/node/259 for pricing information!

***If your guests space has been taken, please contact Parking Enforcement at 209-205-8061 or 209-228-8277

From: Coty Ventura [mailto:cventura@ucmerced.edu]
Sent: Monday, December 06, 2010 2:05 PM
To: cgalvan3@ucmerced.edu; esoria3@ucmerced.edu
Subject: 12-9-2010

Hello Ladies,
I need to reserve two parking spaces in the Le Grand Lot for 12-9-2010, all day please:

[redacted] National Park Service

Gavin Frost, Department of Interior

Purpose: Meeting with DOI and NPS
FAU: 449001-2A-19900-03 Project: GENOPS
Source: DIR

Coty Ventura
University of California, Merced
Administrative Specialist
209-228-7674
Sierra Nevada Research Institute
Roger Bales, Ph.D - Director
(See attached file: Directions to Le Grand Lot and SE 202 .doc)

McCoy, Lytashia

From: Frost, Gavin
Sent: Tuesday, December 07, 2010 3:22 PM
To: McCoy, Lytashia
Subject: Fw: Parking directions for Thursday at UC Merced
Attachments: Directions to Le Grand Lot and SE 202 .doc

Importance: High

Delivered by SOL Blackberry Services

----- Original Message -----
From: [redacted]
To: Frost, Gavin
Sent: Tue Dec 07 13:36:09 2010
Subject: Parking directions for Thursday at UC Merced

Gavin -- Could you please confirm our appointment, and that you have the information you need to park and find our meeting place?

I'm out most of Wednesday, so it would be helpful if you got back to me today.

[redacted]

[redacted] Ph.D.
Chief Scientist, Pacific West Region, National Park Service Sequoia & Kings Canyon National Parks 47050 Generals Highway Three Rivers, CA 93271-9599
[redacted] voice [redacted] cell 559.565.4283 fax [redacted]

----- Forwarded by David Graber/SEKI/NPS on 12/07/2010 10:34 AM -----

"Coty Ventura" <cventura@ucmerced.edu>
12/07/2010 10:27 AM

To [redacted]
cc [redacted]

Subject
FW: 12-9-2010

Print

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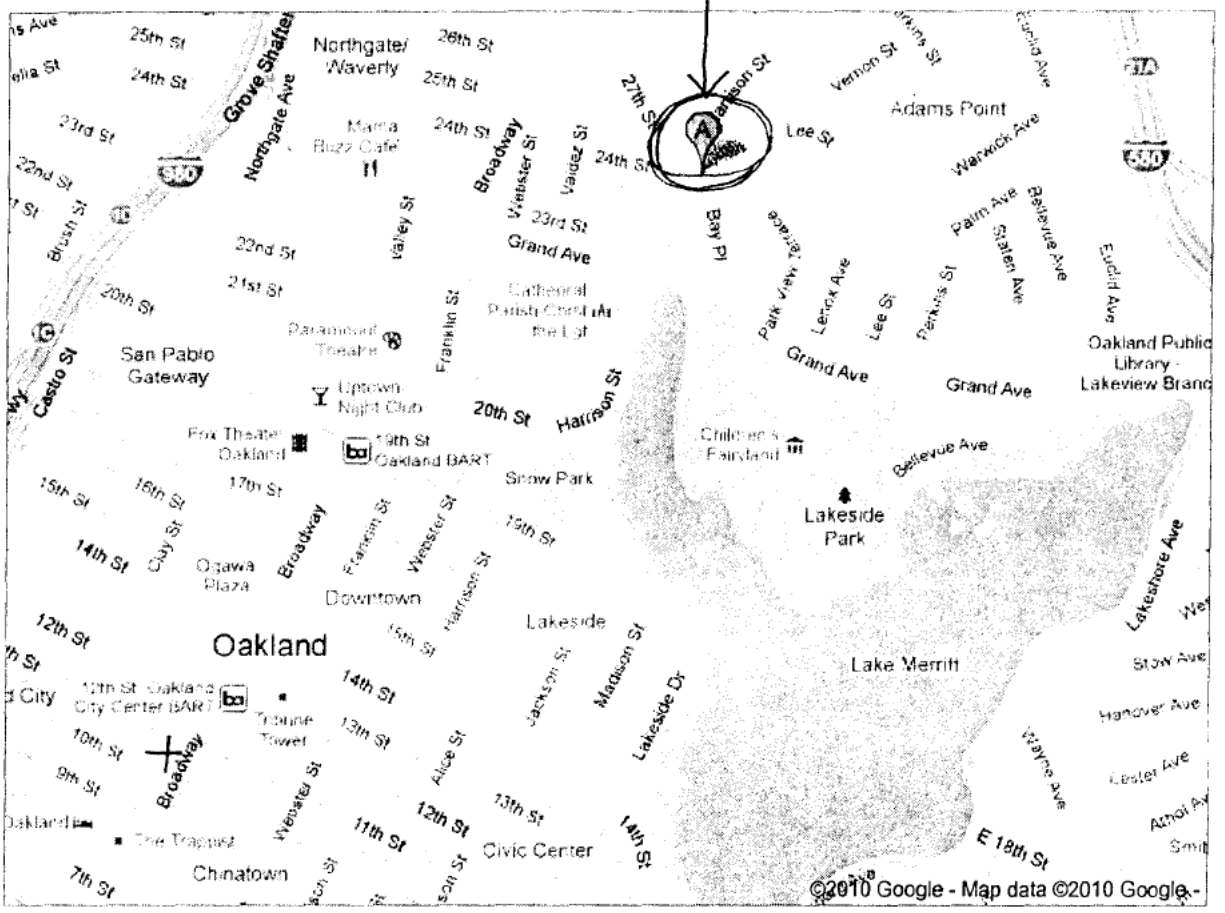
A. **Whole Foods** Market - Oakland
~~230 Bay Place~~, Oakland, CA - (510) 834-9800
53 reviews

B. **Whole Foods** Market ~~Regional Office~~
5980 Horton St ~~#~~ 200, Emeryville, CA - ~~(510) 428-7400~~
~~3~~ reviews



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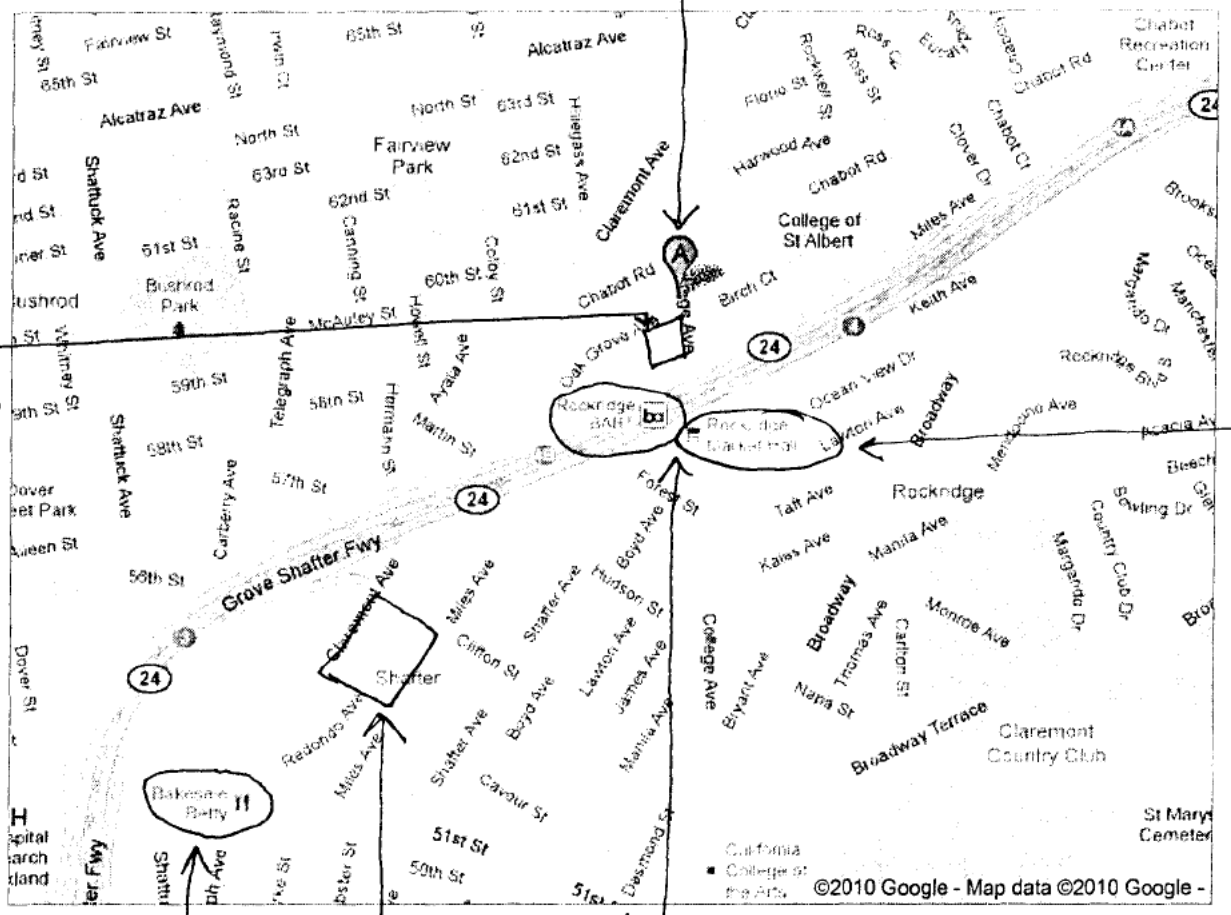
A. **Zachary's** Chicago **Pizza**
5801 College Ave, Oakland, CA -
(510) 655-6385
399 reviews



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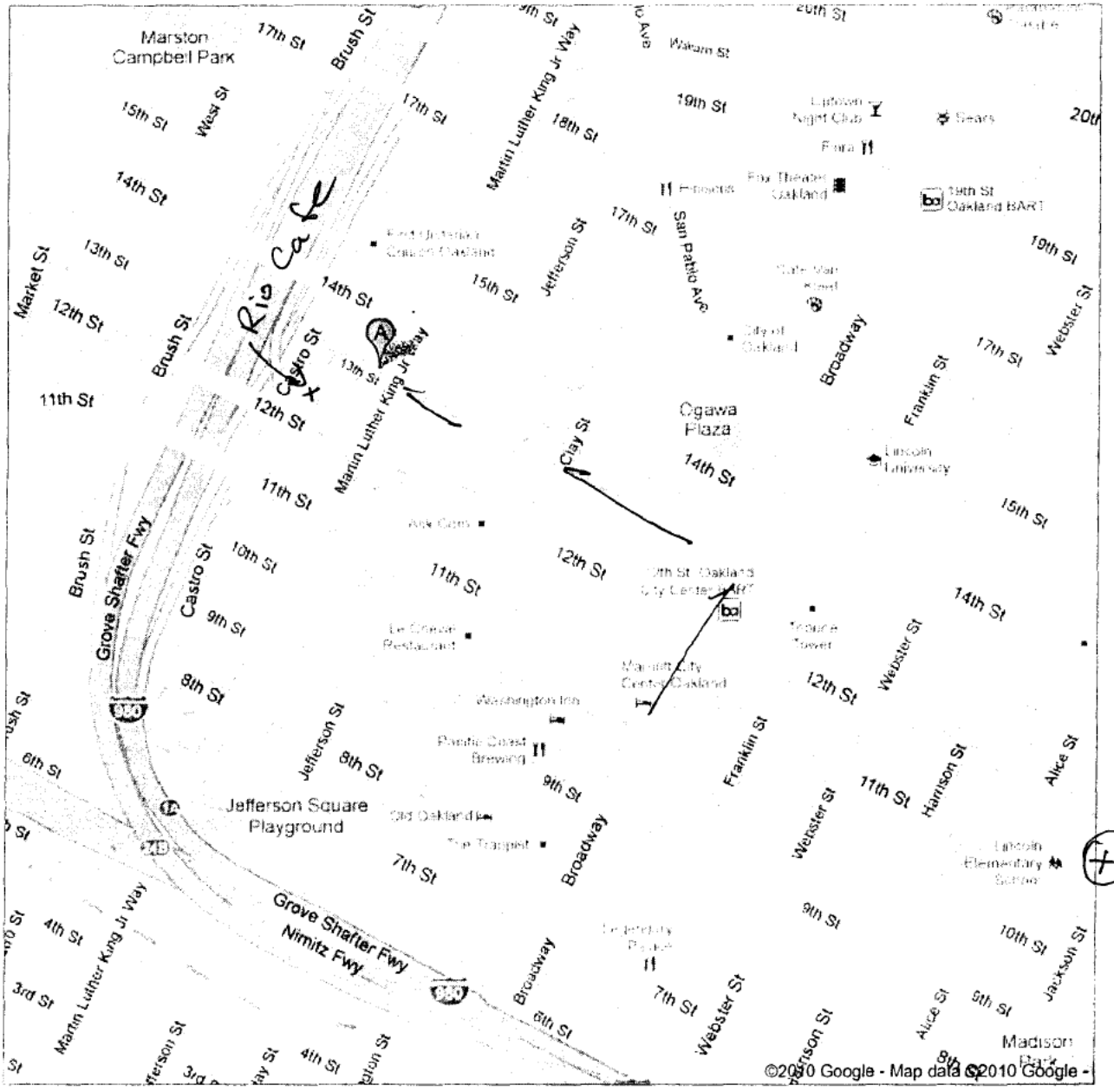

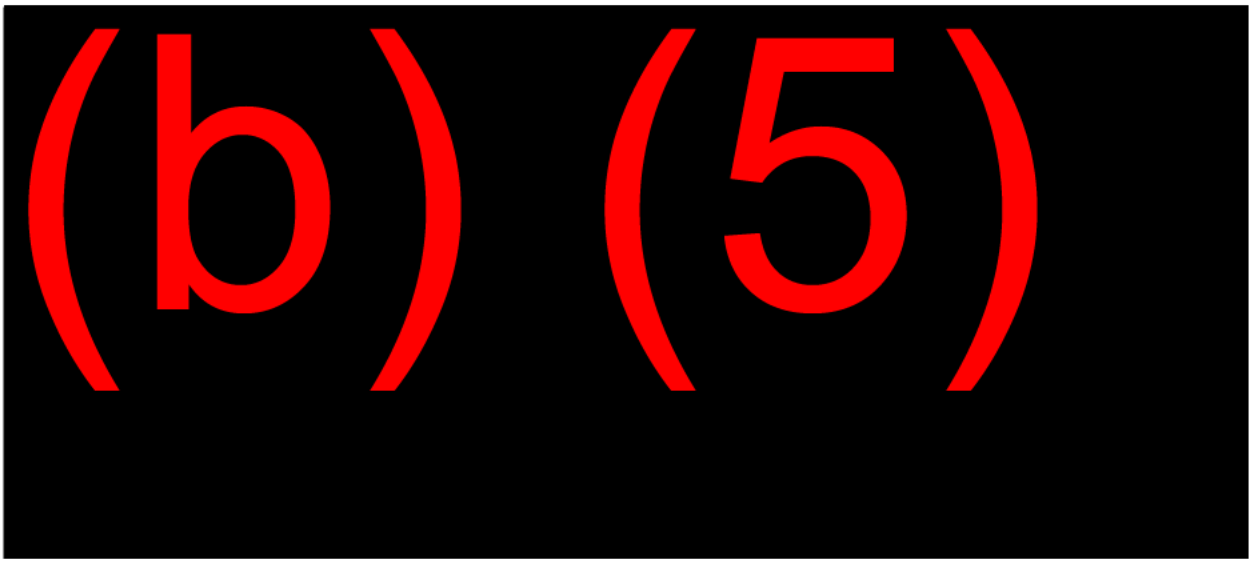
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Marine Mammal Science

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Modeling the effects of El Niño, density-dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997–2007

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ABSTRACT

Harbor seal (*Phoca vitulina*) haul-out site use may be affected by natural or anthropogenic factors. Here, we use an 11-yr (1997–2007) study of a seal colony located near a mariculture operation in Drakes Estero, California, to test for natural (El Niño-Southern Oscillation (ENSO), density-dependence, long-term trends) and anthropogenic (disturbance or displacement related to oyster production activities) factors that may influence the use of haul-out subsites. Annual mariculture related seal disturbance rates increased significantly with increases in oyster harvest ($r_s = 0.55$). Using generalized linear models (GLMs) ranked by best fit and Akaike's Information Criteria, ENSO and oyster production (as a proxy for disturbance/displacement) best explained the patterns of seal use at all three subsites near the mariculture operations, with effects being stronger at the two subsites closest to operations. Conversely, density-dependence and linear trend effects poorly explained the counts at these subsites. We conclude that a combination of ENSO and mariculture activities best explain the patterns of seal haul-out use during the breeding/pupping season at the seal haul-out sites closest to oyster activities.

Key words: information-theoretic, AIC, *Phoca vitulina*, harbor seal, disturbance, Point Reyes, Drakes Estero, El Niño, density-dependence, mariculture.

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The Pacific harbor seal (*Phoca vitulina richardii*) ranges along the eastern Pacific from Baja California to Alaska, and in north-central coastal California, they are the dominant and only year-round resident pinniped (Sydeman and Allen 1999, Burns 2002). The population at Point Reyes, California, represents the second largest concentration of harbor seals in the State of California, accounting for about 20% of the mainland breeding population, and the most seals per haul-out site in the state occur between 37.5° and 38.0°N.[1] Much of the Point Reyes coastal zone remains relatively pristine within a national park, and provides diverse marine and terrestrial habitat for seals to rest, molt, feed, and breed whete human encroachment is minimal, in contrast to urbanized locations nearby such as San Francisco Bay (Sydeman and Allen 1999, Grigg *et al.* 2004).

Harbor seals are unusual for a large marine predator because they occur almost exclusively in nearshore habitats, and as a pinniped, they come onshore at traditional terrestrial sites to breed and rest (Burns 2002). Typically, seals attend haul-out sites year round and spend about 33%–55% of their time onshore (Yochem *et al.* 1987, Allen Miller 1988). The number of seals present at any given haul-out site is influenced by several factors including time of day, tide level, current direction, weather, season, year, disease outbreaks, disturbances from other wildlife, and human activities (Allen *et al.* 1984, Yochem *et al.* 1987, Suryan and Harvey 1999, Thompson *et al.* 2001, Grigg *et al.* 2004, Hayward *et al.* 2005, Seuront and Prinzivalli 2005). During the pupping and molting seasons, attendance is usually higher than at other times of the year (Yochem *et al.* 1987, Grigg *et al.* 2004), but females and pups may also react more strongly to disturbances, depending on the source (Perry *et al.* 2002). Environmental factors such as El Niño-Southern Oscillation (ENSO) events can affect attendance and reproduction (Allen *et al.* 1989, Trillmich and Ono 1991, Sydeman and Allen 1999), as can density-dependent factors (Brown *et al.* 2005, Jeffries *et al.* 2005), interspecific competition (Bowen *et al.* 2003), predation (Lucas and Stobo 2000), and epizootic outbreaks (Thompson *et al.* 2001). Human activities can disturb seals at haul-out sites, causing changes in seal abundance, distribution, and behavior, and can even cause abandonment (Allen *et al.* 1984, Suryan and Harvey 1999, Grigg *et al.* 2002, Seuront and Prinzivalli 2005, Johnson and Acevedo-Gutierrez 2007). Given all of these potential factors, it can be difficult to determine which are the most important ones affecting seal attendance at haul-out sites. This pitfall was aptly noted by Richardson *et al.* (1995) by the statement: "it is uncommon to have a series of reliable counts long enough to quantify the numerical change, let alone determine the cause."

To explore how environmental and anthropogenic factors affect seal use of colonies, we examined a long-term study of harbor seals at Drakes Estero, Point Reyes, California. The purpose of the study was to determine changes in population size, reproductive success, and anthropogenic or environmental factors that may affect trends in counts (Sydeman and Allen 1999, Allen *et al.* 2004). Here, we present an analysis of the seal population at three of eight subsites in Drakes Estero that were exposed to varying levels of human related disturbances associated with a mariculture operation. We tested four *a priori* hypotheses that could explain trends in seal counts: (1) year as a linear trend, (2) number of seals at subsites in the middle-lower estero (to search for a density-dependent effect), (3) years since the last ENSO event, and

[1]Lowry, M. S., J. V. Carretta and K. A. Forney. 2005. Pacific harbor seal, *Phoca vitulina richardii*, census in California during May–July 2004. NMFS NOAA-SWFSC Administrative Report LJ-05-06. 38 pp.

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(4) the level of mariculture operations in the estuary as measured by the magnitude of annual oyster harvesting.

METHODS

Study Area

The Point Reyes peninsula, along the north-central California Coast, extends from Tomales Bay (38°30′N) south to Bolinas Lagoon (37°30′N). The peninsula is located within the Point Reyes National Seashore and adjacent to the Gulf of the Farallones National Marine Sanctuary. The topographic diversity of this coastal zone provides a broad range of substrates for harbor seals to haul-out of the water. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. A "haul-out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987). A colony site may be a collection of haul-out sites within a limited geographic area. Drakes Estero and Estero de Limantour encompass a complex of eight subsites where seals haul-out (Fig. 1), which are referred to collectively as the Drakes Estero/Limantour colony. Seals use the subsites at various times of the year depending upon their reproductive status, molting condition, and the level of disturbance encountered (Allen Miller 1988). All subsites are used during the breeding and molt seasons, and some are used regularly year-round. Females with pups have disproportionately used the sand bars exposed at low tide in the upper and middle portions of the estero that are isolated from the mainland, and consequently from humans and predators. Limantour Spit was mostly used by non-breeding seals during the breeding season (Allen Miller 1988). Subsites in the middle-lower estero, which are generally closer or attached to the mainland, have historically suffered higher human disturbance rates when compared to the isolated island sandbars of the upper estero.

Human access to the seal haul-out sites within Drakes Estero was limited because it is part of a national park and a congressionally designated wilderness area. During the breeding season (1 March to 1 July), no boats were allowed within the estero except for the non-conforming (to congressionally designated wilderness) uses by a commercial oyster operation. Three of the subsites where seals haul-out were proximate to this commercial oyster operation (UEF, OB, and UEN). Subsite OB was within the oyster lease but was not used much for oyster culture in the recent past (1999–2004), portions of subsite UEN were within or adjacent to the lease, and subsite UEF was in a navigational channel that bisects a gap in the oyster lease where oyster boats traversed Drakes Estero (Fig. 1).

Oyster production and oyster culture methods used within the estuary have varied over the past 50 yr. However, the primary methods included oyster racks (measuring approximately 3×30 m^2 each), stakes, and bags (each measuring 0.5×1 m^2). In 2007, most of the racks were distributed in the upper portion of the estuary and >1,000 oyster bags (estimated) were distributed along the margins of the estuary, on intertidal sandbars in the center of the bay and in Home and Creamery Bays (Fig. 1).[2] Oyster production levels were high between 1981 and 1998 (annual production ranged from 3 to 9 million oysters per year) and reduced between 1999

[2]Brown, D., and B. H. Becker. 2007. Trip report—Drakes Estero eelgrass, oyster bag, and oyster rack assessment. Unpublished National Park Service report.

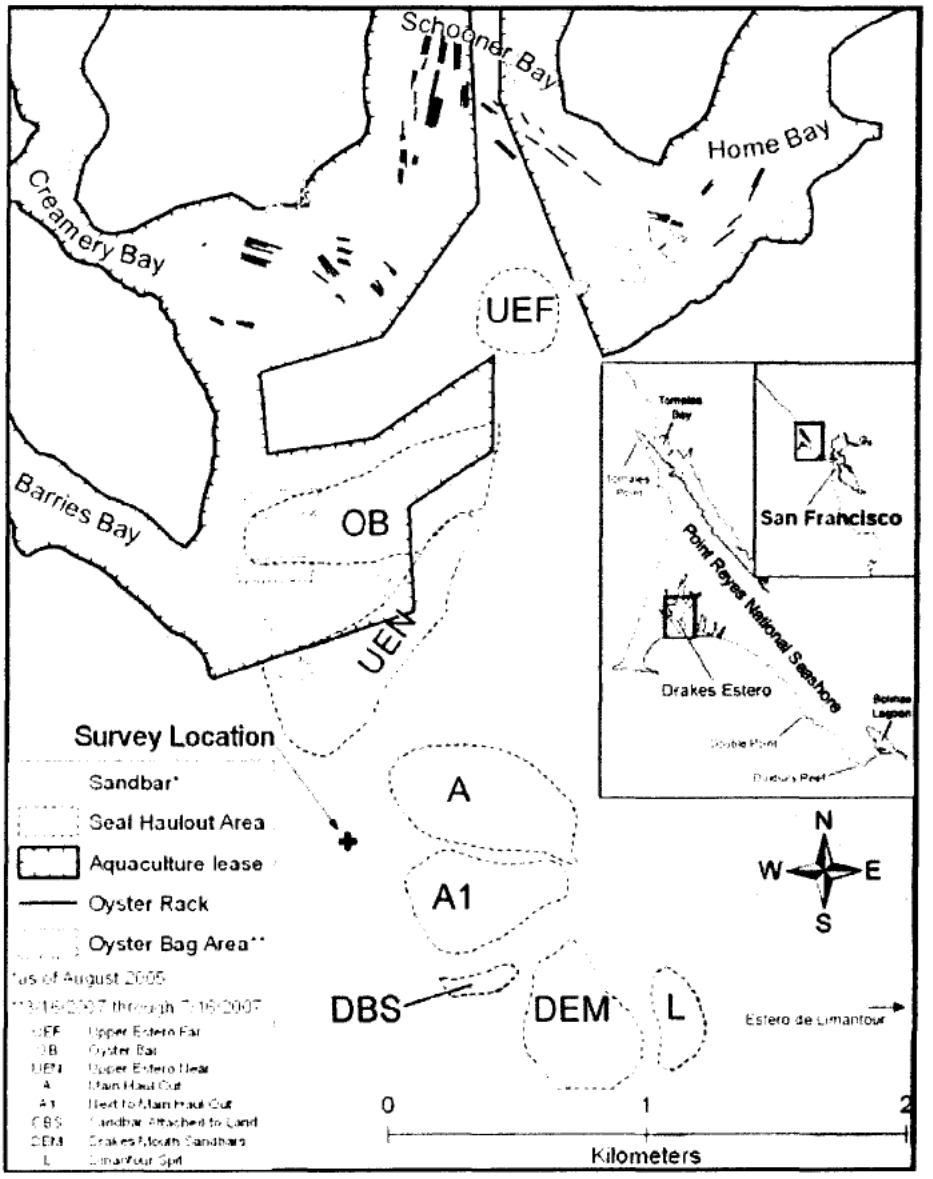

Figure 1. Oyster bag areas (mapped in spring of 2007), oyster racks, and the eight seal haul out subsites (*e.g.*, OB) in Drakes Estero. UEF, OB, and UEN are considered upper estero. Subsites A, A1, DBS, DEM, and L are in the middle-lower estero and not subject to disturbance from mariculture. All surveys were completed from the bluffs indicated by the "survey location" marker.

and 2005 (annual production <2 million oysters per year). Production then increased to about 3.5 million (~136,000 kg) oysters in 2006, and ~211,000 kg oysters for 2007 (Fig. 2A, B).[3,4]

[3]California Department of Fish and Game. 2007. Unpublished report on oyster landings in Drakes Estero from 1950 to 2006. Available from Tom Moore, CDFG Biologist, Bodega Bay, CA.

[4]Tom Moore, Biologist, California Department of Fish and Game, Presentation to the National Research Council Panel on Mariculture in Drakes Estero, 4 September 2008.

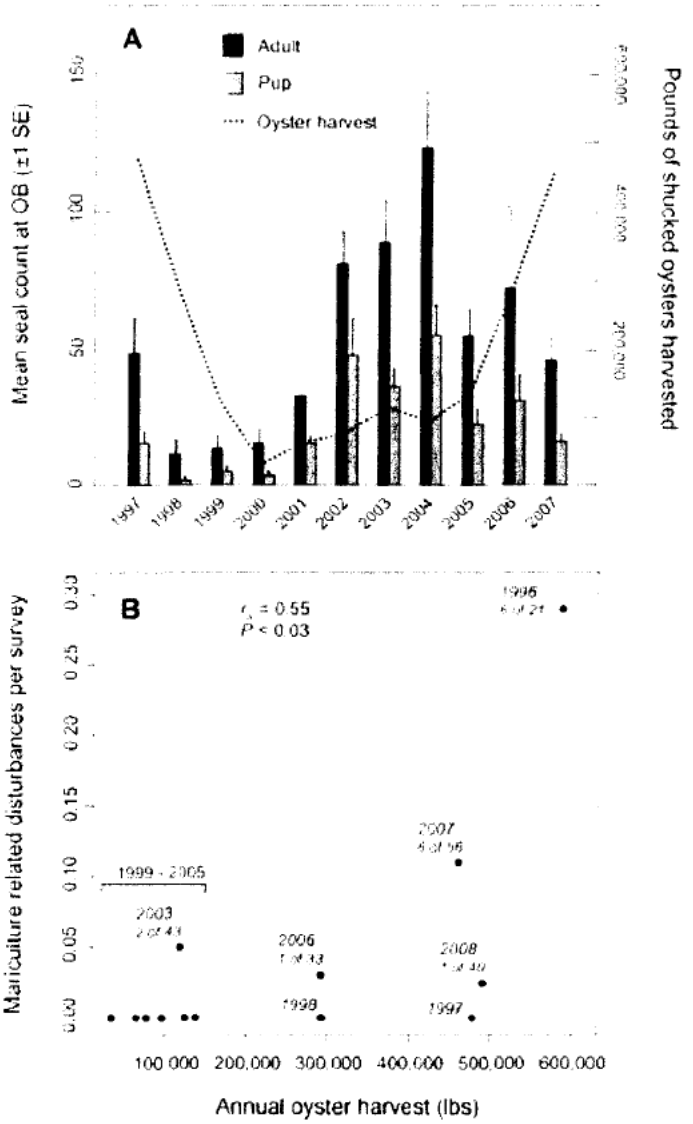

Figure 2. (A) Mean (±1 SE) counts of harbor seals at Drakes Estero subsite OB and oysters harvested from Drakes Estero during 1997–2007. The year 1998 was an El Niño year. (B) Relationship between annual oyster harvest and mariculture related disturbance rate from 1996 to 2008. Text adjacent to points indicates the year, the number of disturbances in that year, and the number of surveys. Between 37 and 50 surveys were conducted each year from 1997 to 2005. During 1997–1998, oyster harvest rate was rapidly declining which may have diminished some of the factors that lead to disturbance.

Surveys

The National Park Service (NPS) conducted surveys of harbor seals throughout the year from 1996 to 2007, but surveys were more frequent during breeding (1 March to 30 May) and molting (1 June to 1 August) seasons (two to four times per week, depending on weather). Trained volunteers and NPS staff conducted surveys at medium to low tides (below 2.5 ft [0.76 m]) during the day. Surveys were

not conducted in heavy fog or rain because of poor visibility. NPS data collection began in 1996 but we were not able to completely discern all subsite count data in that first year since a few subsites were grouped on some surveys. We therefore analyzed disturbance data from 1996 to 2008, and count data from 1997 to 2007.

Surveys were designed to capture the seasonal peak numbers at several of the Point Reyes seal colonies, including the Drakes Estero/Limantour colony, and to detect disturbances that might affect seasonal peak numbers at each colony. Survey periods lasted at least 2 h, with counts occurring every half-hour. Each subsite was surveyed separately, and added to other subsites to obtain a total count for the entire colony. All subsites were visible from one survey location. For each subsite, the observer recorded the total number of adult/immature seals, pups, and dead pups present. Because of the difficulty in distinguishing adult from immature seals, these two groups were combined. Pups were the young of the year and, after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only from 1 March to 1 June. Surveys were conducted with binoculars and a 40–50× monocular spotting scope from a bluff on the western edge of Drakes Estero (Fig. 1).

Disturbances of the seals were recorded during each survey, and within a survey, multiple disturbances could occur. We defined disturbance as any activity that elicited a reaction by the seals; which was either a head alert, a flush toward water, or flush into water. Disturbance rate (# disturbance events/# surveys during March–July of each year) was analyzed from 1996 to 2008 for the upper estero subsites and we tested for a correlation in mariculture related disturbance rate in relation to annual oyster harvest using a 1-tailed Spearman ranks test. We also used a non-parametric Wilcoxon rank test to see if oyster harvest differed in years with or without mariculture related disturbances. To be conservative, if two or more activities (*e.g.*, oyster boat and a kayak) appeared to cause a seal disturbance, the event was categorized as "non-oyster" related.

Data Preparation

We selected count data from Drakes Estero within the historical peak of the pupping season (15 April to 15 May) during 1997–2007. These data were then filtered to remove: (1) data from observers with less than 1 yr of survey experience, (2) observations at tide levels above +2 ft (+0.61 m) (MLW) when fewer seals would be present because some subsites might be submerged (Allen Miller 1988, Grigg *et al.* 2004), and (3) observation dates where weather reduced visibility. Tide level and tide time were standardized to the Golden Gate Bridge, San Francisco (PST). To ensure that variation in tide levels $\leq$ 2 ft (0.61 m) did not affect counts, we tested for correlations between tide level and counts at all of the eight subsites and found no relationships (Spearman ranks test, all $r_s < |0.24|$, $n = 104$). Temporal autocorrelation plots of means by year indicated no significant autocorrelations at any time lag (all $r < 0.5$). The data from all 104 surveys used in this analysis were checked for accuracy against the raw data forms and by comparing subsite data with the sum of counts from the full estero. Between 6 and 15 surveys (mean = 9.5 $\pm$ 2.9) were completed in each year during this period. We also graphically compared pupping season counts with the five other primary local harbor seal colonies within 30 km of Drakes Estero from 2000 to 2007 to provide a regional context.

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Analyses

We hypothesized that there could be four potential effects on counts at two of the subsites closest to the mariculture operation in the upper estero (OB and UEN): (1) year as a linear trend through time, (2) density-dependence, defined as total seal counts in the middle-lower estero away from mariculture operations (L, A, A1, DEM, DBS), (3) years since the last ENSO event (1991–1992 and 1997–1998; http://www.pmel.noaa.gov/tao/elnino/), and (4) mariculture activity measured as the weight of oysters harvested ($\times 10^5$ lbs) during the same year. We assumed that the oyster harvest variable represented the combined effects from boat traffic, human activity, and oyster bag placement that may displace or disturb seals. Candidate models included between one and three of the above factors; year and ENSO were not used in the same models since both represent time and they were correlated. Density-dependence data was limited to the middle-lower estero counts since the upper estero subsites were being modeled as dependent variables and including them would lead to lack of independence between independent and dependent variables. For example, if oyster harvest was impacting any of the upper estero subsite counts, then using those counts as independent variables in the model would lead to a lack of independence. This could result in using overlapping data in both the independent and dependent variables.

To investigate the robustness of the models to how density-dependence was calculated, we also investigated density-dependence effects on an annual (mean) basis (in addition to daily, as described above). Similarly, we also investigated modeling oyster harvest with a 1-yr time lag. Since time from oyster planting to harvest is about 18 mo, any effects due to harvest levels could potentially begin to be expressed sometime during the 18 mo prior to harvest (Pauley *et al.* 1988). However, in Drakes Estero, most oyster related activity occurs near seal haul-out sites OB and UEN for only 3–4 mo prior to harvest. Consequently, we focus on *same* year oyster harvest effects in the analyses and results. Lastly, we considered lowest tide height during the survey as an additional covariate. Linear mixed-effects models were also tested using ENSO as a random effect.

For analyses of total counts at subsites OB and UEN, we built generalized linear models (GLMs). Daily counts were overdispersed (*i.e.,* variance greater than the mean and increasing with the mean), and therefore, we used a negative binomial distribution to model the data (Venables and Ripley 2002, Insightful Corp. 2003, Crawley 2005) and ranked each model using Akaike's Information Criterion corrected for small sample sizes (AIC_c) (Burnham and Anderson 2002). Lower AIC_c values indicate a more parsimonious model that better explains the pattern in the data while penalizing the addition of trivial parameters. For the negative binomial distribution, we used a maximum likelihood estimation of θ (shape parameter for the negative binomial distribution) for both UEN and OB using the glm.nb function in S-Plus (GLM with negative binomial distribution) (Venables and Ripley 2002). These values (1.0 for OB and 1.6 for UEN) were subsequently used in all GLM models because θ must be kept constant to compare maximum likelihood (and hence AIC_c) between models using the same data set (Venables and Ripley 2002). We report the ΔAIC_c value, Akaike weights (w_i), and pseudo r^2 (Maddalla 1983) to present the level of confidence in each model.

To validate the best model at OB, we used the best fitting GLM model parameters to predict counts at UEF using a scaling parameter that divided the mean counts at UEF from 1997 to 2007 (26.4) by the mean counts at OB (83.6) for the same

period (ratio = 0.32). We then compared the predicted and actual counts at UEF for each year using a Pearson correlation. Lastly, we constructed a regression tree with the software program R to illustrate and test the interactions between independent variables (year, ENSO, density-dependence, and oyster harvest in the same year) on combined OB and UEF harbor seal counts. Statistical analyses were done with S-Plus 6.2 (Insightful Corp. 2003) or R 2.7.2 (R Development Core Team 2008) using the MASS library (Venables and Ripley 2002).

RESULTS

Seal attendance varied at all three upper Drakes Estero subsites from 1997 to 2007; however, the amount of change varied amongst the subsites. At subsite OB, both the maximum and mean counts for seals and pups were lower from 1998 to 2001, higher from 2002 to 2004, and then lower for 2005–2007. Oyster harvesting showed a U-shaped pattern, declining in the early part of the study period and increasing in 2005 (Fig. 2A).

Disturbance rates in the upper estero (subsites OB, UEF, UEN) significantly increased with oyster harvest ($r_s = 0.55$, $P < 0.03$) (Fig. 2B). This correlation is highly robust to sample size. For example, there was still a significant positive correlation ($r_s = 0.53$, $P < 0.04$) of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on 1 day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis. Similarly, oyster harvest levels in years with oyster related disturbances were significantly higher ($U = 43$, $n = 13$, $P_{1-\text{tail}} < 0.04$). Only one mariculture related disturbance was recorded in the middle-lower estero during the study. This was at subsite A in 2003 and was likely due to a state mandated water quality testing trip.

The best GLM model to explain seal counts at OB ($w_i = 0.65$) included years since ENSO and oyster harvest (Table 1). The coefficients indicated that seal counts had a positive relationship with years since ENSO and a negative relationship with oyster harvest (Table 2). The second ranked model (oyster + ENSO + density-dependence) was similar to the first model with the inclusion of density-dependence as a non-significant variable ($w_i = 0.32$). Thus, the top two models had a total w_i of 0.97 and consisted primarily of years since ENSO and oyster harvest. Pseudo r^2 was moderate (0.37–0.38) for these two best models and declined rapidly thereafter to <0.29 for the remaining models.

Predicted counts at UEF using the scaled best fit/lowest AIC_c model from OB fit well ($r = 0.66$, $P < 0.04$), strongly suggesting that similar processes (ENSO and oyster harvest) were driving the counts at both OB and UEF (Fig. 3A). In fact, all years except the highest oyster harvest years (1997, 2006, 2007) fit extremely well. The only significantly correlated ($P < 0.05$) variables were year and ENSO ($r_s = 0.89$), and ENSO and subsite OB counts ($r_s = 0.64$). Daily density-dependence was not correlated with counts at OB ($r_s = -0.12$), but mean annual density-dependence was using ranks tests ($r_s = 0.65$) but not Pearson tests ($r_p = 0.43$, $P > 0.18$).

Using density-dependence as an annual mean rather than a daily value and/or oyster harvest with a 1-yr lag effect still resulted in oyster harvest (with a significant negative coefficient) being included in all of the best (lowest AIC_c/highest r^2) models at OB. For example, if considering density-dependence on an *annual* mean basis (not shown in tables) the best model included density-dependence, ENSO and oyster

Table 1. Ranking of candidate models at subsites OB and UEN by AIC_c and Akaike weights (w_i). The dependent variable is the count of total seals at subsite OB and independent variables are year as linear trend (Year), density-dependence (DenDep: daily sum of seals in the middle-lower estero), years since last El Niño event (ENSO), and lbs of oysters harvested in the same year (Oyst). Column headings are: small sample AIC (AIC_c), distance from best model (Δ_i), and Akaike weight (w_i); $n = 104$ for all models.

Model	AIC_c	Δ_i	w_i	r^2
Subsite OB				
Oyst + ENSO	332.96	0.00	0.65	0.37
Oyst + ENSO + DenDep	334.38	1.42	0.32	0.38
ENSO	340.36	7.40	0.02	0.25
ENSO + DenDep	340.70	7.74	0.01	0.28
Year	344.90	16.53	0.00	0.19
DenDep	353.16	20.20	0.00	0.07
Oyst	353.22	20.26	0.00	0.05
Oyst + DenDep	353.42	20.47	0.00	0.11
Null	353.68	20.72	0.00	0.05
Subsite UEN				
Oyst + ENSO	320.19	0.00	0.41	0.16
Year	321.68	1.49	0.20	0.10
Oyst + ENSO + DenDep	322.34	2.15	0.14	0.16
ENSO + DenDep	322.66	2.47	0.12	0.12
ENSO	323.20	3.01	0.09	0.11
Null	326.10	5.90	0.02	0.00
DenDep	327.66	7.47	0.01	0.01
Oyst	328.22	8.02	0.01	0.00
Oyst + DenDep	329.81	9.61	0.00	0.01

Table 2. Coefficients of the best two AIC_c ranked models for OB and UEN from Table 1. w_i is Akaike weight. Asterisk indicates coefficient is significant at $P < 0.05$.

Subsite: Model	Coefficient	Standard error	t	$P < 0.05$
Subsite OB				
Model 1 ($w_i = 0.65$)				
Constant	3.530	0.185	19.099	*
Oyst	−0.240	0.063	−3.821	*
ENSO	0.261	0.035	7.563	*
Model 2 ($w_i = 0.32$)				
Constant	3.269	0.366	8.928	*
Oyst	−0.229	0.066	−3.447	*
ENSO	0.251	0.036	6.911	*
Density-dependence	0.001	0.001	0.914	
Subsite UEN				
Model 1 ($w_i = 0.41$)				
Constant	4.720	0.117	40.292	*
Oyst	−0.105	0.040	−2.631	*
ENSO	0.119	0.022	5.436	*
Model 2 ($w_i = 0.20$)				
Constant	−140.463	36.041	−3.897	*
Year	0.073	0.018	4.038	*

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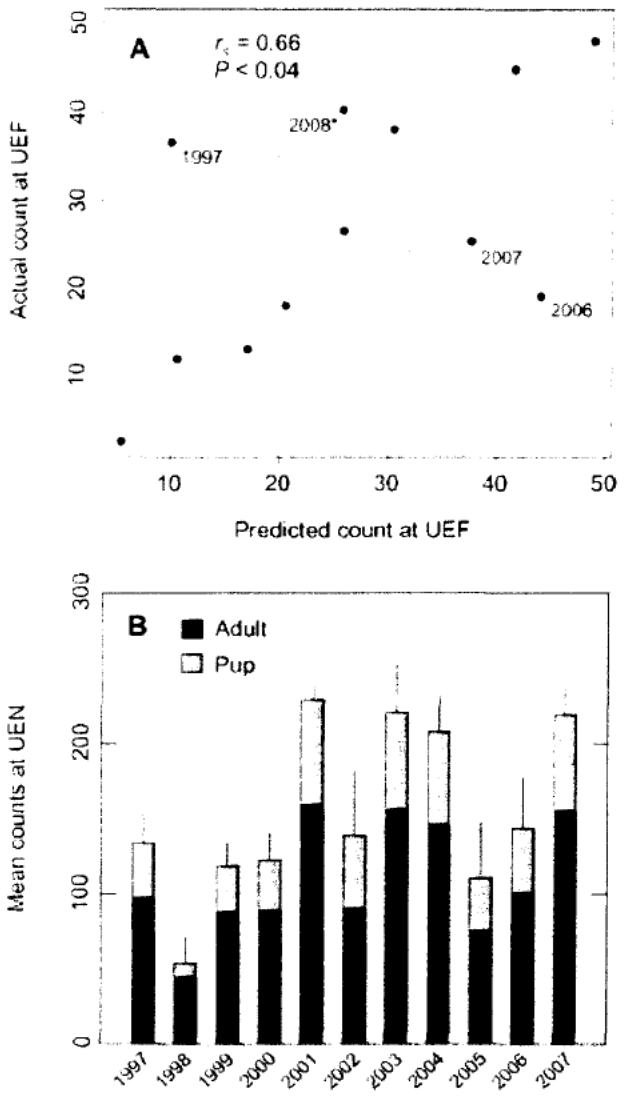

Figure 3. (A) Predicted and actual (from the best fitting GLM at OB) mean counts of pups and adults from 1997 to 2007 at subsite UEF. The 2008 data point is not derived from the model (it is actual data) or used in the correlation test. It is only shown to illustrate that seals in 2008 appear to be returning to more normal covariation between OB and UEF. (B) Mean seal counts from 1997 to 2007 at subsite UEN during the 15 April–15 May pupping season. Error bars represent the standard error for the total count.

harvest (same year) all as significant ($P < 0.004$) variables and oyster harvest still had a negative coefficient similar to that in Table 2. However, removing oyster harvest from the model increased AIC by ~6.7, indicating that failing to consider oyster harvest results in a model with much lower confidence (Burnham and Anderson 2002). Tide height effects were not important in any models and did not appear in the highest-ranking models. Linear mixed-effects models (termed non-nested or

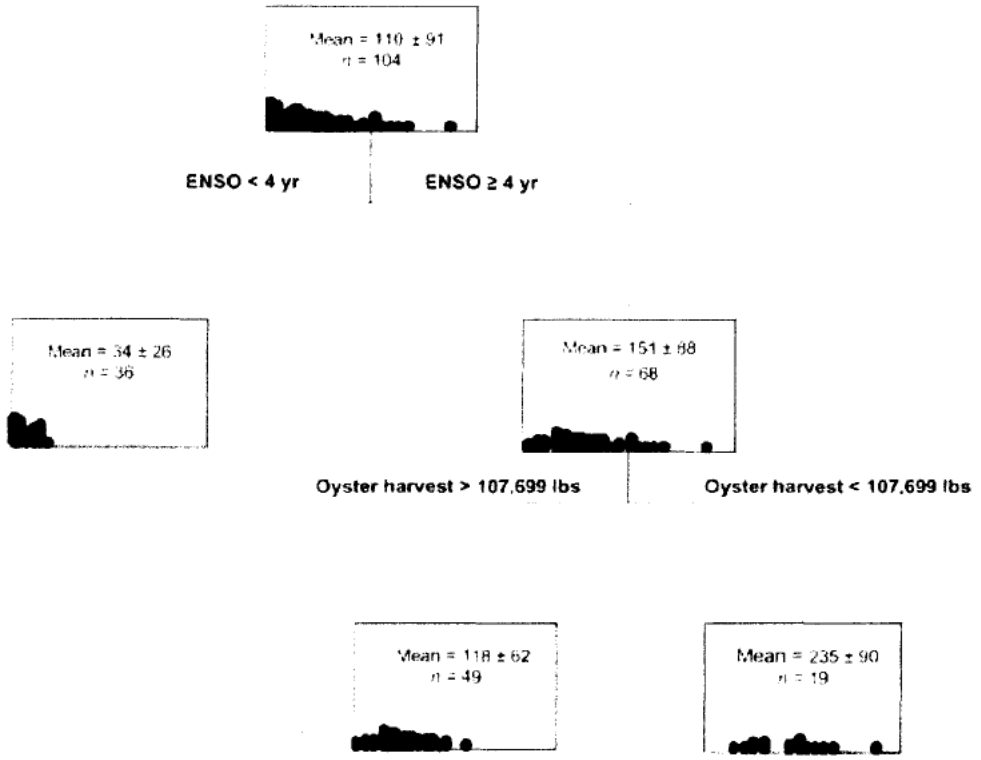

Figure 4. Regression tree illustrating how ENSO and oyster harvest interact to best explain seal counts at subsites UEF and OB. The number of seals for each survey is represented by a dot histogram along the x-axis in each box, with points at the origin indicating a zero count and points to the right of the box indicating larger counts. This model agrees closely with the GLM results in Table 1.

crossed random effects) (Faraway 2006) using ENSO as a random factor also resulted in a significant negative oyster harvest coefficient. Model results were also not affected by including components for temporal autocorrelation. Residual plots for the GLMs showed no issues with homoscedasticity or increasing variance.

Models for subsite UEN, which is farther from the oyster operations, all had poorer fit than OB (all pseudo $r^2 < 0.17$), but oyster harvest and ENSO were once again in the best (lowest AIC_c) model with an Akaike weight of 0.41 (Fig. 3B, Table 1). However, the model containing only year as an explanatory variable ranked second and had an Akaike weight of 0.20, which partially reduces our confidence in the top model.

The regression tree for counts at OB and UEF combined also confirmed the patterns found by the GLMs. ENSO explained much of the variation, and an increase in oyster harvest explained the significantly lower counts (from 255 ± 90 seals down to 118 ± 62) once ENSO effects had subsided (Fig. 4). The tree was grown until additional nodes had a negligible (<5%) additional reduction in model deviance. Residual plots of the regression tree model indicated that the model was sound.

Five other colonies in the region showed a different pattern than Drakes Estero subsites UEF, UEN, and OB, as well as Drakes Estero as a whole (Fig. 5). Bolinas

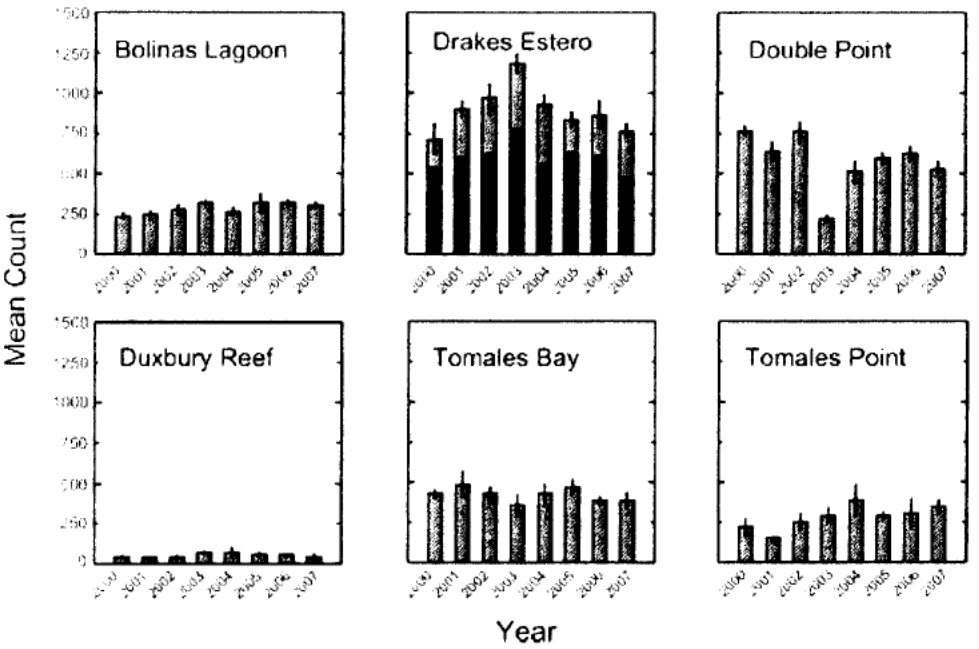

Figure 5. Mean (±1 SE) counts of pups and adults during the pupping season (15 April–15 May) from 2000 to 2007 at Drakes Estero and five regional sites within 30 km. Dark bars on the Drakes Estero panel represent only the middle-lower estero counts used for calculating density-dependence in the GLM and regression tree models.

Lagoon, Tomales Bay, and Duxbury Reef showed stable populations during the time series. The Double Point colony suffered from an aggressive male elephant seal (*Mirounga augustirostrus*) in 2003 that killed approximately 40 (mostly female) and chronically harassed hundreds of harbor seals throughout the breeding season. Coincidentally, the Drakes Estero colony had an abrupt peak in 2003, possibly due to movement of some of the seals from Double Point. The Tomales Point colony showed a small increase over time. Finally, middle-lower Drakes Estero counts (used to analyze density-dependence in this paper: subsites A, A1, DEM, DBS, and L) were relatively stable from 2000 to 2006, and similar to the entire estero, had a 1-yr peak in 2003 that may have been related to the displaced seals from nearby Double Point, and then a small decline in 2007.

Discussion

Pinnipeds, and harbor seals in particular, are vulnerable to human disturbance at haul-out sites where they rest, molt, and raise their young (Kenyon 1972, Allen *et al.* 1984, Suryan and Harvey 1999, Grigg *et al.* 2002, Perry *et al.* 2002, Seuront and Prinzivalli 2005). Determining the level of effect from human activities, though, is difficult because of confounding factors such as environmental variables and multiple disturbance sources. Additionally, many studies are of short duration, focusing on short-term issues, and do not account for factors such as density-dependence on

long-term trends of populations (Grigg *et al.* 2002, Perry *et al.* 2002, Johnson and Acevedo-Gutierrez 2007).

This study illustrates the utility of concurrently modeling anthropogenic and environmental factors using *a priori* hypotheses and information-theoretic (*i.e.*, AIC) model selection to explain observed patterns in wildlife counts. Here, we provide evidence that from 1997 to 2007 seal counts at Drakes Estero subsites OB and UEF increased after the last ENSO and then declined with an increase in mariculture activities around 2005. The strong ENSO in 1998 had widespread ramifications for many upper trophic level predators in the California current, and in harbor seals, who may forego breeding and pupping in years of low available forage while spending more time foraging (Trillmich and Ono 1991, Sydeman and Allen 1999, Benson *et al.* 2002, Grigg *et al.* 2004, Lee *et al.* 2007). The upper estero subsites were used mainly for pupping and molting because they are islands, and therefore generally have lower human and natural disturbance rates.

Mariculture operations likely began increasing by 2005 to generate the increases in harvesting seen in 2006 and 2007, as time from oyster planting to harvest is typically around 18 mo in Drakes Estero, with the latter 3–4 mo being in areas closer to seal haul-out sites OB and UEF. This is consistent with observations that there was little or no oyster equipment (*e.g.*, bags) near the OB sandbars from the summer of 2002 to the summer of 2004 (DTP, unpublished data). Also, aerial imagery from August of 2005 showed oyster bags on the west end of sandbar OB. By April 2007, there were extensive oyster equipment arrays and bags in this area (Fig. 1). The disturbance data and oyster landings (Fig. 2B, Table 1) suggest that increasing mariculture activities resulted in some combination of increased disturbance from boat traffic, human presence on sand bars, and/or physical displacement of seals from the sandbars by oyster growing equipment. While disturbance would likely occur primarily at low tides when seals were hauled out, surveys that count seals and record disturbance events were only completed during a small fraction of the year (typically <50 d per year, each survey 2–4 h), so all types of disturbance were likely underestimated here. Studies from Washington found that disturbance events that flush seals into the water only resulted in a return to previous numbers 39% of the time (Suryan and Harvey 1999), and results from nearby Bolinas Lagoon were similar (Allen *et al.* 1984). Other studies have indicated that females with pups may be more vigilant and sensitive to disturbance, and this also may have contributed to the sharp decline of seals at the subsite (OB) in Drakes Estero where mostly females and pups occurred (Stein 1989, Suryan and Harvey 1999, Lucas and Stobo 2000). Such disturbance events in Drakes Estero at OB and UEF appear to have produced effects that were detectable during the entire pupping season via reduced seal counts. However, simple displacement due to mariculture activities or equipment without actual direct disturbance events may equally be driving the patterns observed at OB and UEF.

The similar count pattern and good model fit observed at subsite UEF (Fig. 3A) suggests that the same factors were driving counts at both OB and UEF. However, the predictive model also showed that the subsites appeared to decouple when oyster harvest was high (1997, 2006, 2007, and perhaps 2008). This suggests that UEF and OB covary strongly in the absence of high oyster harvest levels. Conversely, it appears that when oyster harvest was high, the subsites (OB and UEF) fell out of sync due to mariculture related disturbance or displacement events. Curiously, there is no consistent directionality in this decoupling pattern (Fig. 3A). Alternatively, this decoupling could be related to poorer model fit at the beginning and end of the

time series, but because time (year) was not a variable selected or used in the model, this seems unlikely.

Counts at subsite UEN, which is slightly further away from mariculture operations, nonetheless showed a significant, but muted response to ENSO and oyster harvesting. While several other subsites in the estero vary with changes in sandbar morphology, disturbance, predators, and other environmental factors, subsites OB and UEF (and UEN) suffered no such physical changes other than an increase in nearby mariculture use. The generally poor fit for all of the UEN models suggests that other unmodeled factors (including interactions among subsites) may affect counts there more than ENSO, density-dependence, or oyster harvest. Additional processes that might influence the seal counts at UEN include: (1) seals are typically farther from oyster operations than those at OB and UEF and thus less susceptible to disturbance, and/or (2) some seals may have moved from OB or UEF to UEN upon being displaced by oyster operations. Distance from a disturbance source has often been documented as contributing to whether seals respond to a human activity (Allen *et al.* 1984, Suryan and Harvey 1999, Johnson and Acevedo-Gutierrez 2007). Furthermore, changes in sandbar morphology in the middle-lower estero, might also have affected counts in the upper estero because of redistribution of seals. For example, counts at subsite A in the middle estero (Fig. 1) declined dramatically from 2004 to 2007, due to a naturally shifting sandbar that allowed predator (coyote, *Canis latrans*) access to the site. The displaced seals appeared to move to other subsites in the estero (*e.g.*, subsite A1 increased dramatically as A declined), and this process may have also had a confounding impact on the counts at UEN. Clearly, the variation at UEN is not very well explained by our candidate models and unknown processes such as interactions among subsites in the estero may be partially driving counts there. Additionally, variation in tidal height should not affect the counts since all surveys were conducted at low tides, and multiple counts were conducted during each survey, with only the highest count recorded and analyzed here.

Modeling density-dependence should also control for larger scale regional impacts such as the poorly understood oceanographic anomalies in the California Current reported in 2005 and 2006 that depressed food for many seabirds (Barth *et al.* 2007). For example, if ocean conditions depressed seal density in Drakes Estero and this in turn caused less use of OB or UEF due to density-dependent effects, then density-dependence should have presented a better (more parsimonious) explanation of the data than "ENSO" and "Oyster" (Table 1). This would similarly address any covariation of counts in Drakes Estero compared to other harbor seal haul-out sites in north-central California due to unexplained interannual variation (Fig. 5). While mean total harbor seal counts in all of Drakes Estero increased from 2000 to 2003 (from ~700 to 1,200 individuals), and then declined from 2003 to 2007 (back down to ~750 individuals), ENSO and oyster harvesting still explained the data much better than density-dependence (Table 1, 2). This is likely because the middle-lower estero counts were somewhat more stable (Fig. 5). The 1-yr spike in 2003 was likely due to displaced seals from Double Point moving to Drakes Estero. There was also a small, unexplained decline in 2007.

The significant decline in adults and pups at OB after 2004 suggests that oyster harvesting influenced these numbers; however, the GLM models were fit to actual data, so it would be inappropriate to predict if seals at OB would have continued to increase or asymptote after 2004 in the absence of increasing oyster harvesting. In fact, a square-root (diminishing effects) transformation for ENSO may have also

been a reasonable *a priori* test. Nonetheless, while long-term studies in Washington and Oregon noted density-dependence effects at harbor seal colonies (Brown *et al.* 2005, Jeffries *et al.* 2005), the data for subsite OB in Drakes Estero were most consistent with the hypothesis that a significant portion of the reduced seal count during 2005–2007 was related to the increase in oyster harvesting.

Further evidence for the negative effect of oyster harvest levels on counts at subsites OB and UEF comes from the limited data available for 1996. These counts were not used in the GLM or tree models due to incomplete data; however, five surveys during the peak pupping season showed a mean count for OB of only 47 ± 39 (similar to 1997, 2005, and 2007) during the highest oyster harvest year (587,000 lbs) and the highest disturbance rate during the study (Fig. 2B).

The 2008 pupping season presented an opportunity to investigate the immediate effect of a change in oyster operations. In 2008, the California Coastal Commission (CCC) imposed a seal protection zone that restricted some use of the lateral channel adjacent to OB by oyster boats during the pupping season. Thus, boat use in the lateral channel in 2008 may have been curtailed from use levels during 2005–2007, and concurrently, mean counts at OB increased from about 61 ± 10 (SE) in 2007 to 81 ± 12 in 2008 despite a nominal increase in oyster harvest, from 466,000 lbs in 2007 to a projected 493,000 lbs in 2008. The restriction of oyster operations also coincided with one mariculture related disturbance detected in the upper estero in 2008 (*vs.* six in 2007) (Fig. 2B), suggesting that conditions that previously reduced pupping season seal counts may have partially abated due to CCC restrictions.

We therefore suggest that an adaptive management approach for oyster operations be investigated since apparently reducing activity in the area close to seals may have had immediate positive effects. This also suggests that while oyster harvest was a good proxy for impacts on seal counts in the upper estero for 1997–2007, changes in operations such as those experienced in 2008 may make the oyster harvest proxy less useful in the future. For this reason, it is not appropriate to include the 2008 data in the models because of this large change in management.

In conclusion, patterns observed in Drakes Estero at upper estero subsites OB and UEF (and potentially UEN) are best explained by ENSO and increased disturbance from oyster harvest activities. The ability of the OB model to predict counts at subsite UEF suggests that similar processes are occurring at both subsites and that the modeling techniques are robust. The results of this study also contribute to a limited body of literature on the potential negative effects of mariculture on marine mammals. Watson-Capps and Mann (2005) found that oyster operations in coastal waters off Australia reduced use by bottlenose dolphins (*Tursiops* sp.) even though the facility had open areas that presumably would allow dolphins to pass. Such conflicts may increase in the future if mariculture replaces wild ocean harvesting due to the worldwide decline in wild fish stocks (Worm *et al.* 2006).

This study illustrates the benefits of long-term studies for understanding multiple anthropogenic and environmental factors that can affect pinniped populations and productivity (Richardson *et al.* 1995, Thompson *et al.* 2001). It also demonstrates how chronic disturbance activities, in this case associated with a mariculture operation, can lead to displacement of seals at haul-out sites, resulting in animals either shifting to alternate subsites or leaving the area. Kenyon (1972) noted for the monk seal (*Monachus schauinslandi*) that such losses likely led to net population losses because of the lack of suitable breeding habitat. If harbor seals in the region are at environmental carrying capacity, then loss of pupping sites within Drakes Estero also might conceivably lead to population loss. Finally, our results suggest that an

important part of managing for protection of pinnipeds may be to provide a higher level of protection around breeding habitat which is not currently protected under the U.S. Marine Mammal Protection Act (www.nmfs.noaa.gov/pr/laws/mmpa).

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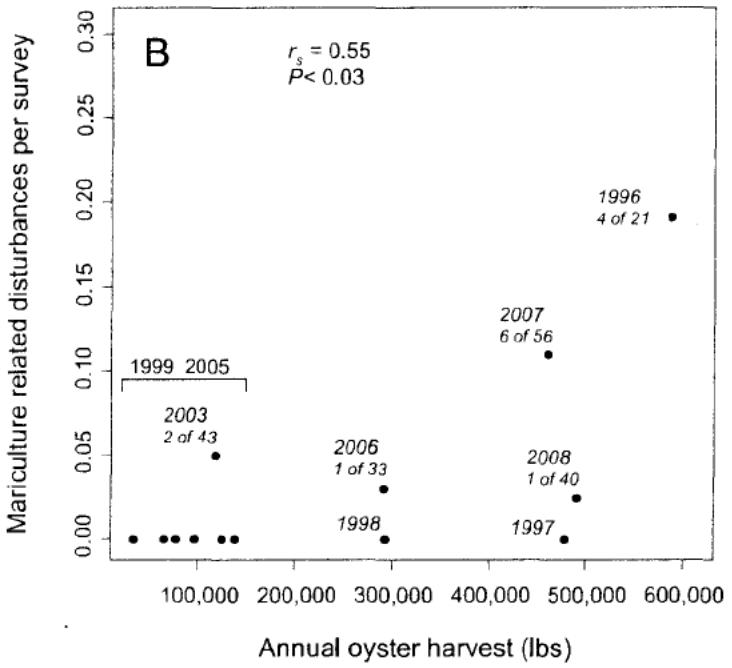
Corrigendum

In our recent article, "Modeling the effects of El Niño, density-dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997–2007," Marine Mammal Science 25:1–18, we have become aware of one minor enumeration error. The error was due to accidentally classifying two *potential* seal disturbances as *actual* disturbances. This error does not affect our statistics, results, or conclusions. We present an updated Figure 2B that reflects four disturbances in 1996, rather than six as reported in the original article.



The statistical results are unchanged because 1996 is still the year with the highest overall disturbance rate. This error also requires a correction in the Results section (p. 8), middle of the second paragraph (lines 6–7 of the paragraph) that should read: "...and two of the 1996 disturbances (seven total) from the analysis."

Additionally, on page 15, the California Coastal Commission "reaffirmed (with some modifications)" rather than "imposed" a seal protection zone in 2008.

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RE: **National Park Service Special Use Permit Application by Drakes Bay Oyster Company for Aquaculture Operations in Drakes Estero, Point Reyes National Seashore**

Dear Addressees:

This letter responds to the December 1, 2010, letter from Drakes Bay Oyster Company (DBOC) to the National Oceanic and Atmospheric Administration (NOAA) and Office of Ocean and Coastal Resource Management (OCRM) and its supporting attachment from Dr. Corey Goodman dated November 23, 2010. These two documents contain a variety of assertions regarding the legal, procedural, and scientific merits of the California Coastal Commission's (Commission) November 10, 2010 request to obtain permission from OCRM to proceed with federal consistency review of a proposed ten year authorization for commercial shellfish aquaculture operations in the Drakes Estero portion of the Point Reyes National Seashore. While many of these assertions are not relevant to OCRM's consideration of the Commission's request, for the sake of factual accuracy, we have made an effort to respond to each of the points raised in these documents. Several of these responses are included below and the remainders are provided in a supplementary attachment to this letter.

DBOC's letter obscures the only issue before OCRM at this time, which is whether the coastal effects of DBOC's proposed activity are reasonably foreseeable. The CZMA's implementing regulations state that "[t]he sole basis for the Director's approval or disapproval of the State agency's request will relate to whether the proposed activity's coastal effects are reasonably foreseeable." 15 C.F.R. § 930.54(c) (emphasis added). Nothing in PL 111-88 changes or supersedes this requirement. Public Law 111-88 is aimed solely at clarifying the scope of the Secretary of Interior's (Secretary) authority and does not address OCRM's authority under the CZMA. Even if DBOC is correct that PL 111-88 would allow the Secretary to issue an SUP

over an objection to DBOC's consistency certification, that is an issue for the Secretary, Commission and DBOC to address if such a circumstance arises. At least two things would need to happen for this to even be an issue: the Commission would need to object to DBOC's consistency certification, and the Secretary would need to exercise his discretion to issue an SUP. It is pure speculation at this time whether either of these events would occur, and the potential for such an outcome is not a sufficient basis on which to ignore the regulatory language laying out the sole basis for OCRM's decision regarding the Commission's request.

With regard to the substance of OCRM's review, as discussed in more detail below, the evidence clearly shows that DBOC's current operations have coastal effects,[1] so it is reasonably foreseeable that new authorization for DBOC to engage in ten years of commercial shellfish mariculture operations will have coastal effects. Even the primary report on which DBOC relies, *Shellfish Mariculture in Drake's Estero, Point Reyes National Seashore, California*, acknowledges these effects. It states: "[o]yster mariculture necessarily has ecological consequences in Drake's Estero."[2] (emphasis added). This report, and others discussed below and in the attachment, show that DBOC's activities currently have coastal effects. Thus, under the relevant federal regulations, NOAA should approve the Commission's request to perform federal consistency review in this case because coastal effects from the new proposed ten year authorization are reasonably foreseeable.

Scientific Basis for Commission Request

As noted in both the Commission and DBOC letters, the standard of review for OCRM's consideration of the Commission's request and the foundation upon which the Commission's request is based, relates to "whether the proposed activity's coastal effects are reasonably foreseeable.[3]" In this case, the proposed activity is a new authorization for shellfish mariculture in Drakes Estero for ten years, beginning on November 30, 2012. As noted repeatedly by the DBOC letter and Goodman attachment, the report titled *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California,* produced by the National Research Council's Committee on Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drakes Estero, provides a wealth of information regarding the current DBOC commercial mariculture operation. Commission staff did not reference or cite this report in our November 10, 2010, request letter because we made an effort to base that letter on peer-reviewed, primary source materials as much as possible. With the exception of a few references to more general reports and memoranda that provide a summary of some relevant papers and studies, the 50+ citations included in our previous letter are predominately to direct scientific research and journal publications. We readily acknowledge that the National Research Council (NRC) report contains pertinent discussions that OCRM may wish to draw upon in its consideration of the

[1] The California Coastal Management Program, most notably, the enforceable policies of Chapter Three of the California Coastal Act, establishes a standard for the determination of coastal effects. Several of these policies require protection of marine resources, habitat, and water quality. Pub. Res. Code §§ 30230 and 30231.

[2] National Research Council, 2009. *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California.* National Academies of Science, 139 pp. Page 2.

[3] 15 C.F.R. § 930.54(c).

Commission's request. We have therefore attached to this letter the 70 initial pages of this report that were omitted from the excerpt included with DBOC's letter.[4] These initial sections of the report provide a much more detailed and thorough discussion of the ecological implications of shellfish mariculture in Drakes Estero than the selective summary included with DBOC's recent letter, and in many cases, the complete discussion more appropriately describes the current, potential, and foreseeable coastal effects resulting from DBOC's operation. Although we have concerns regarding some of the assumptions underlying portions of the NRC report's analysis and conclusions, as discussed further below and in the attachment to this letter, we fully support many of the report's findings and have provided in the body of this letter a discussion of the NRC report as it relates to the Commission's request.

One of the more relevant findings to the question of whether coastal effects are reasonably foreseeable from a new, ten year authorization of DBOC's operation is included in a primary opening statement of the NRC report:

> *Oyster mariculture necessarily has ecological consequences in Drakes Estero as in other lagoons and estuaries, the magnitude and significance of which vary with the intensity of the culturing operation. These effects derive from two different sources: the presence of and biological activity of the oysters, and the activities of the culturists.*[5]

This concept is described further in another more recent report published by the National Academy of Sciences (NAS) in 2010, titled, *Ecosystem Concepts for Sustainable Bivalve Mariculture*, which states in its introduction that "[c]ulturing of suspension-feeding bivalves has effects on the plants, animals, biogeochemical processes, food webs, and habitats of estuarine and coastal ocean ecosystems."[6] This 2010 NAS report also includes a table listing the potential problems and resulting impacts associated with bivalve mariculture, most of which are noted and discussed in the Commission's November 10, 2010, request letter to OCRM. An excerpt of this table is included below:

Potential Problem	*Impact*
Excessive localized organic loading to sediments via biodeposits from bivalve mariculture	*Low oxygen (hypoxia) in sediments and loss of benthic biota*
Decreased planktonic biomass by overstocking	*Shift planktonic composition; reduce turbidity allowing greater light penetration*

[4] The entire report may be found online: http://www.mmc.gov/drakes_estero/pdfs/nas_shellfish_mariculture.pdf

[5] National Research Council, 2009. *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California*. National Academies of Science, 139 pp. Page 2.

[6] Committee on Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drakes Estero, Pt. Reyes National Seashore, California. 2010. *Ecosystem Concepts for Sustainable Bivalve Mariculture*, National Academies of Science. 180 pp. Page 4

	and hence more benthic plant production; deprive native suspension feeders of food
...	...
Introduction and transmission of disease organisms	*Large losses of cultured bivalves; transmission of disease to native species with possible biodiversity losses and reduction in wild stocks of bivalves*
Establishment of breeding populations of nonnative bivalves introduced through culture	*Loss of native biodiversity resulting from competition, predation, and habitat modification*
Spread of nonnative species associated with mariculture	*Loss of native biodiversity resulting from competition, predation, and habitat modification*
Overfishing, depleted stocks, and habitat degradation and loss	*Reduction in seafood supply* *Food web changes and biodiversity loss*
Displacement of native species and/or Predation on cultured stock	*Disturbance of birds, marine mammals, and marine turtles*
...	...[7]

In other words, the commercial shellfish mariculture operation in Drakes Estero, by its very nature, currently has actual and potential coastal effects. It is therefore clear that these effects would be "reasonably foreseeable" if a new ten year Special Use Permit were issued to DBOC, as proposed.

Harbor Seals

As noted in the NRC report, "[t]he activities of the oyster culturists can disturb wildlife such as harbor seals, which are of particular concern because they use the estero for resting, mating, pupping, suckling, molting, foraging, and sheltering from oceanic predators."[8] This statement closely matches the conclusion reached by Commission staff in the Commission request letter to OCRM, which states: "Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population." In this letter, Commission staff also notes that:

> *For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal*

[7] Ibid. Pages 6-8.

[8] National Research Council, 2009. *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California.* National Academies of Science, 139 pp. Page 3.

> *haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water.*[9]

The detailed discussion on page 49 of the NRC report also closely matches this conclusion reached by Commission staff. It states, in part:

> *Some oyster rack and oyster bag areas within Drakes Estero are located within 500 m of sand flats used by harbor seals as haul-out sites. Based upon the findings in the studies outlined above and the informal observations of biologists who study seals, visits to these areas by oyster farm workers can be expected to lead to the short-term disturbance of any seals using these haul-out areas at the time. Depending on visibility and wind conditions, disturbance may also occur at greater distances. Furthermore, the work by Brasseur and Reijnders (2001) suggests that seals could be disturbed before they come ashore if boats pass through haul-out areas at high tide.* (emphasis added)[10]

The Goodman attachment specifically questioned these exact conclusions made by Commission staff, despite their support in the NRC report. Goodman used these conclusions as examples to support his allegations of "false claims against DBOC" and "false science" that is being spread by the Commission. Clearly, these allegations are unwarranted and inappropriate, as the conclusions drawn by Commission staff are the same as those in the report on which Goodman relies. Goodman also went on to call into question the Commission staff's reference to Becker et al. (2009), alleging that "Becker et al., 2009, your citation #49, is seriously flawed."[11] Commission staff notes that Becker et al. (2009) has undergone both an internal and external peer review process as well as an extensive evaluation in the NRC report, none of which has suggested that this scientific publication is seriously flawed. Further, similar to the discussion included in our supplementary attachment to this letter regarding the NPS report, *Drakes Estero: A Sheltered Wilderness Estuary*, though aspects of Becker et al. (2009) have been debated, none of this debate has focused on the aspect of this publication that is relevant to its citation by Commission staff, namely, the potential for human activities in close proximity to hauled-out marine mammals to result in disturbances to these animals.

Eelgrass

In our request letter to OCRM of November 10, 2010, Commission staff details many of the ecological functions of eelgrass meadows as a means of demonstrating the importance of this coastal resource. Our letter also describes several ways in which the current shellfish mariculture operation appears to be affecting eelgrass in Drakes Estero. The Commission has long considered the potential or actual loss, disturbance, removal, and/or degradation of eelgrass

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[9] Becker, B.H., D.T. Press, S.G. Allen. 2009. Modeling the effects of El Nino, density dependence, and disturbance on harbor seals (*Phoca vitulina*) counts in Drakes Estero population, California: 1997-2007. Marine Mammal Science, 25(1): 1-18. 19 pp.

[10] National Research Council, 2009. *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California.* National Academies of Science, 139 pp. Page 49.

[11] Goodman, C. Letter to Executive Director of the California Coastal Commission, November 23, 2010. Page 6.

and eelgrass habitat to be coastal effects. As noted in our letter, coastal effects to eelgrass appear to be resulting from the current DBOC operation, and a variety of first-hand observations, photographic documentation, and scientific research supports this conclusion. These effects appear to have resulted from three main factors: (1) the operation of outboard motor driven vessels in eelgrass meadows; (2) shading from oyster racks and hanging culture; and (3) habitat loss and displacement resulting from the presence of mariculture structures, equipment, and debris in eelgrass habitat. Because a new ten year authorization of commercial shellfish mariculture activities in Drakes Estero would involve the continuation of all three of these factors, Commission staff finds coastal effects to eelgrass to be reasonably foreseeable from the proposed activity.

Contrary to Dr. Goodman's allegations that Commission staff's eelgrass discussion (summarized above) represents "false science" that was "refuted by the [NRC] report in 2009," [12] we find the actual observations and conclusions of the NRC report to completely support the analysis included in our letter. For example, with regard to the disturbance and loss of eelgrass from motorized vessels, the NRC report notes:

> *A secondary impact to eelgrass arises from damage by boat propellers; scars or disturbance tracks are visually documented in aerial photos of Drakes Estero (total area with scars loosely quantified to be about 50 acres; NPS GIS Map, July 27, 2007). The committee infers that these scars were caused by DBOC boats because the scars are located near the site of rack deployment and are aligned in the direction that leads from or to those racks. In addition, all other motorboats were excluded from Drakes Estero upon passage of the Point Reyes Wilderness Act of 1976. This photograph was thus taken in 2007 and is therefore indicative of current impacts of mariculture boating activities.* [13]

In other words, the NRC report found that in 2007, the DBOC mariculture operation disturbed roughly 50 acres of eelgrass and that this disturbance is "indicative of current impact of mariculture boating activities."[14] This is clearly evidence of a current coastal effect of the current DBOC operation.

With regard to shading effects of the mariculture equipment on eelgrass habitat, the NRC report again supports Commission staff's discussion:

> *Perhaps the most relevant to off-bottom rack-and-line culture—the dominant form of oyster culture in Drakes Estero—is work conducted by Everett et al. (1995) in Coos Bay, Oregon. This study demonstrated complete absence of eelgrass directly under oyster racks and lines, presumably due to shading and sediment erosion (10–15 cm at the base of the structure). The absence of eelgrass immediately beneath racks in Drakes Estero (as*

[12] Goodman, C. Letter to Executive Director of the California Coastal Commission, November 23, 2010. Page 4.

[13] National Research Council, 2009. *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California.* National Academies of Science, 139 pp. Page 33.

[14] Ibid. Page 33.

> *reported by Harbin-Ireland [2004] and Wechsler [2004]) can therefore be reasonably attributed to mariculture.*[15]

Finally, with regard to habitat loss and displacement due to the presence of oyster mariculture structures, equipment, and debris, the opening phrase of the NRC report's eelgrass discussion appears to be especially relevant: "Shellfish mariculture and eelgrass compete directly for space..."[16] The NRC report also summarizes recent research carried out on a similar mariculture operation in Washington where "all culture methods were shown to result in decreased production of eelgrass" and notes that "In Drakes Estero, the mariculture footprint is roughly 8 acres for racks predominately in areas of eelgrass..."[17]

Overall, as concluded in the NRC report, it appears that the 2007 level of mariculture operation resulted in the degradation, disturbance, and/or loss of approximately 58 acres of eelgrass habitat in Drakes Estero. Because the activities that resulted in these coastal effects would be carried out if a ten year authorization were provided to DBOC in 2012, as proposed, Commission staff believes that the proposed activity's coastal effects are reasonably foreseeable.

While the NRC notes that 58 acres of eelgrass represent less than 8% of the total coverage of eelgrass in the estero, we do not believe that a secondary evaluation of an impact's magnitude in proportion to a potentially greater level of impact is relevant to our conclusion regarding the reasonable foreseeability of coastal effects that would result from the proposed activity.

Invasive Species
Neither the DBOC letter nor the Goodman attachment appear to dispute the reasonable foreseeability of coastal effects resulting from the presence and spread of invasive species in Drakes Estero. It is well established that invasive species and non-native species with the potential to become invasive currently exist in Drakes Estero and are associated with the current mariculture operation. The NRC report notes that "[t]he introduction of nonnative species can result in dramatic environmental and economic impacts (Parker et al., 1999; Ruiz et al., 1999)" and provides a thorough discussion on pages 50-56 that identifies a series of important questions that need to be further studied to better inform the scope of current and future exotic species related effects on Drakes Estero. The NRC report also describes the widespread presence of an invasive tunicate, *Didemnum vexillum*, on mariculture equipment in Drakes Estero and notes that "[*D. vexillum*]'s rapid growth and competitive over-topping abilities make it an ecological threat to many native and nonnative invertebrate taxa..."[18]

Recently published research on *D. vexillum* provides further support for the likelihood that a ten year authorization of shellfish mariculture activities in Drakes Estero would result in coastal

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[15] Ibid..Page 32.

[16] Ibid. Page 31.

[17] Ibid. Pages 32-33.

[18] Ibid. Page 56.

effects. Specifically, surveys of a *D. vexillum* invaded marine system in the north eastern U.S. with similar characteristics to Drakes Estero suggest that this tunicate is able to successfully colonize eelgrass meadows.[19] This phenomenon has been observed several miles away in Tomales Bay, as noted by the NRC report, and the New England case suggests that when space is limited on artificial hard surfaces, eelgrass may provide suitable substrate for supporting *D. vexillum*. As noted by Carman and Grunden, this is likely to result in adverse effects on eelgrass:

> *Attached tunicates probably block photosynthesis, release of seed, and natural defoliation. Eelgrass serves as a juvenile shellfish and fish habitat and threats to it are of concern by coastal managers and the fishing industry. The effect of D. vexillum overgrowth of eelgrass, and the community dependent upon eelgrass, should be assessed further because D. vexillum can negatively impact habitat such as is occurring on Georges Bank (Valentine et al. 2007b). The use of eelgrass as a mechanism of transport for D. vexillum may be contributing to its spread. The results of our study demonstrate that D. vexillum is continuing to spread, occupying substrate not typically used, and posing a threat to the protected species Z. marina.*[20]

The abundance of *D. vexillum* observed by Commission staff to be growing on DBOC's mariculture equipment, infrastructure, and cultured shellfish suggests that the mariculture operation may be the primary habitat for *D. vexillum* in Drakes Estero and thus a key reason for its continued presence in this system. As the infestation of *D. vexillum* continues and additional space for further *D. vexillum* expansion on these materials becomes scarcer, however, the invasive tunicate may potentially begin to colonize other available substrate – namely eelgrass – as suggested by the New England case and recent evidence in nearby Tomales Bay. DBOC may also be further promoting the spread of *D. vexillum* through other aspects of its mariculture operation as well. Currently, some initial washing and shucking activities occur on a dock located both above the estero's waters and along its shoreline. During these operations *D. vexillum* and other epibiotic organisms are frequently collected and deposited into the estero where they may be transported by currents and tides to eelgrass meadows and other locations. In these ways, it is reasonably foreseeable that a new ten year authorization for DBOC's mariculture operation would facilitate the persistence and spread of *D. vexillum* in Drakes Estero, a situation with the potential to also adversely affect eelgrass and thereby cause coastal effects.

Birds

The NRC report also provides a discussion of the potential effects of the current mariculture operation on birds. Although little research on this topic is available and uncertainty exists concerning specific effects on some species, as noted in the NRC report, "Oyster culture bags placed on intertidal flats in Drakes Estero clearly prevent access by probing shorebirds to the sediments beneath them, thereby removing typical foraging habitat for many species."[21] The

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[19] Carman, M.R. and D.W. Grunden. 2010. First occurrence of the invasive tunicate *Didemnum vexillum* in eelgrass habitat. Aquatic Invasions 5(1): 23-29.

[20] Ibid.

[21] National Research Council, 2009. *Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California.* National Academies of Science, 139 pp. Page 58.

report also provides support for this conclusion by referencing research carried out in nearby Tomales Bay where "two of the most abundant shorebirds, dunlin and western sandpipers, demonstrated significant avoidance of mariculture plots."[22] These conclusions closely mirror the discussion of this issue included in our November 10, 2010, request letter to OCRM. Overall, because the proposed ten year authorization of shellfish mariculture activities in Drakes Estero would result in the placement of shellfish cultivation bags in intertidal flats (totaling approximately 140 acres according to DBOC), Commission staff believes coastal effects, including the loss of 140 acres of shorebird foraging habitat, are reasonably foreseeable.

Legal and Procedural Issues

Section 124 of Public Law111-88 Does Not Supersede the CZMA
As explained at the beginning of this letter, because OCRM should be simply evaluating whether it is reasonably foreseeable that a new ten year authorization for commercial shellfish mariculture in Drakes Estero will cause coastal effects, it is not necessary for OCRM to determine the scope of the "notwithstanding" clause found in PL 111-88 when considering the Commission's request. A determination of PL 111-88's scope, if necessary at all, would only need to occur if the Commission objected to DBOC's consistency certification and the Secretary determined that he intended to exercise his discretion to issue an SUP. With that said, even if this circumstance were to arise, PL 111-88 would not remove the Commission's authority under the CZMA.

PL 111-88 provides that "notwithstanding any other provision of law, the Secretary of the Interior is authorized to issue a special use permit [to Drake's Bay Oyster Company]." Pub. L. 111-88, § 124, 2009 H.R. 2996. DBOC argues that this language prevents the Commission from even undertaking federal consistency review.[23] Such a broad interpretation of this phrase, however, is not warranted in this context. Courts have held that the phrase "notwithstanding any other provision of law" must be construed by considering the statutory context within which it is found, rather than construing it literally. *Consejo de Desarrollo Economico de Mexicali v. United States*, 482 F.3d 1157, 1168 (9th Cir. 2006); *Miccosukee Tribe of Indians v. U.S. Army Corps*, 619 F.3d 1289, 1298 (11th Cir. 2010). Moreover, courts limit the effect of such language to that which is the "minimum" necessary to effect the "clear and manifest demonstration of legislative intent." *Northwest Forest Resource Council v. Pilchuck Audubon Society*, 97 F.3d 1161, 1166-67 (9th Cir. 1996) (citing *E.P. Paup Co. v. Director*, 999 F.2d 1341, 1348 (9th Cir. 1993).

Here, as DBOC acknowledges, the purpose of PL 111-88 was to address the National Park Service's concern that it was legally prohibited from issuing a new Special Use Permit (SUP) to DBOC.[24] This is explained further on pages 2 and 3 of the attached NPS document, *National Park Service Clarification of Law, Policy, and Science on Drakes Estero*, which notes that in 1976, Congress designated certain parts of Point Reyes National Seashore as wilderness and

[22] Ibid. page 59 referencing Kelly et al. (1996).

[23] Drakes Bay Oyster Company. Letter to NOAA and OCRM dated December 1, 2010.

[24] Ibid. Page 2.

potential wilderness (PL 94-544 Oct. 18, 1976), including Drakes Estero, and the Congressional report accompanying this legislation established that these lands would be "essentially managed as wilderness" and that efforts would be made to "remove all obstacles to the eventual conversion of these lands and waters to wilderness status."[25] Because the mariculture operation in Drakes Estero is the primary obstacle to the conversion of this area to wilderness status, NPS interpreted this and other NPS and Point Reyes National Seashore laws and management policies as a limit to their ability to authorize a new SUP. These were the concerns that gave rise to the enactment of section 124 of PL 111-88. Given that the CZMA process had not even commenced, much less concluded in a manner affecting issuance of an SUP, NPS's position in 2009 that it could not issue an SUP was not based on a concern that application of the CZMA would prevent it from issuing an SUP. The intent of PL 111-88 was to authorize the Secretary to exercise his own authority to issue an SUP, regardless of the laws that NPS had already identified that would prevent issuance of such a permit. In this context, the language of PL 111-88 should not be read so broadly as to repeal unrelated federal laws, such as the CZMA.

Even ignoring the context in which PL 111-88 was passed, the language in PL 111-88 shows no intent to supersede the CZMA. One context in which courts have interpreted "notwithstanding" clauses to have a broader reach is when they are drafted in connection with language mandating an agency take immediate action. For example, in *Consejo*, the plaintiffs had sued the Department of Interior and Bureau of Land Management for, among other allegations, failing to comply with the National Environmental Protection Act, the Endangered Species Act, the Migratory Bird Treaty and the Settlement Act when the BLM pursued a project to line the All American Canal. *Consejo*, 482 F.3d at 1168. Defendants claimed that those causes of action were moot due to passage of the Tax Relief and Health Care Act of 2006 (2006 Act) stating: "... [n]otwithstanding any other provision of law, upon the date of enactment of this Act, the Secretary shall, without delay, carry out the All American Canal Lining Project" *Id.* at 1167. This language mandated certain action to take place "without delay." The court found that this language requiring immediate action, coupled with the "notwithstanding any other provisions of law" language, showed Congress's intent that the project proceed without compliance with the "usual course of administrative proceedings." *Id.* at 1169. It held that the 2006 Act rendered the challenges under the cited environmental statutes moot, as compliance with the environmental statutes would delay commencement of the project, which was what was specifically prohibited in the 2006 Act.

Unlike *Consejo,* the plain language of PL 111-88 does not mandate any specific action be taken nor does it require action by the Secretary within a given timeframe. It simply allows the Secretary to take action and does not limit the information that the Secretary may consider when deciding whether to take that action. It in no way prohibits normal regulatory review procedures, including federal consistency review under the CZMA, from occurring. PL 111-88, therefore, does not alter the legal standard for OCRM in reviewing the Commission's request to conduct consistency review of DBOC's application for the SUP.

[25] National Park Service. 2007. *National Park Service Clarification of Law, Policy, and Science on Drakes Estero,* 18 pp. Page 3 quoting House Report No. 94-1680.

CZMA Procedures Should Still Apply, Even if PL 111-88 Overrides a Portion of the CZMA
Even if a court were to determine that the Secretary could exercise his discretion to issue an SUP to DBOC over the Commission's objection, it would not render the Commission's review under the CZMA moot. Thus, PL 111-88 does not conflict with and does not prevent application of the procedures found in the CZMA, even if the ultimate outcome of the Commission's review could be ignored. The text of PL 111-88 deliberately does not direct or require the Secretary to take any specific action; the original version of the bill would have required the Secretary to issue an SUP, but the final version simply provides him with the authority to do so. It therefore merely allows him to exercise his discretion to issue an SUP. Pub. L. 111-88, § 124. Under the CZMA, the Commission is obligated to analyze a proposed activity's consistency with California's Coastal Management Plan (CCMP). 16 U.S.C. § 1456(c)(3)(A). After completing such an analysis, the Commission could concur or object to DBOC's certification of consistency with the CCMP. Under either of these scenarios, the Commission's conclusion regarding CCMP consistency could inform the Secretary's exercise of his discretion under PL 111-88. If the Commission were to object to DBOC's consistency certification, such an objection would still provide the Secretary with valuable insight into California's assessment of the proposed activity and its consistency with the CCMP. Thus, even if PL 111-88 would allow the Secretary to issue an SUP over the Commission's objection, the Commission's analysis of the proposed project would not in itself be inconsistent with the language of PL 111-88. This aspect of the CZMA is therefore not superseded by PL 111-88.

The Timing of the Commission's Review Is Not Inconsistent with PL 111-88
DBOC also argues that there is a possibility that the Commission's review of DBOC's consistency certification could delay the Secretary's ability to issue the SUP. First, the argument that the Commission's review would not be completed prior to November 30, 2012, is highly speculative, as evidenced by the very language used in DBOC's letter. It notes that it is "entirely possible" that the Commission's review could go beyond November 30, 2012, and that this "could cause" a conflict with PL 111-88.[26] Thus, DBOC would like OCRM to refuse to grant the Commission's request because there is a possibility that the Commission might not have fulfilled its obligations under the CZMA prior to November 30, 2012. Moreover, since the CZMA requires the Commission to act within 6 months of submittal of a consistency certification, there is no reason to assume the Commission will not act in a timely manner.

Second, and more importantly, the language of PL 111-88 does not support the conclusion DBOC urges OCRM to adopt. PL 111-88 does not require any action of the Secretary, much less action by a certain date. It authorizes issuance of an SUP prior to November 30, 2012, but it does not require action before that date. Pub. L. 111-88, § 124. Congress has included temporal requirements in similar provisions, but it did not do so here. *See, e.g.*, Tax Relief and Health Care Act of 2006 Pub. Law No. 109-432, § 385(a), 120 Stat. 2922, ("[n]otwithstanding any other provision of law, upon the date of enactment of this Act, the Secretary shall, without delay, carry out the All American Canal Lining Project"); 1995 Supplemental Appropriations for Disaster Assistance and Rescissions Act. Pub. L. No. 104-19, § 2001(k), 109 Sta. 194, 240-47 (requiring agency action with 45 days); and Omnibus Appropriations Act 2009, Pub. L. No. 111-8, 123 Stat. 524 ("the Army Corps of Engineers ... shall, notwithstanding any other provision of law,

[26] Drakes Bay Oyster Company. Letter to NOAA and OCRM dated December 1, 2010. Page 4.

immediately and without further delay construct ... Alternative 3.2.2.a to U.S. Highway 41"). Congress can, and has, required immediate action or action by a certain date, but it did not do so in PL 111-88. Thus, there is nothing in PL 111-88 that would prevent the Commission from undertaking consistency review on the basis that such review might take too long.

Marin County Local Coastal Program
DBOC's recent letter includes claims that: (1) the Commission's consistency review request to OCRM contradicts the Marin County Local Coastal Program; (2) the Marin County Local Coastal Program governs the shellfish mariculture operation; and (3) Section 30411(a) of the California Coastal Act provides the California Fish and Game Department with primary authority over mariculture operations under the Coastal Act. These claims are neither accurate nor relevant to the Commission's federal consistency review request.

The DBOC mariculture operation is located entirely within the federally owned lands and tidelands of Point Reyes National Seashore. As noted in the Marin County Local Coastal Program, "the federal Coastal Zone Management Act of 1972 provides that federal lands be legally excluded from the coastal zone and thus exempt from a state's coastal planning and regulatory jurisdiction. However, the federal act also provides that federal activities within the coastal zone boundary must be consistent with a state's coastal zone management program."[27]

For all of the California coast, except the San Francisco Bay, the Commission is the state agency responsible for implementing the Coastal Zone Management Act (CZMA). The Commission is responsible for reviewing proposed federal and federally authorized activities to assess their consistency with the enforceable policies of the approved state coastal management program (CCMP). To the extent that it has been incorporated into the CCMP, the Marin County LCP is used solely as guidance. Therefore, Marin County's LCP is not the standard of review for the Commission's consideration of whether the proposed activity is consistent with its coastal management program. Any mariculture-related policies included in the Marin County Local Coastal Program are provided for guidance purposes only.

The claim that Section 30411(a) of the California Coastal Act provides the California Fish and Game Department with primary authority over mariculture operations is also misinformed. The Commission has a long history of regulating mariculture activities throughout the state in coordination with the California Department of Fish and Game and numerous other state and federal resource agencies. Section 30411(a) of the Coastal Act specifies that "The Department of Fish and Game and the Fish and Game Commission are the principle state agencies responsible for the establishment and control of wildlife and fisheries management programs..." The proposed continuance of commercial shellfish mariculture operation by DBOC for ten years beginning in 2012 is neither a wildlife nor fishery management program. Section 30411(a) of the Coastal Act therefore does not apply to these proposed activities.

DBOC Production Levels
Commission staff disagrees with the characterization of previous correspondence and the current and maximum production levels described by DBOC in its recent letter. However, we do not

[27] Marin County Community Development Agency. 2010. *Marin County Local Coastal Program Unit 2 Land Use Plan, 295 pp.* Page 53 – Federal Parklands.

find this discussion to be pertinent to the decision currently before OCRM or the substance of the Commission's request. We therefore propose to pursue this issue directly with DBOC. If, however, OCRM finds this issue to be relevant or pertinent to its review, we would be happy to provide a more detailed response.

Right to Fish
DBOC's letter appears to suggest that shellfish cultivation is fishing. This assertion contradicts both reason and fact. The relevant state and federal resource agencies are in agreement on this point, as demonstrated by the attached letter from the Director of the California Department of Fish and Game to the Superintendent of Point Reyes National Seashore which clearly states that:

> *Although the right to fish extends to both commercial and sport fishing, it does not extend to aquaculture operations. Regardless of whether its purpose is commercial or recreational, fishing involves the take of public trust resources and is therefore distinct from aquaculture, which is an agricultural activity involving the cultivation and harvest of private property (Fish and Game Code Sections 17, 15001, 15002, 15402).*

This understanding is also reflected in the California Coastal Act which states in Section 30100.2 that " 'Aquaculture' means a form of agriculture as defined in Section 17 of the Fish and Game Code..."

DBOC's Existing National Park Service Authorizations
Commission staff also does not find the discussion included in DBOC's letter regarding the specific provisions of DBOC's Reservation of Use and Occupancy to be relevant to the request currently before OCRM. Even if DBOC is correct that continued operation of the oyster farm was contemplated nearly forty years ago, such a lease renewal provision would not preclude the Commission's review of a federal agency's renewal of such a lease.

Conclusion
As described above and in the attachment to this letter, we believe that the legal, procedural and scientific assertions made by DBOC and its supporters do not provide compelling evidence that the coastal effects resulting from the proposed ten year continuance of commercial shellfish mariculture activities in Drakes Estero are not reasonably foreseeable. Commission staff is therefore reiterating our request for permission to review this proposed activity.

Please call Deputy Director Alison Dettmer, at 415/ 904-5205 if you have any questions.

Sincerely,

PETER M. DOUGLAS
Executive Director

Attachments

cc: Dr. Jane Lubchenco, NOAA
David Kaiser, OCRM

November 23, 2010

From: Dr. Corey S. Goodman, member, National Academy of Sciences

To: Executive Director Peter Douglas, California Coastal Commission

Re: REQUEST THE CALIFORNIA COASTAL COMMISSION STOP PROMOTING FALSE AND DISCREDITED SCIENCE CONCERNING DRAKES ESTERO

Dear Executive Director Douglas:

In your letter of November 10 to Donna Wieting, Acting Director, Office of Ocean and Coastal Resource Management (OCRM), National Oceanic & Atmospheric Administration (NOAA), you assert that Drakes Bay Oyster Company (DBOC) is having a negative impact on the ecology of Drakes Estero at Point Reyes National Seashore. However, your letter to Wieting contains numerous false scientific claims that were refuted over one year ago by the National Academy of Sciences (NAS) report of May 5, 2009. I write to request that you retract your letter, retract other letters or documents with similar claims, and refrain from making similar false claims in the future.

Your letter to Wieting repeats false scientific claims that have their origins in the NPS May 2007 Drakes Estero Report (*Drakes Estero: A Sheltered Wilderness Estuary*). Most of those same claims were repeated by Dr. John Dixon, California Coastal Commission (CCC) scientist, in his September 2007 report to the CCC. In your letter to Wieting, you cite both documents. The parallel claims in both documents were retracted by the NPS in 2007 and subsequently refuted by the NAS report in 2009. This could have been cleared up years ago, but you will remember that back in December 2007, you refused my request when I asked to meet with Dr. Dixon to go over the science.

(1) Are you aware that most of those scientific claims have been discredited?

(2) Are you aware that NPS retracted most of those scientific claims in 2007?

(3) Are you aware that the NAS May 5, 2009 report refuted those scientific claims?

NPS RETRACTED MOST OF THEIR FALSE CLAIMS IN TWO DOCUMENTS IN 2007

First, the NPS retracted many of these scientific claims against DBOC in their secret, non-public July 2007 version of the Drakes Estero Report. For example, in the July 27 version, NPS deleted the claims concerning impacts of DBOC on sediments, fish communities, and harbor seals.

Second, the NPS made more extensive retractions a few months later in their September 18, 2007 Clarification document. I encourage you to read both documents

and consider the implications to the credibility and integrity of the CCC as you continue to repeat false scientific claims that even the NPS retracted three years ago.

In the September 18, 2007 Clarification document, NPS retracted most major claims against DBOC. Concerning oyster feces in the sediments, the NPS document stated:

> *"The NPS incorrectly interpreted the report by Dr. Roberto Anima ..."*
>
> *"The Elliott-Fisk et al. (2005) report notes oyster feces are not a problem..."*

Concerning the impact of DBOC on eelgrass, NPS stated:

> *"The current level of impact to eelgrass beds by the oyster operation may or may not be significant to the overall persistence of eelgrass within Drakes Estero."*

Concerning the impact of DBOC on the harbor seals, NPS stated:

> "*More focused analyses are required to determine if oyster operations are affecting seal distribution and productivity within Drakes Estero."*

Finally, concerning the overall impact of DBOC on Drakes Estero, NPS concluded:

> *"Scientific studies to date are inconclusive as to the extent to which oyster farming is altering natural resources within the Estero..."*

In a letter to you on October 30, 2007, Dr. Peter Gleick, a fellow member of the NAS, MacArthur Fellow, President and co-founder of the Pacific Institute, and world-renown environmentalist and water expert, wrote about the September 18, 2007 NPS Clarification document and NPS retractions of their false claims. Dr. Gleick wrote:

> *... the memo of September 18 by the National Park Service ... essentially acknowledges the many errors and misrepresentations of the NPS ...*

Concerning the NPS Clarification document, Dr. Gleick wrote to the Sierra Club (as provided to you and your staff in multiple documents over the past few years):

> *... this NPS 'rebuttal' ... acknowledges very clearly that the NPS was wrong ... over and over and over again, but couched in language that pretends the opposite.*
>
> *The NPS errors were NOT minor, but major and misleading, and now, given the responses, pretty obviously intentional.*

I had hoped that Dr. Gleick's letters to you and the Sierra Club in the fall of 2007 would have encouraged you to correct your misuse of the NPS false science. Evidently they have not. I once again encourage you to read these NPS documents and Gleick letters.

NAS 2009 PANEL REPORT REFUTED THE NPS 2007 FALSE CLAIMS

While the NPS retracted many of their false claims against DBOC in 2007 – including most of the claims that you repeat in your letter to Wieting, the National Academy of Sciences (NAS) report of May 5, 2009 went much further in criticizing the NPS false science. The NAS stated that NPS misrepresented their own scientific studies in the Drakes Estero Report. It is thus difficult to reconcile the history of NPS retractions and NAS repudiation of the NPS false claims with the letter you recently sent Wieting.

Several key members of your CCC staff were present on July 21, 2007 at Senator Feinstein's Olema meeting during which allegations of NPS scientific misconduct were raised concerning NPS claims that scientific data showed that DBOC was harming the ecology Drakes Estero. During the Olema meeting, your staff heard Senator Feinstein ask, and NPS Director Mary Bomar agree, that NPS should request that the NAS conduct a study to determine if the NPS had correctly represented the scientific data concerning DBOC and Drakes Estero.

It is important to note that four days after the July 21,2007 Olema meeting, NPS Superintendent (b) (6), (b) (7)(C) issued his "*acknowledgement of corrections*" in which he retracted two major claims against DBOC concerning oyster feces in the sediments and impacts on fish communities. Two days later, (b) (6), (b) (7)(C) and others completed their July 27, 2007 non-public version of the Drakes Estero Report (discussed above) in which they deleted many of the major claims against DBOC.

The NPS formerly asked the Ocean Studies Board of the National Research Council (NAS) on October 24, 2007 to review the scientific claims in the NPS Drakes Estero Report and other NPS public presentations. The NPS asked the NAS to examine:

> *the scientific basis for the National Park Service (NPS) presentations and the report (including revisions), "Drakes Estero: A Sheltered Wilderness Estuary," on the ecological effects of the Drakes Bay Oyster Company operations on Drakes Estero…*

The resulting May 5, 2009 NAS report by the Ocean Studies Board, *Shellfish Mariculture in Drakes Estero*, concluded:

> *The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances selectively presented, overinterpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects.*

The 2009 NAS report repudiated nearly every one of the scientific claims made by the NPS in their 2007 Drakes Estero Report, and thus nearly all of the scientific claims made by Dr. Dixon in his 2007 report to the CCC, and nearly all of the claims that you recently made to NOAA's Wieting in your November 10, 2010 letter. None of those claims remains standing. Do you not know that your claims were refuted by the NAS?

Although your letter to Wieting contains 51 citations, the NAS report never made it onto

your list. Why did you ignore the report by our country's most prestigious scientific body that refuted nearly all of the NPS scientific claims that you repeated? The NAS charged the NPS with misrepresenting their own science. Why do you keep repeating the same false claims? I encourage you to retract your letter in light of the NAS report.

Let me give you just one example from the NAS report: the impact of DBOC on eelgrass. This is an issue that you consider in some detail in your letter to Wieting. I use this example as an illustration to demonstrate that you are repeating false science that was refuted by the NAS report in 2009. The NAS report concluded:

> *The absence of eelgrass directly under oyster culture racks represents a small-scale and localized impact on the biogenic habitat. Numerous boat propeller scars in the eelgrass beds, partially affecting a total area of about 50 acres, are also evident and attributable to oyster culturists because they are the only ones allowed to use motorized vessels in the estero. Nevertheless, the total percentage of eelgrass area lost (1%) or partially degraded by propeller scars (7%) and thus attributable to oyster mariculture represents about 8% of all eelgrass habitat in Drakes Estero as of 2007. Eelgrass has approximately doubled in areal cover in Drakes Estero from 1991 to 2007, implying little systemic threat from the existing intensity of oyster culturing activities. Oysters have the potential to benefit eelgrass because their filtering activity improves local water clarity (and hence light penetration) and because they release biodeposits and ammonium (plant nutrients).*

That is quite a different conclusion than is made in your letter to Wieting. I encourage you to read the NAS report and modify your assertions accordingly. You will discover that most of your summary claims in your letter to Wieting are incorrect.

NPS RESPONSE TO THE MAY 5, 2009 NAS PANEL REPORT

When the NAS report was released on May 5, 2009, NPS issued a press release from the office of then Pacific West Regional Director Jon Jarvis in which the NPS stated:

> *Certainly, we apologize for the errors in our original document and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report.*

By "original document", Jarvis was citing the May 2007 version of the Drakes Estero Report, the one reviewed by the NAS report, and the one that you cite in your letter to Wieting. Jarvis apparently was citing both the July 2007 secret non-public version of the Drakes Estero Report and the September 2007 Clarification document when he wrote of the "final, corrected version of the report." Both of those documents retract most of the claims made in the original Drakes Estero Report. Since Jarvis, currently the Director of the NPS, openly acknowledged in 2009 the many errors and mistakes in the Drakes Estero Report, why in 2010 do you keep citing it and repeating these false claims?

NPS HARBOR SEAL CLAIMS REFUTED BY NPS PHOTOS AND DETAILED LOGS

I include here a letter I sent yesterday to Interior Secretary Ken Salazar, alleging that officials and scientists in the NPS violated a series of federal government rules, regulations, and codes, and in so doing committed scientific misconduct. Please carefully read this document and it's four appendices. It involves some of the same scientific claims that you repeat concerning disturbances to the harbor seals by DBOC boats and workers, NPS claims that are refuted by NPS secret cameras, photographs, and detailed logs. The revelations from the NPS photos and logs should encourage you to retract the letter you sent to Wieting, retract letters and documents with similar false claims, and refrain from making similar false claims in the future.

The issue concerns the NPS claims over the past three and a half years that NPS data shows that DBOC boats and workers have been disturbing the harbor seals and pups in Drakes Estero in PRNS. These claims were based on a weak (and now known to be flawed) body of NPS data: a volunteer harbor seal monitoring database. The NPS failed to tell a series of investigations, inquiries, and reviews that it had a second and more reliable (and verifiable) body of NPS data: minute-by-minute, dawn-to-dusk photographs from hidden cameras focused on oyster farm operations and certain harbor seal haul-out sites. Moreover, the conclusions from this more reliable body of NPS data in large part contradicted the conclusions NPS officials and scientists had been making from the less reliable (and flawed) body of data.

The NPS failed to tell the following people and groups about the existence of the secret cameras, photographs, and logs: elected officials (e.g., Marin County Supervisors, Senator Feinstein, Representative Woolsey), the DOI Inspector General, the National Academy of Sciences, the Marine Mammal Commission, the press, the public, the editor of the Marine Mammal Science journal, and the owners of DBOC.

Given what you wrote in your letter to Wieting, it appears as if NPS also failed to tell you and others at the CCC about the secret cameras, photos, and logs. In case you were unaware of them, by sending you this letter, I am informing you of the photos and logs, and the fact that they lead to the opposite conclusion from what has been claimed by both the NPS and CCC. If you would like more detail, please download and examine Appendix 2 that accompanies the letter to Secretary Salazar.

I ask you to stop making these false claims that DBOC is disturbing the harbor seals. According to the NPS photographic data, DBOC is not. The photos clearly show that the occasional disturbances to seals come from kayakers, not oyster boats or workers.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED TO EIS PROCESS

The NPS misconduct is continuing unabated and is having serious impact on policy decisions at Point Reyes, particularly on the Environmental Impact Statement (EIS) process currently being conducted by NPS. To my knowledge, the NPS photos and

logs have not been disclosed as part of the EIS process for the DBOC lease renewal. Rather, the same false claims, including the flawed 2009 NPS paper by [redacted] in the journal *Marine Mammal Science*, were submitted for the EIS process, but not the NPS photos and logs that refute those claims and that paper. This failure also and independently constitutes scientific misconduct and suggests that the ongoing EIS process has been damaged, possibly fatally.

NPS FALSE CLAIMS AGAINST DBOC SPREAD UNABATED BY THE CCC

The NPS false science is also being spread by your organization, the California Coastal Commission, as you appear to be using the false science to negatively influence the EIS process. For example, in your November 10 letter to Wieting, you wrote:

> *"Harbor seals are vulnerable to human disturbance at haul out sites used for resting, breeding, and molting. Human activities associated with shellfish aquaculture within Drakes Estero have the potential to cause disturbances to the resident harbor seal population. For example, the operation of motorized watercraft and the placement, maintenance, and retrieval of bottom culture shellfish bags, if carried out in close proximity to harbor seal haul-out sites and intertidal sandbars, may cause seals in these areas to alter their behavior, flush towards the water, and/or flush into the water." (citation #49)*

As the basis for this statement, you cited (#49) the [redacted] 2009 paper in Marine Mammal Science. That paper is incorrect. NPS should have informed the CCC that the NPS harbor seal claims were incorrect, that the photos and logs, presumably never shared with CCC, refute those claims, and that the Becker et al. 2009 paper is incorrect and also refuted by the photos and logs (and thus needs to be retracted from the journal). By including here the material I sent yesterday to Secretary Salazar, I am informing you that [redacted] et al., 2009, your citation #49, is seriously flawed.

Please read my letter to Salazar, carefully read the four appendices with it, and then in accordance with the conclusions from the NPS photos and detailed logs, retract your letter to Wieting.

CONCLUSIONS

I request that you and the California Coastal Commission immediately:

(1) retract your Nov. 10 letter to Donna Wieting, Acting Director, OCRM, NOAA,

(2) retract other letters or documents containing similarly false scientific claims that you have submitted as part of the EIS process for DBOC and Drakes Estero,

(3) refrain from submitting additional letters or documents containing similarly false scientific claims concerning DBOC and Drakes Estero,

(4) refrain from repeating and promoting this false science, and

(5) begin an open and transparent investigation to determine why false science continues to be repeated in letters and documents emanating from the CCC.

It is imperative that you begin an investigation into the use of science – or in this case the misuse of science -- by the CCC. Your organization has been making these false claims for over three years now, and it is worrisome that the CCC appears to be letting a predetermined political agenda drive the misuse of science.

You are charged by the people of California with conducting your "*affairs in an open, objective, and impartial manner free of undue influence and the abuse of power and authority.*" It appears as if your use of science – or in this case misuse of science -- concerning DBOC and Drakes Estero has not been objective and has not been impartial. I request that you investigate these allegations. If you are not capable of having an "*open, objective, and impartial*" investigation of your own conduct, then I request that you hand such an investigation over to another impartial State agency.

Two elected members of the National Academy of Science – Dr. Peter Gleick and I – have warned you repeatedly of your repeated use of false science. It certainly needs to be investigated why you have repeatedly ignored a detailed report by the most prestigious scientific body in our country – the National Academy of Sciences – and why you continue to quote National Park Service documents that have been discredited and retracted. Only an open and transparent investigation will help clear the air.

Please respond to this request for a retraction and an investigation in a timely fashion. Kindly provide me with information on whether you plan to retract your letter, investigate your use of science, how you plan to proceed, who will be involved, the timeline for this process, if and when your representatives will interview me, and how you plan to communicate your investigation and its outcome to the public.

Time is of the essence, since the EIS is underway, and you have weighed in on the EIS process with this false science. I ask you to retract this false science from the EIS.

Please distribute this letter to the six CCC Commissioners, the one North Coast representative, and the appropriate Commission staff.

I look forward to hearing from you. Do not hesitate to contact me if you have any questions or want further information.

Sincerely yours,

Corey S. Goodman, Ph.D

corey.goodman@me.com
PO Box 803, Marshall, CA 94940

cc: Acting Director Donna Wieting, OCRM, NOAA
David Kaiser, Senior Policy Analyst, OCRM, NOAA
John McCamman, Director, CA Department of Fish & Game
Secretary Lester Snow, CA Resources Agency
Assemblymember Jared Huffman, CA State Assembly, 6th District
Senator Mark Leno, CA State Senate, 3rd District
Senator Dianne Feinstein, US Senate
Representative Lynn Woolsey, US House
Marin County Supervisor Steve Kinsey
PRNS Superintendent (b) (6), (b) (7)(C) NPS
Yosemite Superintenden (b) (6), (b) (7)(C) NPS
Drakes Bay Oyster Company owners Kevin and Nancy Lunny

APPENDIX: How I Got Involved in This Issue

Three and a half years ago, on August 28, 2007, Marin County Supervisor Steve Kinsey first asked me to look at National Park Service science concerning the impacts of DBOC on Drakes Estero, and to come report on that science at a Marin County hearing on May 8, 2007. At that hearing, I made three particularly relevant statements in my testimony:

> *"I believe that public policy decisions can and should be informed by quality science. But this must be science conducted rigorously, without agendas or conflicts-of-interest. The political process can be dangerously misled by bad or misused science. One of my greatest concerns when I see science being invoked in public policy debates is to make sure that it is good science and not pseudo-science or ... a blatant misuse of science."*
>
> *"My only hesitation in coming forward to testify today is the realization that openly expressing my views as a scientist may cause me to come under personal attack by local groups that are determined to remove Lunny's operation from the PRNS. Nevertheless I feel compelled to speak out for good science instructing public policy."*
>
> *I end with a note of caution. Beware of sudden claims of "new" data that refute what I have laid out here today and in my more detailed written testimony. If such claims are made, insist on seeing the complete database, check for bias, and seek independent review."*

Brief Biosketch

Dr. Corey S. Goodman is a scientist, educator, and biotech entrepreneur. With a B.S. from Stanford and Ph.D. from Berkeley, he spent 25 years as a biology professor at Stanford and the University of California Berkeley. Goodman is currently on the faculty of U.C. San Francisco. He was elected a member of the National Academy of Sciences (NAS), American Academy of Arts and Sciences, and American Philosophical Society. He won numerous scientific awards (e.g., Alan T. Waterman Award from the National Science Board, Canada Gairdner International Award in Medical Sciences, March-of-Dimes Prize in Developmental Biology), was a Howard Hughes Medical Institute Investigator, Evan Rauch Chair of Neuroscience, and co-founded the Wills Neuroscience Institute.

Goodman moved into biotech to apply biomedical discoveries to human and environmental health. He co-founded Exelixis, Renovis, and PhyloTech, was CEO of Renovis, and President of Pfizer's Biotherapeutics and Bioinnovation Center. Today Goodman is Managing Director and co-founder of venBio, Board Chair of six biotech companies, and Board member of two others.

Amongst his many public policy roles, Goodman is on the Board of the California Council on Science and Technology, Pacific Institute, Bay Area Science and Innovation Consortium, and is former Chair of the National Research Council's (NAS) Board on Life Sciences.

CALIFORNIA COASTAL COMMISSION

Program Overview

The mission of the Coastal Commission is to:

Protect, conserve, restore, and enhance environmental and human-based resources of the California coast and ocean for environmentally sustainable and prudent use by current and future generations.

The California Coastal Commission was established by voter initiative in 1972 (Proposition 20) and later made permanent by the Legislature through adoption of the California Coastal Act of 1976.

The Coastal Commission, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone. Development activities, which are broadly defined by the Coastal Act to include (among others) construction of buildings, divisions of land, and activities that change the intensity of use of land or public access to coastal waters, generally require a coastal permit from either the Coastal Commission or the local government.

The Coastal Act includes specific policies (see Division 20 of the Public Resources Code) that address issues such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. The policies of the Coastal Act constitute the statutory standards applied to planning and regulatory decisions made by the Commission and by local governments, pursuant to the Coastal Act.

The Commission is an independent, quasi-judicial state agency. The Commission is composed of twelve voting members, appointed equally (four each) by the Governor, the Senate Rules Committee, and the Speaker of the Assembly. Six of the voting commissioners are locally elected officials and six are appointed from the public at large. Three ex officio (non-voting) members represent the Resources Agency, the Business, Transportation and Housing Agency, and the State Lands Commission.

The coastal zone, which was specifically mapped by the Legislature, covers an area larger than the State of Rhode Island. On land the coastal zone varies in width from several hundred feet in highly urbanized areas up to five miles in certain rural areas, and offshore the coastal zone includes a three-mile-wide band of ocean. The coastal zone established by the Coastal Act does not include San Francisco Bay, where development is regulated by the Bay Conservation and Development Commission.

Along with the Bay Conservation and Development Commission (BCDC), the Coastal Commission is one of California's two designated coastal management agencies for the purpose of administering the federal Coastal Zone Management Act (CZMA) in California. The most significant provisions of the federal CZMA give state coastal management agencies regulatory control (federal consistency review authority) over all federal activities and federally licensed, permitted or assisted activities, wherever they may occur (i.e., landward or seaward of the respective coastal zone boundaries fixed under state law) if the activity affects coastal resources. Examples of such federal activities include: outer continental shelf oil and gas leasing, exploration and development; designation of dredge material disposal sites in the ocean; military projects at coastal locations; U.S. Army Corps of Engineers fill permits; certain U.S. Fish and Wildlife Service permits; national park projects; highway improvement projects assisted with federal funds; and commercial space launch projects on federal lands. Federal consistency is an important coastal management tool because it is often the only review authority over federal activities affecting coastal resources given to any state agency.

Commission Meetings

The Commission holds monthly public meetings of three to five days in length in different locations throughout the state. The Commission meetings provide an opportunity for the Coastal Commissioners to take public testimony and to make permit, planning, and other policy decisions. Prior to each meeting, Commission staff collects and analyzes information pertinent to meeting agenda items and prepares written staff reports with recommendations for Commission action. These staff reports are available for public review, by contacting the appropriate Commission office. Selected staff reports are also available electronically by means of a link from the Commission's Meeting Notice.

Public Participation

Members of the public may participate in the Commission's decision-making process by attending public hearings or by making their views known to the Commission prior to public hearings.

Key Statutory Responsibilities

California's coastal management program is carried out through a partnership between state and local governments. Implementation of Coastal Act policies is accomplished primarily through the preparation of local coastal programs (LCPs) that are required to be completed by each of the 15 counties and 60 cities located in whole or in part in the coastal zone. Completed LCPs must be submitted to the Commission for review and approval. An LCP includes a land use plan (LUP) which may be the relevant portion of the local general plan, including any maps necessary to administer it, and the zoning ordinances, zoning district maps, and other legal instruments necessary to implement the land use plan. Coastal Act policies are the standards by which the Commission evaluates the adequacy of LCPs.

Amendments to certified LUPs and LCPs only become effective after approval by the Commission. To ensure that coastal resources are effectively protected in light of changing circumstances, such as new information and changing development pressures and impacts, the Commission is required to review each certified LCP at least once every five years.

Development within the coastal zone may not commence until a coastal development permit has been issued by either the Commission or a local government that has a Commission-certified local coastal program. After certification of an LCP, coastal development permit authority is delegated to the appropriate local government, but the Commission retains original permit jurisdiction over certain specified lands (such as tidelands and public trust lands). The Commission also has appellate authority over development approved by local governments in specified geographic areas as well as certain other developments.

The Commission reviews and acts on port master plans and amendments to them from the industrial ports of Hueneme, Los Angeles, Long Beach, and San Diego. Commission approval is necessary to allow port expansions to meet future growth needs. A similar requirement applies to land areas of universities in the coastal zone (e.g., the University of California campuses at Santa Cruz, Santa Barbara, and San Diego; Pepperdine University; and San Diego State University). The Commission also has an oil spill prevention and response program and a statewide Coastal Act enforcement program.

Under 1990 amendments to the federal Coastal Zone Management Act, the Commission and the State Water Resources Control Board have prepared and adopted and are now implementing a Coastal Nonpoint Source Water Pollution Control Program. The Commission also implements a Coastal Access Program, in partnership with other state agencies such as the Coastal Conservancy, State Lands Commission, California State Parks and federal, regional and local park and recreation entities. The Commission carries out an extensive public education program that includes annual statewide coastal clean-up events, the "Adopt-A-Beach" program and the WHALE TAIL℠ license plate program. It also maintains a Coastal Resource Information Center.

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NATIONAL ACADEMY OF SCIENCES

Office of the President

FEB 22 2011

February 18, 2011

Gavin M. Frost, Attorney
Rocky Mountain Region-Billings Field Office
Office of the Solicitor
US Department of the Interior
316 North 26th Street, Room 3005
Billings, MT 59101

Dear Mr. Frost:

I understand that you have conducted an inquiry into the possibility that U.S. National Park Service staff have obtained potentially relevant information concerning the environmental impact of oyster farming at a site in California named Drakes Estero. As you know, a National Academy of Sciences/National Research Council committee was asked to evaluate a number of potential environmental effects of those oyster operations some time ago, and there have been questions raised by Dr. Corey Goodman and others about the degree to which the National Park Service staff cooperated with the NAS/NRC committee that undertook that 2008-09 study.

You have interviewed a number of individuals connected with that study and with our governance here at the NAS/NRC. I have been told by Dr. Goodman that you told him that our NAS/NRC staff did not cooperate with you and that in one case the interview was encumbered by being "lawyered up". Some months ago, I wrote to Department of Interior leaders and expressed my interest in what has become your inquiry, and I told them that we would be glad to cooperate in such an inquiry. So, if you have negative impressions of our degree of cooperation, I would appreciate it if you would communicate them directly to me or to the NAS/NRC Executive Officer, Dr. E. William Colglazier, because we are indeed interested in what you have found. Our committees consist of unpaid volunteers who are striving to serve the country upon request from the Federal government and our efforts are impeded if responsible parties such as National Park Service staff are not forthcoming in relevant parts of our own studies.

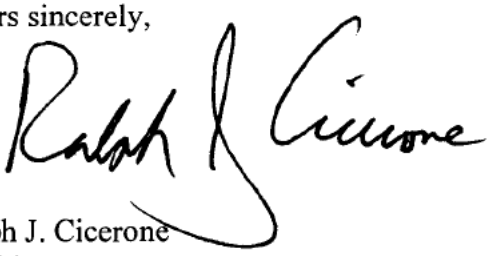
An attorney who works with us who was present at one of the interviews has told me that one line of inquiry of yours involved the internal deliberations of our committee. Our attorney advised against providing you with that kind of information because we always try to shield and protect the independence of our committee members. There have been a number of instances where this protection has been necessary, over the years, for several important reasons. Other than that kind of concern, I certainly hope that you found our NAS/NRC staff and officers whom you interviewed to be cooperative. Once again, I ask you to tell Dr. Colglazier and me directly if that was not the case.

500 Fifth Street, NW Washington, DC 20001

I understand from another NAS member who was interviewed by you that he felt that he was under oath as he answered your questions. I would appreciate some clarification as to whether or not that was the case. In yet another interview which you conducted, the interviewees at our end were told by you that you would provide them with a transcript or tape of the entire interview and neither of the parties present at that interview have received any information from you. Those individuals look forward to hearing from you.

I hope that we might receive a copy of your entire report or at least a fair summary of what you have concluded because of our interest in the matter at hand.

Yours sincerely,



Ralph J. Cicerone
President

Cc: Mr. Will Shafroth, Acting Assistant Secretary, Fish and Wildlife and Parks, Department of Interior
Dr. Ralph Morgenweck, Senior Science Advisor, US Fish and Wildlife Service
Dr. E. William Colglazier, NAS/NRC Executive Officer

(b) (5)

TO: Dr. Tim Ragen
Executive Director
Marine Mammal Commission

FROM: Point Reyes National Seashore, National Park Service

RE: Response to followup datapoint questions

(b) (5)

May 8, 2007 – The datasheet documented 55 harbor seals at subsite OB at 8:55 AM, although only about two dozen at most are visible in the camera image. The seals in the image are at subsite OB at around the same time. Only a portion of the lateral channel is visible, with the connection to the main channel out of the camera view to the right. Not all seals that were recorded on the datasheet are visible in the photos. The seals on OB to the far right and closest to the main channel are missing from the camera view. The attached map includes the approximate location and camera angle in 2007. Also refer to Figure 1 in Becker et al. (2009) which shows the generalized locations of haul out sites OB and UEF.

The datasheet indicates seals were flushed from UEN (34), OB (6+), and UEF (5+) and the camera image only shows part of OB. The associated map created during the field survey shows that seals on subsite OB were separated into three distinct groups (5-08-07 map.pdf). In the images however, only one large group of seals is visible with a few stragglers on the left. Thus, the flushed seals were not seen in the camera image.

May 13, 2007 - NPS harbor seal datasheets document motorboat activity with men transporting oyster bags onto a boat in Drakes Estero on Friday, May 11, 2007. On Sunday, May 13, 2007, NPS harbor seal datasheets documented a motorboat pulling a "barge or platforms" in Drakes Estero.

(b) (5)

March 14, 2008 - The activities documented on the datasheet and recorded by the camera between approximately 12:30 and 1 pm (a motorboat traveling from Schooner Bay to the oyster beds at OB) are consistent. The pinniped monitoring program does not prescribe any time synchronization between volunteer watches as part of the protocol.

(b) (5)

March 23, 2008 – NPS indicated that, "NPS has time stamped images of a DBOC boat present at Drakes Estero on March 23, 2008, also a Sunday". Based on further review, NPS concurs that the object in this image cannot be definitively identified as a DBOC motorboat. There are no datasheets documenting a harbor seal survey on this date.

Mariculture Related Harbor Seal Disturbances in Drakes Estero, Point Reyes National Seashore

	SiteLocation	Month	Date	Time	Subsite	Source	Comments
*	Drake's Estero	3	03/03/1982	12:15	A	JOC	
*	Drake's Estero	3	03/03/1982	12:23	UEN	JOC	
*	Drake's Estero	4	04/30/1982	10:45	A	powerboat	JOC

	SiteLocation	Month	Date	Time	Subsite	Type	Response	Comments
*	Drake's Estero	4	04/07/1996	12:26	A	motorboat	Y	alarm, no flushes
*	Drake's Estero	4	04/07/1996	12:30	UEN	Power boat	Y	Head lifts only
*	Drake's Estero	5	05/04/1996	9:45	UEF	5 p in boat	Y	head lifts; boat close, veered away
	Drake's Estero	5	05/08/1996	12:00	UEF	mtr boat	Y	head lifts only
	Drake's Estero	8	08/17/1996	15:05	A	motorboat	Y	potential - headlifts only
	Drake's Estero	8	08/17/1996	15:35	DM	gr mtrboat	Y	potential - headlifts only
	Drake's Estero	6	06/29/1999	11:03	A	Boat	HA,FW	Motor boat anchored, pulled up net, boat left arter seals rehauled

	Location Name	Month	StartDate	Time	Subsite	Source	SourceSpecific	Response	Comments	Comments
*	Drakes Estero	5	05/08/2003	13:40	A	motor boat	oyster boat	FW	boat came from the oyster farm	
*	Drakes Estero	5	05/08/2003	13:40	UEN	motor boat	oyster boat	HA	boat came from the oyster farm	head alert written into notes, "some HA from UEN seals, but none flushed"
	Drakes Estero	7	07/17/2003	10:06	UEN	motor boat	oyster boat	HA		
*	Drakes Estero	5	05/06/2006	14:05	UEF	motor boat	motor boat	FW	blue yellow, possibly oyster related zipped through the channel and headed in the direction of Johnson's	
*	Drakes Estero	4	04/26/2007	15:50	OB	motor boat	oyster boat	FW	oyster boat and two people, see trip report	remain on sandbar to 16:30
*	Drakes Estero	4	04/26/2007	15:50	UEN	motor boat	oyster boat	HA	oyster boat and two people, see trip report	remain on sandbar to 16:30
*	Drakes Estero	4	04/26/2007	16:10	OB	motor boat	oyster boat	HA	oyster boat and two people	remain on sandbar to 16:30
*	Drakes Estero	4	04/26/2007	16:55	UEN	motor boat	oyster boat	FW	oyster boat and two people	
*	Drakes Estero	4	04/26/2007	16:55	OB	motor boat	oyster boat	FW	oyster boat and two people	
*	Drakes Estero	4	04/29/2007	12:50	UEN	motor boat	oyster boat	F	mom and pup flushed when boat accelerated toward bull point from N end of OB after throwing out bags	
*	Drakes Estero	4	04/29/2007	13:40	UEN	motor boat	oyster boat	FW	boat returned, threw more bags out and left	
*	Drakes Estero	5	05/08/2007	08:45	UEN	motor boat	oyster boat	FW	directional path of boat described on form	
*	Drakes Estero	5	05/08/2007	08:45	OB	motor boat	oyster boat	FW	directional path of boat described on form	
*	Drakes Estero	5	05/08/2007	08:45	UEF	motor boat	oyster boat	FW	directional path of boat described on form	
*	Drakes Estero	3	03/14/2008	12:33	UEN	motor boat	oyster boat	FW	Engine noise oyster boat grayish, beat up, 1 man and 2 children	taking bags to boat; all seals left site by 13:25
	Drakes Estero	12	12/10/2008	15:15	OB	motor boat	clam boat	HA	boat noise from the boat that picked up the 3 clammers from OB. Observer took photos.	
	Drakes Estero	6	06/03/2009	15:45	OB	motor boat	oyster boat	FW	small inflated rubber boat	

(b) (5)

131

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:21 PM
To: McCoy, Lytashia
Subject: Fw:
Attachments: DE_Motorboat_Disturbances_2006_2009.pdf

Delivered by SOL Blackberry Services

----- Original Message -----
From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:38:59 2010
Subject:

Most of the data I sent in the previous emails will be of little interest.

(b) (5)

DE_Motorboat_Disturbances_2006_2009
All motorboat related disturbance datasheets in which a head alert, flush, or flush water was recorded in 2006-2009 from the volunteer harbor seal monitoring program at Drakes Estero. Includes associated count data.

(See attached file: DE_Motorboat_Disturbances_2006_2009.pdf)

(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5530 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: 5/6 Day of Week SAT Year 06 Location: DRAKES ESTERO

Start Time: 12:00 End Time 15:30 Observers [redacted]

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N Low Tide Level closest to survey time 13:41 . 0, 13:41

# of White Pelicans: 0 # of Brown Pelicans: 0 All subsites surveyed? (Y or N) Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bites	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
13:15	DB	[redacted]50	17	67	0	0	—	N		
	DEM	84	[redacted]15	99	[redacted]0	0	—	N		
	L	188	—	188	2	1	—	N		# of pups too hard to tell.
	A1	[redacted]70	[redacted]33	[redacted]103	0	2	0	N		
	A	132	83	215	0	1		N	[redacted]al, 2038	
	AB	—	—	0	—	—	—	N		
	UEN	[redacted]15	7	22	0	0	—	N		
	CB	149	48	197	0	1	—	N		
	UEF	—	—	24	—	—	—	Y		BLUE/YELLOW MOTOR BOAT
		033 [redacted]	203 [redacted]			½				
1430	DB	33	17	[redacted]50	0	1	—	N		
	DEM	82	17	102	0	0	—	N		
	L	264	—	264	—	[redacted]	—	N		# pups too hard to see
	A1	106	52	158	0	1	0	N		
	A	130	66	196	0	1	0	N		
	AB	—	—	0	—	—	—	N		

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITE: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: 5/6 Day of Week SAT Year 06 Location: DRAKES ESTERO

Start Time: 12:30 End Time 15:30 Observers: (b) (6) [redacted]

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N Low Tide Level closest to survey time 13:41

# of White Pelicans: 0 # of Brown Pelicans: 0 All subsites surveyed? (Y or N) Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bites	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
15:00 UEN	UEN	13	6	19	0	0	—	N		
OB	OB	156	60	216	0	2	—	N	784 [redacted] 215 p	
UEF	UEF	—	—	0	—	—	—	N		
		[redacted]	218			6				
		754								

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITE: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, **DEM**=Drakes Estero Mouth, **OB**=Oyster Bar, **UEF**=Up Estero Far, **UEN**=Up Estero Near, **L**=Limantour Spit, DB=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack) **Tomales Point** (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island) **Bolinas Lagoon** (**KI**=Kent Island, S=Seadrift, **PWI** = Pick ther) **Duxbury Reef** (**DUX**=Duxbury Reef

Site: DE Time: 14:50 A: [redacted] 754 P: 218

T: [redacted] 1002 dPup: 0 Red: 6 SB: 0

Disturbed: (Y)/N Comments (Y)/N

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/6 **Year** 06 **Location:** DRAKES ESTERO **Observers:** (b) (6) [redacted]

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
4:05	MOTORBOAT	24	UEF	FLUSHED	24	0	0	24	NO	BLUE YELLOW
									REHAUL	MOTORBOAT
									IN 30 MIN.	OYSTER-RELATED?
									—	ZIPPED [redacted]
										THROUGH THE
										CHANNEL AND
										HEADED DIRECTION
										JOHNSON'S

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: 4/26 Day of Week _____ Year 07 Location: DRAKES ESTERO

Start Time: 345 End Time 500 PM Observers: (b) (6), (b) (7)(C)

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N Low Tide Level closest to survey time _____

# of White Pelicans: 0 # of Brown Pelicans: 0 All subsites surveyed? (Y or N) Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bites	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
345 PM	L	70	13	83	1	0	N			
	DEM	21	8	29	0	0	↓			
	DB	75	18	93	2	0	↓			
	A1	104	65	169	0	2				
	A	26	19	45	0	0				
	UEN	54	0							
		139	120	313	1	2		Y		
	OB	3	2	5	0	0		Y		
	UEF	11	2	13	0	0		N	750 (247 PUPS)	
430	L	69	16	85	1	0				
	DEM	23	10	33	0	0				
	DB	65	22	87	3	0				
	A1	108	67	175	0	2				
	A	30	20	50	0	0				

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITE: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef

POINT REYES NATIONAL SEA ..ORE HARBOR SEAL SURVEY

Date: 4/26 Day of Week _____ Year 07 Location: DRAKES ESTERO

Start Time: 3:45 End Time 5PM Observers: [redacted]

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N Low Tide Level closest to survey time _____

# of White Pelicans: 0 # of Brown Pelicans: 0 All subsites surveyed? (Y or N) Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bites	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
430	UEF	18	2	20			0		[redacted]	SEE TRIP REPORT
	UEN	197	116	313	1	2	0	Y	769 (255p)	
	OB	4	2	6				Y		

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITE: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/26/07 **Year** 07 **Location:** DRAKES ESTERO **Observers:** (b) (6), (b) (7)(C) [redacted]

Time	Source * ex. human →	Number of disturbance ex. 3	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
350	BOAT	1	OB	FW	?			4		OYSTER BOAT
			VEN	HA						+ 2 PEOPLE
										SEE TRIP
										REPORT
410	BOAT +	2	OB	HA						REMAIN ON
	PEOPLE									SANDBAR TO
										438
455	BOAT	1	OB	FW	6	1	0	5		
			VEN	FW	313	307	113	6		
				HA	075					

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*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

Trip Report
Drakes Estero
4/26/07
3:45-5:00 PM

(b) (6) **Science Advisor**

I conducted a field survey of Drakes Estero on Thursday during the afternoon low tide to count harbor seals for the peak pupping season count.

I arrived at 3:45 PM and began counting the seals at A and A1 sandbars. At 3:50 PM I noted a white boat (@20 ft long) with outboard motor and two people aboard in the east end of the OB seal haul out site. The boat was fowled in eelgrass and the operators were poling through the eelgrass bed. Once half way along the channel going west, they used the engine again. I did not see the number of seals present before the boat was there; however there were only 5 (2 pups) when I began surveying and I saw seal heads in the water. There were seal drag marks on the sand bar indicating other seals may have been present and several fresh wet seals were hauling out on UEN, an adjacent sand bar. Also on previous day 4/25, a volunteer counted 21 (8 pups) on the OB haul out. When the boat went by the seals at 3:55 PM, all flushed into the water except one lone seal. Seals on UEN raised their heads but I did not see any enter the water. The boat continued west along the channel and flushed around 120 Black Brant that were in the eelgrass beds in the channel.

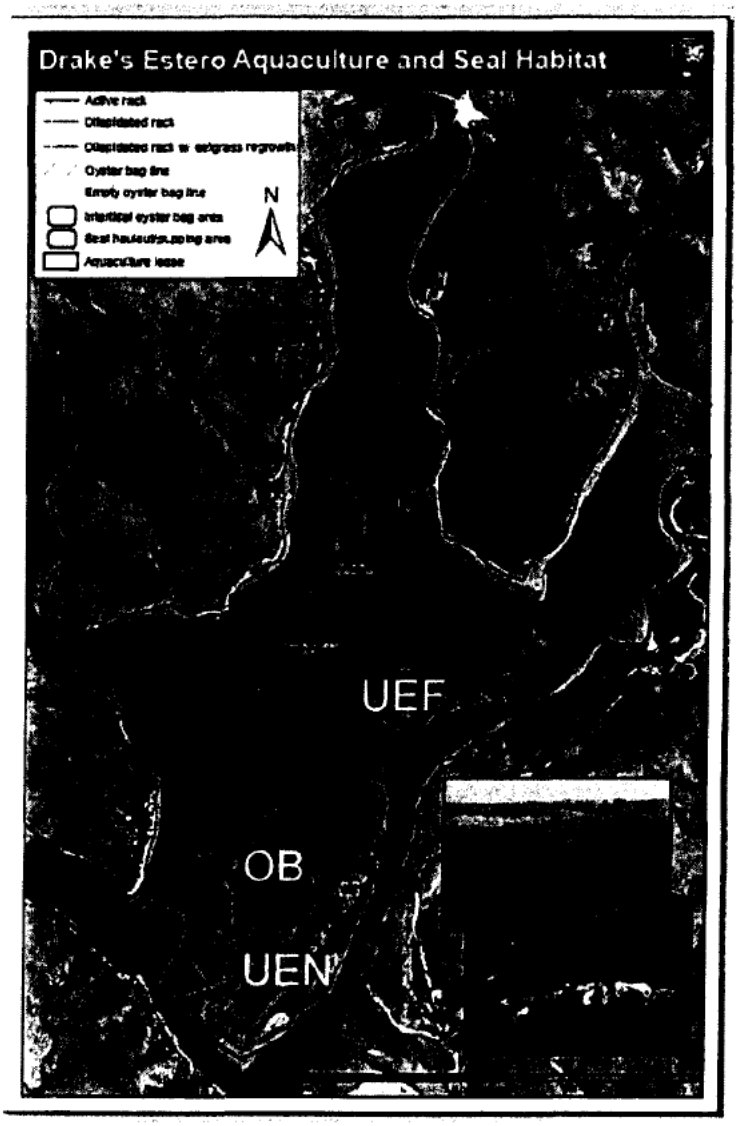
The boat then landed at around 4:10 PM about 2/3 of the way along the channel going west on the OB channel on the north west side where many oyster bags are located. Two men got off the boat, one taller in a green slicker and another in yellow slicker pants. They remained on the site until around 4:38 OM. During this time, they checked bags and added around 30 more bags onto the sandbar on the north west side of the sand bar and closer to the seals. During the interim time, 6 (2) seals hauled out at OB. When the boat proceeded back down the channel going east towards the seals at 4:55 PM, 5 seals flushed into the water included 2 mother-pup pairs at OB, another 3 mother pup pairs flushed at UEN sand bar, and around 75 seals alerted at UEN but did not enter the water. Additionally, around 200 black brant were flushed that were in the eelgrass beds in the channel after previously being flushed by the boat. At 4:58 PM, the boat then proceeded up into Home Bay. I terminated the survey at 5:00 PM.

A total of around 90 seals including around 50 pups were disturbed by the boat, and of these, I observed 14 seals including 7 pups directly flushed into the water. From previous research, we know that females with pups are more disturbed than adult males or immature seals. Additionally, around 320 black brant were flushed while in eelgrass beds.

During surveys of the estero, I again observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because this is the peak pupping season, mothers with pups are hauling out all over UEN, including near where the oyster bags are

located. There also appeared to be more bags on UEN, in addition to the bags added to OB today. Again, the bags were adjacent to and directly on the haul out sites where the seals historically hauled out in the past three decades of surveys that I have conducted.

Map of Drakes Estero – red circle indicates where seals and Black Brant were disturbed.



POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Page 1 of 1

Date: 4/29 **Day of Week** SUN **Year** 2007 **Location:** Drakes Estero

Start Time: 9:30 **End Time** 4:00 **Observers:** (b) (6) [redacted]

Weather: Visibility (1,2 or 3) 1 **Rain (Y/N)** N **Low Tide Level closest to survey time** 16:25 (1.4)

# of White Pelicans: 0 **# of Brown Pelicans:** 0 **All subsites surveyed? (Y or N)** Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
1415	A	13	12	25	0	0	0	0		
	L	103	30 (est)	133 (all)	0	0	0	Y		flush in middle of count
	DLm	6	4	10	0	0	0	0		see disturbance sheet
	DB	25	17	42	0	0	0	0		
	A1	183	62	245	0	1	0	0	751	
	UEN	178	67	245	0	3				POOR CONTED
	OB	26	9	35				0		
	UEF	13	3	16						
										3:15

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

***SUBSITES:** **Drakes Estero** (**A**=A sandbar, **A1**=A1 sandbar, **DEM**=Drakes Estero Mouth, **OB**=Oyster Bar, **UEF**=Up Estero Far, **UEN**=Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack) **Tomales Point** (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island) **Bolinas Lagoon** (**KI**=Kent Island, **S**=Seadrift, **HWY1**= Highway 1 channel, other) **Duxbury Reef** (**DUX**=Duxbury Reef)

FOR OFFICE USE ONLY: Site: DE Time: 1415 A: 547 P: 204 T: 751

dpup: 2 red: 4 sb: Disturbed: (Y)N Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/29 **Year** 2007 **Location:** Drakes Estero **Observers:** (b) (6) [redacted]

Time	Source * ex. human →	Number of disturbance ex. → 3	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
1250	motor boat	1	UEN (left)	F	6	5	1	0	→	mom + pup flushed
1300	human	11	L	NR	104	84	20	0		when boat accelerated
										toward Bull Point
										from N. end of OB channel
										after throwing out bags
1300	kayak	4	L	NR	104	84	20	0	→	kayaks hauled out
										on N side of L IN
										Dem channel
1340	motor boat	1	UEN (left)	FW	9	4	3	2	?	boat returned, threw more bags
										left again (see above)
1415	human	2	L	FW	100+	45		50+	N	hikers flushed *
										seals during count
1445	airplane	1	UEF	NR ?	16				?	flying east over
										south side, low
										and loud
1504	airplane	1	all	head alert DB						see other side

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*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

** * need signs!

entered checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: 5/8 Day of Week Tu Year 07 Location: DE

Start Time: 8:45 End Time 10:35+ Observers: (b) (6) [redacted]

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N Low Tide Level closest to survey time 10:06/-0.3 -0.4 1037

# of White Pelicans: 0 # of Brown Pelicans: 0 All subsites surveyed? (Y or N) Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturbance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
									845 40 P	EXTREME heat!! Blur heat conditions in Estero sites.
8:48	UEN	72	50	122	0	1	N	Y	26 122	BOAT @ 8:45 just as E arrives
8:55	OB	42	13	55	0	0	N	Y	55	#'s + | East Ch. only 4 by the
8:57	UEF	18	5	23	0	1	N	Y	23	white stack East this time
9:05	A1	114	78	192		0		N	192 78	
9:08	L	105 (15)	78 (35)	191		0		N	191 25	Blur conditions UEN/OB/
9:15	DEM	67	25	92		0		N	92 675	UEF @ time of day I
										Was there - A.M. is Tough to
9:20	UEN	103	58	161		1		N	161	See all only SUE DEM/ L
9:25	OB	38	21	59				N	59	
9:30	UEF	20	8	28		1		N	28	
9:33	A1	122	86	208		2		N	208	
9:36	L	185 (38)	49 (13)	234		0		N	49 234	
9:43	DEM	78	15	93		0		N	393	
									152	
									327	

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITES: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef)

FOR OFFICE USE ONLY:	Site: DE	Time: 0920	A: 546	P: 237	T: 783
dpup:	red: 4	sb:	Disturbed: Y/N	Entered	Checked

Time w 2 mm derive.

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: 5/8 **Day of Week** Th **Year** 07 **Location:** DE

Start Time: 8 45 **End Time** 10:35+ **Observers:** (b) (6) [redacted]

Weather: Visibility (1,2 or 3) 1 **Rain (Y/N)** N **Low Tide Level closest to survey time** 10:06/-0.3 -0.4 1037

# of White Pelicans: 0 **# of Brown Pelicans:** 0 **All subsites surveyed? (Y or N)** Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour P	Comments
										3 Boats Seen during time @ Site
9:47	UEN	102	60	162	NO	1	~~09~~	N	162	1 P/F @ Bays East side
9:53	OB	36	24	60		0			24 60	Boat Arrives Again but in West
9:55	UEF	19	12	31		1			31 12	Channel Clearing Rocks moving
9:57	A1	125	86	211		2			211	Boat To Far Down OB
10:02	L	(146) 87 63 31	15 (46)	191		0			191	
10:13	DEM	71	16	87		0			87 742	
										11:40
10:11	UEN	103	70	173		1		N	70 173	But 2nd Time boat in West
10:19	OB	38	21	59		0		N	59	Channel - Stopped on OB bay
10:21	UEF	24	8	32		1		N	32	2 Bays put on OB Side
10:24	A1	102	62	164		2		N - Y @ 5	164	11:38 AM Ultralight
10:28	L	55 140 36	(35)	175		0		Y	175	3 Ultralights Down Channel
* 10:35	DEM	74	12	86	✓	0	↓	Y	86 689	Bay - few ft. above Water, Curled, Ground Alt. Tide
									106 476	
									+153 +327	4 Humans on DB - 20 Min. Apart 2 couples.
									P. 258 803	

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITES: **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef)

FOR OFFICE USE ONLY:	Site: DE	Time: 0920	A: 546	P: 237	T: 783
dpup:	red: 4	sb:	Disturbed: (Y)/N	Entered	Checked

Survey sheets

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/8 **Year** 07 **Location:** DE **Observers:** (b) (6) [redacted]

OVER

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										Saw Boat @ 840 Before I was @ site + setup - it traveled slowly + hugged land then he
8 45	Oyster Boat		UEN/OB UEF	HA/F/FW	156/61/28	46/30/3	47/unk/ unk	34/6+/5+	Y - 30 min	nosed + headed boat 100-150 ft maybe toward UEN then left,
					1P/1F in UEN by Bays East channel					East side approached in channel - [illegible] just looking @ sandbar/seals
10:40	2nd Time Oyster Boat		OB	0	No Disturb. 123	123	20	0	—	Down West Channel to
							Trying to look @ them all [illegible] planes that were [illegible]			Minus Low Tide near peak - pulled onto
										OB Sandbar w/ 2 lg Bags - left them +
										left 11 30 + backup channel.
10:55	Aircraft		A1	HA/FW	164	unk heads in water & DEM/DB	unk DB L DEM	unk. 25-50	left 10-15 min.	To Schooner Bay - [illegible]
10:55-11 00	3 Aircraft		L/DB/DEM	HA/FW	175/86	1/5	0/1	174/81	Y-25 min / 18-25 min	DEM came few ft. above
11:05	Landed on L	Called	Dispatch - Rangers headed	out to Lim. The 3 Planes left						water from Drakes Bay/
		Approx. 11 20 flew around Lim/DEM some more then down L. Bch + East.								West - circled 3-4 times then were
		Did they go down PRS - Tomales Bay - Any witnesses?								3 landed on Limantour near
										end of beach + ultralite
11:10	M/F	3	DB/DEM	aircraft FW	5	19	1	by aircraft	Y 10-15 min	Couple saw seals @ distance + left far away + sat down on DB.
11:25	M/F	3	DB/DEM	HA/FW	19	8	?	11		M/F kept walking until seals left sandbar -

Spoke to them @ pkg. lot much later!!

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

1 yellow plane not like other 2 ultralites - pilot wore yellow short sleeve shirt/shorts.
1 ultralight Blue + orange trim - pilot dark clothes
1 ultralight Blue w/ Blk. engine + orange "spot" on front of engine - dark clothes -
All out of planes. I took Dig. Pic but computer chip froze after 1st shot + wiped out all images. BUMMER!

FOR OFFICE USE ONLY:	
Entered	Checked

(2) ~40 I Saw 2 Boats in DE bu[illegible] ing 1 Came down into the East S[illegible] Channel Estero – Other boat no problems went into I Think Home Rch estero.

This boat 1 operator – hugged Land on East side Then nosed boat + moved Toward UEN – Looking @ I don't know what but appeared The Seals on Sandbar – he was Further away From the Bags on UEN but where the Main Colony of Seals were hauled OUT. Thus Flushing Some Seals. UEF + OB had some disturbances while boat came down Eastside Channel + Returned same channel back to Oyster Bldg. in Schooner Bay.

There was 1 Pup / 1 Female whole Time during survey @ Bag area undisturbed – This is further West From Above Mentioned "Main Colony" group @ UEN.

S 1810) Survey oyster boats rules -0 3 11 22 n m

DRAKES ESTERO

Map of Drake's Estero haul out sites. Sub-sites include: L = Limantour Spit, DEM = Drake's mouth sandbars, DB = Drake's Beach, sandbars attached to land A1 = sandbar next to main haul out, A = sandbar main haul out, AB = back of A sandbar, UEM = Upper Estero Middle, OB = Oyster Bar, UEF = Upper Estero Far. X=Observation Point.

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 03/12 Year 08 Location: DE Observers: (b) (6)

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1145	U	U	L	FW	62	0	0	62	N	Did not observe disturbance - Seals were there @ 1145 & gone @ 1145

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickle Weed Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Page 1 of 2

Date: 3/14 **Day of Week** F **Year** 08 **Location:** DE

Start Time: 11:55 **End Time** 1:25 **Observers:** [redacted]

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N **Low Tide Level closest to survey time** 2:11 / -0.3

# of White Pelicans: 0 **# of Brown Pelicans:** 0 **All subsites surveyed? (Y or N)** Y

a gorgeous Day perfect to Count

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturbance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
										A1 1 Dead Seal [redacted] Vulture eating
11:55	A1	187	0	187	0	0	0	N	187	2 People near HS walking
	L	26	0	26				N ?	26	Away when I was arriving
	UEN	19		19				N		3 HS came on A1 from L
	UEF	10		10				N		UEN HS appear nervous -
										Constant edge to water line
12:25	A1	189		189						12:30 - 1ish outhd. Boat - 3
	L	27		27					27	Oystermen West Side
	UEN	19		19					19	OVER →
	UEF	13		13						
12:55	A1	96		196						
	L	22		22						
	UEN	15		15						HS heard Engine Noise
	UEF	23		23						
1:25	A1	218		218					218	
	L / UEN	22		22						all left site UEN after
	UEF	24		24					24	12:55 NO Seals due TO

TOTAL 288 Disturbance noise ?

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

***SUBSITES**: **Drakes Estero** (**A**=A sandbar, **A1**=A1 sandbar, **DEM**=Drakes Estero Mouth, **OB**=Oyster Bar, **UEF**=Up Estero Far, **UEN**=Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack) **Tomales Point** (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island) **Bolinas Lagoon** (**KI**=Kent Island, **S**=Seadrift, **HWY1**= Highway 1 channel, **PWI** = Pickleweed Island) **Duxbury Reef** (**DUX**=Duxbury Reef)

FOR OFFICE USE ONLY:	Site:_____	Time:_____	A:_____	P:_____	T:_____
dpup:_____	red:_____	sb:_____	Disturbed: Y/N	Entered EF 3/17	Checked

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments

1) man White Jacket / Red Shirt ① Female - lg. Blk hair Child

Helm / other Dark Jacket Blue - male or Female w/ hood ~~[illegible]~~ man in White Jacket and all [illegible]

Taking Bags to Boat — 4-6 Behind HEN West channel approach

Other 2 Stayed in boat & looked like Children or Mother + Child ??

He Left 12[48] From HEN West

Side, Boat [13] Beat up - Port + STARBD - Side (dark)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/14 Year 08 Location: DE Observers (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										Engine Noise
12:33	MotorBoat	M.BT	UEN	HA/FW	19	15	—	4	N/1255	Oyster Boat Grey Hull Boat up - 1 man + 2 Children on Beach 1 Child in Red. Other in Blue hood jacket headed Tull

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

To Send Dig. # 449|451 Dead Pup
To S. " 454|456|457 clamming Lunny's men on OB

I gave (b) (6), (b) (7)(C) Copy of these sheets 12/12/08

Dlle - changed time to 15 min after start of last survey

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Page 1 of 2 Distu sheet

Date: 12/10 Day of Week W Year 08 Location: DE

Start Time: 1:45 End Time 3:50/6:00 Observers: (b) (6)

Weather: Visibility (1,2 or 3) 1 Rain (Y/N) N Low Tide Level closest to survey time 5.35 -1.1 @ G.G 4:20 DG

# of White Pelicans: 75 # of Brown Pelicans: 0 All subsites surveyed? (Y or N) Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
										Loud mouth 2
1:45	A1	281	1	282	1	1	0	Y	282	Fishermen @ DB Tip HA
2:15	A1	266	-	266	-145	1	0	N	266 Digital	Dead Newborn Pup hidden by F.
	OB	10	0	10	0	0		Potential	10	Gull came + stonted pecking + Put
										it away From F.
2:45	A1	265	-	265	-145	1		Y	265	3 Lunny men clamming OB Tip area
	OB	11	0	11	0	0		N	11	Dropped off Waded on OB - 9 way
										Boat. Also saw 9 men on boat push
										"Raft" to Racks. Drive left along
										UEF
3:15	A1	273	-	273	-1:45	1		N	273	Boat Noise Came To get 3 Clam.
	OB	11	0	11	0	0		N + Y	11	men on OB Took Digital When
								maybe heard - DNB		Sandbar exposed + clam. diggers
3:45	A1	275	-	275	-	1		Y	275	- DB Fishermen To Estero Across A
	OB	11	0	11	0	0		N	11	Boats Activity could affect HS
										haulout on UEF.
unkFam	HS. @	L/DEM/DB	before I Arrived	Caused by Disturbances					-	Black Buoy w/ yellow Line
										still Betw. UEN + A - Since
										before Nov. Survey.

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

*SUBSITES: **Drakes Estero** (A=A sandbar, **A1**=A1 sandbar, **DEM**=Drakes Estero Mouth, **OB**=Oyster Bar, **UEF**=Up Estero Far, **UEN**=Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack) **Tomales Point** (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island) **Bolinas Lagoon** (**KI**=Kent Island, **PWI**=Pickleweed Island, **HWY1**= Highway 1 channel, other) **Duxbury Reef** (**DUX**=Duxbury Reef)

FOR OFFICE USE ONLY: Site:_____ Time:_____ A:_____ P:_____ T:_____
dpup:_____ red:_____ sb:_____ Disturbed: Y/N Entered Checked

*0 Sent Digital Shots To Sarah Allen
= 449/451 Dead Pup + Gull eating
* 454/456/457 Lunny's Clammers & OB

Survey + this Sheet

Page 2 of 2

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 12/10 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
									Women Flushed 75
1:40	L	Human	White Pelicans	75	—	—	—	—	White Pelicans Roosting
* 1:40	OB-E-Channel M.B.		-o-	-o-	-o-	-o-	-o-	-o-	Grey MB drop 3 Men with
	Lunny Men								Shallow Water To OB - Waded
									To OB Sandbar Covered in Wet
1:45	DB	Human	HA Constant during survey	281	281	—	-o-	—	I Didn't Know why the Rocks
								→	2 Loud Mouth Fishermen
1:40	Sunset Bch	Hum	-o- Potential -o-	-o-	-o-	—	-o-	—	2 Women Walk Shoreline
									w/ Tripod + Camera - 2:55 left
* 2:15	OB	Human	Potential Dist.		10	—	-o-		3 Men have Full Use of
	Lunny Men			Took Digitals (Very Far For Limited Lens)					OB Sandbar Grey Water
3:15	OB	MB	HA	11	11	— * May have heard M.B. Boat to pick up 3 Clammers			Are Clamming Distance
									From H.S. on OB -
3:45	A1	Human	HA/F/FW	275	40	—	235	N	DB Fishermen Walk Down
									Estero Bch Seals F + FW
									I Was leaving @ 355

Phocafrm.doc 4/17/01

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; AB=Backof A sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point Oceanside (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water;

OVER →

@ 3.15 - Boat/man grey-work up - came in [illegible] up - worked on sandbar - green packed
Green top baits. Talked to 3 Clamm. USED clam "Plugger" T (Tubes)
2 Clammers (oyster employees Lunny) in black wet suits - 1 w/ blue strip both Tan
Caps (baseball)
1 Clammer - No cap no wet suit Dk-green pants, Blk. Top rolled up sleeves

3:25 - All loaded on boat + Left For Drakes Oyster Beds.
w/ 3 Lg. white buckets + 3 "Clamming Pluggers" whatever I called.

Abt. 3:45 - A grey boat (pushing "a raft") w/ 9 men Standing dropped off @ Rocks Above
UEF + were still working @ 3:55 when I Left Sight. (8 men)
A grey boat Also Cruised Down West Channel beyond Barries Bay.

THERE ARE MANY, many Oyster Racks Above UEF + Towards Home
Bay - All over upper Estero - a - 1-1 Showed every thing in the
Estero.

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: June **Day of Week** 3 **Year** 2009 **Location:** DE

Start Time: 1430 **End Time** 1600 **Observers** (b) (6) [redacted]

Weather: Visibility (1,2 or 3) 1 **Rain (Y/N)** N **Low Tide Level closest to survey time** 1.9 @ 15:30

# of White Pelicans: 76 **# of Brown Pelicans:** 1 **All subsites surveyed? (Y or N)** Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
1430	A			0						
	A1	28		28		1				3 pups
	DEM			0						
	OB	45		45		1	1?			Saw 2 pups. One adult
	UEF			0						blood red at head
	UEN			0						[illegible] of [illegible]
	L	175		175						[illegible] to sit [illegible]
	DB			0					248	Dive. Didn't look or [illegible]
1500	A			0						
	A1	30		30		1				4 Pups
	Dem			0						
	OB	56		56		1	1			3 pups
	UEF			0						
	UEN			0						
	L	175		175						
	DB			0					361	

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

***SUBSITES:** **Drakes Estero** (**A**=A sandbar, **A1**=A1 sandbar, **DEM**=Drakes Estero Mouth, **OB**=Oyster Bar, **UEF**=Up Estero Far, **UEN**=Up Estero Near, **L**=Limantour Spit, **DB**=Drake's Beach) **Double Point** (**SB**= South Beach, **NB**=North Beach, **NBR**=North Beach Rock, **TP**=Tide Pools, **SP**=South Point, **SS**=Stormy Stack) **Tomales Point** (**BR**=Bird Rock, **RB**=Rope Beach, **TRB**=Two Rock Beach) **Tomales Bay** (**SI**=Seal Island, **CI**=Clam Island, **HI**=Hog Island) **Bolinas Lagoon** (**KI**=Kent Island, **PWI**=Pickleweed Island, **HWY1**= Highway 1 channel, other) **Duxbury Reef** (**DUX**=Duxbury Reef)

FOR OFFICE USE ONLY: Site:____ Time:____ A:____ P:____ T:____

dpup:____ red:____ sb:____ Disturbed: Y/N Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY

Date: June **Day of Week** 3 **Year** 2009 **Location:** PE

Start Time: 1430 **End Time** 1600 **Observers:** (b) (6) [redacted]

Weather: Visibility (1,2 or 3) 1 **Rain (Y/N)** ___ **Low Tide Level closest to survey time** 1530 @ 1.9

# of White Pelicans: 126 **# of Brown Pelicans:** 5 **All subsites surveyed? (Y or N)** Y

Time (Survey every ½ hr)	Sub-Site*	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments
1530	A			0						
	A1	29		29		1				4 pups
	DEM			0						
	OB	67		67		1	1?	Y		3 pups
	UEF			0						
	UEN			0						
	L	212		212						
	DB			0					508	
1600	A			0						
	A1	29		29		1				4 pups
	DEM			0						
	OB	56		56		1	1?			3 pups
	UEF			0						
	UEN			0						
	L	142		242						
	DB			0					327	

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count.

***SUBSITES:* Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)**

FOR OFFICE USE ONLY:	Site:_____	Time:_____	A:_____	P:_____	T:_____
dpup:_____	red:_____	sb:_____	Disturbed: Y/N	Entered	Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: June 3 Year 2009 Location: DE Observer: (b) (6) [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
845	Motor Boat	1	OB	FW	67	56		11	N	Small inflated rubber boat
										There were 3 diff
										groups on DB
										one had 48
										one had 1
										one had 18.
										The group with
										18 did the FW
										11 into water
										Time: Seal on
										land

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered 6/11/09

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:21 PM
To: McCoy, Lytashia
Subject: Fw: scanned datasheets - email 8 and final
Attachments: Upper_DE_Disturbance_2008_2009.PDF

Delivered by SOL Blackberry Services

----- Original Message -----
From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:45:47 2010
Subject: scanned datasheets - email 8 and final

(b) (5)

Upper_DE_Disturbance_2008_2009
All disturbance datasheets in which a head alert, flush, or flush water was recorded in 2008 and 2009 from a pilot study from the Estero Trail at Drakes Estero. Includes all disturbance sources, such as hikers, airplanes, birds, boats, etc.

(See attached file: Upper_DE_Disturbance_2008_2009.PDF)

(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5530 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/6 Year 08 Location: Drakes Estero Observers: (b) (6)

Time	Source *	Number	Sub-Site ** UEM= UEN	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
2:55	Turkey Vulture	1	UEM	FW	13	3	—	10		Didn't stay long enough to check for rehaul

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/7 **Year** 08 **Location:** Drakes Estero **Observers:** (b) (6) [redacted]

Time	Source *	Number	Sub-Site ** UEM= UEN	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
4:05	Unknown		UEM	FW	17	11	—	6	N	combined to 1 event
4:06	"		UEM	FW	11	6	—	5	N	
										3:40 boat activity in bay ↓ No disturbance

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

Oyster Activity data sheet Record #

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/11 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
10:55	Boat	1	UEF	HA	26	26	—	Ø	—	4-5 animals head alert

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/13 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time ✱ comments on back	Comments (vessel/aircraft identification)
3:21		Unknown*		UEF	FW	22	12	—	10	Y ✱A.	3 Allen saw boat in Home Bay. This is not in any view from my location.

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

1) 3:21 disturbance (cont.) comments - 2 seals rehauled at 3:30. 2 seals rehauled at 3:40. 2 more at 4:0

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/14 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site UEM= UEN	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:02	—	Unknown		UEM	HA/F/FW	18	17	—	1	N	5 Seals flushed, 4-5 head alert
1:15	—	Unknown		UEM	FW	15	0	—	15	N	Did not see it happen. Was changing camera car.

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/18 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Recover Activity Data Sheet

	Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
4	1:45	2min	Boat	1 Motor boat	UEN	HA/slight move	25	25	—	0	—	6 HAs, 67 moved slightly when motor started
0	3:19	15 min	Possible boat	Possible Disturbance	UEF	HA	8	12 (4 seals hauled)	—	0	—	couldn't see boat in Home Bay. Possible disturbance
7	4:46	6 min	Motor boat		UEF	HA	17	17	—	0	—	3 HAs

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

* more description on oyster activity sheet.

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/14 Year 2018 Location: Drakes Estero Observers: (b) (6) [redacted]

Activity Sheet #	Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
2	2:00	2min	Motor boat		UEN	HA/slight movt	17	17	0	0	—	

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/24 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:20	—	2 Birds	Seagulls	UEN	HA	22	20	2	0	—	2 HAs when birds got ne pup

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/26 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:48	—	Birds	Seagull noises	UEN	HA	~~HH~~50	44	6	—	—	4 HAs. only affected 2 southern groups of UEN.
10:52	-	Unk		OB	HA	28	27	1	—	—	6 HAs. Not sure if source was birds or seal coming ashore.
11:18	—	1 Bird	Seagull walking by seal	OB	HA	28	28	—	—	—	1 HA

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/27/08 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Activity Data Sheet

	Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1	12:53	seconds	Motor boat		UEF	HA	6	6	—	—	—	3 HAs when boat went into Home Bay
7	1:29	3 min	Motor boat		UEF	HA	6	6	—	—	—	2 animals each had 2 HAs. Boat was moving up Schooner Bay
	1:37	2 min	Many birds	Birds diving into water	UEF	HA/F	6	6	—	0	-	(four)
	2:01		~100 birds	Cormorants resting on EEN	UEN	F	12 only the SE group	10	2	0	—	1 animal multiple HAs, 1 animal single HA. 1 animal flushed towards group.
												1 animal flushed. Birds surrounded animals.
	2:15	< 1 min	Flock of birds	Blk brants flying overhead	OB	HA	31	30	1	0	—	3 HAs.
	3:34		Unk		OB	HA/F	34	33	1	0	—	4 HAs, 1 Flush

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/31 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
2:23	1-2 min	1 Bird	Raven walking around seals	UEN	FW/F	84	68	13	3	Y(2:32)	Had 5-6 animals flushed when raven walked near them

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/1/08 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:43	1-2 min	~20 Birds	Seagulls after something in water	UEN	FW	~~82~~	~~65~~	~~11~~	6	Y(12:45)	
1:09	2-3 min	1 Raven	Walking around seals	(UEN) ~~UEN~~	FW	11	1	1	9	N	Bird stayed around pup. Mom left pup
2:50	~2 min	1 Bird	Seagull pecking at pup	UEN	FW	91	72	15	4		Flush on land also (4 ani...

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/2 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/ai identifica
1:31	—	Unk		UEN	HA	~~88~~ 87	68	19	0	—	8 HAs, possi caz of birds
2:10	—	1 Bird	Turkey Vulture walking near seal	~~UEN~~ ?	FW	8	0	0	8	N	might have rehauled ou
3:48	<1 min	Unk *		UEN	~~F~~ F	79	64	15	0	—	Possibly mot but or bird

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/10 Year 2008 Location: Drakes Estero Observers: [redacted]

Activity date sheet	Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
2	10.07	~1 min	Motor boat	1 boat travelling near seals	UEF	FW	12	6	—	6	Y 1@10:15	boat travelling from bed 7 down route 5
4	1:45	~1 min	1 Motor boat	travelling near seals	OB	HA	58	50	8	0	—	5 HAs

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/21 Year 2008 Location: Drakes Estero Observers (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/air identificat
3:48		Unk		OB	FW	30	8	4	18	Y, 3:55	[redacted]

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head-alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY 1 of 1

Date: 4/23 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/air identifica
1:12	2 min	~100 Birds	Cormorants landing in water and land near seals	OB	FW	120	62	20	24 adults, 21 pups	Y (1:20)	No pups left alone

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/1/08 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/air identificat
12:45		Aircraft	2 planes, not turbo, not loud	UEN	F	210	130	80	0	—	6 ad, 6 pups flushed ~15 ft As

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/13 Year 2008 Location: Drakes Estero Observers: [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comm (vessel/ai identifica
12:07		Unk		UEN	FW	41	16	6	10 Ad/4 pups	Y-12:14	Saw seals flush into
1:41	~2-3 min	~100 Birds	Lg flock of birds flying/circling around seals	OB	F	~~68~~ 72	43	29	0	—	water, but didn't see disturbance source.
											5 seals flushe
1:41		~100 Birds	"	UEN	F	50	26	24	0	—	6 seals flushed

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/14 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/air identificat
11:44	<1 min	Helicopter	low flying helicopter	UEN	FW	30	X 11	2	9 Adults/ 8 pups	Y (11:52)	white helicop

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/15 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Record # from oyster activity data sheet

	Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/air identificat
	12:28	1min	Helicopter	low flying helicopter	OB	FW	46	15	2	16 Ad/13 pups	Y(12:31)	Flying NW circled ove
	"	"	"	"	UEN	FW	20	8	7	3 Ad/2 pups	Y(12:32)	UEN & OB b continued flying NW
3	2:05	<1 min	Motor boat	Boat starting up engine	OB	FW	76	36	11	8 Ad/2 pups	Y(2:07)	
	2:28		Birds	15 Pelicans landed on sandbar	OB	FW	76	14	1	30 Ad/3 pups	Y(2:32)	its might be c little off un
	2:30		Birds	"	UEF	FW	33	5	4	17 Ad/7 Pups	Y(2:36)	never recomle after last disturbance

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/27 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comme (vessel/air identificat
1:38											
13:38	<1min	Plane	Military plane	OB	FW	45	24	2	13 Ad/ 6pups	Y 13:43	Flying lower than normal
											planes & ve found
2:10		Human	Oyster farmers talked loudly	OB	FW	41	27	2	8 ad/ 4 pups	Y 2:15	

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/21/09 **Year** 09 **Location:** Drake's Estero **Observers:** Adrianne Korpke (b) (6)

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
1620	Plane	1	OB/[illegible]	HA	92	70	22	0		flying low
1620	Plane	1	UEN	HA	177	111	56	0		flying low

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/11 Year 09 Location: Drakes Estero Observers: [redacted]

Time	Duration	Source *	Source Specific	Sub-Site	Seal Behavior **	No. Before Disturb-ance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1115	<1min.	UKn.	UKn.	OB	HA	37	37	2	0	N/A	

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE (include number): Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other, Unknown

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:19 PM
To: McCoy, Lytashia
Subject: Fw: scanned datasheets - email 1
Attachments: DE_Disturbance_2005.PDF

Delivered by SOL Blackberry Services

----- Original Message -----
From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:04:45 2010
Subject: scanned datasheets - email 1

Hi Gavin,

(b) (5)

Here is the fist document:

DE_Disturbance_2005
All disturbance datasheets in which a head alert, flush, or flush water was recorded in 2005 from the volunteer harbor seal monitoring program at Drakes Estero. Includes all disturbance sources, such as hikers, airplanes, birds, boats, etc.

(See attached file: DE_Disturbance_2005.PDF)

(b) (6), (b) (7)(C)
(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5530 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 3/4/05 Year 05 Location: DE Observers: (b) (6)

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
11:30	A	researchers (2)	FW	7	0	0	7		? maybe heard owl
12:30	A1	Birds?	HA	~~3~~150	357				voices?

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 3/6 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
2:05		2 seagulls 6 turkey vultures	FW	377		1	372	Y 25 by 2:30	Segull came to get afterbirth followed by turkey vultures

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 3/19 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
1:30	A	Birds	FW	359	~~200~~ 194	6	159	Yes ~10-15 2:20pm	Hard to tell what spooked them - seagulls?
~2:25	OB	Birds	F	91	91	4	0		
2:30	L	Bird ↓ lowflying ~~seagull~~ Ospreys (2) ↓	HA	105	105	4	0		

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 2 of 2

Date: 4/2 Year 05 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
11:35	DEM	unk	HA	90	90	2	0		
11:59	A	researchers	FW	14	3	0 (11 flushed)	11	Y	
13:30	A	seagulls→gang	F	149					
			placenta						

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

$$\begin{array}{r} 319 \\ 8 \\ \hline 327 \end{array}$$

$$\begin{array}{r} 295 \\ 14 \\ 7 \\ \hline 316 \end{array}$$

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/05 Year 05 Location: Drakes Estero Observers (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
2:50	A	plane	F	179			0		
2:57	A	unk	HA	179			0		
2:20	OB	human	NR	63			0		3 people on Oyster bars

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 5/6 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
17:15	L	aircraft	HA	~~224~~	224	40	~~0~~		aircraft, low
17:20	L	aircraft	F	224	15	5	~~20~~ 204	4/17:25	flying - Blue +
									White - circular
									path across bay,
									seeming to be
									looking for
									something.
									extremly low
									flying.
18:48	A	?	HA.	2					Unknown.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 5/7 Year 05 Location: DRAKES ESTERO Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
3:15	A1	BIRDS	FLUSH	+60	4	2	60	Y	
		–		IN THIS					
		DOUBLE		GROUP				WITHIN	
		CRESTED		CLOSEST TO				15	
		CORMORANTS		CORMORANTS				MINUTES	
		+ GULLS		+ GULLS.				ALL SEEMED	
								TO HAVE	
								REHAULED.	
4	L	HIKERS	FLUSH	12	0	0	12	NO	A GROUP OF 12
								REHAUL	SEALS SEPERATE
								AT 5PM	FROM MAIN GROUP
									AT END OF SPIT
									ALL FLUSHED.
4:30	DB	HIKERS (2)	FLUSH	28	0	0	28	NO REHAUL	
								AT 5PM	

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page ___ of ___

Date: 5/7 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior *** HA	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
14:45	A	birds	~~HA~~	337					huge group of gulls + cormorants took off + spooked group of closest seals

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 3 of ___

Date: 5/11 Year 09 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
9:56	A	unk	HA	155	106	49	0		
10:10	OB	aircraft	FW						

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/13/15 Year _____ Location: D. E. Observers: [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
11:50	A	Bobcat	FW	143	~~0~~	~~0~~	143	Gradual-	
								back to	
								52 by	
								1:15 PM	
12:30	L, DM	hikers	HA	L = .87	About 10 seals from each site flushed into water - ~~some moved~~ some went from L to the sandbar at Limantour Mouth				
				DEM = 431	Some moved farther down DEM				

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 05/25 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
1145	A1	people on beach	HA/FW	181	179 144	35	2		2 people on beach - Flush camera, food + coffee. Picnic, Maybe 300 ft away from seals * They are going closer to take photos.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 6/14 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
1125	DEM	Heli	HA/F	476	476?	—	0	—	Right in Middle of Country - Seals Moved as I Counted + headed Closer to Water as Heli flew over TO Right of DEM.
	L-	don't know if same account							
									Choppa was multi Color - Red - Yellow + another color head; Toward Mariner St.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/24 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
10:16	DEM	Clammer	HA	414	414	—	0	—	4 Clammers DB loud voices by Wind Carry the Sound down Site All Colony HA.
10:46	DEM	Clam.	HA	410	410	—	0	—	Same which explained 1st HA.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/27 Year 05 Location: Drakes Est. Observers: (b) (6) [redacted]

	Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
①	11am	L	Makes X2	Flush	69	37	ø	33		Blue shorts + shirt, group
	11:05	L			37	37	ø	22		Male Berk / Fe... Shoes - Tan shirt
②	11:10	A'	Motor?	HA					4 11:15	Fishing L/c ... mom
	11:20	A'							seals	rock
									rehauling	2 people
										2nd L/c
										Some rehauled
										11:10 am 2 A'
										1 man: asian
③	12:30	UEN	?	Full Flush	77	ø	ø	77	N	Mother-Turkey with ...
	12:40	UEN							N	

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 2 of 2

Date: 7/1 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source ** 16	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
2:45	A	Kayakers	Gone	unk.	Gone	—	unk.	—	16 Kayakers across from A/A1-Sand HS Marks on A
3:45	DEM	16 Kayaks	HA/FL/FW	372	347 obs.	—	25 *	N	HS Saw Kayakers on Beach Seals crowded on beach
4:15	OB	16 Kayaks	HA/FW	46	—	—	46	—	Sand Spits + UEF also - Kayakers on distance away but seem enough for Seals - Group always FW. Same last yr.
4:20	UEF	16 Kayaks	HA/FW	75	60-65	—	10-15	—	* As I Counted FW from Sandbar covered up in coming Tide.
	Wish DE Closed permanently to all boaters!								Even 1 Kayak "Can" disturb - No Tolerance
									UEN/UEF/OB A/D/ - Not enough safety net for H.S.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page ___ of ___

Date: 7/14 Year 05 Location: Drakes Estero Observers (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
11:10	A	plane	HA	293	293	—	0		

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, othe[redacted]

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 3 of 3

Date: 7/16 Year 2005 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
1240	A	3Kayaks	NR	641			0		kayaks stayed on far side of [illegible]
1	A	4Kayaks	NR	641			0		
110	A	1 Kayak	FW	641	490	—	150	N	
		This boat passed mid channel - close.							to seals than previous boats
1:25	DEM	8kayaks	HA	488			0		
1:40	A	"	HA	488			0		

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

[redacted]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/23 Year 05 Location: DE Observers (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
938	~~DEM~~	Dog	HA/F/FW	in Mid Count (201)	596	0	unk	—	Ranch hand on Wheeler, had dog Chased 4 Cattles Dog Barking —
1045	UEF	unk	HA/FA/FW	539	unk	0	504	Y-10+7	In Middle of Count Near end. Returned Back to haulout w/in Minutes

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Re[redacted]

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, [redacted]

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

596
325
73
994

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

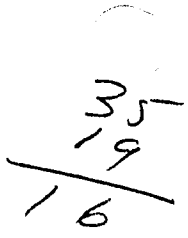
Date: 10/29 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
3:11	L	Hum-4	H/F/W	35	19	0	16		4 People along the
3:20	L	Hum-4	F/W	19	16	0	3	3	Sunset Bch Shore
3:25	L	Hum-1	F/W	16	8	0	8		Count from "L" - Not
3:38	L	Hum-2	F/W	8	11	0		@ 3:38	Main "L" Bch but
									small Sandbar in
									estero.
									I Saw 8 People @
									Sunset Today
									Women Walked along
									edge of surf from H to
									Look @ Him + She went Water
									in to Water Toward Seals
									@ Sunset more F/W

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)



POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY page 1 of 1

Date: 2/13 Year 05 Location: DE Observers: (b) (6) [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	# of Seals Before Disturbance (From Survey Form)	# of Adult Immature Seals Remain On site	# of Pups Remain On Site	# of Seals Flush Into Water	Seals Rehaul? (Y/N) If Y, # And Time	Comments (vessel/aircraft identification)
									Red boat "Surfer" MF
2:20	A	Kayaker	HA/FW	2	0	0	52	N 250	Kayaker 1 m/2 people
2:24	A1	"	"	9			9	N 250	Kept going w/o Stop &
3:20	UEF	Kayaker	HA/FW	71	18	—	53	Y-16 330	Turning around.
			F	[redacted]					all my energy to get here & This happens. I Was
									Pissed. I Then My wife
									go by Sites again back
									To Johsons
									This estero Should
									Be Closed to Kayak &
									Canoe etc. !

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI = Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI = Pickle Weed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:21 PM
To: McCoy, Lytashia
Subject: Fw: scanned datasheets - email 6
Attachments: DE_Disturbance_2010.PDF

Delivered by SOL Blackberry Services

----- Original Message -----
From (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:24:31 2010
Subject: scanned datasheets - email 6

Same as previous but for 2010.

DE_Disturbance_2010
All disturbance datasheets in which a head alert, flush, or flush water was recorded in 2010 from the volunteer harbor seal monitoring program at Drakes Estero. Includes all disturbance sources, such as hikers, airplanes, birds, boats, etc.

(See attached file: DE_Disturbance_2010.PDF) _____

(b) (6), (b) (7)(C)
(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5530 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 1/14 **Year** 2010 **Location:** Drakes Estero **Observers:** [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1515	Birds	2	A1	HA	—	—	—	0	—	[illegible] bird wade commotion in water
1520	Canoe	1	OB	FW	66	20	—	46	Y 1525	orange canoe went near seals

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

✓ 4/5/10

Revised March 2009

Entered SC 3/17/10

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 2/22 Year 2016 Location: PR Observers: (b) (6) , (b) (6), (b) (7)(C) Marine Mammal Commission

Time	Source *	Number Of Source	Sub-Site **	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult-Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11:35	Kayak	2	DB	HA						

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, AT=A T sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UPE=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TT=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef).

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered 5/31/16

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

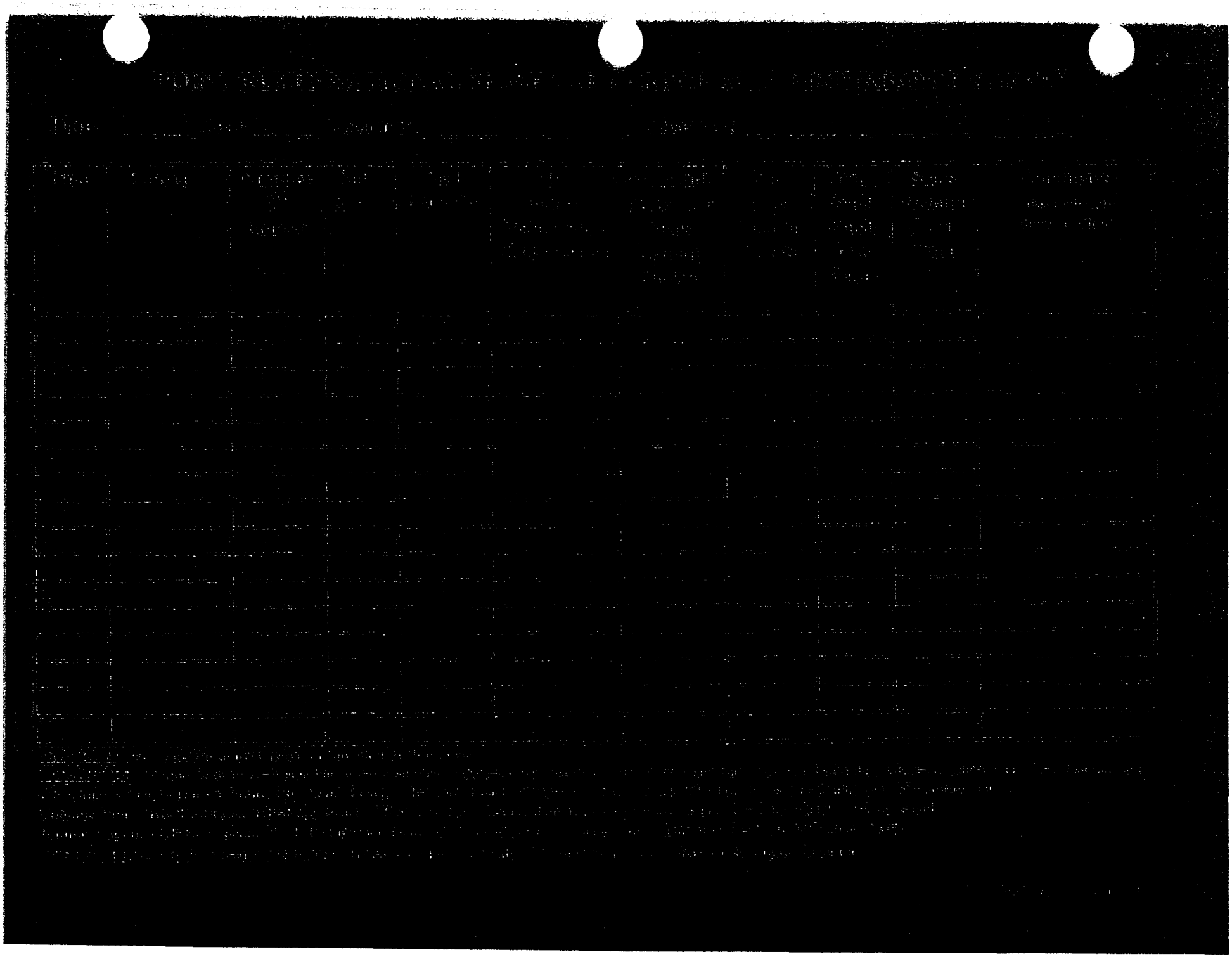
motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc



Vehicular Type Disturbance Sources	
Source	Source Specific
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance
aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite
non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer
motor boat	fishing boat
motor boat	tugboat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	Source Specific
fisherman	
clammer	
human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers
researcher	
school group	

Other Disturbance Source Types	
Source	Source Specific
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc.

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/20 **Year** 2010 **Location:** Drake's Estero **Observers:** [redacted]

Time	Source *	Number Of Source	Sub-Site **	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult/ Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11:30	Bikers on Beach	1	L	FW	54	0	0	54	Y @ 1 1:06	As the bikers approach the harbor seals, they all flushed into water
11:35	hikers	1	DEM	HA	15	13	2	0		

*SOURCE: Use a specific source listed on the back of this sheet.
**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack)
Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island)
Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)
***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

added to datasheet by [illegible] based on comment from count survey sheet

✓ 4/5/10 Entered [illegible]

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/27 Year 2010 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of Source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1) 15:05	tourist fisherman + kids	3	A1	FW	72	23	1	48	Y	not serious fisher, nasty play +
2) ~~15:15~~									(some,	roaming all
	(NB: disturbance	came	in 2	waves,					unsure	over DB
	separated by	10 minutes)							of time)	
16:40	hikers	2	DEM	HA	66	66	NA	0	NA	see couple walking on DEM, Must have crossed over from DB.
1630	hikers	7	L	FW	33	0	0	33		Did not see actual disturbance, but people on L spit + seals gone.

Added by S Ledee based on comments from count site form

SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

*SOURCE: Motor-boat, Non Motor-boat, Vehicle, Dog, Aircraft, Human, Bird, Other

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

✓ 8/5/10

Entered SC 4/14/11

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/28 Year 2016 Location: Drake's Estero Observers: (b) (6) [redacted]

Time	Source*	Number of source	Sub-Site	Seal Behavior**	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
5:16	a small plane	1	A1	HA	153	[redacted] 123	1	0	N	a small plane at 5:16 flew overhead up the Estero above A1 and HA was high
4:35	seagull	1	A1	HA and flushed	2	[redacted]		0	N	a seagull disturbed these seals as it flew by the group. The seals stopped moving and lifted their heads but did not flush into the water early
6:02	2 people	2	Kat	HA	45	4/5	0	40	N	

*SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island), Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water, (Record Strongest Reaction)

FOR OFFICE USE ONLY: (Entered) (Checked)

SC 3/30/16

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

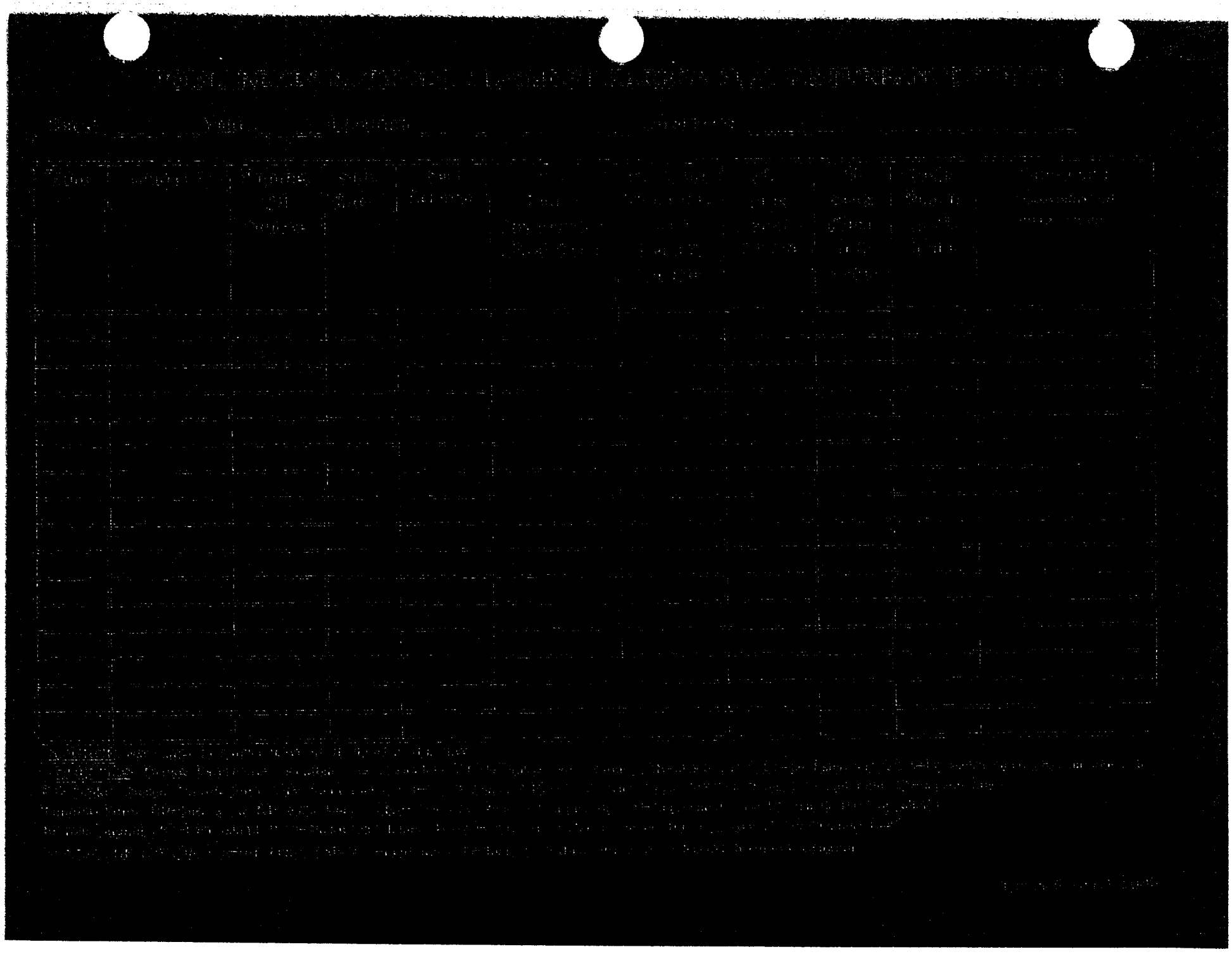
motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

1 n Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc



Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/5 Year 10 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
12:15	Before next count									
1230	Hum.		L	HA/F/FW	90	85 90	unk	5	Y-15m	MAN Approached Seals

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

J 8/5/10 Entered SC 4/14/10

Page 1 of 1

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/10 Year 2016 Location: Mills Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
2105	Human [redacted]	1	DB	FW	2 [redacted]	1	0	1	N	Walking Human

*SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South point, SS=Stormy Stacks) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water (Record Strongest Reaction)

FOR OFFICE USE ONLY
Entered Checked

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

an Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/4/10 Year 2010 Location: DE Observers: (b) (6), (b) (7)(C) [redacted]

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
11:39	MOTORBOAT	1	OB	NR	~~76~~ 113	~~76~~	37	~~0~~	NR	BOAT Landed on far tip of OB on NW tip. Did not enter lateral channel 4 people landed
11:50	HIKERS	2	L	FW	70	~~0~~	~~0~~	70	Y	2 AT 12:07
12:39	UNK	—	OB	HA	105	~~105~~ 70	35	~~0~~	—	
12:44	MOTORBOAT	1	OB	NR	105	~~105~~ 70	35	~~0~~		PBOC boat leave sandbar

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

Entered SC 5/10/10 Checked 8/9/10

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/8 Year 2010 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:26PM	UNKNOWN	UNKNOWN	A	FW	91 [illegible]	64	15 [illegible]	12	Y	1:45pm rehauled
2:40pm	HIKERS	2	A	FW	51	[illegible]	25	3	Y 2:[illegible]	[illegible] rehauled in 10 minutes - 2:50pm
2:45	HIKER	1	DB	FW	2	0	0	2	N	

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water (Record Strongest Reaction)

[illegible] 5/10/10 Revised March 2009 Checked [illegible]

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/18 Year 2010 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior	No. Before Disturbance (Total Seals)	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N), Time	Comments (vessel/aircraft identification)
1100	Ark		A	FW						
1125	Adult	1	A1	FW						
1150	Human	1	A							

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DBM=Drakes Estero Mouth, OB=Oyster Bar, UDE=Up Estero Far, UEN=Up Estero Near, IL=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered Checked 5/20/10

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/22 Year 2010 Location: D[illegible] E[illegible] Observers: (b) (6) [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1037	Unk	[illegible]	A1	F/W	[illegible]	1	16	[illegible]	[illegible]	[illegible]

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack)
Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island)
Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Entered SC [illegible] Revised March 2009 Checked [illegible]

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/1 Year 2010 Location: Drakes Estero Observers: [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain Onsite	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:38	Unk	—	A1	FW	91	87	—	4	N 1min	A seals suddenly [illegible]

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack)
Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island)
Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Entered [illegible]

Revised March 2009

Checked 8/9/10

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/3 Year 2010 Location: Drakes Estero Observers: (b) (6) [redacted] (b) (6) [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11:27	UAIC	—	A1	F(W)	46	[illegible]		19	[illegible]	[illegible]

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/1 Year 2010 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior**	No. Before Disturbance (Total Seals)	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:13	Kayaks	2	OB	F	31	0	—	31	N	
10:45	Kayaks	2	DEM	F	110	110	—	0		
11:10	Kayaks	2	DEM	HA	76	68	—	8		

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UDE=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 Channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: ~~7/2~~ 7/3 Year 2010 Location: Drakes Estero Observers [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1045			DEM							
~~1030~~	Hikers	3	~~DB~~	FW	249	239	—	10	Y/5 min	Seals on DEM flushed ~~people~~ ~~of DB~~
~~1050~~	~~Hiker~~	~~1~~	~~L~~							(Hikers on DB at
~~1045~~										acceptable distance
										but flushed anyway
										happened before count
										was complete
1050	Hiker	1	~~L~~ DEM	None	~~0~~ 249	~~0~~ 249	—	0	N/A	No seals were on before [illegible]
										[illegible]
										300 of seals on
										DEM
10:55	Kayak	10	UEF/OB	—	?	0	—	15	N	Kayaks b/w OB +
										UEF. Did not
↑										see disturbance,
										but saw kayaks

and seals are gone

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TB=Tide Pools, SP=South Point, SS=Stormy Stack)
Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island)
Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Kayaks were already [illegible] by 11:10 6 seals
on UEF at 11:10 68 at 11:25

Entered SC 7/26 Checked 8/9/10

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: ~~7/2~~ 7/3 Year 2010 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:00	Airplane	1	UEF	HA	~~188~~	All	—	~~0~~	N/A	Small airplane
12:00	Airplane	1	A1	FW	~10	0	—	All	N	Same plane.
					↑ Same ~10 gather while I ate my lunch left before actual count					↑ Happened right as I was starting to count - not sure of exact #'s of seals on site. But certain that seals on UEF did not flush and all of them on A1 did.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered SC 7/26 Checked 8/9/10

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

[illegible]n Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 12/7 Year: 2016 Location: Drakes Estero Observers: (b) (6)

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior***	No. Before Disturbance (Total Seals)	No. Adult/Immature Seals Remain Onsite	No. pups Remain Onsite	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:05	HWY1	1	A	FW	38	0	0	38	Y	

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, AI=AI sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UET=Up Estero Far, UEN=Up Estero Near, L=Limantour Split, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef).

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:20 PM
To: McCoy, Lytashia
Subject: Fw: scanned datasheets - email 4
Attachments: DE_Disturbance_2008.PDF

Delivered by SOL Blackberry Services

----- Original Message -----
From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:12:55 2010
Subject: scanned datasheets - email 4

Same as previous but for 2008.

DE_Disturbance_2008
All disturbance datasheets in which a head alert, flush, or flush water was recorded in 2008 from the volunteer harbor seal monitoring program at Drakes Estero. Includes all disturbance sources, such as hikers, airplanes, birds, boats, etc.

(See attached file: DE_Disturbance_2008.PDF)

(b) (6), (b) (7)(C)
(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5530 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 03/12 Year 08 Location: DE Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1115 1145	U	U	L	FW	62	0	0	62	N	Did not observe disturbance - Seals were there @ 1115 & gone @ 1145

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickle Weed Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/14 Year 08 Location: DE Observers (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
				F/						Engine Noise
12:33	MotoBoat	M.BT	UEN	HA/FW	19	15	—	4	N/1255	OysterBoat grayish Boat up - 1 man + 2 Children on @ rear 1 Child in Red. @ Bow in Blue hood jacket hands to Face

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 03/25 Year 08 Location: DE-"L" Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1145	Human	4	L	FW	23	0	0	23	N	

Phocafrm.doc 4/17/01

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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Page ___ ___

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/30 Year 06 Location: DE Observers: (b) (6) [redacted]

1 viewed as potential dist.

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:20	Cows	35	A	NR	—	—	—	—	—	South east side of sandbar
2:00	Cows	35	A	NR						
2:10	Birds	8-10	A	FW	2	0	0	2		stayed in shallow water

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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Entered Checked

LF 8/12

No Oysterboat Disturbance but Boat out @ Home Pt

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/31 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:40	Hum	Hum	A1	HA/F/FW	323	320	7	3	Y-10M	2 People on D.B Main Bch - Seals Saw them Male on Bike @ Sunset Bch rides along Bch TO Rocky area
247	Hum	Bike	A1	G	335	323				
	Potential	Dist. only								
305	Hum	Hum	A1	HA/FW/F1	364	359	7	5	unk. I but Area	2 men - I talked loud JOOhm @ a distance & the Walk & ins. de Estero Post Trees.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

EF 8/1

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/11 Year 08 Location: Drakes Estero Observers: Katie Culver, Amy [redacted] Whelan

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adu Immature Seals Remain On site	pups Remain On site	Seals Flush Into Water	Rehaul (Y/N) Time	(vessel/aircraft identification)
1115	Humans		Drakes Estero Mouth	HA's		same		one		clammers
1145	Humans	3		FW HAs	2+4	0	0	6	0	people walking OTS guy + 2 kids walking
12:00	Humans	2	L	FW	4	0	0	4	0	people taking a walk

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/17 **Year** 2008 **Location:** Drakes Estero **Observers:** _____

	Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
1)	11:20	Human	1	L	FW	~~Unknown~~ 26	0	0	All	Y, 14 rehaul on DEM	Hiker, sitting approx 300 ft, may be cause
2)	11:42	airplane	1	A1	None	*Note, plane caused so recorded with that sitting	HA @ 14	15,	11:42		plane flew @ about 500 ft
3)	11:59	~~Human~~	1	DEM	NONE	15-20			1		Limantour
4)	12:19	Human Hike	1	A1	FW	280	222	51	7		Hiker on Drakes Beach
5)	12:45	Helicopter	1	A1	FW	235	176	44	15	Y, 12:45	Red Helicopter with White Stripe flew into Estero

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

Entered ✓

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date:_____ **Year**_____ **Location:**_____ **Observers:**_____

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
~~1:30~~ 1:35	Human	4	A1	NONE						Mainland
	Airplane	1	A1	HA				None		Single
1:45	Yellow airplane at ~500 ft			flew directly over	estero	(seen earlier)				Esteros
1:50	boat Oyster	1 3 people	OB	None						See map Oyster boat on OB, humans got out on Sand bar

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/27 Year 08 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1105 1103	human	5	DEM	F	5	0	0	5		3 of 5 people approached seals. Got very close and seals flushed as they walked away
1113	human	2	L tmain spit	HA	84					2 hikers walked towards seals then backed off

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/29 Year 2008 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
15:36	Researcher	1	DB	FW	40	25	10	5	?	I think I flushed seals while retrieving dpup I saw some go in water and HA, but did not have full view

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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EF 2/1

Dark clothes - given ... Shovel, 2 poles, white Bucket Fish pole Bright Green Bach man Carries - Tan Shirt / Dark Shirt Bag

Page 3 of ##

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Map

Date: 5/10 **Year** 08 **Location:** DE **Observers:** [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adul Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification) I spoke to Family before they got to DE about Noise disturbance - Clammers Also told them of Quarantine!
9:15	Hum	4 Hum -	A1	All HA/F1	250 / 15	235 / 153	82	Apt. 15	y-10-15 M.	Family of 4 Clammers Mom + Dad - Son's Loud Voice
930	Hum	6 Hum	A1	HA/F1/FW	257	(113) 117	42 56	84	y-10-20 M	6 Fisherman Walk Down Estero Bch Talking + family still digging clams
10^00	Hum	Hum	L	HA/F1/FW .	84	* 74 -	Unk.	10+	*	5 People - 1 man Walks toward Seals
1050	Hum	Hum	L	HA/F1/FW	81 / 5	? 76 Don't *See All seals @ edge of Water	Unk.	5+	*Unk	← 1 man on spit on Lim. Bch inside.
1055	Hum	2 Hum	A1	HA	8	8	3	0	-	Same 2 Clammers @
(Potential					273				Sunset B.	Shoreline Now fishing
										edge of A - Man Walks
9:00	Hum	2 Hum	L	0	0	None @ this small "L" Sandbar But 3 came on @ Tip @ 10^00				down A - H.S. Across
Potential										Channel here - left
										1120 fr. 3 Estero Tr.

Am not done

(X) Weekends plus Minus Tide brings Many disturbances on DE and Limantour and Sunset Bch in Potential Disturbances.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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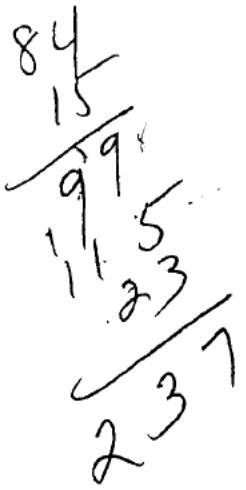
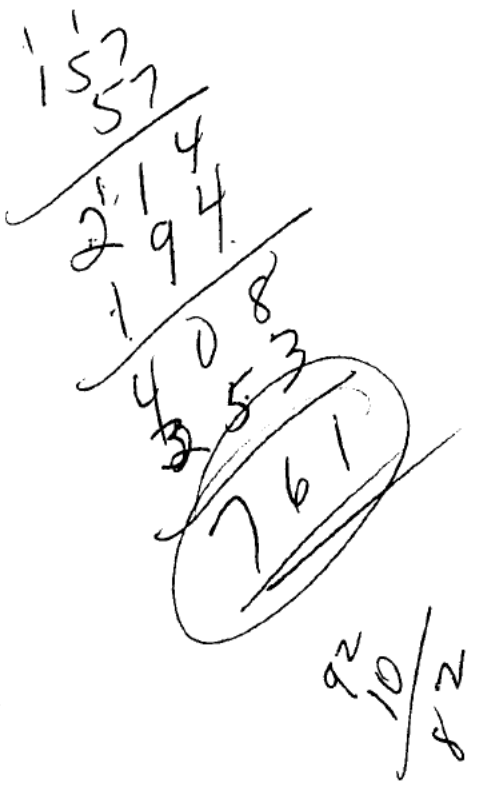
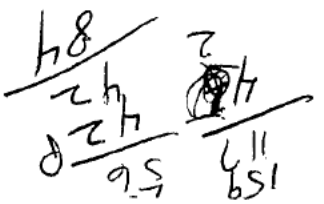
LT 8/12







POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/13 Year 2008 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:36	Unknown	1	A1	FW	186	85	55	46	Y, 12:45	Seals looking towards DB but did not see anyone

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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ET 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/23 Year 08 Location: DE Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
★ 825	Hum	Hum	A1	HA/FW	77	4677	31	2	10-30m	2 FW - Clammers
850	Hum	Hum	A1	HA/F/FW	>7	4773	26	4+		2 Clammers came CLOSER TO HS (Across Channel Towards Tree) Seals returned previous while Clammers near site Left 930 a.m.
Bet 910+ 940	UNK	UNK	L-Bch	FW	All 4 (3 L. Bch)	243 (168)	??	168±	N	

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

★ Noted 2 comments, but clammer disturbance counted as 1 event

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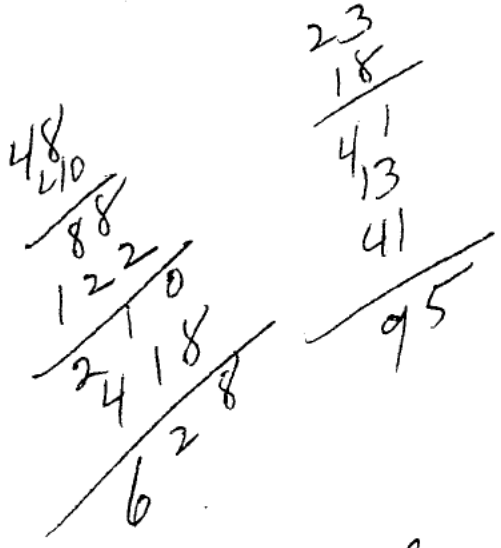
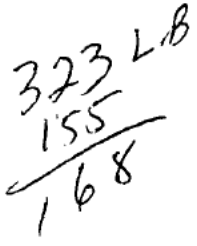
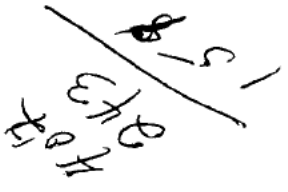
EF 8/1







POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/25 Year 2008 Location: DE L Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1030	2 Human	2	L	HA&FW	201	~~104~~ 85	19	97	Y-1045-1100 @	different Par Up "L" site

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*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

**BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/6 Year 08 Location: DE Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										Before Harvest Unsure 3 Clammers
8:10	Hum	Hum	A1	HA/FW	unk	6	0	unk.	y 830	I saw 6 on site Some but Seals in Water
8:10	Hum	Hum	A1	unk.	unk.	6	—	unk	y 83	3 People Past There look like Tidepooling All those people out Before I went to DB. Pkg Lot
930	HAM	HUM	A1	HA	10	10	X	0	—	The 3 Tidepoolers Past A1 to DB

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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ET 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/22 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1230	Surfers	4	DEM	FW	96	76	—	20	Unk	flushed group as seals got ahead to tide

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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EP 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/5 **Year** 08 **Location:** DE **Observers:** [redacted]

Disturbance Record

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:20	Clammers	Hum. 5	A1	HA/F	1298 ?	1298	—	0	—	As I was counting Terrible Timing.
10:35	Clammers	Hum. 5	A1	HA/F	1298 ?	1298	—	0	—	5 Clammers w/ Cart lg. [illegible] Red + Blue Kayakers The Clammers were Beyond A1/A and the Trees I couldn't see Them when in DE but Saw footprints. This is 2nd Time I've seen Clammers Coming from Barries Bay Area.
10:25	Kayakers 2	POTENTIAL Kay.	Above UEF							2 Kayakers - Blue + Red. Kayaks - While on Site They didn't come down To OB/UEN/A1 etc. Lost sight of them - either left Back to Schooner Or into Home Bay

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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POTENTIAL

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/9 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
			Above			Disturbance				
1100	Hum/mb	Hum./mb	UEF	0	0	POTENTIAL	0	0	0	6-7 oystermen Rocks Above UEF-
1130	Hum/mb	Hum/mb	↕	0	0	0	0	0	0	1 oysterman joined the Above Others
1230	Hum 2	Hum 2	B/a1	0	572	572	—	0	—	ON Sunset Bch
			DB	?	643	643??		?	?	Across #1 From the South Army Rocks Opposite DB-DEM EWAS Counting Near Sam Then Arrive
1000	Birds	Birds	DB	HA/F	638	638	—	0?	—	H.S. became alert + disturbed Pelican flying all over + landing on DB

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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ET 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/19 Year 2008 Location: DRAKES ESTERO Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:40	Kayaker	1	A1	FW	464	172	—	292		
11:40	Kayaker	1	DEM	FW	580	1	—	-579		Same Kayaker
										Flushed Pelicans, Cormorants, Gulls, Terns

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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CT 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/23 Year 08 Location: DE Observers [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:00	Hum	Hum	2	HA/F/FW	.		—	unk. Cupi lost		2 Fishermen Wet Suits on Sandbar DEM - I Couldn't Believe it! Didn't see them wade in swim over as I was counting OB/A1 Seals very nervous
1030	Hum Potential	Hum	A/A1	0	431	431	—	0	—	2 People Sunset A1 Across From A1
10:45	Hum	HUM	DB	FW	2	1	—	1	0	Fisherm from DEM Swam to DB Tip @1115 I saw them hauling a ~~Rubber~~ Kayak Boat all the way back to Drakes pkg.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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LF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/26 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site *	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11am	NON-motor Boat	14	A1	FW	178	140		38	Y 12:00	
11:30	NMBoat ~~Kayak~~	7	A1	FW	187	161		26	Y 12:00	

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Kayaks

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LF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 11/11 **Year** 08 **Location:** DE **Observers:** [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain Onsite	No. pups Remain On-site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
3:30	Human	~~Hum~~ ?	A1	HA~~F~~	402	402		~~6~~ 0		Women left spot She was Sitting back to beach from Estero.
3:35	Human	Hum.	A1	HA/F	~~396~~ 402	~~402~~ 396	—	6+		3 Men Kept Walking along Estero Beach Past Trees. Saw them again @ Horick Ranch heading Toward the house. Park Employee + friends???

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered SC 2/26/09 Checked SC 7/29

*@ Sent Digital Shots to Sarah Allen
= 49/451 Dead Pup + Gull eating
* 154/456/457 Lunny's Clammers OB

Survey + this Sht
Page 2 of 2

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 12/10 Year 08 Location: DE Observers (b) (6) [redacted]

	Time	Sub-Site*	Source **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										Women Flushed 75
	1:40	L	Human	White Pelicans	75	—	—	—	—	White Pelicans Roosting
*	1:40	OB-E.channel M.B. Lunny MEN		-0-	-0-	-0-	-0-	-0-	-0-	Grey MB drop. 3 MEN with Shallow Water To OB - Waded To OB Sandbar Covered in Wat
	1:45	DB A1	Human	HA Constant During Survey	281	281	—	-0-	—	I Didn't Know Why the Rocks → 2 Loud Mouth Fishermen
	1:40	Sunset Bch	Hum	-0- POTENTIAL -0-	-0-	-0-	—	-0-	—	2 Women WALK Shoreline w/ TRIPOD + CAMERA - 2:55 left
*	2:15	OB Lunny MEN	Human	POTENTIAL DIST.	10	10	—	-0-		3 men have Full dry use of OB Sandbar free of Water
					TOOK DIGITALS (VERY FAR For limited lens)					
	3:15	OB	MB	HA	11	11	— "may" have heard M.B. over Boat to pick up 3 Clammers			Are Clamming Distance From H.S. on OB+
	3:45	A1	Human	HA/F/FW	275	40	—	235	N	DB Fishermen Walk down Estero Bch Seals F+FW
										I was leaving @ 3:55

Phocafrm.doc 4/17/01

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; AB=Backof A sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point Oceanside (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water;

OVER →

Entered sc 2/29/09

Checked 7/29

@ 3:15 - Boatman grey-with up - [illegible] tip - walked on sandbank - green jacket
green hip boots. Talked to 3 clamm. USED clam "plugger" (Tubes)

2 clammers (oyster employees Lunny) in black wet suits - 1 w/ blue strip both Tan
Caps (Baseball)
1 clammer - No cap no wet suit Dk-green pants, Blk. Top rolled up sleeves

3:25 - All 4 loaded on boat + Left For Drakes Oyster Docks.
w/ 3 Lg. white buckets + 3 "Clamming Pluggers" whatever I called.

Abt. 3:45 - A grey boat pushing "a raft" w/ 9 men standing dropped off 8 men @ Racks above
UEF + were still working @ 3:55 when I Left sight.
A grey boat also cruised Down West Channel beyond Barries Bay.

There are many, many oyster racks above UEF + toward Home
Bay - All over upper Estero - a -1.1 showed every thing in the
Estero.

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:20 PM
To: McCoy, Lytashia
Subject: Fw: scanned datasheets - email 4
Attachments: DE_Disturbance_2008.PDF

Delivered by SOL Blackberry Services

----- Original Message -----
From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:12:55 2010
Subject: scanned datasheets - email 4

Same as previous but for 2008.

DE_Disturbance_2008
All disturbance datasheets in which a head alert, flush, or flush water was recorded in 2008 from the volunteer harbor seal monitoring program at Drakes Estero. Includes all disturbance sources, such as hikers, airplanes, birds, boats, etc.

(See attached file: DE_Disturbance_2008.PDF)

(b) (6), (b) (7)(C)
(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5550 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 03/12 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1145	U	U	L	FW	62	0	0	62	N	Did not observe disturbance - Seals were there @ 1145 & gone @ 1145

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickle Weed Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/14 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										Engine Noise
12:33	MotoBoat	M.BT	UEN	F/HA/FW	19	15	—	4	N/1255	Oyster Boat going past Beat up - 1 man + 2 Children on @ rear 1 Child in Red, Other in Blue hood jacket headed Tell

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 03/25 Year 08 Location: DE - "L" Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1145	Human	4	L	FW	23	0	0	23	N	

Phocafrm.doc 4/17/01

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/30 Year 06 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:20	Cows	35	A	NR	—	—	—	—	—	South east end of Sandbar
2:00	Cows	35	A	NR						
2:10	Birds	8-10	A	FW	2	0	0	2		stayed in shallow water

1 potential disturbance

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

LT SHL

No Oysterboat Disturbance but Boat out @ Home Pt

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/31 Year 08 Location: DE Observers (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:40	Hum	Hum	A1	HA/F/FW	323	320	7	3	Y-10M	2 People on D.B Main Bch - Seals Saw them Male on Bike @ Sunset Bch rode along Bch to Rocky area
247	Hum	Bike	A1	—	333	323				
	Potential Dist. Only									
305	Hum	Hum	A1	HA/FW/F	364	359	7	5	Unk. I left area	2 Men - 1 Talked Loud 100 Yds @ a distance & the Walked inside Estero Past Trees.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

EF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/11 Year 06 Location: Drakes Estero Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Ad Immature Seals Remain On site	pups Remain On site	Seals Flush Into Water	Rehaul (Y/N) Time	(vessel/aircraft identification)
1115	Humans		Drakes Estero Mouth	HA's		same		none		kayakers
1145	Humans	3		FW HAs	2+4	0	0	6	0	people walking OB guy + 2 kids walking
12:00	Humans	2	L	FW	4	0	0	4	0	people taking a walk

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/17 **Year** 2008 **Location:** Drakes Estero **Observers:** _____

	Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
1)	11:26	Human	1	L	FW	~~Unknown~~ 26	0	0	A1	Y, 14 rehaul on DEM	Hiker, sitting approx 300 ft, maybe cause 1)
2)	11:42	airplane	1	A1	None	*Note, plane caused HA @ 12 so recorded with that sitting			15, 1	11:42	plane flew @ boat 500 ft 2)
3)	1159	~~Human~~	1	DEM	NONE	15-20			1		Limantour 3)
4)	12:19	Human Hike	1	A1	FW	280	222	51	7		hiker on Drakes Beach 4)
5)	12:45	Helicopter	1	A1	FW	235	176	44	15	Y, 12:45	Red Helicopter with white stripe flew into Estero 5)

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

Entered ✓ EF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date:_____ **Year**_____ **Location:**_____ **Observers:**_____

Time	Source *	Number	Sub-Site **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) If Y, # and Time	Comments (vessel/aircraft identification)
~~1:32~~ 1:35	Human	4	A1	NONE						Kayaker circle
	Airplane	1	A1	HA				None		Single
1:45	Yellow airplane at ~500 ft			flew directly over estero			(seen earlier)			Esteros
1:50	boat Oyster	1 3 people	OB	None						See map Oyster boat on OB, humans get out on Sandbar

PB_DISTURBANCE.doc 2/16/06

*SOURCE (include number): school group, aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

** SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Split) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, PWI=Pickle Weed Island, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/27 Year 08 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1005 1003	human	5	DEM	F	5	0	0	5		3 of 5 people approached seals. Got very close and seals flushed as they walked away
1113	human	2	L ↑ main spit	HA	84					2 hikers walked towards seals then backed off

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/29 Year 2008 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On-site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
15:36	Researcher	1	DB	FW	40	25	10	5	?	I think I flushed seals while retrieving dpup- I saw some go in water and HA, but did not have full view

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

EF 5/1

DARK Clothes - green pants
Shovel, 2 poles, white Bucket
Long
Fish pole
Bright Green Back man Carries - Tan Shirt
or Bag Dark Shirt

MAP

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/10 **Year** 08 **Location:** DE **Observers** (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification) I spoke to Family Before They got to DE About Noise disturbance - Clammers Also told them of Quarters
9:15	Hum	4 Hum -	A1	All HA/F1	250 / 15	235 / 153	82	Abt. 15	y-10-15m.	Family of 4 clammers Mom+Dad - Son's Loud Voice
930	Hum	6 Hum	A1	HA/F1/FW	257	(113/4) 117	42 56	84	y-10-20m	6 Fisherman Walk Down Estero Bch Talking + family still digging
1000	Hum	Hum	L	HA/F1/FW.	84	* 74 -	Unk.	10+	*	5 people (clams) 1 man Walks Toward Line
1050	Hum	Hum	L	HA/F1/FW	81 / 5	? 76 [illegible] *See All seals @ edge of Water	Unk.	5+	Unk ←	1 man on spit on Lim. Bch 1 w/ dog.
1055	Hum	2 Hum	A1	HA	~~8~~	8	3	~~0~~	-	Same 2 clammers @
(Potential					273				Sunset B.	Shoreline Now finding
										edge of A - Man Walks
9:00	Hum	2 Hum	L	0	0	None @ This small 'L' Sandbar But 3 Came on @ Tip @ 1000				down A - HS Across
Potential										Channel [illegible] - [illegible]
										11:20 Fr? Estero Tr.

(X) Weekends plus Minus Tide brings many disturbances on DE And Limantour And Sunset Bch to Potential Disturbances.

Non ... note [illegible]

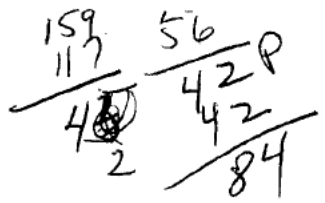
*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

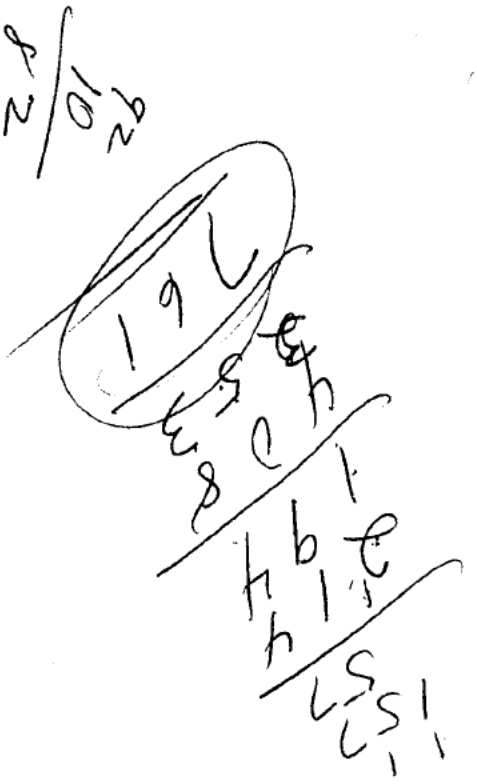
**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

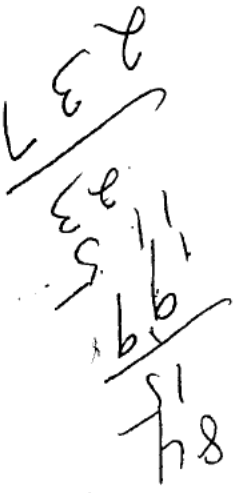
***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

LF 8/12







POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/13 Year 2008 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:36	Unknown	1	A1	FW	186	85	55	46	Y, 12:45	Seals looking towards DB but did not see anyone

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

ET 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/23 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
★ 825	Hum	Hum	A1	HA/FW	79	4677	31	2	10-30m	2 FW - Clammers
850	Hum	Hum	A1	HA/F/FW	77	4773	26	4+		2 Clammers came CLOSER TO HS (ACROSS Channel Towards Trees) Seals returned previous whole time Clammers near site Left 930 a.m.
Before 910+	UNK	UNK	L-Bch	FW	~~811~~ 418	243			No	
940					(~~823~~ L. Bch)	(168)	7?	168±		

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

★ Noted 2 commands, but clammer disturbance counted as 1 event

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ET 8/11

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/29 Year 2008 Location: DE L Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1030	2 Human	2	L	HA&FW	201	~~104~~ 85	19	97	Y-1045-1100 @	different Par Up "L" site

Phocafrm.doc 4/17/01

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

**BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/6 Year 08 Location: DE Observers (b) (6) [redacted]

not there or disturbance not observed

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										Before I arrived [illegible] 3 Clammers —
8:10	Hum	Hum	A1	HA/FW	unk	6	ø	unk.	y 830	I saw 6 on site Some but seals in water
8:10	Hum	Hum	A1	unk.	unk.	6	—	unk	y 830	3 People past Them look like Tide pooling. All those people are out Before I went got to DB. Pkg Lot
930	HUM	HUM	A1	HA	10	10	X	ø	—	The 3 Tide poolers past A1 to DB

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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EF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/22 Year 2008 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
12:30	Surfers	4	DEM	FW	96	76	—	20	Unk	flushed group as seals were heading to tide

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered Checked

EF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/5 **Year** 08 **Location:** DE **Observers** [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:20	Clammers	Hum. 5	AI	HA/F	1298 ?	1298	—	0	—	As I was counting Terrible Timing.
10:35	Clammers	Hum. 5	AI	HA/F	1298 ?	1298	—	0	—	5 Clammers w/ Cart lg. white bucket, Red + Blue Kayakers. The Clammers were beyond AI/A and the Trees I couldn't see them when in DE but saw footprints. This is 2nd Time I've seen Clammers coming from Barries Bay area.
10:25	Kayakers 2	Potential Kay.	Above UEF							2 Kayakers - Blue + Red. Kayaks - While on site they didn't come down to OB/UEN/AI etc. Lost sight of them - either they left back to Schooner or into Home Bay

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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GF 8/11

POTENTIAL

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/9 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
			Above			Disturbance				
1100	Hum/mb	Hum./mb	UEF	0	0	POTENTIAL	0	0	0	6-7 oystermen Rocks Above UEF-
1130	Hum/mb	Hum/mb	↓	0	0	0	0	0	0	1 oysterman joined the Above others
1[illegible]00	Hum 2	Hum 2	A/A1	0	572	572	—	0	—	ON Sunset Bch
			DB	?	643	643??		?	?	Across A1 From the South Arm Rocks Opposite DB-DEM E WAS Counting Nesters Saw them Arrive
1000	Birds	Birds	DB	HA/F	638	638	—	0?	—	H.S. became alert + disturbed Pelican flying all over + landing on DB

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

EF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/19 Year 2008 Location: DRAKES ESTERO Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:40	Kayaker	1	A1	FW	464	172	—	293		
11:40	Kayaker	1	DEM	FW	580	1	—	-579		Same Kayaker
										Flushed Pelicans, Cormorants, Gulls, Terns

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

ET 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/23 Year 08 Location: DE Observers [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:[illegible]	Hum	Hum	L	HA/F/FW	.		—	unk. before 10:30		2 Fishermen w/ Wet Suits on Sandbar DEm - I Couldn't Believe it! Didn't see them wadein swim over as I was counting OB/A1 Seals Very nervous
10[30]	Hum	POTENTIAL Hum	A/A1	0	431	431	—	0	—	2 People Sunset Bch Across From A1
10:45	Hum	HUM	DB	FW	2	1	—	1	0	Fisherman From DEM Swam To DB Tip @ 11[15] I Saw Them haulin a ~~Rubber~~ Kayak Boat all the Way back To Drakes pkg.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

LF 8/[illegible]

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/26 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site*	Seal Behavior **	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11am	NON-motor Boat	14	A1	FW	178	140		38	Y 12:00	
11:30	NM Boat ~~Kayak~~	7	A1	FW	187	161		26	Y 12:00	

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Kayaks

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EF 8/12

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 11/11 Year 08 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) & Time	Comments (vessel/aircraft identification)
3:30	Human	Hum 7	A1	HA~~F~~	402	402		~~6~~ 0		Women left spot She Was Sitting back TO beach from Estero.
3:35	Human	Hum.	A1	HA/F	~~395~~ 402	~~402~~ 396	—	6+		3 men Kept Walking Along Estero Beach Past Trees Southern Again @ Hauck Reb Heading Toward the house. Park Employee +friends ???

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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SC

2nd on SC 7/29

* Sent Digital Shots to Sarah Allen
- 49/451 Dead Pup + Gull eating
* 154/456/457 Lunny's Clammers OB

Survey + this sht

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 12/10 Year 08 Location: DE Observers [redacted]

Time	Sub-Site*	Source **	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
									Women Flushed 75
1:40	L	Human	White Pelicans	75	—	—	—	—	White Pelicans Roosting
* 1:40	OB-E-Channel M.B. Lunny MEN		-o-	-o-	-o-	-o-	-o-	-o-	GREY MB drop. 3 MEN with Shallow WATER To OB - Waded To OB Sandbar Covered in Wat
1:45	DB A1	Human	HA Constant During Survey	281	281	—	-o-	—	I Didn't Know why the Rocks 2 LOUD MOUTH FISHERMEN
1:40	Sunset Bch	Hum	-o- POTENTIAL -o-		-o-	—	-o-	—	2 Women WALK Shoreline w/ TRIPOD + CAMERA - 2:55 left
* 2:15	OB Lunny MEN	Human	POTENTIAL DIST.	10	10	—	-o-		3 men have Full dry use of OB Sandbar free of Water
			TOOK DIGITALS (VERY FAR For limited lens)						
3:15	OB	MB	HA	11	11	— "may" have heard M.B. Quickly Boat to pick up 3 CLAMMERS			Are Clamming Distance From H.S. on OB+
3:45	A1	Human	HA/F/FW	275	40	—	235	N	DB Fishermen WALK down ESTERO Bch Seals F+FW
									I WAS leaving @ 3:55

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*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; AB=Backof A sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point Oceanside (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird,, clammer, dog, fisherman, human, non-motor boat, motor boat, researcher, swimmer, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water;

OVER →

Entered sc 2/29/09

Checked 7/29

@ 3:15 - BoatMan gray-with up-came [illegible] - walked on sandbar - green jacket
Green top boots. TAlked to 3 Clamm.   USED clam "Plugger" (Tubes)
2 ClAmmers (oyster employees Lunny) in black wet suits - 1 w/ blue strip both TAn
CAps (Baseball)
1 ClAmmer - No Cap No wet suit DK-green pants, Blk. Top rolled up Sleeves

3:25- All 4 loaded on boat + Left For Drakes Oyster Docks.
w/ 3 Lg. white buckets + 3 "clamming Pluggers" whatever (called.

Abt. 3:45- A grey boat pushing "a raft" w/ ~~9~~ 8 men Standing dropped off @ Racks Above
UEF + were still working @ 3:55 when I Left sight.
A grey boat Also cruised Down West Channel beyond Barries Bay.

There Are many, many Oyster Racks Above UEF + Toward Home
Bay - All over upper Estero - a -1.1 Showed everything in the
Estero.

McCoy, Lytashia

From: Frost, Gavin
Sent: Monday, December 13, 2010 7:19 PM
To: McCoy, Lytashia
Subject: Fw: scanned datasheets - email 5
Attachments: DE_Disturbance_2009.PDF

Delivered by SOL Blackberry Services

----- Original Message -----
From: (b) (6), (b) (7)(C)
To: Frost, Gavin
Sent: Mon Dec 13 16:15:24 2010
Subject: scanned datasheets - email 5

Same as previous but for 2009.

DE_Disturbance_2009
All disturbance datasheets in which a head alert, flush, or flush water was recorded in 2009 from the volunteer harbor seal monitoring program at Drakes Estero. Includes all disturbance sources, such as hikers, airplanes, birds, boats, etc.

(See attached file: DE_Disturbance_2009.PDF)

(b) (6), (b) (7)(C)
(b) (6), (b) (7)(C)
San Francisco Area Network
Inventory and Monitoring Program
(b) (6), (b) (7)(C)
415-331-5530 (FAX)

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 1/7 Year 2009 Location: DE Observers: S Codde (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1342	Bird	1 Raven	A1	HA	287	287	—	0	—	Raven making noises
1400	Unk		A1	FW	287	284	—	3	Y 14.11	3 also flushed by many HAs
1404	bird	1 seagull	A1	FW	284	280	—	4	Y 14.11	seagull walking near seals

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 2/4 Year 2009 Location: DE Observers: S Codde (b) (6)

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
13:21	seal	1	A1	HA	128	128	—	—	—	1 seal entered water causing noise and ~20 seals HA.
13:38	bird	2	A1	HA	134	134	—	—	—	→ 2 sea gulls walking next to seals

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/2 Year 09 Location: DE Observers: [redacted] (b) (6)

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										(Other)
										2 Women in Blk
150	Hum		L	HA/	36	-6	—	30	N	2 Horses Passed
										1 person in Red + in green Jacket Continued
	Potential @ Sunset Beach				14 People Total					Problem @ L
150	Hum-2	Potential affected	A/AI	-0						Clamming
200	Hum-6		A/AI							3 wet clam buckets
2:10	Hum		AI	HA/F/FW	363	350	—	104	Y	Child loud mouth
										3 People and Children Walked On Top of [redacted]
										[redacted]
										[redacted]
345	Hum		L	FW	6	0	—	6	NO	2 Hum. Walked Near Seals - 4 of them SAT Down by Haulout

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

(5)
2 - There were 6-8 people sitting down + standing but seats not disturbed. They left + Horses arrived. They could have leased from the group!
Should be closed to horses

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/19 Year 2009 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:43pm	seacliff	3	A1	HA						
2:45	Unknown	—	L	HA						

*SUBSITE: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing/glider), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY:
Entered 3/25/09 SC
Checked 5C 7/09

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 3/31/09 **Year** 2009 **Location:** Drakes Estero **Observers:** [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11:00am	Seal	Seal	A1	HA (F?)	107	103	4	n/a	n/a	seal breaking water
11:20	Hikers	2	L	FW	?	6	0	approx 30	Y on 22	happened before our counts
12:13	Hikers	3	A1	F					↳	some remained in A1
										est 15 flush / 90% HA →

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered SG 4/1/09 Checked 7/20

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/6 Year: 2009 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1458	UNKNOWN	1	A	HA	125					

*SUBSITE: Drakes Estero (A=A sandbar, A1=A1sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB=South Beach, NB=North Beach, TP=Tide Pools, SP=South point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water (Record Strongest Reaction)

FOR OFFICE USE ONLY
Entered Checked
4/11/09 JC 7/19

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

H n Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/10 Year 09 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source*	Number of source	Sub-Site	Seal Behavior**	No. Before Disturbance	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
6:30AM	Researchers	2	DEM	F-W	6		1	2 Ad/1 pup		When we checked out a dead pup near group, they flushed
6:45AM	Researchers	2	A1	F	10	11	4			As we walked the inside part of the beach, seals flushed

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth; OB=Oyster Bar; UEF=Up Estero Far; UEN=Up Estero Near; L=Limantour Spit) Double Point (SB=South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock; RB=Rope Beach; TRB=Two Rock Beach) Tomales Bay (SI=Seal Island; CI=Clam Island) Bolinas Lagoon (KI=Kent Island; S=Seadrift; HWY1=Highway 1 Channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane); bird; dog; human; non-motor boat; motor boat; researcher; unknown; other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

I n Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/14 Year 2009 Location: Drakes Estero Observers: [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior ***	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
10:00	Researcher	2	A1	FW	[illegible]	[illegible]	[illegible]	[illegible]	??	I was walking on the
										inner part of DB (directly
										across from [illegible]) I
										thought there was a
										dead pup. Could not get
										all the way [illegible] due to high
										winds. Only saw how
										many seals FW

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth; OB=Oyster Bar; UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB=South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1=Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water (Record Strongest Reaction)

FOR OFFICE USE ONLY
Entered Checked
[illegible]

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

I n Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/16 Year 09 Location: DE Observers (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11:10	Hum's.	—	L	HA/F/FW	12 5	174	unk	8	N	5 People Moved Closer to Seals Pushing Seals Toward Water edge & some into Water.
										Saw Two Oyster Boats during Surveys.

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 4/18 Year 2009 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before * Disturbance (Total Seals)	No. Adult Immature Seals Remain Onsite	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1:15	Bird	8	A	NR	6	3	3	0	0	3 adults 5 Harbor seals pups
1:45	Human Hiker	1	L	FW	13	X	1	12	N	
2:15	Human Hiker	1	L	FW	3	10	0	3	X N	Hiker walked up to mom and pup. Mom pushed pup to water. Hiker stayed with pup 3 times. Hiker pup flushed to water 5 min later pup came back near approached pup. Pup fed no return

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, GI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered 4/22/09 SC

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/7 Year 09 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
2:25	Pelicans	15	E	F						Pelicans disturbed and caused constant moving of harbor seal Seaward Exit

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEE=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1channel point) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water (Record Strongest Reaction)

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5-12 Year 2009 Location: DE Observers [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
945	unknown		A	FW	~~150~~ 173 [illegible] [illegible]	153	10	20	1 hr	[illegible] not just kind of it of 35 and only 20 FW. There were 2 boats out by the oyster beds most of the time we were surveying and no seals around them

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered [illegible] Checked [illegible]

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/17 Year 2009 Location: Drakes Estero Observers: (b) (6) [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time:	Comments (vessel/aircraft identification)
1400	Unk	~	L	FW	15	0		15	?	Did not see disturbance but were observing other subsites. People were on the beach earlier, but not when we arrived the seals were gone

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water, (Record Strongest Reaction)

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 5/20 **Year** 2009 **Location:** DE **Observers:** [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
7:00	Unknown		A1	FW	103 [illegible]	[illegible]	39	11	[illegible]	
7:35	Aircraft	1	DB	HA	57 [illegible]	[illegible]	0	0		Military Jet very loud

*SOURCE: Use a specific source listed on the back of this sheet.
**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rocks, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)
***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water (Record Strongest Reaction)

Entered [illegible] Checked [illegible]

Revised March 2009

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: June 3 Year 2009 Location: DE Observers (b) (6) [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1545	Motor Boat	1	OB	FW	67	56		11	N	Small inflated
										rubber boat
										There were 3 diff
										groups on OB
										one had 99
										[illegible]
										one had 18
										The group which
										[illegible]
										[illegible]
										[illegible]
										boat

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water (Record Strongest Reaction)

Entered EC 6/4/09

Revised March 2009

Checked [illegible] 6/[illegible]/09

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/27 Year 2009 Location: DRAKES ESTERO Observer: (b) (6) [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult/Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft Identification)
1236	VISITOR	1	A1	FW	530	360		425 28	Y 5min	

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water (Record Strongest Reaction)

Revised March 2009

Entered 7/2/09 Checked 7/9/09

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 6/28 Year 2009 Location: DE Observer: (b) (6) [redacted]

Time	Source*	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
11:30	Bird(egret)	1	A-1	FW	475	375	100		Y(1195)	

*SOURCE: Use a specific source listed on the back of this sheet.

**SUBSITES: Drakes Estero (A=A1sandbar, A1=A1sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered on data sheet

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 7/13 **Year** 2009 **Location:** Drakes Estero **Observers:** [redacted]

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1055	Visitor	1	[illegible]	FW	260	230	–	30	Y, 1047	Person walked
1152	Visitor	1	[illegible]	FW	25[illegible]	70	[illegible]	187	Y, 1?51	near the seals
										Person walked near the seals, maybe 300-400 ft away
									rehauled at A1	

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

Revised March 2009

Entered [illegible] 7/15/09 Verified [illegible]

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 11/14 Year 09 Location: DE Observers: (b) (6) [redacted]

Time	Source *	Number of source	Sub-Site	Seal Behavior **	No. Before Disturbance	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
										M/F remained
~~12:30~~	Fishing	Man+Women	A1	HA/FW	132	122	—	10	y-20min	All afternoon in Estero
2:00	"	"	A1	HA/FW	188	188	—	—	—	Across A1-Loud TALK. Consist HS Disturb. Many FW Over afternoon
~~12:30~~	Human	~~Biker~~ Potential	~~A/A1~~	~~0~~	Not potential, too far away (sc)					Sunset Bch
1:35	KAYAK		A1	HA/FW	188	178	—	10	y-15-20mm	Going to DB They Tried Very hard Not to Disturb - paddled far to edge of shore
2:30	Fishing	2 Humans	A1	HA/F/FW	188	182	—	6	y-15-20mm	Constant dist.
3:00+	"	"	A1	HA/F	195	195	—	—	—	Thru out afternoon by M/F Fishing right Across from A1
			~~UEF~~	~~NOTES OVER~~						

*SUBSITE: Drakes Estero (A=A sandbar; A1=A1 sandbar; DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit) Double Point (SB= South Beach; NB=North Beach; TP=Tide Pools; SP=South point; SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island) Bolinas Lagoon (KI=Kent Island, S=Seadrift, HWY1= Highway 1 channel) Duxbury Reef (DUX=Duxbury Reef)

**SOURCE (include number): aircraft (helicopter/fixed wing plane), bird, dog, human, non-motor boat, motor boat, researcher, unknown, other

***SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

FOR OFFICE USE ONLY: Entered Checked

SL 3/16/10 9/4/10

12^{30} Gray Boat, 3 men push Raft to far WEST end of Channel + worked on Western Sandbar

Boat left, to raft Took Oyster Bags off on to boat - went into HOME Bay

2^{05} Back out + left immediate area for other sites then back to QB Oyster base.

3^{00} Boat Out again - Then to HOME BAY

3^{30} Back out from HOME Bay back to base operations

UEF - No one @ This Site. Many "objects" in "Oyster bags" all over this Sandbar. HARD TO clearly I.D. from such long distance from the monitoring site above D.E. "Objects" looked like a "base" cover for something To go on Top. Similar TO a sandbar to left of UEF. Looking like "beds of Something" for growing oysters.

I Took digital Sent TO Sarah Allen + film photos (slides) Taken to be developed + reviewed + given TO Sarah Allen/ PRNS.

Oystermen never STOPped on UEF The whole Time I WAS doing Survey - I arrived 12^{15} when upper Estero still covered in Water + no Sandbars exposed. UEF exposed @ about 2^{30}+ on -

A number of PRNS personnel + others Should be out on Estero in a boat, at Low TO minus Tide TO View + photo EXACTLY what is on UEF.

UEF had Nothing on This Site This summer during Surveys - Only H.S. !

POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: 12/2 Year 2009 Location: Drakes Estero Observers: (b) (6)

Time	Source *	Number Of Source	Sub-Site**	Seal Behavior ***	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. Pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)
1509	Pleasure Boat	1	A1	F	60	60	—	0		Left Drakes Estero

*SOURCE: Use a specific source listed on the back of this sheet

**SUBSITES: Drakes Estero (A=A1 sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB=South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1=Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

***SEAL BEHAVIOR: NR=no response, HA=head alert, F=flush, FW=flush into water (Record Strongest Reaction)

Revised March 2009

Entered 2/9/10

Vehicular Type Disturbance Sources	
Source	**Source Specific**
vehicle	car
vehicle	truck
vehicle	motorcycle
vehicle	bus
vehicle	ambulance

aircraft	small plane
aircraft	jumbo jet
aircraft	helicopter
aircraft	hang glider
aircraft	ultralite

non-motor boat	kayak
non-motor boat	canoe
non-motor boat	sailboat
non-motor boat	row boat
non-motor boat	wind surfer

motor boat	fishing boat
motor boat	tug boat
motor boat	sailboat w/engine
motor boat	jet skis
motor boat	park ranger boat
motor boat	oyster boat
motor boat	clam boat

Human Type Disturbance Sources	
Source	**Source Specific**
fisherman	
clammer	

human	hikers
human	visitors / tourists
human	photographers
human	divers
human	surfers
human	oyster workers
human	horse riders
human	joggers
human	bicyclists
human	other workers

researcher	
school group	

Other Disturbance Source Types	
Source	**Source Specific**
dog	
coyote	
bobcat	
bird	gull, turkey vulture, etc.
unknown	
other	rock slide, elephant seal etc

Frost, Gavin

From: TransferBigFiles [DoNotReply@TransferBigFiles.com] on behalf of Corey Goodman [corey.goodman@me.com]
Sent: Sunday, October 16, 2011 6:05 PM
To: Frost, Gavin
Subject: TransferBigFiles.com - You have a file waiting

A file has been sent to you!

You have been sent one or more files through the TransferBIGFiles.com service. If you were not expecting to receive any files, please use caution before downloading anything to your computer.

Go to my download page >>
https://www.transferbigfiles.com/c7fb3aa7-84b2-44fc-9fc2-3/ca14cded5d?rid=7CsdQvFfctaR31Kf%2bN11Uw%3d%3d

Dr. Corey Goodman's analysis of dEIS and Becker 2011

- analysis of dEIS.CSG.pdf
- analysis of Becker 2011.CSG.pdf

(link expires Monday, October 24, 2011, 12:00 AM CST)

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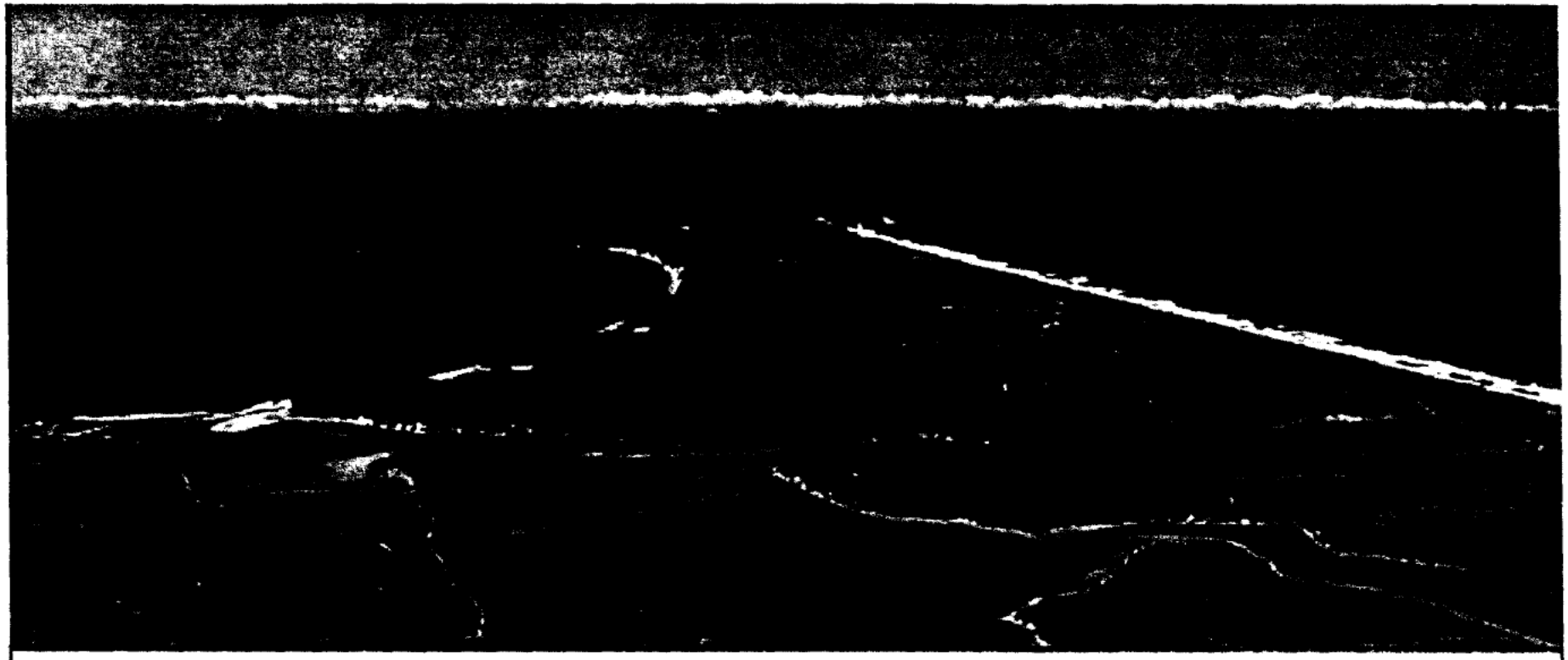


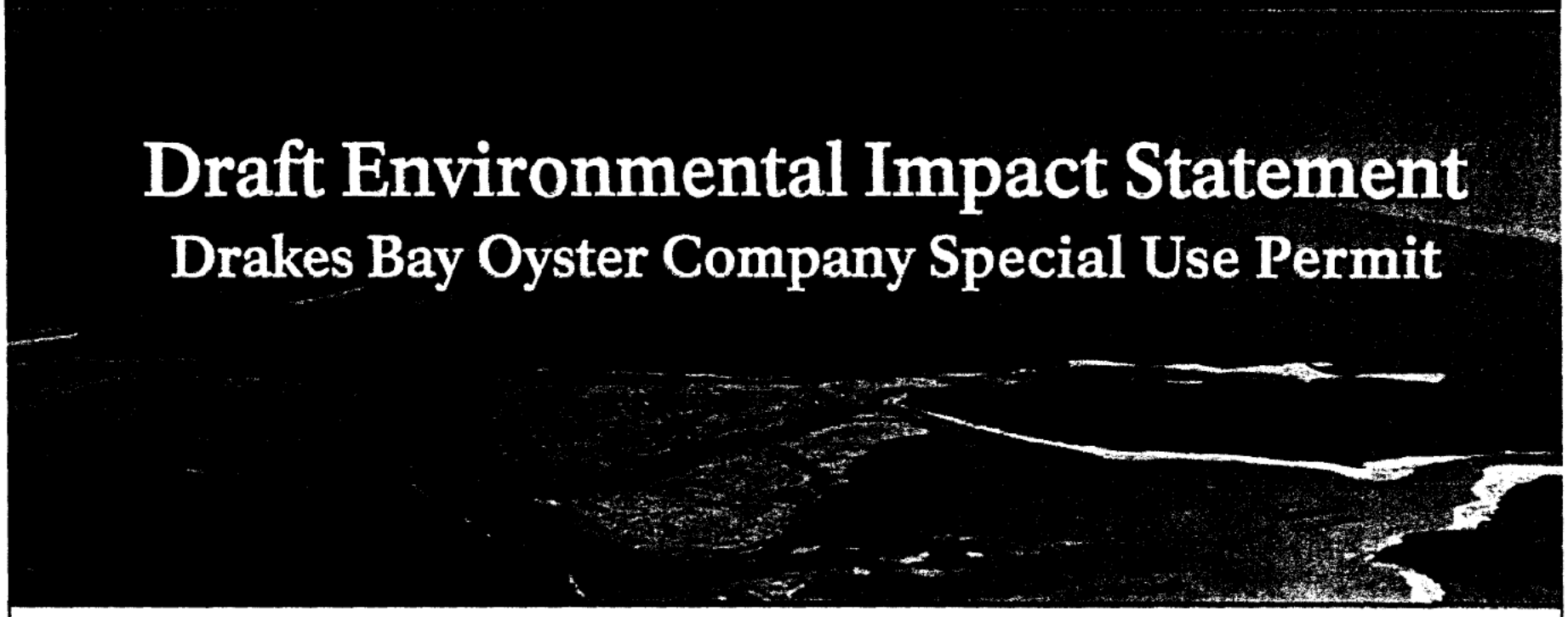
NPS Science & Implications for the Oyster Farm EIS

by Dr. Corey Goodman
October 16, 2011
Dance Palace, Point Reyes Station, CA

Sponsored by:
Tomales Bay Association (TBA) and
Alliance for Local Sustainable Agriculture (ALSA)

National Park Service
U.S. Department of the Interior

Point Reyes National Seashore
California



Draft Environmental Impact Statement

Drakes Bay Oyster Company Special Use Permit

The NPS draft Environmental Impact Statement:

- **What is the scientific evidence for environmental impacts?**
- **What role does the Becker, Press, & Allen 2011 paper play?**

Why did I get involved? Supervisor Kinsey asked me

April 5, 2007: NPS Superintendent Don Neubacher met with Marin County Supervisor Steve Kinsey. Kinsey reported that Neubacher made ***"strong environmental accusations"*** against DBOC including overwhelming data of harm to harbor seals; claimed DBOC ***"committed environmental felonies."***

Apr 28 2007: based on my scientific credentials and involvement in science-based public policy issues (e.g., Chair of National Academy of Sciences' Board on Life Sciences), Marin County **Supervisor Steve Kinsey contacted me** on April 28 2007, asked me to examine NPS science & testify at May 8 '07 hearing

May 8 2007: **did not know Kevin Lunny** when testified at Marin County hearing; involved as **public service for scientific integrity** – good science driving public policy

Why did Supervisor Steve Kinsey ask me to get involved?

1) **Biology professor for 25 years** at UC Berkeley & Stanford
2) **Current faculty** at U.C. San Francisco
3) **Published over 200 peer-reviewed papers**
4) **Elected member of National Academy of Sciences**, Amer. Philosophical Soc., & Amer. Academy of Arts & Sciences
5) **Winner of numerous scientific awards** including Alan T. Waterman Award, Canada Gairdner International Award, March-of-Dimes Prize, & Dawson Prize in Genetics (2011)
6) **Chair of National Academy of Sciences' Board on Life Sciences** for 6 years; committee oversees environmental & biological studies for federal government
7) **Member of California Council on Science & Technology**; oversees science & technology studies for state government
8) **Involvement in science-based public policy** – good science driving policy rather than policy driving bad science

My testimony at the May 8 2007 Marin County hearing at the request of Supervisor Steve Kinsey

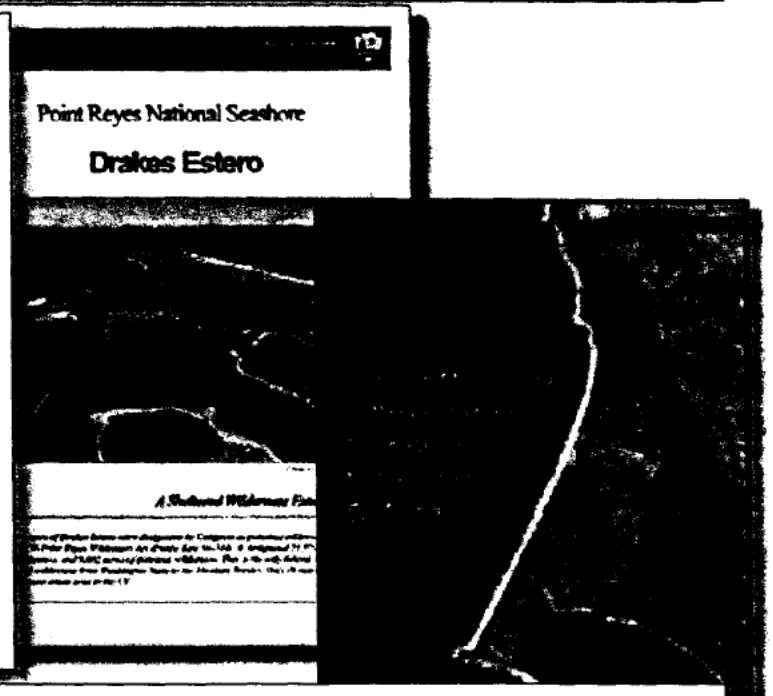
"... public policy decisions can and should be informed by quality science. But this must be science conducted rigorously, without agendas or conflicts-of-interest. ***The political process can be dangerously misled by bad or misused science.*** *One of my greatest concerns when I see science being invoked in public policy debates is to make sure that it is good science and not pseudo-science or -- even worse -- a blatant misuse of science."*

"My only hesitation in coming forward to testify today is the realization that openly ***expressing my views as a scientist may cause me to come under personal attack*** *by local groups ... determined to remove [DBOC] ... Nevertheless I feel compelled to speak out for good science instructing public policy."*

Public testimony from Dr. Corey Goodman on May 8, 2007 to Marin County Supervisors at request of Marin County Supervisor Steve Kinsey on April 28, 2007

- **July 21 2007: Senator Feinstein asked that the NAS review NPS science: the NPS Drakes Estero report**
- **May 5 2009: National Academy of Sciences (NAS) panel released report: "*Shellfish Mariculture in Drakes Estero*"**

"The National Park Service report "Drakes Estero: A Sheltered Wilderness Estuary" in some instances ***selectively presented, overinterpreted, or misrepresented*** *the available scientific information on DBOC operations by exaggerating the negative and overlooking potentially beneficial effects."*



NAS found NPS misrepresented NPS data in every category of environmental harm including harbor seals. NAS concluded: *"… there is a* ***lack of strong scientific evidence*** *that shellfish farming has major adverse ecological effects on Drakes Estero"*

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

Senator Feinstein legislatively asked that draft EIS follow conclusions of the National Academy of Sciences report

The May 5, 2009 NAS report concluded: *"… **there is a lack of strong scientific evidence that shellfish farming has major adverse ecological effects on Drakes Estero** …"*

But the dEIS dismissed the NAS conclusion: ***"The 2009 NAS report does not provide a definition or detection threshold for what a "major" adverse ecological effect would be** in this context, nor does it indicate that the NAS use of an impact qualifier (e.g., "major") is consistent with NEPA standards."*

dEIS dismissed NAS conclusion **because NAS did not define "*major*" – NPS says NAS report inconsistent with NEPA**

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

Absence of "*data*" and "*evidence*" from draft Environmental Impact Statement (DEIS)

Environmental impact	"*data*" and "*evidence*" showing impact	Hypothetical "*potential*" for impact
overall	7*	**514**
seals	1	74
eelgrass	0	43
red-legged frog	0	10

* 7 = 1 for seals (Becker 2011) and 6 for noise measurements of oyster boats and onshore oyster operation

NPS **dEIS based upon hypothetical "*potential*" impacts** and not actual "*data*" or "*evidence*" showing impacts

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

Absence of "*data*" and "*evidence*" from draft Environmental Impact Statement (DEIS)

Environmental impact	"*data*" and "*evidence*" showing impact	Hypothetical "*potential*" for impact
overall	7*	**514**
seals	**1**	74
eelgrass	0	
red-legged frog	0	

The one citation of "*data*" in the dEIS is from Becker 2011 which is why that paper is so key

Oyster farm has existed for nearly 80 years, and yet NPS has no data of impacts but only "*potential*" impacts; After millions of $$ on studies, shouldn't NPS have data?

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Drakes Bay Oyster Company Special Use Permit

The dEIS raises the specter that DBOC is a threat to seven different "*special-status*" endangered species

Environmental impact	"*data*" and "*evidence*" showing impact	Hypothetical "*potential*" for impact
overall	7*	514
seals	1	74
eelgrass	0	43
red-legged frog	**0**	**10**

dEIS presented "*potential*" impact with no data for seven endangered species including e.g. red-legged frog, Myrtle's silverspot butterfly, Western snowy plover, and CA least tern

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The dEIS raises the specter that DBOC is a threat to the "*special-status*" species: the red-legged frog

- Red-legged frogs cannot live in salt water (i.e., Drakes Estero)
- Red-legged frogs live in 50+ fresh-water ponds in seashore

In 1998, NPS produced Environmental Assessment (EA) for oyster farm. With US Fish & Wildlife Service, they wrote:
"... NPS has concluded that the proposed action would not adversely affect any federally listed species or critical habitat."
"... no federally protected species ... have been detected ..."
"... no effect on threatened or endangered species."

In 2011 NPS dEIS, NPS reversed its 1998 NPS EA, stating DBOC has potential for adverse impacts on red-legged frogs because of ***"... increased risk for vehicle strikes."***

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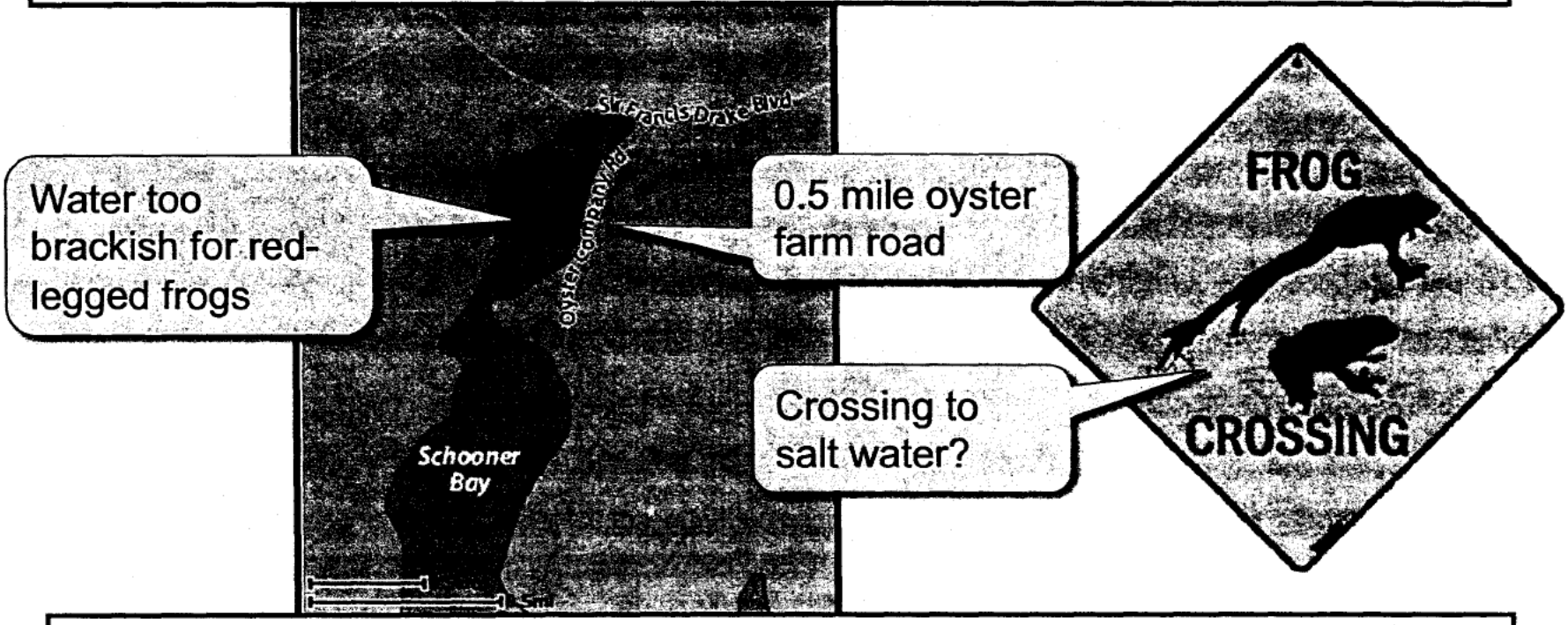
The dEIS raises the potential that DBOC might threaten red-legged frogs due to "*vehicle strikes*"



PRNS has 2.6 million visitors each year driving on 50 miles of roads, but dEIS suggests **danger to red-legged frogs from "*vehicle strikes*"** on 0.5 mile road to oyster farm (1%)

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The dEIS claims that DBOC might account for 1% (7 acres) of lost eelgrass due to shading by oyster racks …

Environmental impact	"*data*" and "*evidence*" showing impact	Hypothetical "*potential*" for impact
overall	7*	514
seals	1	74
eelgrass	**0**	**43**
red-legged frog	0	10

… but the dEIS neglects to mention that eelgrass never existed at most racks, and from 1991 to 2007, eelgrass expanded 100% (368 acres), from 368 to 736 acres

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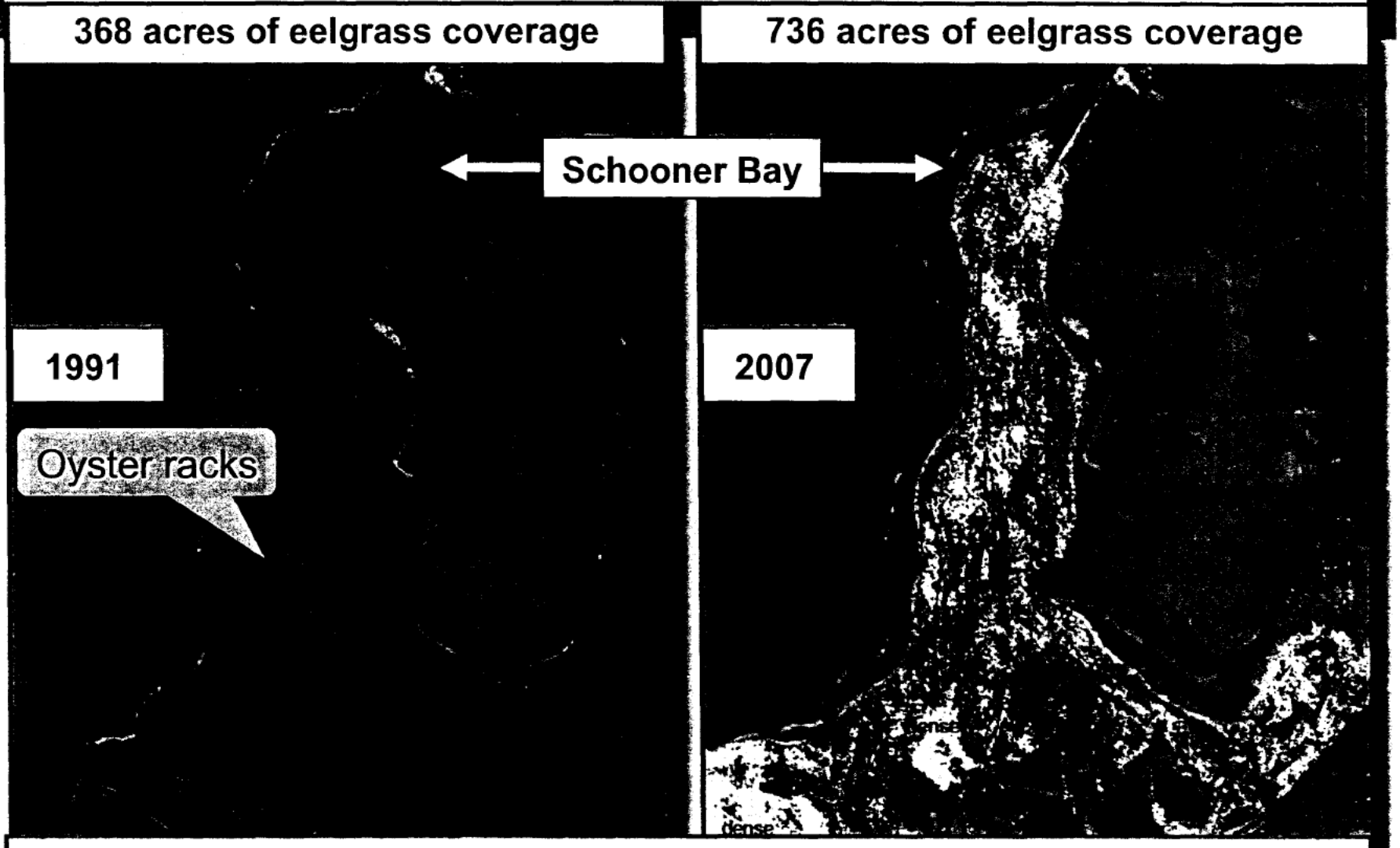
NPS-CDFG Aerial Mapping of Eelgrass Coverage in Drakes Estero



Eelgrass is thriving partly due to oysters improving water clarity

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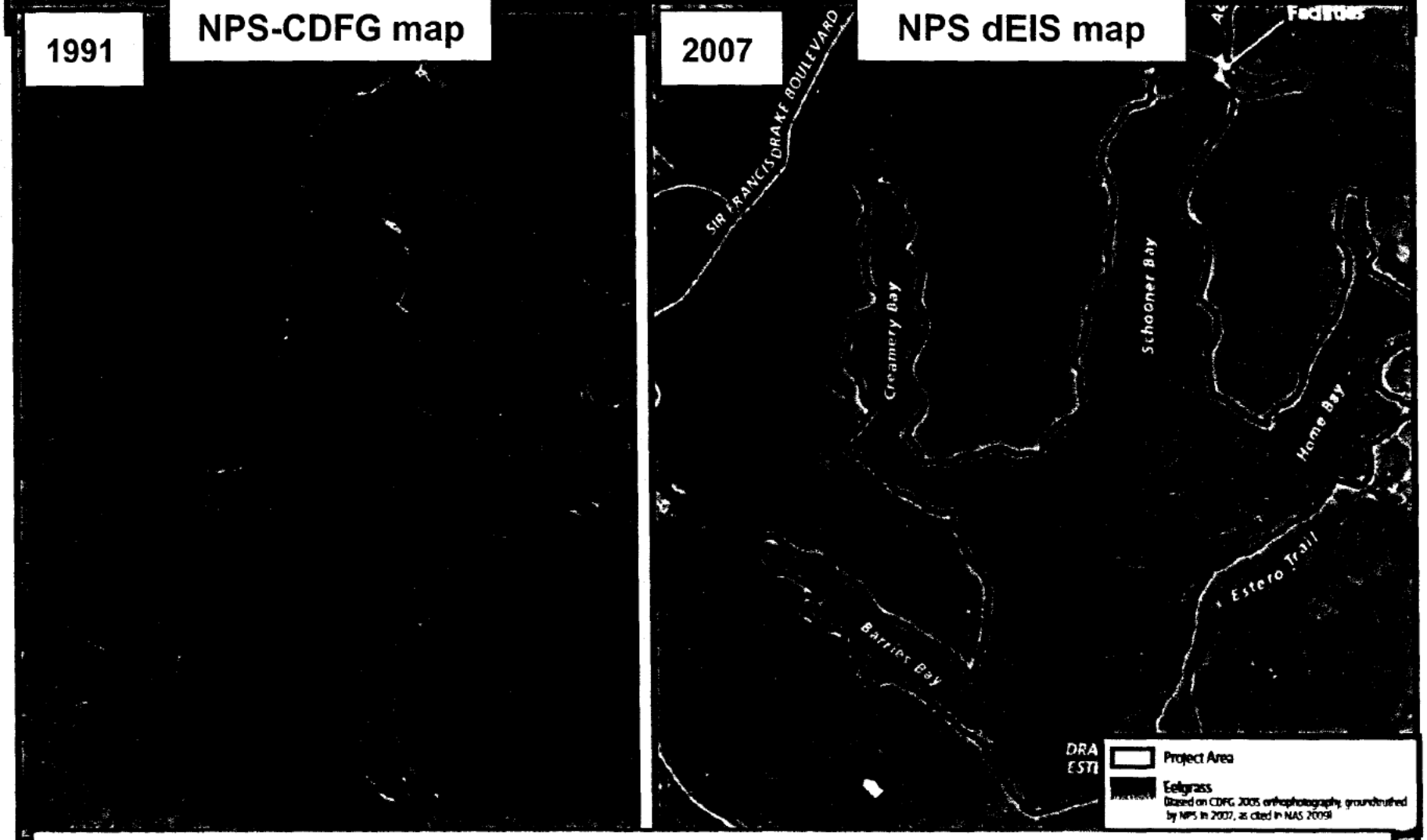
1991 NPS-CDFG map

2007 NPS dEIS map



Eelgrass is thriving partly due to oysters improving water clarity

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Senator Feinstein legislatively required the draft EIS follow conclusions of the National Academy of Sciences

The 2009 NAS report concluded: *"**Eelgrass has approximately doubled** in areal cover in Drakes Estero from 1991 to 2007, implying little systemic threat from the existing intensity of oyster culturing activities. **Oysters have the potential to benefit eelgrass** because their filtering activity improves local water clarity (and hence light penetration) and because they release biodeposits … (plant nutrients)."*

But the dEIS came to the opposite conclusion: *"Although there are some highly localized beneficial impacts on eelgrass associated with commercial shellfish operations, **the overall impact … on eelgrass would be moderate and adverse**."*

Eelgrass is thriving partly due to oysters improving water clarity

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The only reference to "data" for an environmental impact is this one harbor seal reference to Becker 2011

Environmental impact	"*data*" and "*evidence*" showing impact	Hypothetical "*potential*" for impact
overall	7*	514
seals	**1**	**74**

Concerning harbor seals, the dEIS states:
"In a recent review of the longterm data at Drakes Estero, Becker, Press, and Allen (2011) used a model-based approach to show that ***harbor seals preferentially use haul-out sites less when located near active oyster mariculture sites during years of high vs. low oyster harvest.****"*

17

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Since 2007, our community has heard four generations of NPS claims of data showing the oyster farm is harming the harbor seals, but the first three are absent from dEIS

- 2007: **1st** NPS claim to **SUPES** that DBOC caused an **80% decline** in harbor seals at one subsite: **NOT IN dEIS**
- 2007: **2nd** NPS claim to **CCC** that **DBOC disturbed harbor seals** based on **April 26 Trip Report**: **NOT IN dEIS**
- 2008-'09: **3rd** NPS claim to **NAS** that **DBOC disturbances** led to decrease in seals (**Becker 2009 paper**): **NOT IN dEIS**
- 2010-'11: **4th** NPS claim to **MMC** that **DBOC activity** led to spatial displacement of seals (**Becker 2011 paper**): **IN dEIS**

dEIS only includes the 4th generation of NPS claims of harm by DBOC to harbor seals: other claims absent

May 5 2009: National Academy of Sciences report

The NAS reported that resolving the controversy over the potential harbor seal disturbances *"... **would require a data collection system that could be independently verified, such as time and date stamped photographs.** This verification is especially important in circumstances where there is an indication of a source of disturbance that could lead to a regulatory action, as was the case with disturbances attributed to DBOC."*

"time and date stamped photographs"

Unknown to NAS, for two years since May 5 2007, NPS had cameras taking pictures every minute of every day, and had the detailed 2008 logs showing no DBOC disturbances.

NPS had two cameras for 3 ½ years taking 281,000 photos

Why didn't NPS disclose the cameras to the NAS?

2008 NPS log: detailed analysis of DBOC boats & workers

TC 85 (cont.)

2008-5-8	8:53	Boat enters OB channel

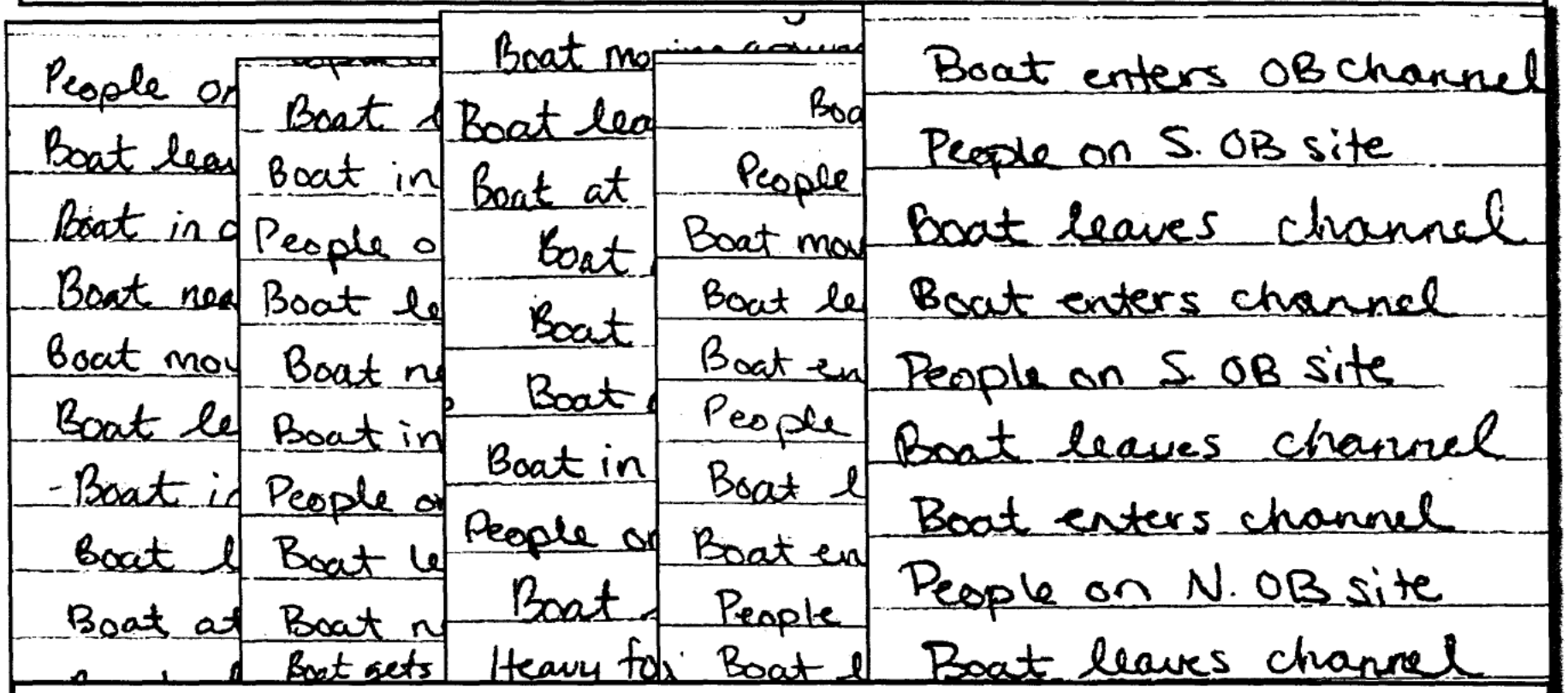
Q. Why didn't NPS disclose the cameras to NAS?

2008-5-8	11:13	Boat leaves channel
2008-5-8	3:11	Boat enters channel
2008-5-8	3:15-3:44	People on S. OB site
2008-5-8	3:45	Boat leaves channel
2008-5-10	8:25	Boat enters channel
2008-5-10	8:29-8:57	People on N. OB site
2008-5-10	8:58	Boat leaves channel
2008-5-13	7:20	Boat enters channel

A. Because the NPS logs of 3 ½ years of minute-by-minute, day-to-day photos showed not a single disturbance of the harbor seals caused by DBOC.

2008-5-13	10:38	Boat leaves channel

2008 NPS log: no disturbances of harbor seals by DBOC



- **NPS said photos had not been analyzed, but NPS logs showed the photos had been analyzed in detail**
- **NPS said cameras were for studying wildlife, but NPS logs showed focus was on oyster boats & workers not wildlife**
- **NPS said DBOC caused seal disturbances, but NPS logs showed no DBOC disturbances to seals in 3 ½ years**

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The dEIS dismisses the NPS photos and detailed logs because of the lack of a NPS protocol for their analysis

The dEIS states:

"Because the collection of these photos was not based on documented protocols and procedures, the body of photographs does not meet the Department's standards for a scientific product. As a result, the photographs have not been relied upon in this EIS."

But dEIS includes other "*data*" without documented protocols, such as aerial photos, maps, and other data (e.g., 1982 & 1983 data from Allen's pre-NPS notebooks) from Becker 2011

dEIS dismisses 281,000 photos and NPS logs that showed no DBOC disturbances of harbor seals over several years

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

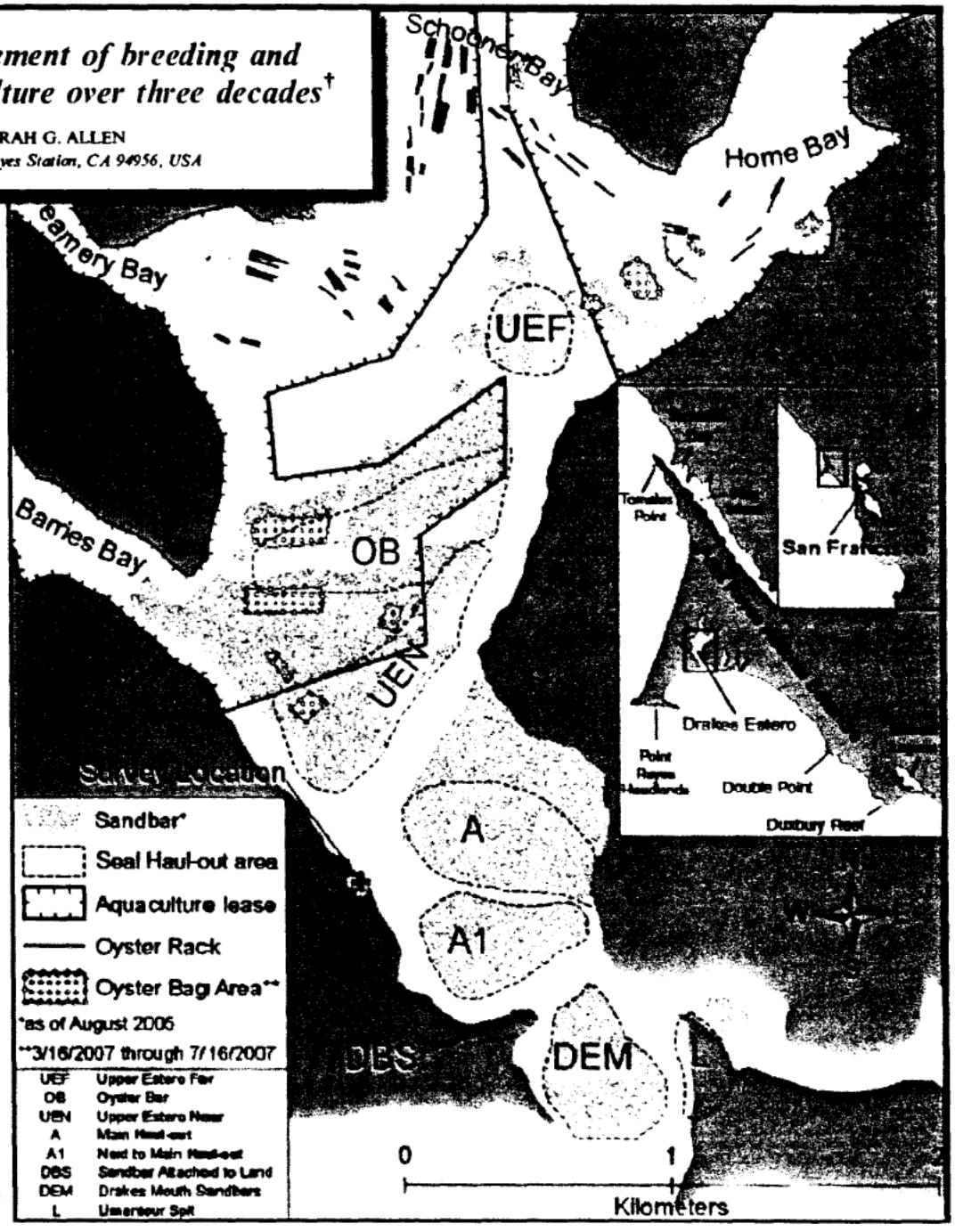
BENJAMIN H. BECKER*, DAVID T. PRESS and SARAH G. ALLEN
US National Park Service, Point Reyes National Seashore, Point Reyes Station, CA 94956, USA

Figure 1: NPS map from Becker 2009 & Becker 2011

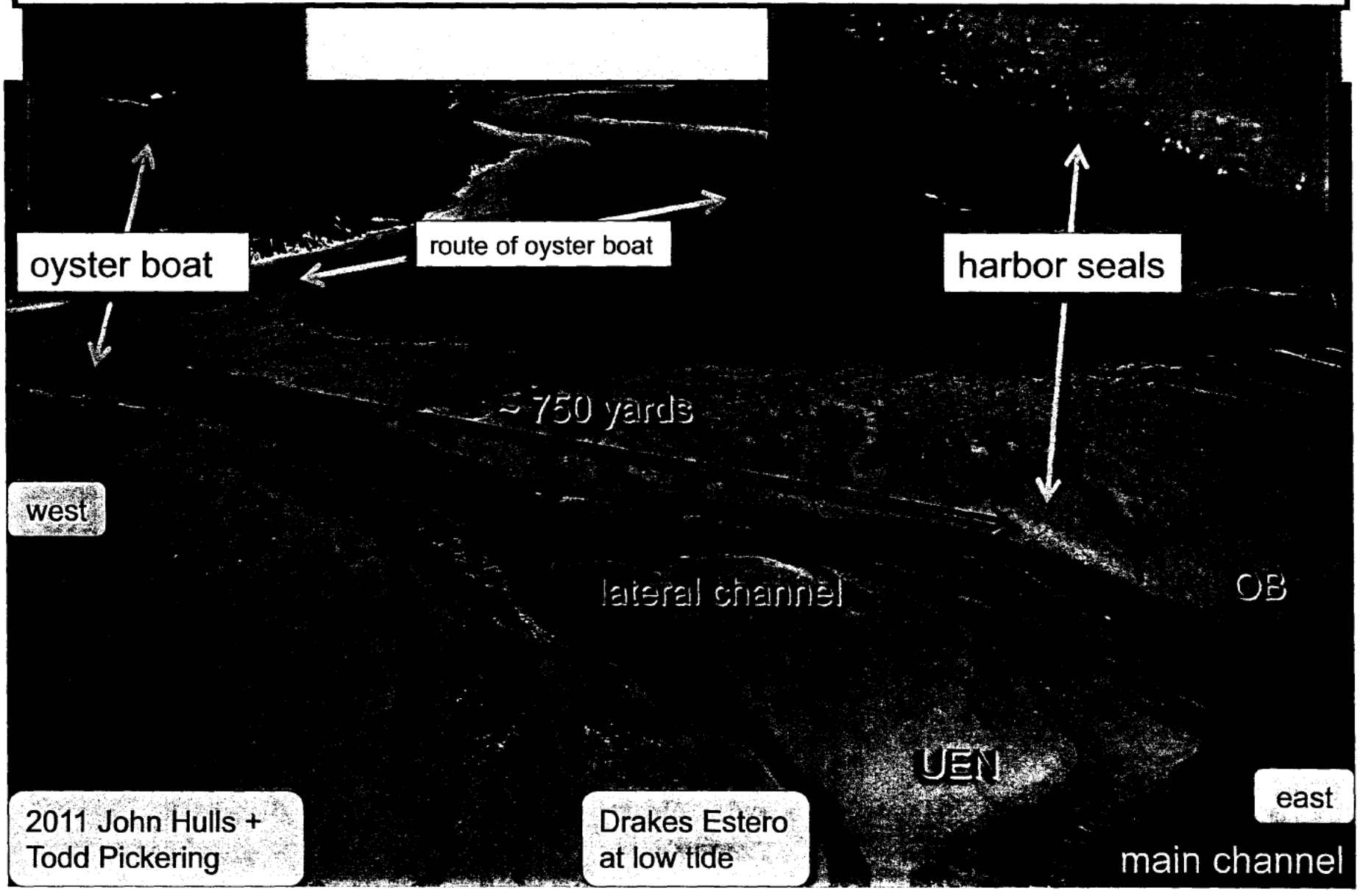
Upper Estero = UEF, OB, UEN

Middle Estero = A, A1

Lower Estero = DBS, DEM, L



A photo you won't find in the dEIS: oyster boats stay >700 yards away from the harbor seals and don't disturb them



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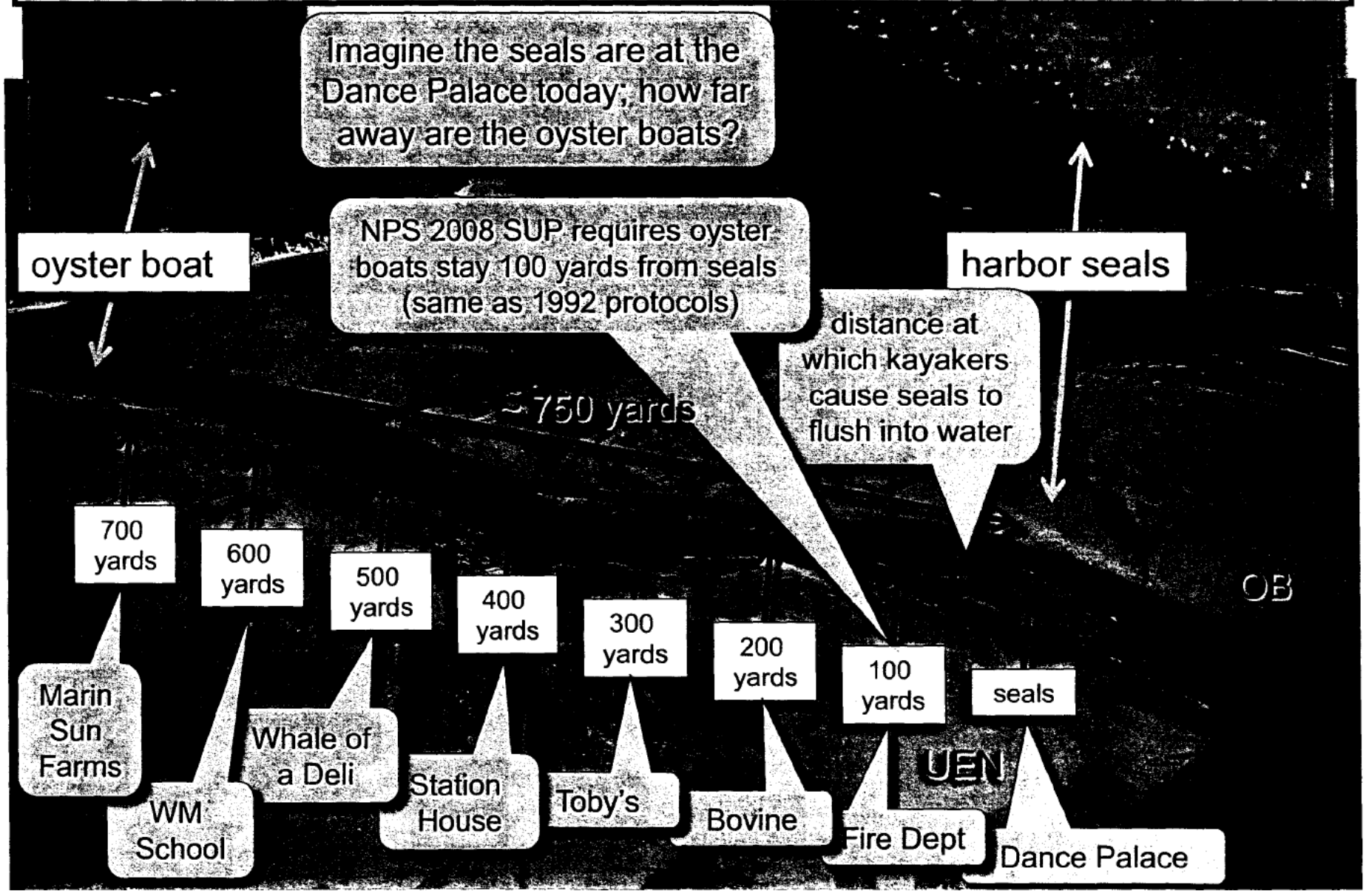
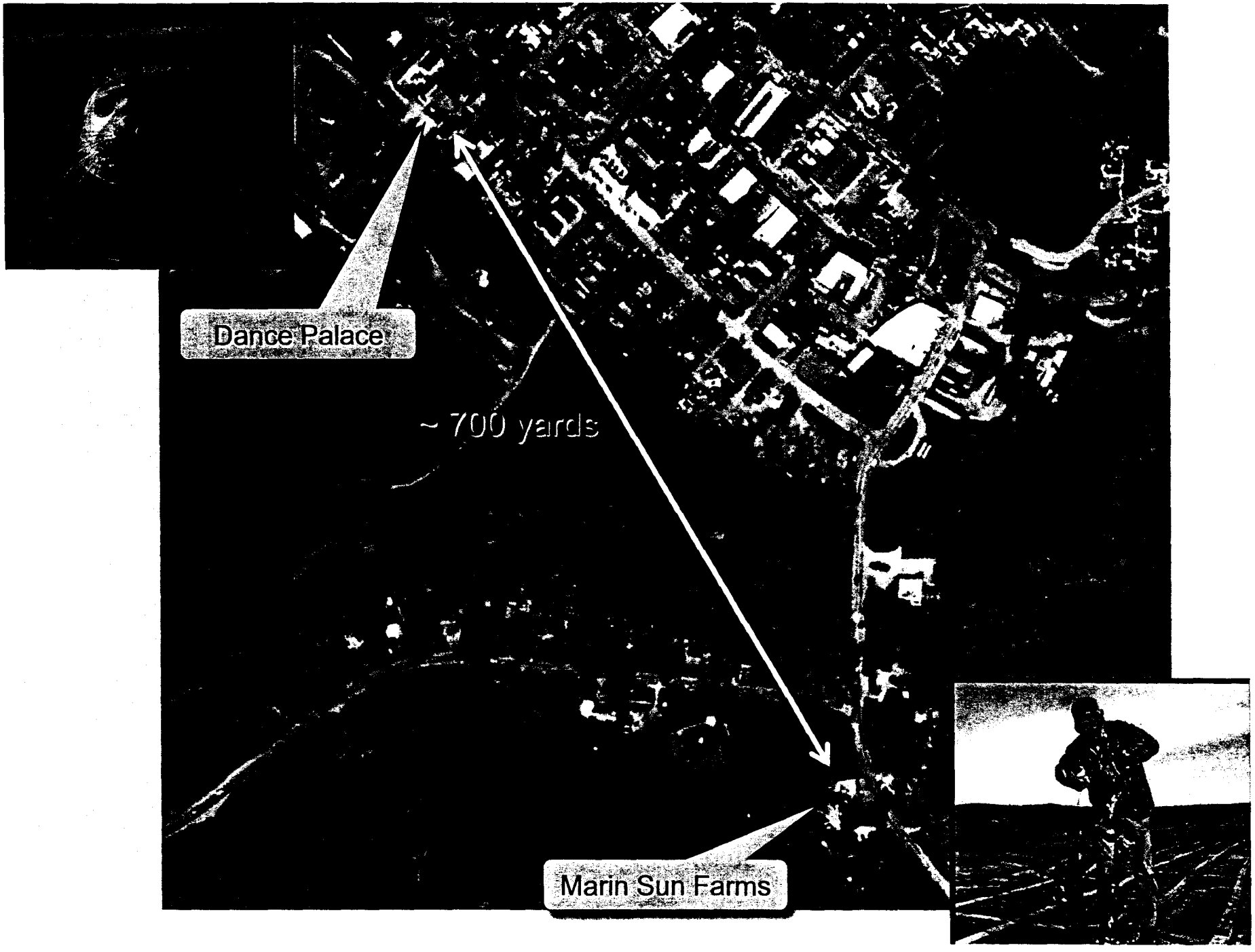
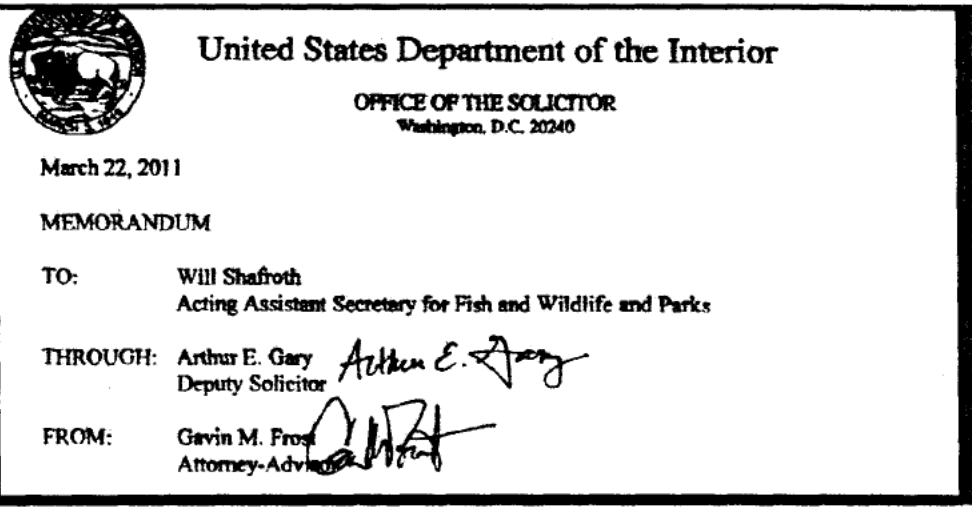



Dance Palace
~ 700 yards
Marin Sun Farms

On March 22, 2011, Dept. of the Interior released the public version of the Frost Report by Field Solicitor Gavin Frost



United States Department of the Interior

OFFICE OF THE SOLICITOR
Washington, D.C. 20240

March 22, 2011

MEMORANDUM

TO: Will Shafroth
Acting Assistant Secretary for Fish and Wildlife and Parks

THROUGH: Arthur E. Gary
Deputy Solicitor

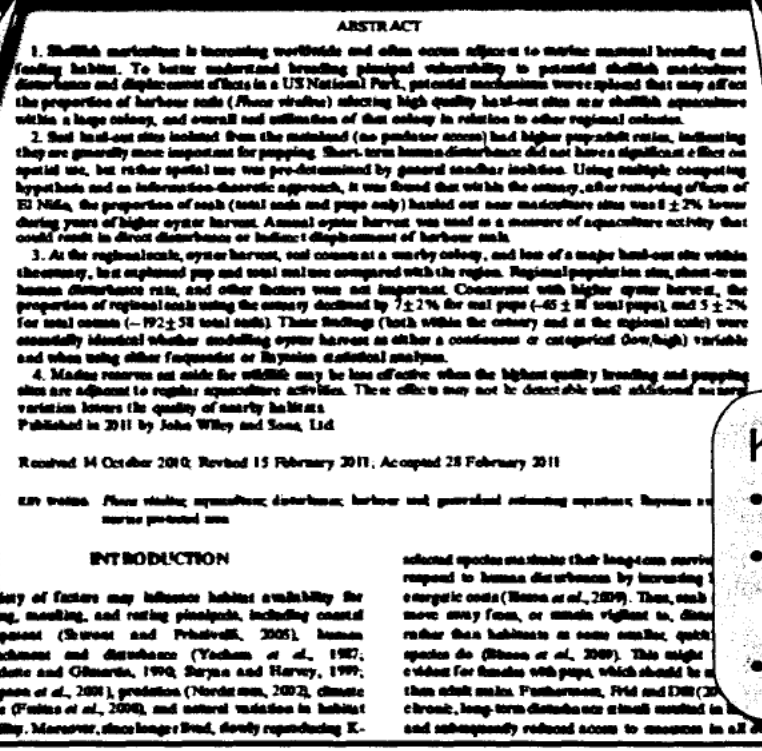
FROM: Gavin M. Frost
Attorney-Advisor

Two weeks before NPS scientists published Becker 2011 paper, Field Solicitor Gavin Frost found that their "*mistakes stem from the refusal … to modify their intuitive, but* ***statistically and scientifically unproven, belief*** *that DBOC mariculture activities …*" disturb harbor seals in Drakes Estero. Frost concluded NPS scientists showed "***bias***," "***advocacy***," "***troubling mind-set***," "**mishandled" data**, and "*willingness to allow* ***subjective beliefs*** *… to guide scientific conclusions.*" Frost found the NPS scientists had **violated the NPS Code of Scientific & Scholarly Conduct**.

NPS Becker et al. paper published April 2011: is it correct?

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

BENJAMIN H. BECKER*, DAVID T. PRESS and SARAH G. ALLEN
US National Park Service, Point Reyes National Seashore, Point Reyes Station, CA 94956, USA



ABSTRACT

1. Shellfish mariculture is increasing worldwide and often occurs adjacent to marine mammal breeding and feeding habitat. To better understand breeding pinniped vulnerability to potential shellfish mariculture disturbance and displacement effects in a US National Park, potential mechanisms were explored that may affect the proportion of harbour seals (*Phoca vitulina*) selecting high quality haul-out sites near shellfish aquaculture within a large colony, and overall seal utilization of that colony in relation to other regional colonies.

2. Seal haul-out sites isolated from the mainland (no predator access) had higher pup:adult ratios, indicating they are generally more important for pupping. Short-term human disturbance did not have a significant effect on spatial use, but rather spatial use was pre-determined by general weather isolation. Using multiple competing hypothesis and an information-theoretic approach, it was found that within the estuary, after removing effects of El Niño, the proportion of seals (total seals and pups only) hauled out near mariculture sites was 8 ± 2% lower during years of higher oyster harvest. Annual oyster harvest was used as a measure of aquaculture activity that could result in direct disturbance or indirect displacement of harbour seals.

3. At the regional scale, oyster harvest, seal counts at a nearby colony, and loss of a major haul-out site within the estuary, but explained pup and total seal use compared with the region. Regional population size, short-term human disturbance rate, and other factors were not important. Concurrent with higher oyster harvest, the proportion of regional seals using the estuary declined by 7 ± 2% for seal pups (−65 ± 18 total pups), and 5 ± 2% for total census (−192 ± 58 total seals). These findings (both within the estuary and at the regional scale) were essentially identical whether modelling oyster harvest as either a continuous or categorical (low/high) variable and when using either frequentist or Bayesian statistical analyses.

4. Marine reserves set aside for wildlife may be less effective when the highest quality breeding and pupping sites are adjacent to regular aquaculture activities. These effects may not be detectable until substantial long-term variation lowers the quality of nearby habitats.

Published in 2011 by John Wiley and Sons, Ltd.

Received 14 October 2010; Revised 15 February 2011; Accepted 28 February 2011

KEY WORDS: *Phoca vitulina*; aquaculture; disturbance; harbour seal; generalized estimating equations; Bayesian [illegible]; marine protected area

INTRODUCTION

If true, this would be a major environmental impact of DBOC on Drakes Estero.
Q. Is it true? A. No.

Key words in title:
- "*evidence*,"
- "*long-term spatial displacement*," and
- "*over three decades*."

Q. Why is it important if this paper is correct or not?
A. Because it represents the only impact data in the dEIS.

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

- NPS 281,000 photographs that reveal no DBOC disturbances were dismissed from dEIS; 3 ½ years of secret photo data rejected.
- **Becker, Press, & Allen 2011 paper provides the only data in dEIS of harm to harbor seals. Without it, NPS has no impact data.**
- The dEIS claims a "*potential to adversely affect seals in the future*" and proposes mitigation measures – poison pills to eliminate DBOC.
- Mitigations apply to all alternatives and will put DBOC out of business.
- Mitigations should apply to known impacts. This is a misuse of NEPA.

- Redraw **lease boundaries** to exclude many shellfish beds
- Eliminate vital **boat routes**
- Eliminate **access** to necessary CDPH sampling stations
- Restrict number of **boats**
- Restrict number of **barges**
- Restrict number of **hours** of boat use to half current use
- Restrict total **harvest levels**

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

- Alternative D (as well as Alternatives B & C) in **the draft EIS contains poison pills to put DBOC out of business** within months.
- These poison pills are mitigations from "*potential*" impacts.
- According to Alternative D, if Salazar renews the lease for 10 years, that lease will be non-renewable.
- In contrast, Feinstein's legislation called for the opposite -- for the lease to have "*the same terms and conditions as the existing authorization*." (DBOC's current lease has a renewal clause.)

- Redraw **lease boundaries** to exclude many shellfish beds
- Eliminate vital **boat routes**
- Eliminate **access** to necessary CDPH sampling stations
- Restrict number of **boats**
- Restrict number of **barges**
- Restrict number of **hours** of boat use to half current use
- Restrict total **harvest levels**

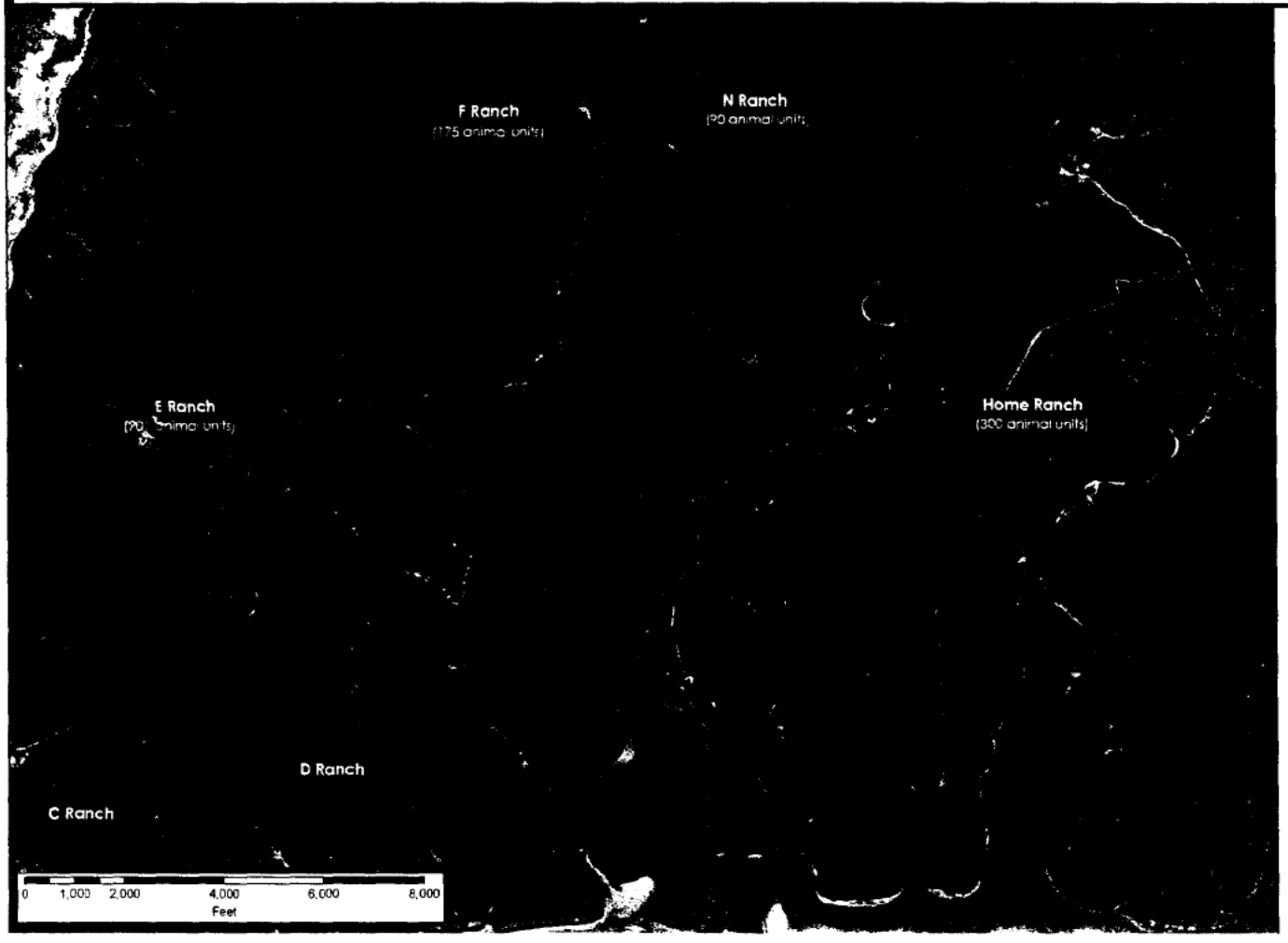
Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

- The dEIS establishes the basis for a domino effect on ag in PRNS.
- The dEIS claims that the six ranches surrounding Drakes Estero are the primary source of nonpoint-source pollution in Drakes Estero.
- The oysters help clarify the water (e.g., the eelgrass has doubled).
- Once Drakes Estero is designated "wilderness," and without oysters, the ranches surrounding it will be eliminated as the source of pollution.
- Their elimination will mark the end of agriculture in the Seashore, and a huge blow for sustainable, local, organic agriculture in Marin County.

The dEIS states: *"Six cattle ranches are located within the Drakes Estero watershed. … fecal coliform levels in most of Drakes Estero have been shown to intermittently rise after rain events associated with runoff from pastures within the watershed… Continued ranching in the vicinity of the project area has the potential to impact the following resources: water quality and socioeconomic resources."*

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

Once Drakes Estero is designated "wilderness," and without oysters, the six ranches surrounding it will be eliminated as the source of pollution.



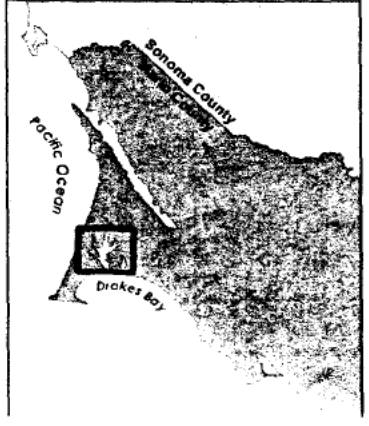
Drakes Estero Adjacent Ranches

Aquaculture Lease
Parcel Boundaries

Data Sources:

USDA, National Agriculture Imagery Program, 2006

California Dept. of Health Services



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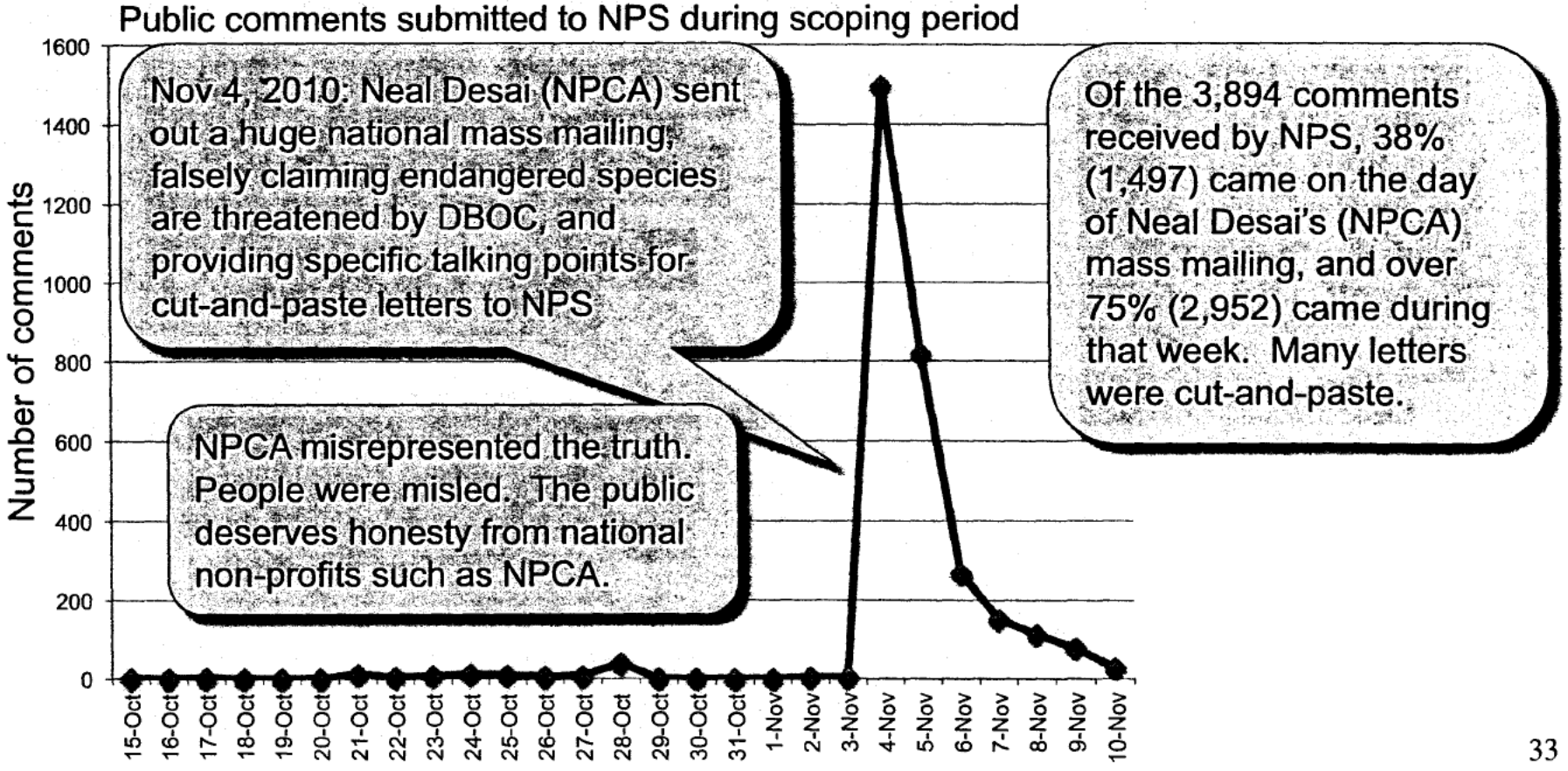
Drakes Bay Oyster Company Special Use Permit

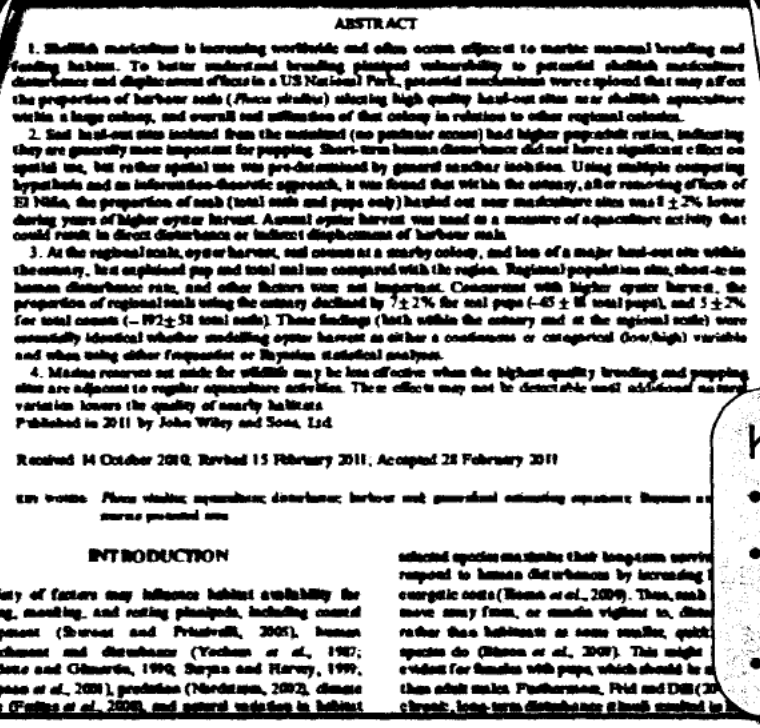
NPCA and Neal Desai turned the NPS EIS process into a national popularity contest, with people across the country being fed false information including threats to endangered species from DBOC



NPS Becker et al. paper published April 2011: is it correct?

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

BENJAMIN H. BECKER*, DAVID T. PRESS and SARAH G. ALLEN
US National Park Service, Point Reyes National Seashore, Point Reyes Station, CA 94956, USA



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4. Marine reserves set aside for wildlife may be less effective when the highest quality breeding and pupping sites are adjacent to regular aquaculture activities. These effects may not be detectable until additional natural variation lowers the quality of nearby habitats.

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KEY WORDS: *Phoca vitulina*; aquaculture; disturbance; harbour seal; generalized estimating equations; Bayesian analysis; marine protected area

INTRODUCTION

If true, this would be a major environmental impact of DBOC on Drakes Estero.
Q. Is it true? A. No.

Key words in title:
- "*evidence*,"
- "*long-term spatial displacement*," and
- "*over three decades*."

The NPS draft Environmental Impact Statement: Is the Becker, Press, & Allen 2011 paper correct?

Corey S. Goodman, PhD, October 16, 2011, Dance Palace, Pt. Reyes Station, CA

NPS Becker et al. paper published April 2011: conclusions

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

BENJAMIN H. BECKER*, DAVID T. PRESS and SARAH G. ALLEN
US National Park Service, Point Reyes National Seashore, Point Reyes Station, CA 94956, USA

ABSTRACT

Two major conclusions from Becker 2011 paper

Regional scale: spatial displacement of 7% of pups and 5% of total seals out of Drakes Estero due to oyster activity

"Concurrent with higher oyster harvest, the proportion of regional seals . using the estuary declined by 7+/-2% for seal pups (–65+/-18 total pups), and 5+/-2% for total counts (192+/-58 total seals)."

Colony scale: spatial displacement of 8% of seals away from Upper Estero haul-out sites within Drakes Estero due to oyster activity

"... the proportion of seals ... hauled out near mariculture sites was 8+/-2% lower during years of higher oyster harvest."

NPS Becker 2011 paper is only data in draft EIS

***Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades*†**

- MMC recommendation NPS not publish this paper.
- MMC did not know; Lunny did not know; Field Solicitor Frost did not know.
- Becker 2011 paper was published in April 2011; Amy Trainer announced
- Becker 2011 contains "*evidence*" of negative impact on harbor seals
- **Environmental Impact Statement relies upon Becker 2011 "*evidence*"**
- Once published using taxpayer money, all materials and methods (i.e., data and codes) must be made available to other scientists to replicate and test
- The Marine Mammal Commission undertook an analysis of Becker 2011 this summer, and asked me and others to help in that process
- With the help of the MMC, I obtained the data used for Becker 2011
- **Although experienced at statistical analysis, I sought help from scientists at Stanford, U.C. Davis, & U.C. Cooperative Extension Marin**
- This presentation is based upon that analysis of NPS data

This analysis relied entirely on NPS data provided by Becker

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

BENJAMIN H. BECKER*, DAVID T. PRESS and SARAH G. ALLEN

US National Park Service, Point Reyes National Seashore, Point Reyes Station, CA 94956, USA

year	adult.de	adultnot.de	pup.de	pupnot.de	tot.de	totnot.de	oyst	a.max	prop.a.de	prop.a.pr	a.avail	bags.6	bags.5	tot.dp	pup.dp	prop.dp	dp.change	dist.rate	mam.dist.rat	weight	enso	92 protocol
1982	556	1674	170	492	726	2166	360004	275	0.379	0.095		1	1	1	851	263	0.294	0	0.33	1.2	1	5	0
1983	534	1678	122	444	656	2122	440139	379	0.578	0.136		1	1	1	832	262	0.299	-0.02	0.62	1.79	1	0	0
1997	854	1431	257	726	1111	2157	476791	252	0.227	0.077		1	1	1	854	357	0.261	0	0.96	1	0.3	4	1
1998	591	1362	162	366	753	1728	292188	247	0.328	0.1		1	1	1	708	187	0.285	-0.17	0.93	0.85	1	0	1
1999	637	1620	285	783	922	2403	125749	241	0.261	0.072		1	0	1	890	335	0.268	0.26	0.77	0.61	1	1	1
2000	755	1778	376	962	1131	2740	34094	325	0.287	0.084		1	0	0	1076	412	0.278	0.21	0.49	0.55	1	2	1
2001	687	1827	327	902	1014	2729	65676	309	0.305	0.083		1	0	0	913	350	0.244	-0.15	0.49	0.39	1	3	1
2002	904	2231	377	813	1281	3044	78064	297	0.232	0.069		1	0	0	1162	380	0.269	0.27	0.87	0.52	1	4	1
2003	1066	1916	486	746	1552	2662	118643	315	0.203	0.075		1	0	0	459	105	0.109	-0.6	0.74	0.75	1	5	1
2004	1183	2322	461	803	1644	3125	96754	313	0.19	0.066		1	0	0	929	264	0.195	1.02	0.42	0.33	1	6	1
2005	754	1951	332	771	1086	2722	138958	220	0.203	0.058		1	1	1	928	289	0.244	0	0.65	0.46	1	7	1
2006	784	1962	287	660	1071	2622	291538	130	0.121	0.035		0	1	1	783	245	0.212	-0.16	0.63	0.1	1	8	1
2007	759	1786	273	624	1032	2410	468000	21	0.02	0.006		0	1	1	684	215	0.199	-0.13	0.94	0.93	1	9	1
2008	627	1708	341	820	968	2528	438000	8	0.008	0.002		0	1	1	824	328	0.236	0.2	0.76	0.75	1	10	1
2009	561	1593	272	739	833	2332	458000	2	0.002	0.001		0	1	1	724	298	0.229	-0.12	0.36	0.43	1	11	1

ADULT

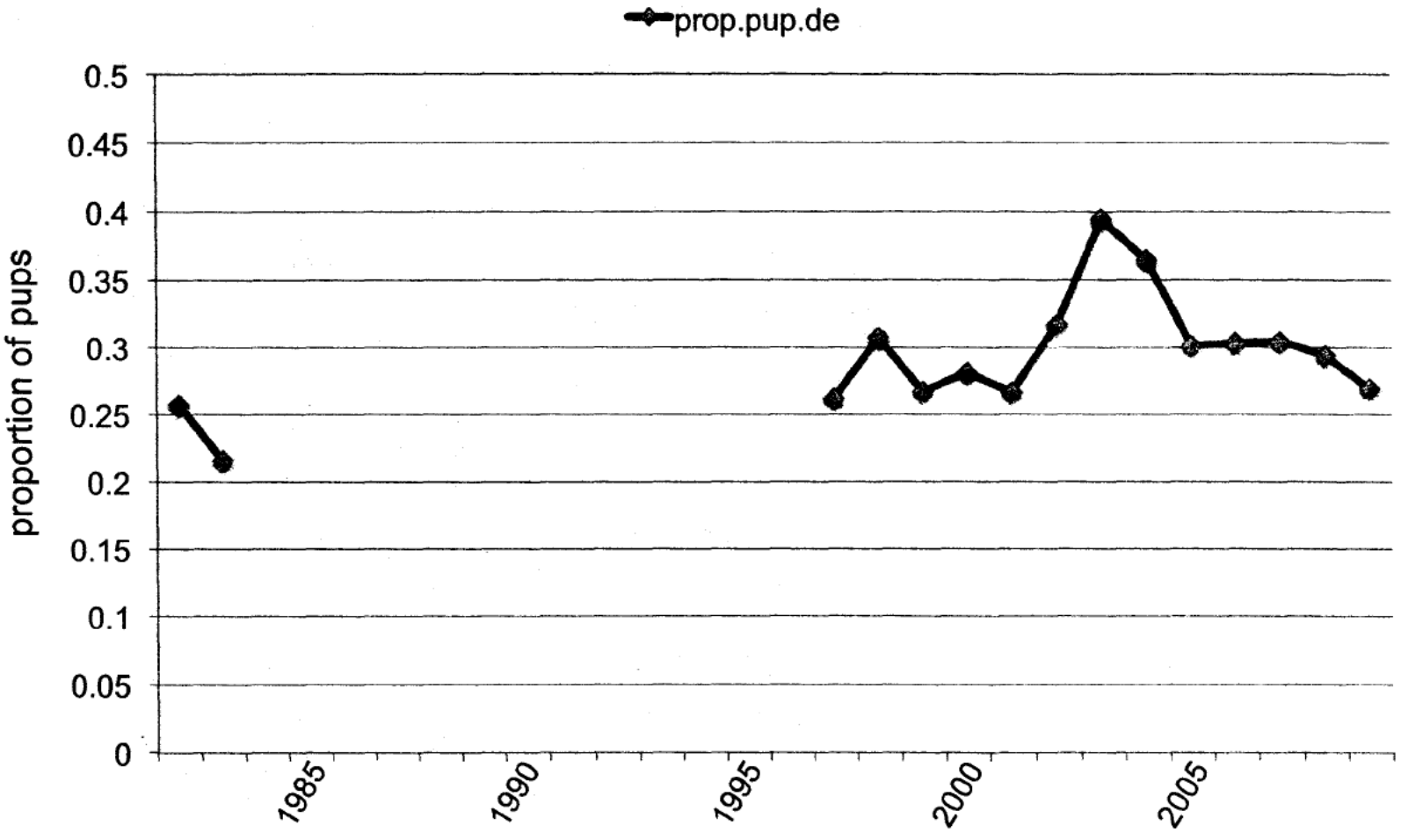
1982	109	588	556	109	213	227	428
1983	119	570	534	166	178	230	394
1997	161	497	854		117	389	267
1998	96	521	591		126	256	363
1999	133	555	637	88	130	435	279
2000	185	864	755	92	118	470	289
2001	224	563	687	71	85	516	388
2002	286	782	904	107	110	529	415
2003	312	354	1088	136	145	594	375
2004	239	665	1183	131	161	497	529
2005	318	639	754	93	84	504	313
2006	361	536	784	72	126	503	362
2007	282	469	759	81	119	461	374
2008	272	496	627	32	142	362	384
2009	281	426	561	59	131	436	255

PUP

1982	17	263	170		19	58	135
1983	17	262	122		1	45	120
1997	51	357	257		24	141	153
1998	47	187	182		24	34	74
1999	59	335	285	10	38	190	151
2000	108	412	376	20	45	188	189
2001	123	350	327	5	51	179	194
2002	123	380	377	3	31	144	132
2003	150	195	486	4	46	172	263
2004	123	264	461	15	57	202	142
2005	143	289	332	6	44	188	101
2006	149	245	287	17	41	108	100
2007	126	215	273	7	46	72	158
2008	153	328	341	3	64	118	154
2009	143	296	272	3	68	89	129

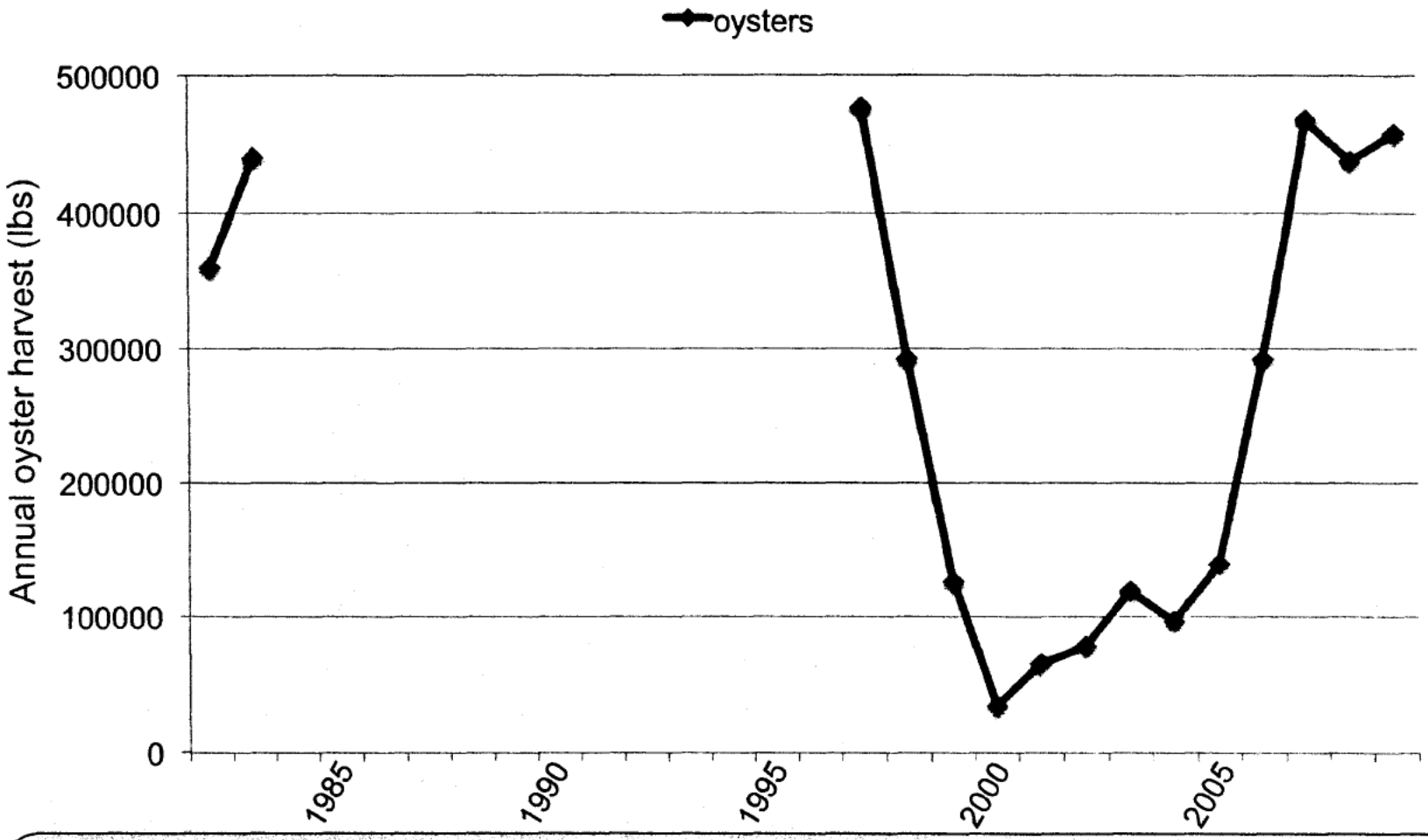
This analysis relied entirely on NPS data shown here as provided by Becker; all NPS data was accepted as is, including disturbance rate. This is a modest data set and straight forward to analyze using statistical tests.

Becker 2011 examined long-term changes in the proportion of seals and pups in Drakes Estero compared to the entire PRNS region



proportion of pups (prop.pup.de) in Drakes Estero compared to entire PRNS region

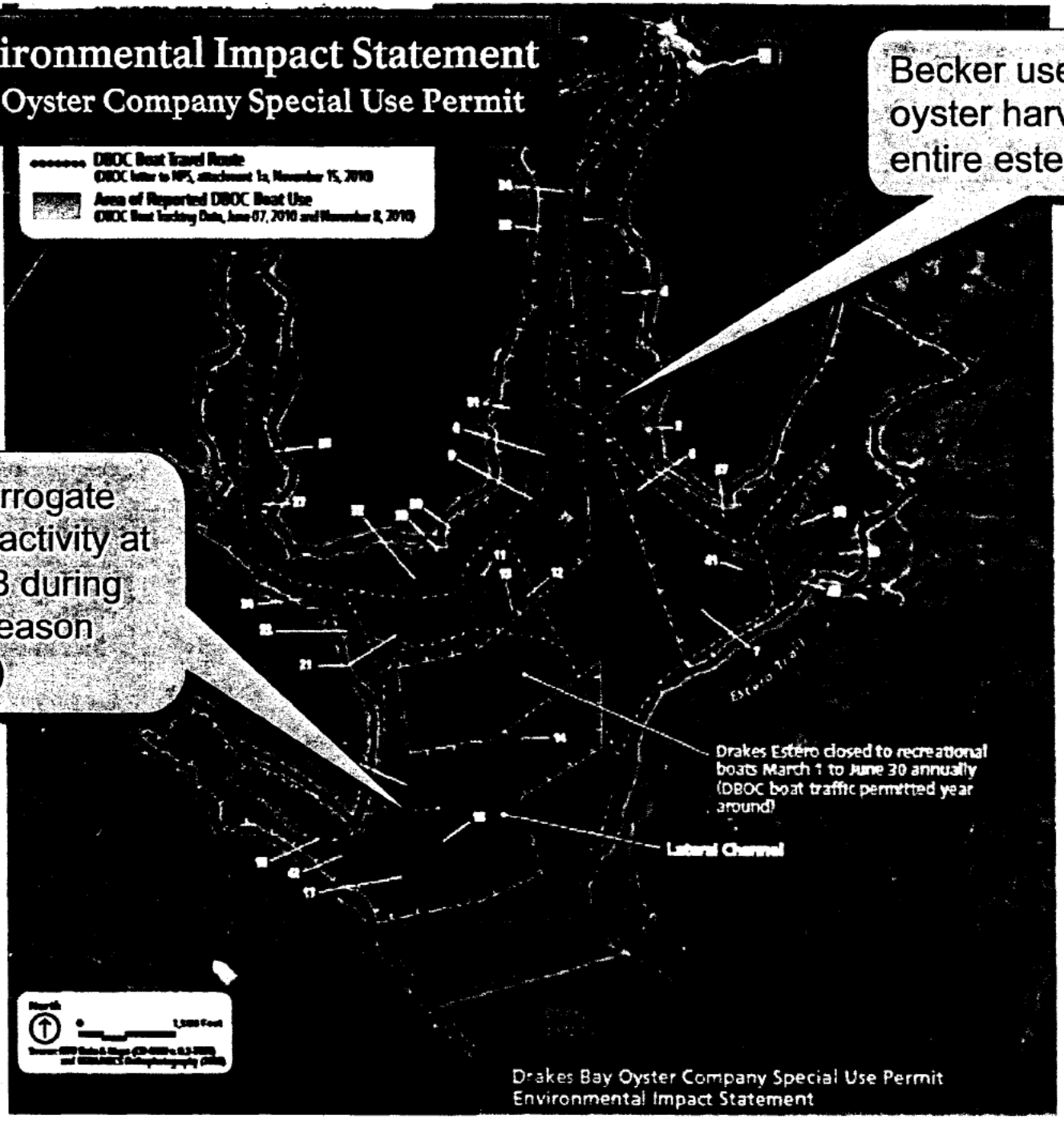
Becker 2009 relied on annual oyster harvest for entire Drakes Estero



The National Academy of Sciences was critical of Becker's previous paper (2009) for using annual oyster harvest for entire Drakes Estero as surrogate for activity at UEN & OB during pupping season (March-May).

Draft Environmental Impact Statement

Drakes Bay Oyster Company Special Use Permit



Becker 2011 sought better measure of oyster activity at UEB/OB during pupping season; used inferences to derive OYST Hi/Low analysis

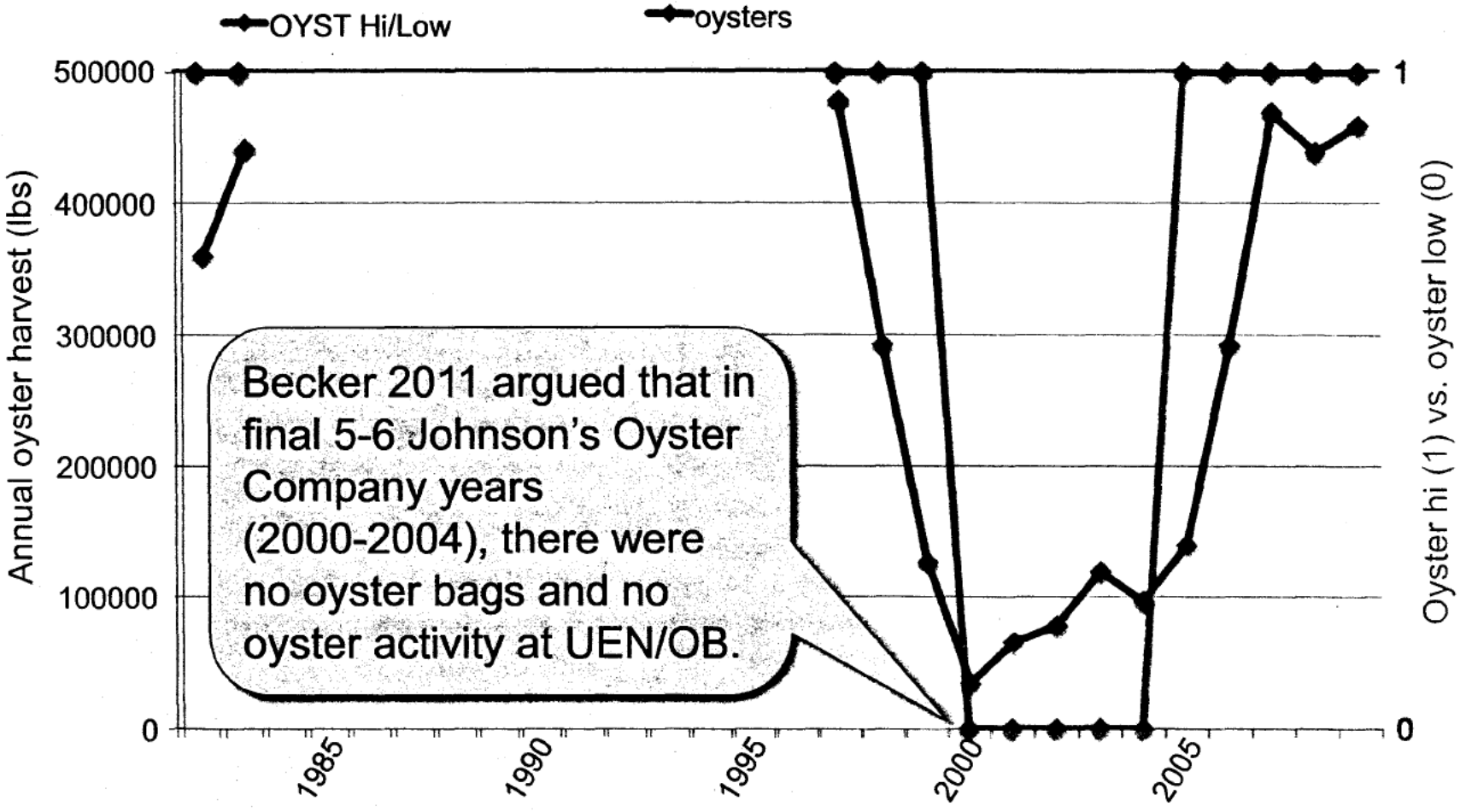
Table A1.

Year	Oyster harvest (lbs)	Inferred level of mariculture use of sandbars near seals	Source(s) of inference
1997	476,791	high	harvest data
1998	292,188	high	harvest data, higher than 2005
1999	125,749	modelled high & low	slightly higher than 2000-2004, declining
2000	34,094	low	lower than 2002-2004
2001	65,676	low	aerial image of absence of bags
2002	78,064	low	DTP, pers. obs, harvest data
2003	118,643	low	aerial image of absence of bags
2004	96,754	low	DTP, pers. obs, harvest data
2005	138,958	high	aerial image of bags, increasing harvest
2006	291,538	high	increasing harvest, bags in '05
2007	468,000	high	aerial image of bags
2008	438,000	high	aerial image of bags
2009	458,000	high	aerial image of bags

OYST Hi/Low is based upon this "inferred" level of activity at UEN/OB during pupping season (March-May)

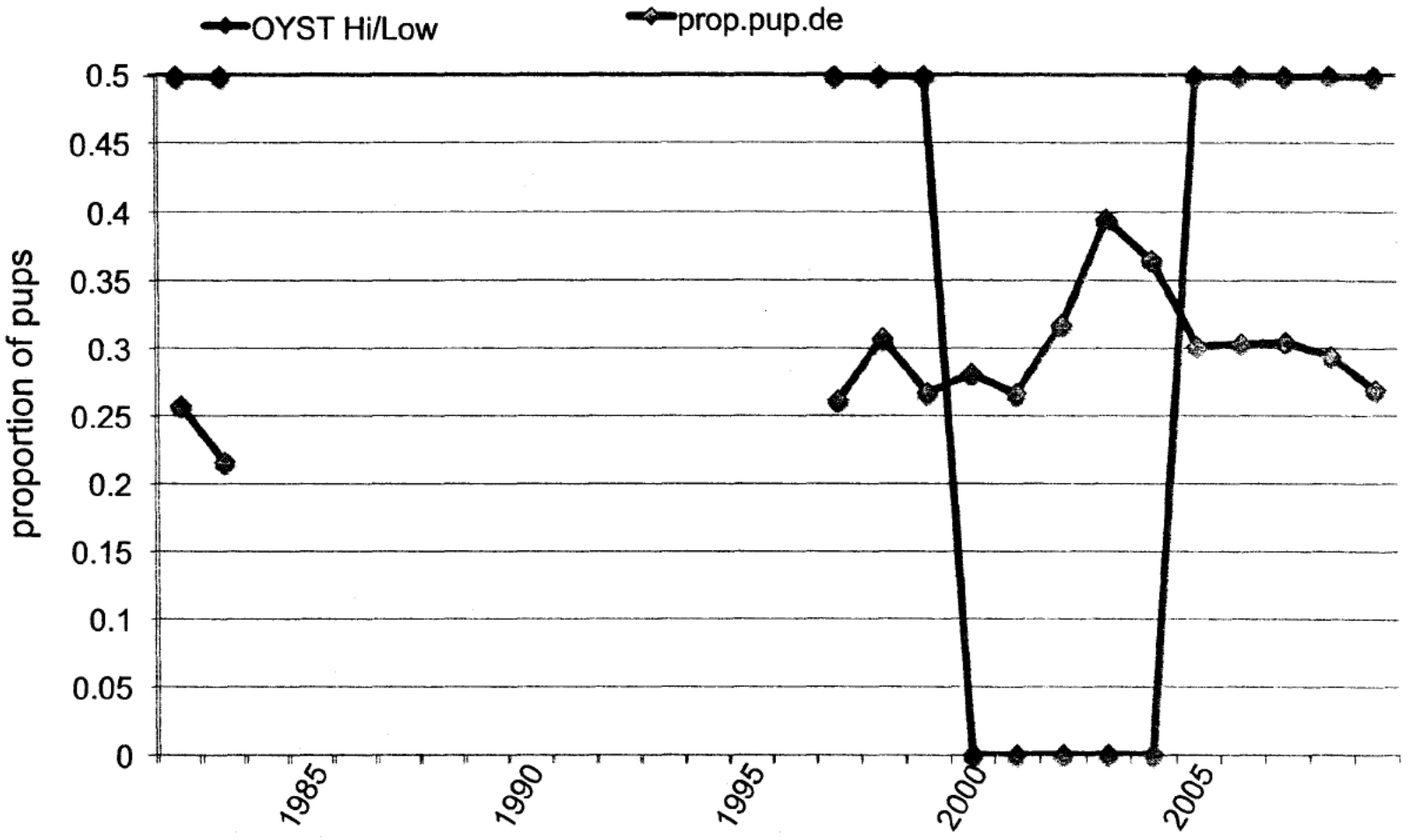
Becker's "inferences" for UEN/OB pupping season activity came from aerial photos, harvest data, and David Press observations

Becker 2011 used OYST Hi/Low categorical designation based on NPS inferences as surrogate for activity at UEN/OB during pupping season



OYST Hi/Low categorical oyster activity

Becker 2011 used statistical analysis to claim that the OYST Hi/Low categorical designation correlated with proportion of pups in Estero



OYST Hi/Low categorical oyster activity correlates with proportion of pups in Drakes Estero

NPS Becker 2011 paper based upon statistical analysis

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

BENJAMIN H. BECKER*, DAVID T. PRESS and SARAH G. ALLEN
US National Park Service, Point Reyes National Seashore, Point Reyes Station, CA 94956, USA

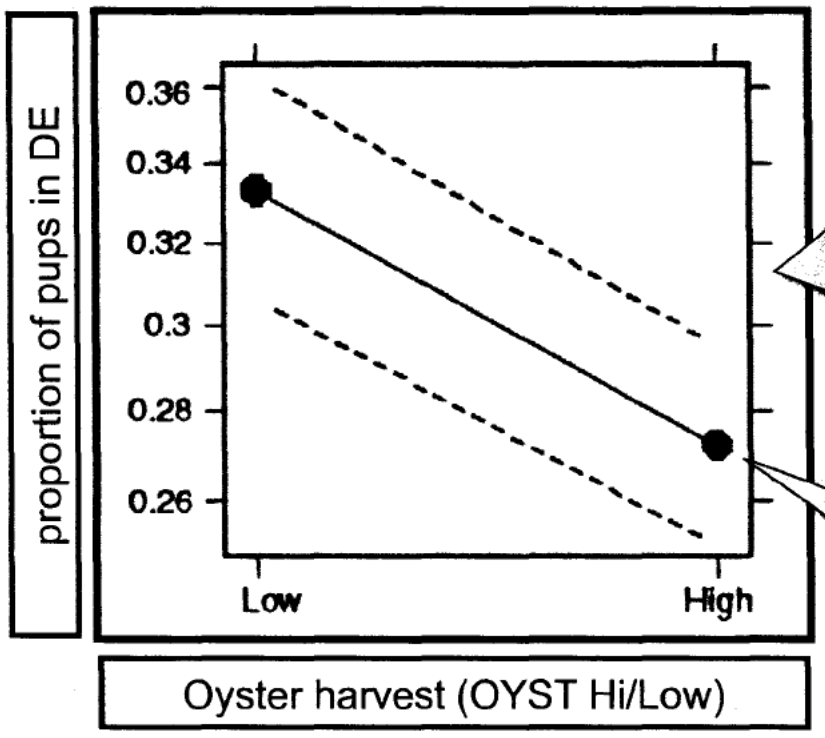
This analysis will by necessity use some statistics; it can't be avoided. The Becker 2011 paper relies on statistics. We need to understand and test it. This analysis will be simplified as much as possible. Even if you get lost, hang in -- the conclusions are simple.

You only need understand two statistical measures here: **P-value** & **R-squared**.

- **P-value**: measure of statistical significance. If $P < 0.05$ (5/100 = 1/20), then there is a 1/20 chance that the correlation occurs for a random reason. The smaller the better. For example, a $P < 0.0001$ or < 0.00001 would be terrific!
- **R-squared**: measures how much variability in what is being studied is accounted for with multiple "independent" variables. The value ranges from 0 to 1, with "0" meaning 0% of the variability is accounted for, and "1" meaning 100% of the variability is accounted for. A value of 0.7 or 0.8 would be terrific! An example will be given during the presentation to help this make sense.

Proportion pups in Drakes Estero vs. OYST Hi/Low regression analysis

Figure 6 from Becker et al. 2011



Becker 2011 showed an analysis for proportion of pups in Drakes Estero vs. OYST Hi/Low. From the intersect of this regression line, you can effectively read the ~7% spatial-displacement of pups out of Drakes Estero with increased oyster activity from ~34% (low) down to ~27% (high).

But Becker did not include the data points and thus it was difficult to see what was driving the analysis.

P-value:	**0.0468**
Adjusted R^2:	**0.2146**

P-value is just < 0.05 (= 0.047) and R-squared accounts for only 21% of variance in proportion of pups in DE.

Ranking of Models in Becker 2011: Proportion of Pups in Drakes Estero

Table 3. A priori models ranked by delta QAICc for the proportion of Point Reyes seal pups and total seals using Drakes Estero. Δi indicates QAICc distance from the best model and wi indicates model weight. Modeling oyster harvest as a continuous variable or low oyster during 1999–2004 gives similar results. Models ranking within the lowest 4 QAICc units (in bold) were used for multimodel inference in table 5. Oyst: low oyster harvest from 2000–2004; DP: Double Point Counts; A: proportion of Drakes Estero seals using subsite A; Dist: anthropogenic disturbance rate. Rankings are similar if using continuous oyster harvest rather than *categorical*

Age class	Model	Δi	wi	r^2
Pup	**Oyst+Double Point (DP)**	**0.0**	**0.35**	**0.51**
	Oyst+DP+A	**1.3**	**0.18**	**0.63**
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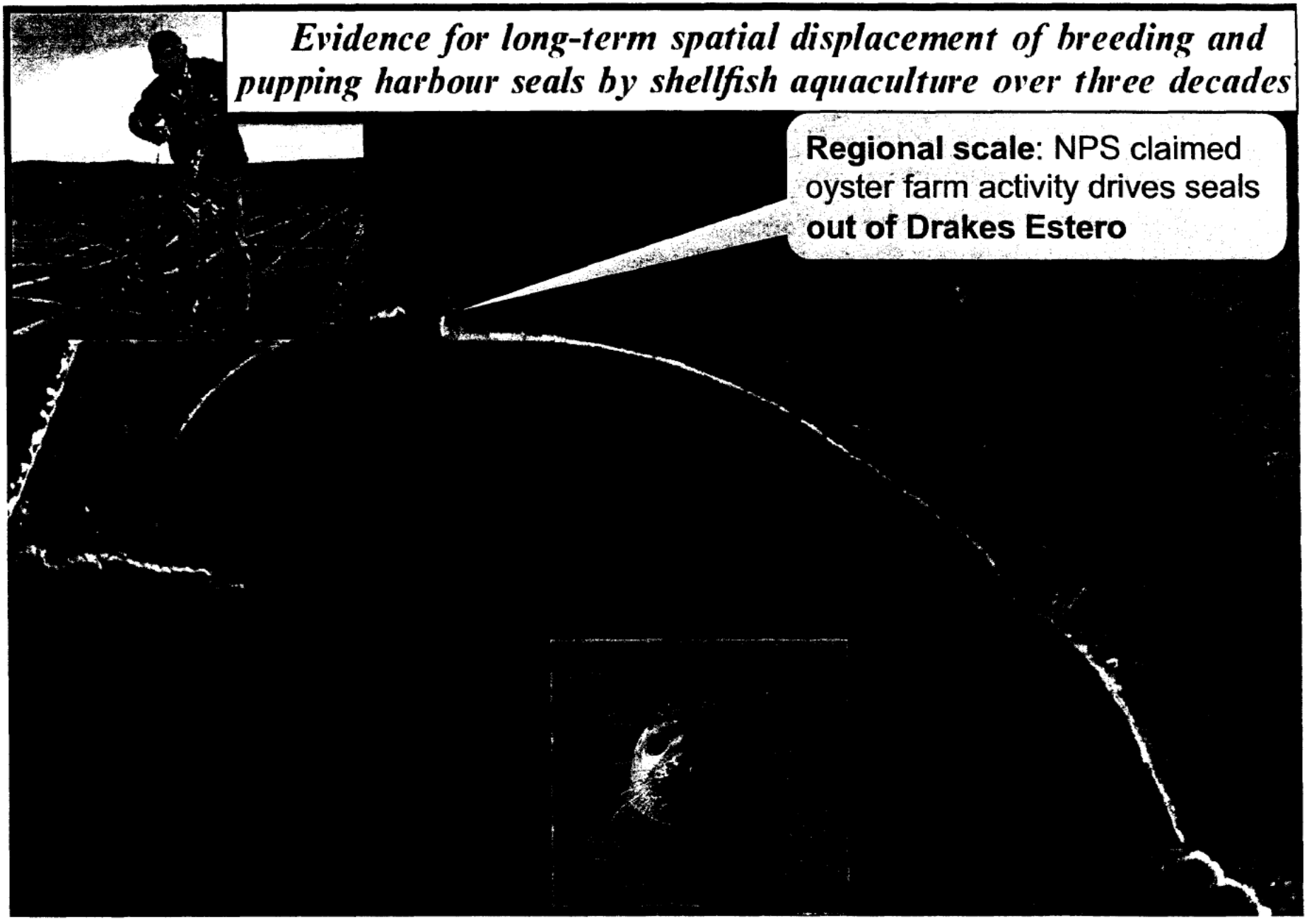
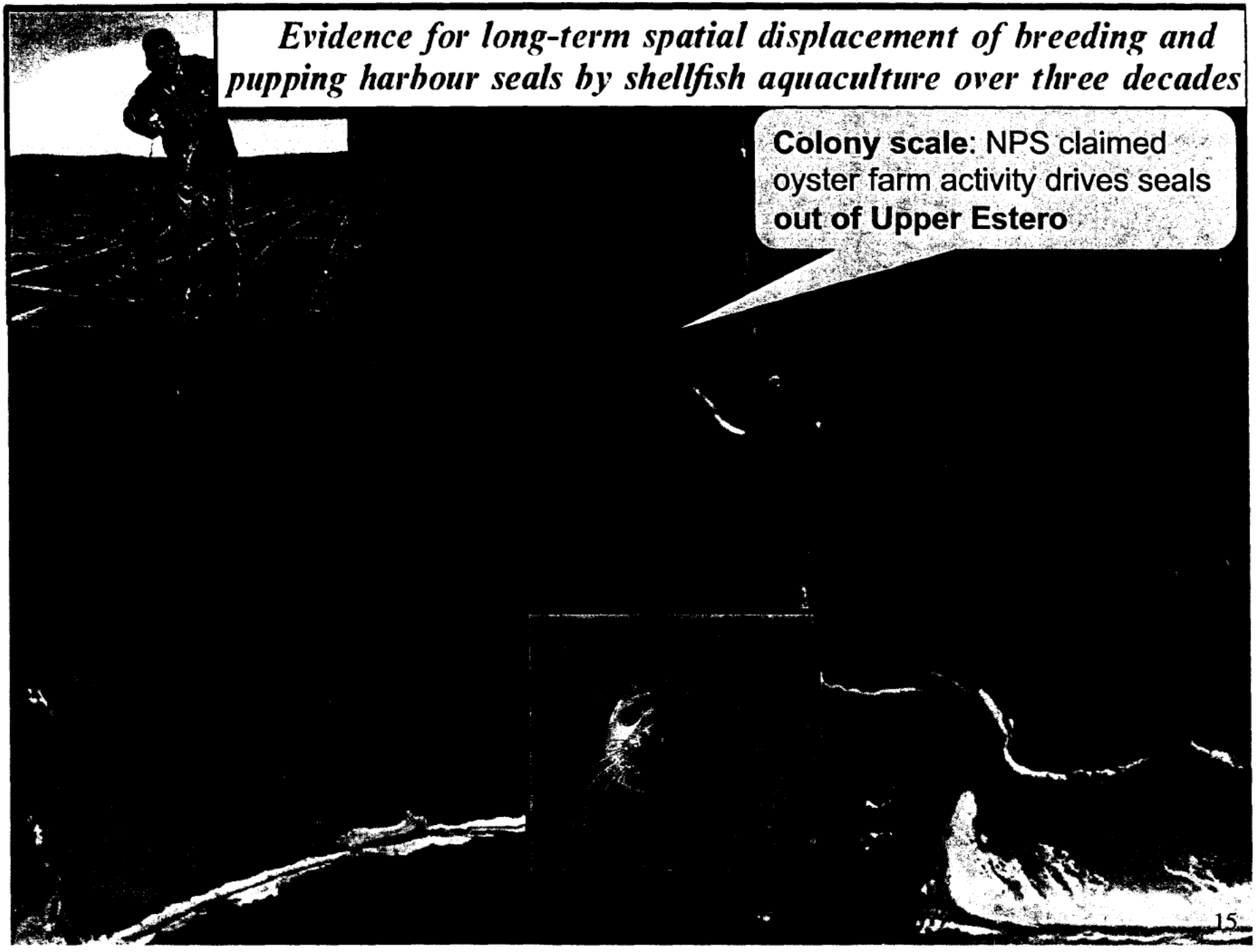
	Oyst+ENSO	**2.6**	**0.09**	**0.42**
	Oyst	**3.3**	**0.06**	**0.26**
	Year	5.0	0.03	0.20
	Oyst+Dist	5.6	0.02	0.32
	Oyst+DP+Dist+A			
	DP+Year	6.4		
	DP	7.3		
	Null	7.7		
	Regional pup count	10.3		

Prop.pup.de

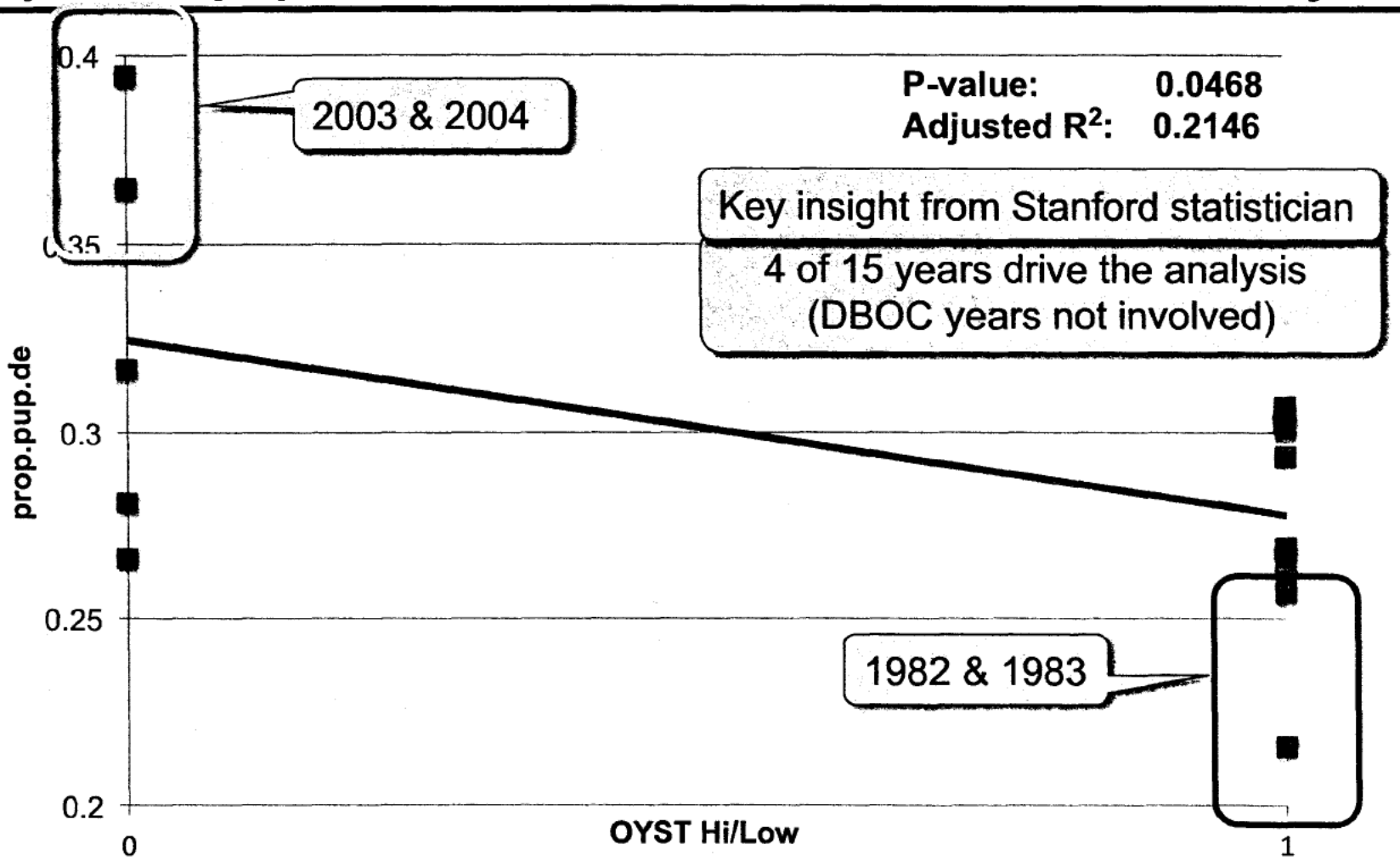
OYST Hi/Low

Becker's top models all included OYST Hi/Low categorical variable.


Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades
Regional scale: NPS claimed oyster farm activity drives seals **out of Drakes Estero**


Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades
Colony scale: NPS claimed oyster farm activity drives seals out of Upper Estero
15

Proportion pups in Drakes Estero vs. OYST Hi/Low analysis



OYST Hi/Low is just barely statistically significant compared to proportion of pups in Drakes Estero; annual oyster harvest is not statistically significant

Analysis of NPS Becker 2011: major conclusions incorrect

***Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades*†**

1. Authors do not have "over *three decades*" of continuous data
13 years of data, 14 year gap; authors cherry picked '82 & '83

2. Analysis reveals no "*long-term spatial displacement*" out of Estero
Rather short-term displacement of seals INTO Estero in 2003 & 2004

3. Rogue elephant seal at Double Point in 2003 killed ~ 40 harbor seals
Displaced over 100 pups INTO Estero; took two years to recover

4. No "*evidence*" that oyster farm displaced seals out of Estero
Becker's best models are driven by rogue elephant seal in 2003

5. Mother Nature leads to movements of seals into & out of Estero
Best models are 1000 times more significant than Becker's models

6. Authors used incorrect seal maps, oyster maps, & inferences
NPS scientists never got correct data; misinterpreted aerial photos

NPS refused to respond to this analysis but released dEIS

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades[†]

- This analysis submitted to Marine Mammal Commission on Aug 29.
- **NPS rejected MMC request** on August 30 to respond to MMC-sponsored reviews by Dr. Harwood and me within 48 hours.
- **NPS refused to participate** in MMC-sponsored public meeting.
- **NPS rejected Senator Feinstein's request** to delay dEIS until validity of Becker 2011 could be resolved.
- **NPS** has now **declined invitation to participate** today.

NPS scientists have government obligation to respond to criticism of Becker 2011. This responsibility is more pronounced given the role of Becker 2011 in the dEIS. The DOI Scientific Integrity Policy (1/28/11) states:

"I will welcome constructive criticism of my scientific and scholarly activities and will be responsive to their peer review."

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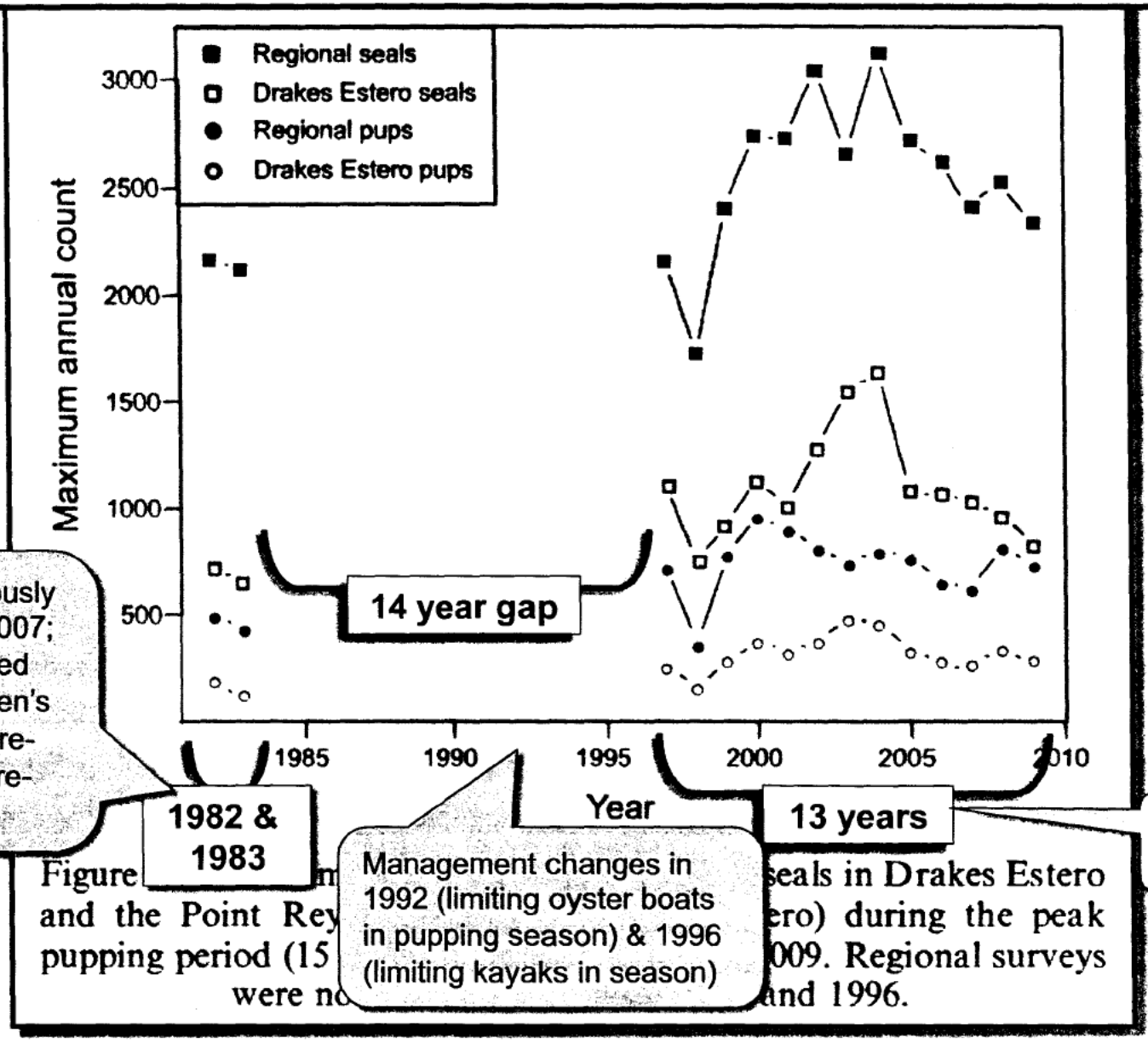

Figure [illegible] and the Point Rey[illegible] pupping period (15 [illegible] were no[illegible] seals in Drakes Estero [illegible]ero) during the peak [illegible]009. Regional surveys [illegible]nd 1996.

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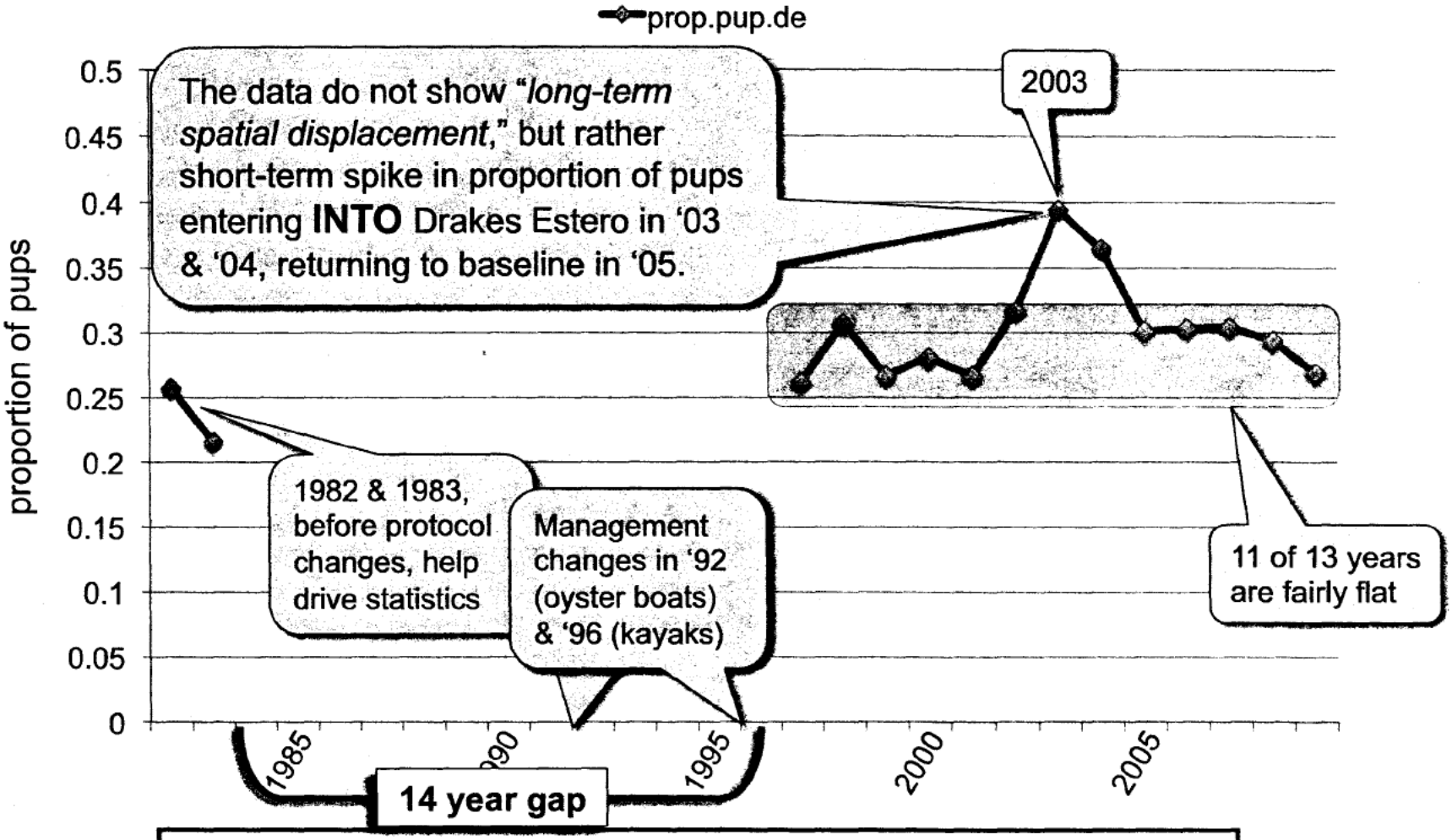

proportion of pups (prop.pup.de) in Drakes Estero compared to entire PRNS region

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Displaced over 100 seals INTO Estero; took two years to recover

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An "*aggressive elephant seal*" at Double Point in 2003 appears to explain the short-term displacement of harbor seals INTO the Estero

From Becker 2011 paper

Maximum annual count of seals at nearest colony (*Double Point*). Seals are thought to transit between Double Point and Drakes Estero (Allen Miller. 1988; Grigg *et al.*, 2009), and in 2003 an aggressive elephant seal probably displaced numerous harbour seals from Double Point to Drakes Estero.

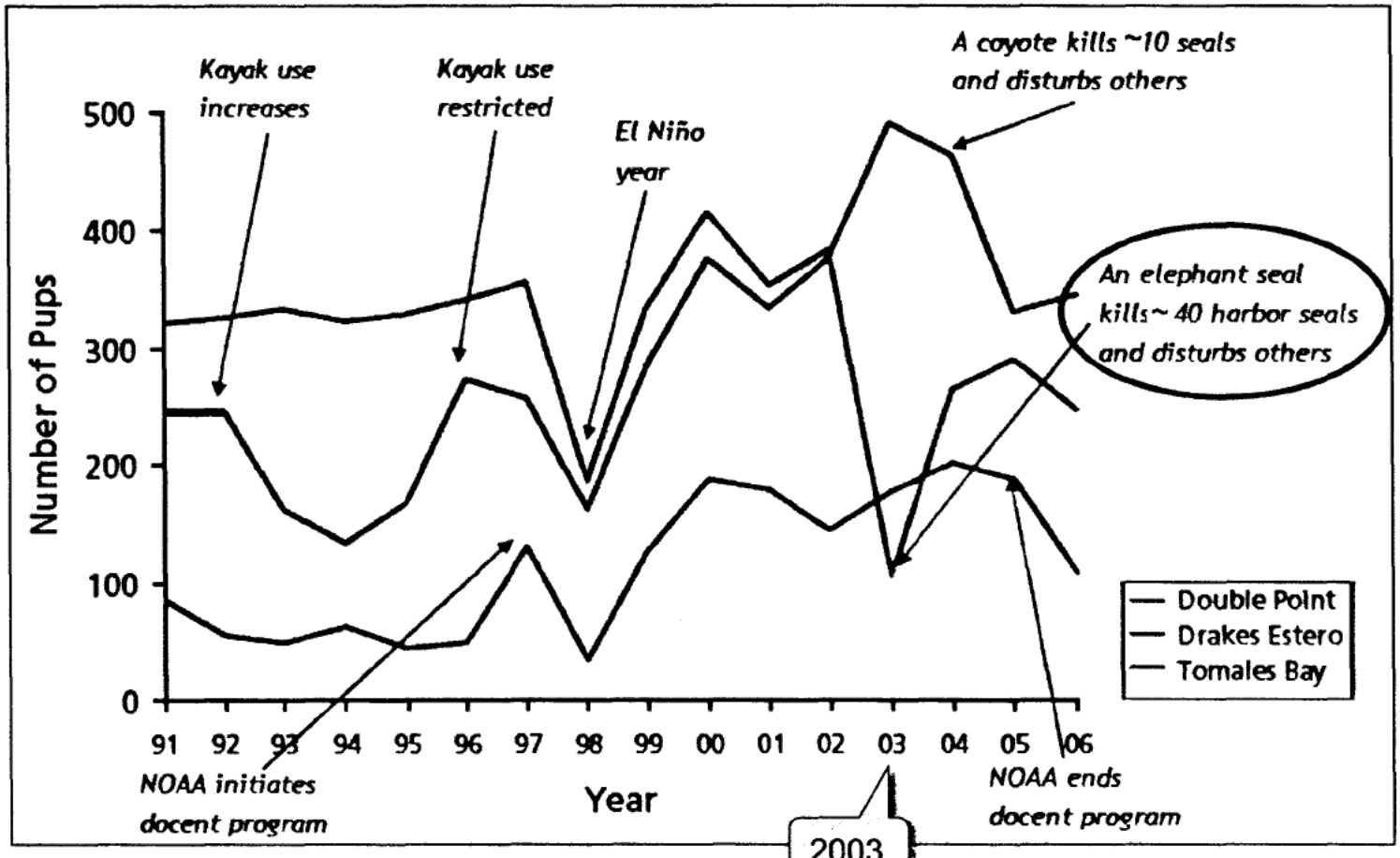
In 2003, a rogue elephant seal killed 40 harbor seals and chased ~600 harbor seals away from Double Point (DP), leading to a decrease in around 260 pups from DP. Around 50% of the pups displaced from DP – or around 130 pups – were displaced **INTO** Drakes Estero in 2003.

This can be seen on next slide from NPS May 2007 report.

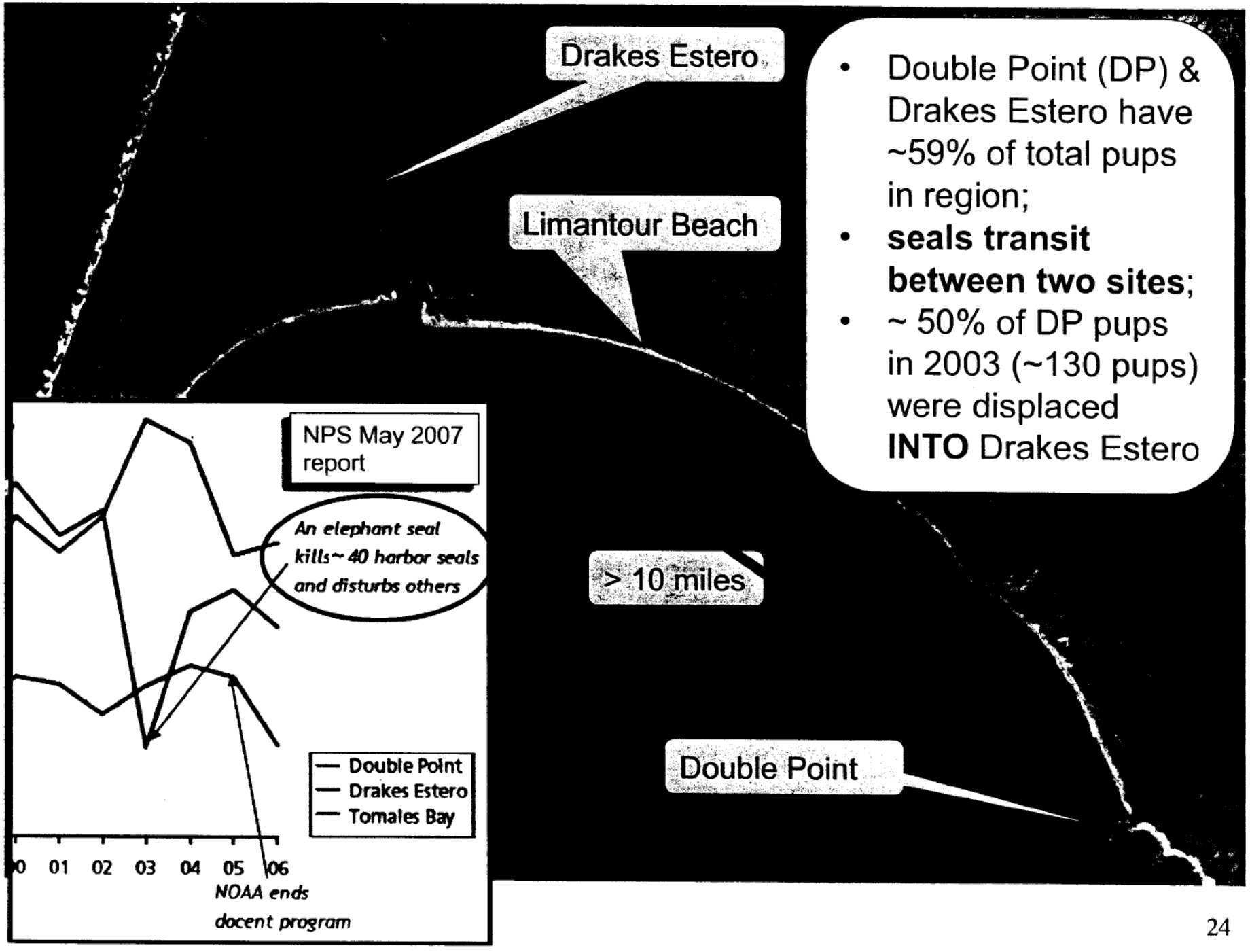
National Park Service
U.S. Department of the Interior
Pacific Coast Science and Learning Center
Research Project Summary May 2007

Harbor Seal Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area

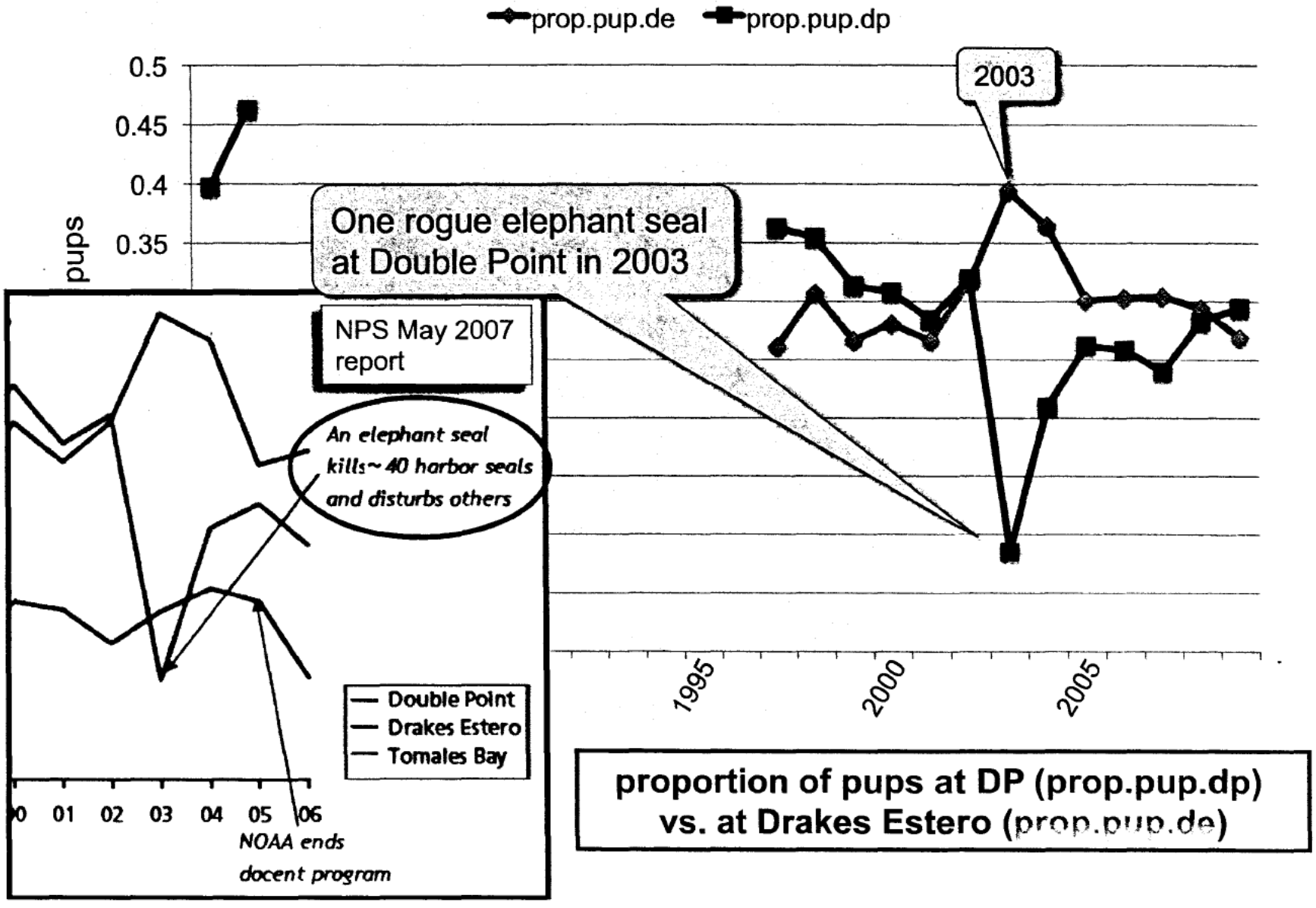
By Marcus Koenen and Sarah Allen



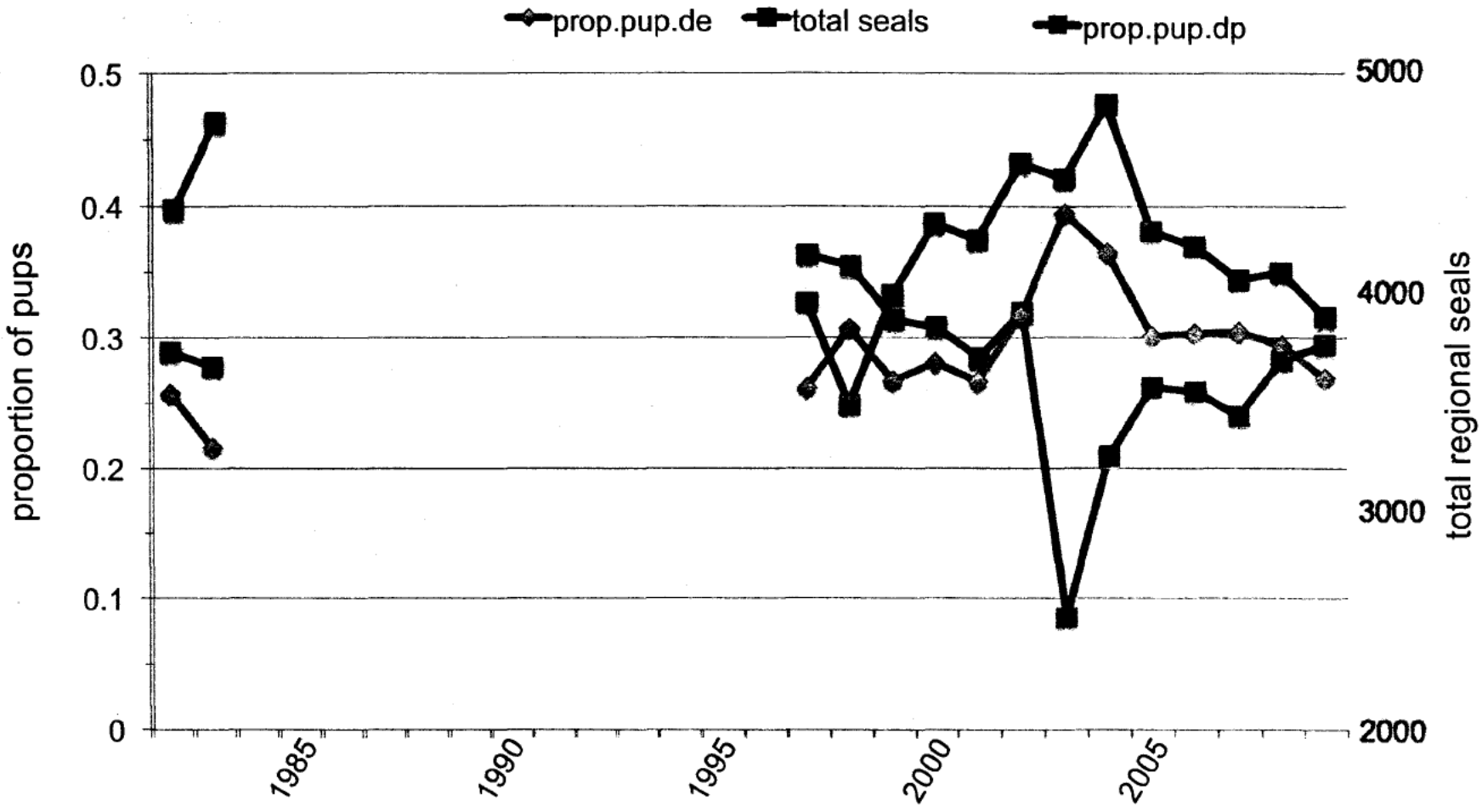
The harbor seal pup population is sensitive to human disturbance, climate variability and interactions with other species. Different management approaches also affect the seal population.


Drakes Estero
Limantour Beach
• Double Point (DP) & Drakes Estero have ~59% of total pups in region;
• **seals transit between two sites**;
• ~ 50% of DP pups in 2003 (~130 pups) were displaced **INTO** Drakes Estero
NPS May 2007 report
An elephant seal kills~40 harbor seals and disturbs others
> 10 miles
Double Point
Double Point
Drakes Estero
Tomales Bay
00 01 02 03 04 05 06
NOAA ends docent program

3. Rogue elephant seal at Double Point in 2003 killed ~ 40 harbor seals
Displaced over 100 seals INTO Estero; took two years to recover



In addition to rogue elephant seal at Double Point in 2003, the other variable that appears to correlate is total regional seal population



proportion pups at Double Point + total regional seals together explain proportion of pups at Drakes Estero

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Becker's best models are driven by rogue elephant seal in 2003

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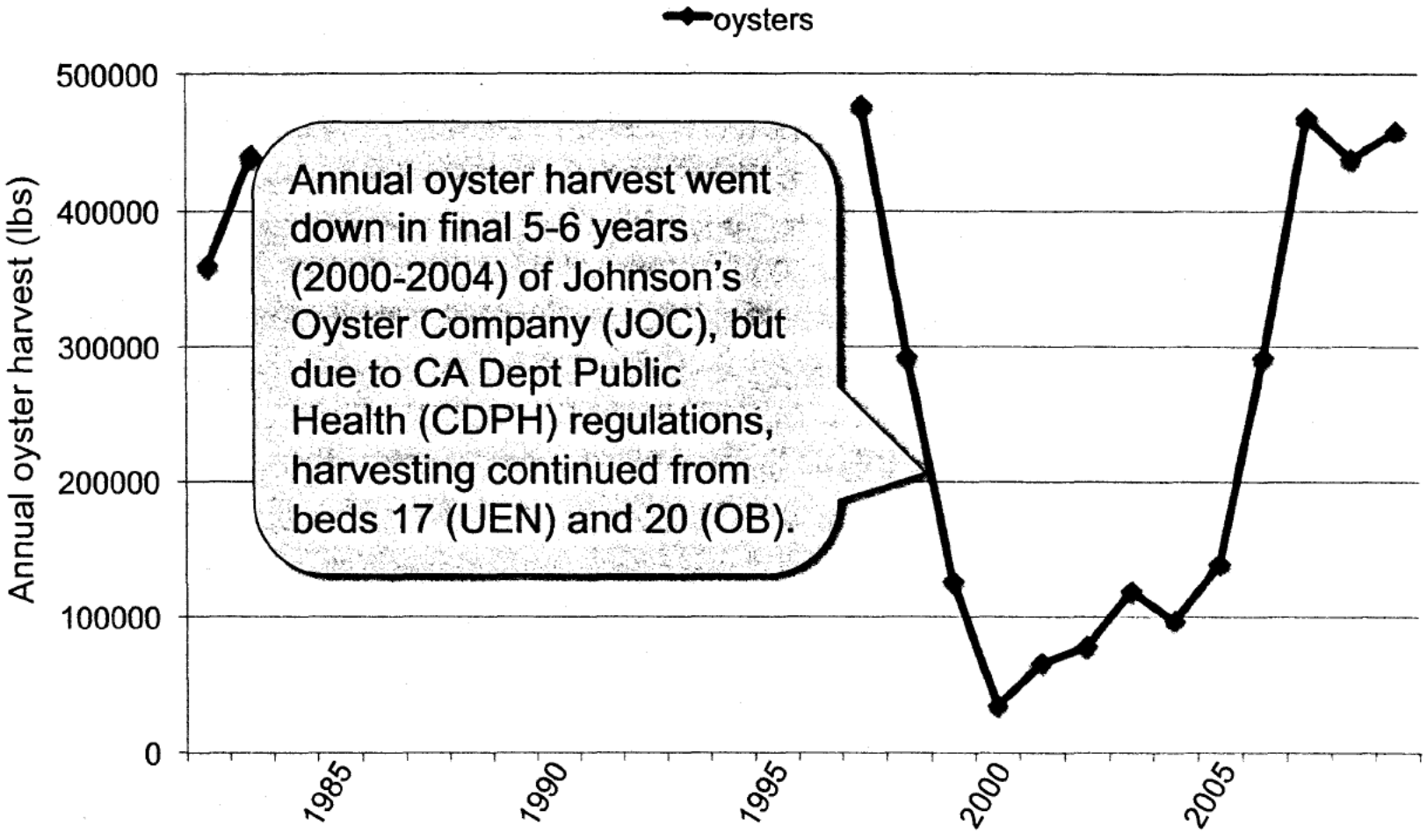
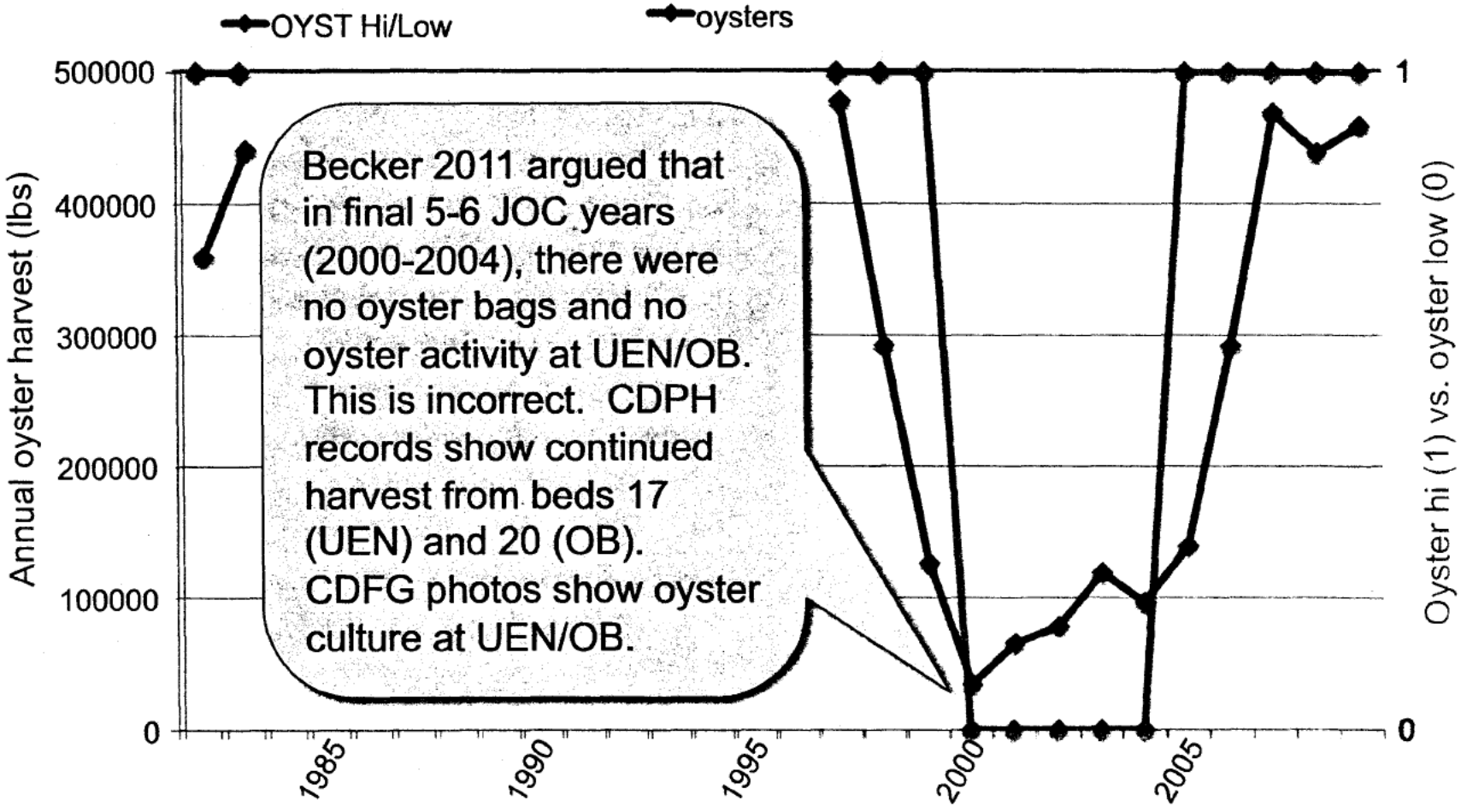
Becker used annual oyster harvest for Estero to compare to seals



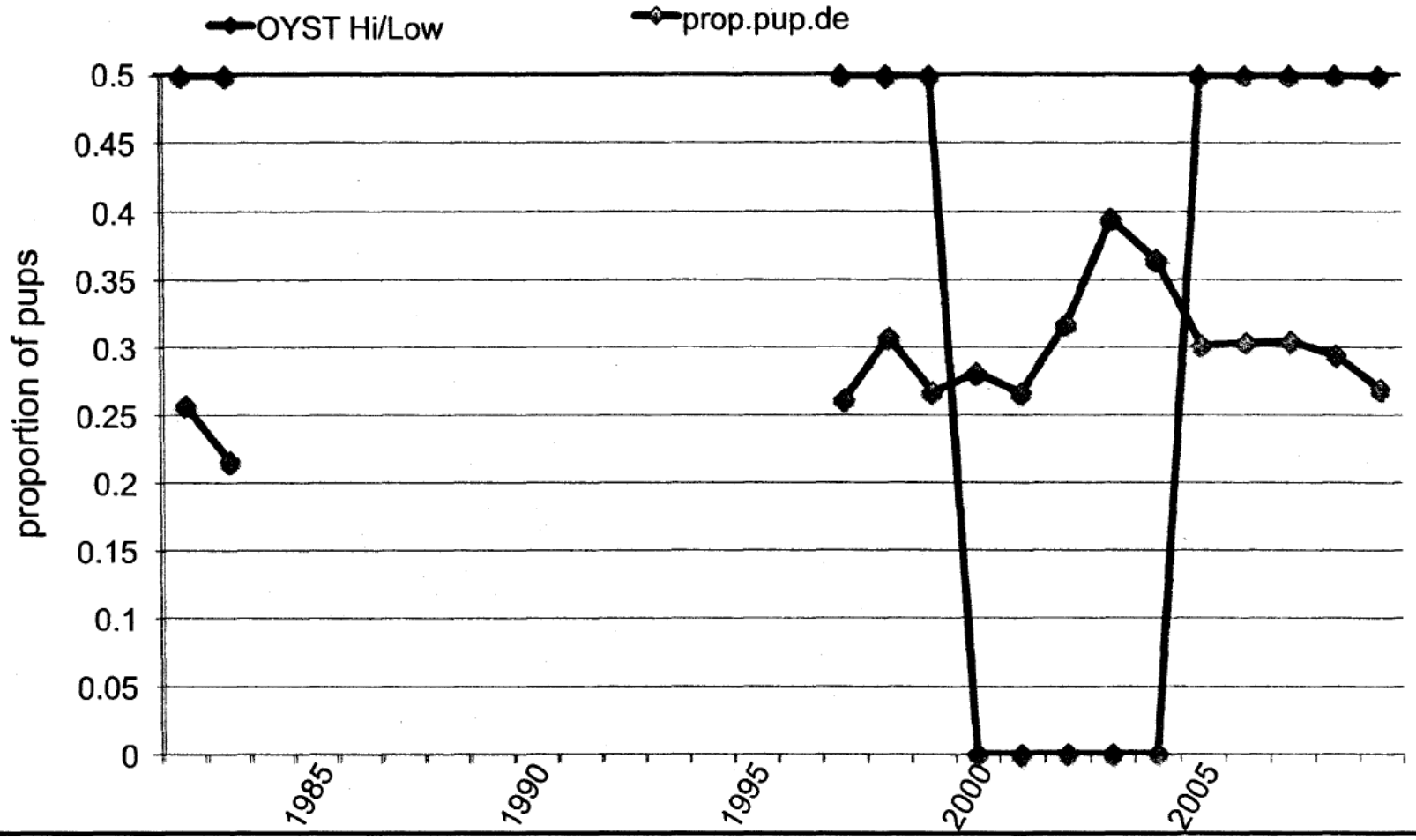
annual oyster harvest for entire estero is not a surrogate for oyster activity at UEN & OB during pupping season (Mar-May)

Becker used OYST Hi/Low categorical designation based upon NPS inferences as surrogate for activity at UEN/OB during pupping season



Becker used incorrect inferences to argue OYST Hi/Low categorical oyster activity is surrogate for UEN & OB

Becker 2011 used statistical analysis to claim that the OYST Hi/Low categorical designation correlated with proportion of pups in Estero



Is this correlation statistically significant?	A: **YES (barely)**
Is it robust to various critical tests?	A: **NO (i.e., remove '03)**
Are there better explanations?	A: **YES (Double Point)**

Ranking of Models in Becker 2011: Proportion of Pups in Drakes Estero

Table 3. A priori models ranked by delta QAICc for the proportion of Point Reyes seal pups and total seals using Drakes Estero. Δi indicates QAICc distance from the best model and wi indicates model weight. Modeling oyster harvest as a continuous variable or low oyster during 1999–2004 gives similar results. Models ranking within the lowest 4 QAICc units (in bold) were used for multimodel inference in table 5. Oyst: low oyster harvest from 2000–2004; DP: Double Point Counts; A: proportion of Drakes Estero seals using subsite A; Dist: anthropogenic disturbance rate. Rankings are similar if using continuous oyster harvest rather than *categorical*

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Prop.pup.de

OYST Hi/Low

Becker's top models all included OYST Hi/Low categorical variable.

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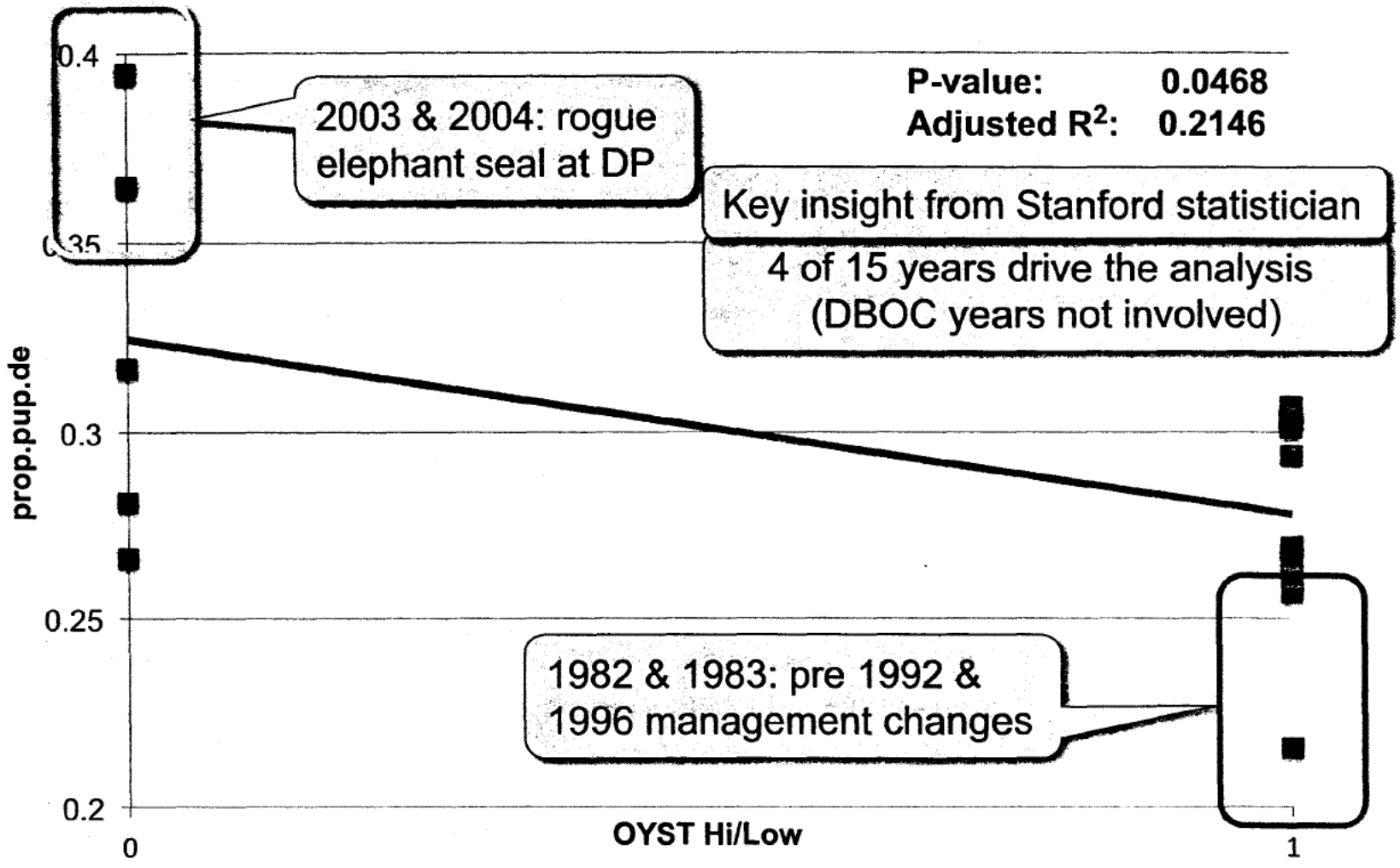
Proportion pups in Drakes Estero vs. OYST Hi/Low regression analysis



OYST Hi/Low is just barely statistically significant compared to proportion of pups in Drakes Estero; annual oyster harvest is not statistically significant

1982 and 1983 should not have been included in the analysis

Modeling the effects of El Niño, density-dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997–2007

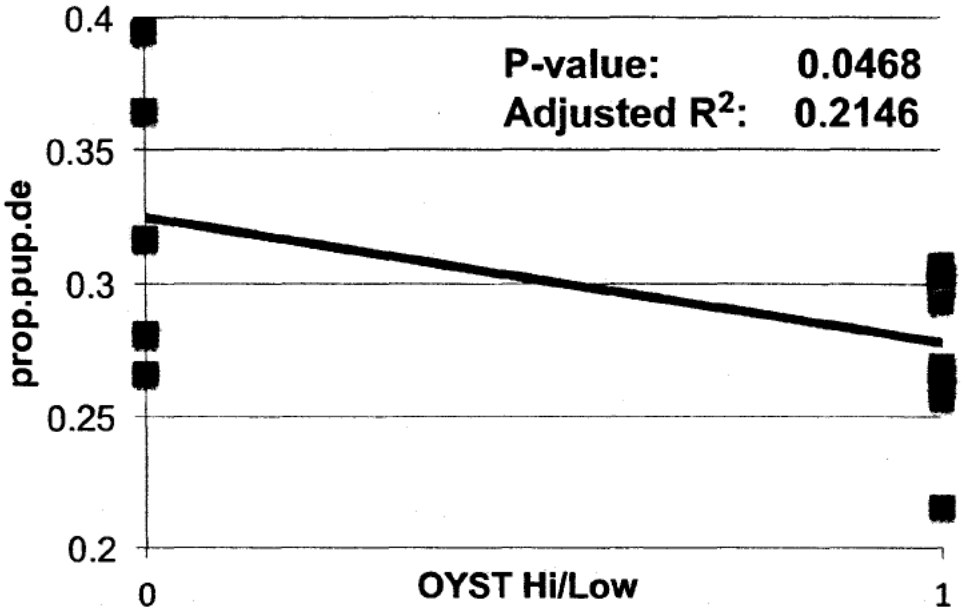
MARINE MAMMAL SCIENCE, 25(1): 1–18 (January 2009)

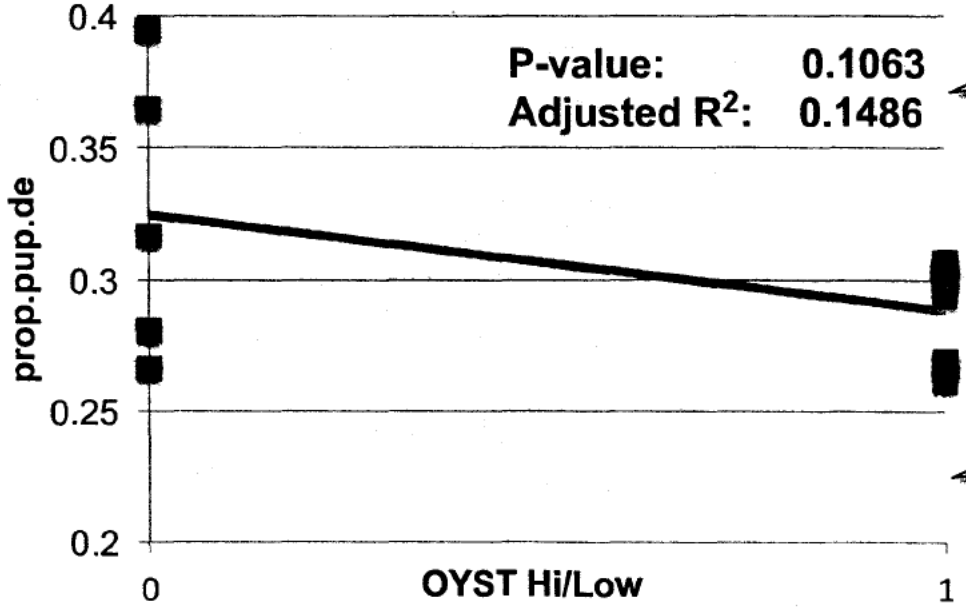
The 2008 pupping season presented an opportunity to investigate the immediate effect of a change in oyster operations. In 2008, the California Coastal Commission

less useful in the future. For this reason, it is not appropriate to include the 2008 data in the models because of this large change in management.

Becker later corrected his 2009 published paper and noted there was no management change in 2008. The 1992 protocols and 1996 kayak ban posed very significant management changes. We can adapt the Becker 2009 language to state the following: **It is not appropriate to include the 1982 & 1983 "*data in the models because of this large change in management.*"**

OYST Hi/Low – Test: eliminate 1982 & 1983 – no longer significant

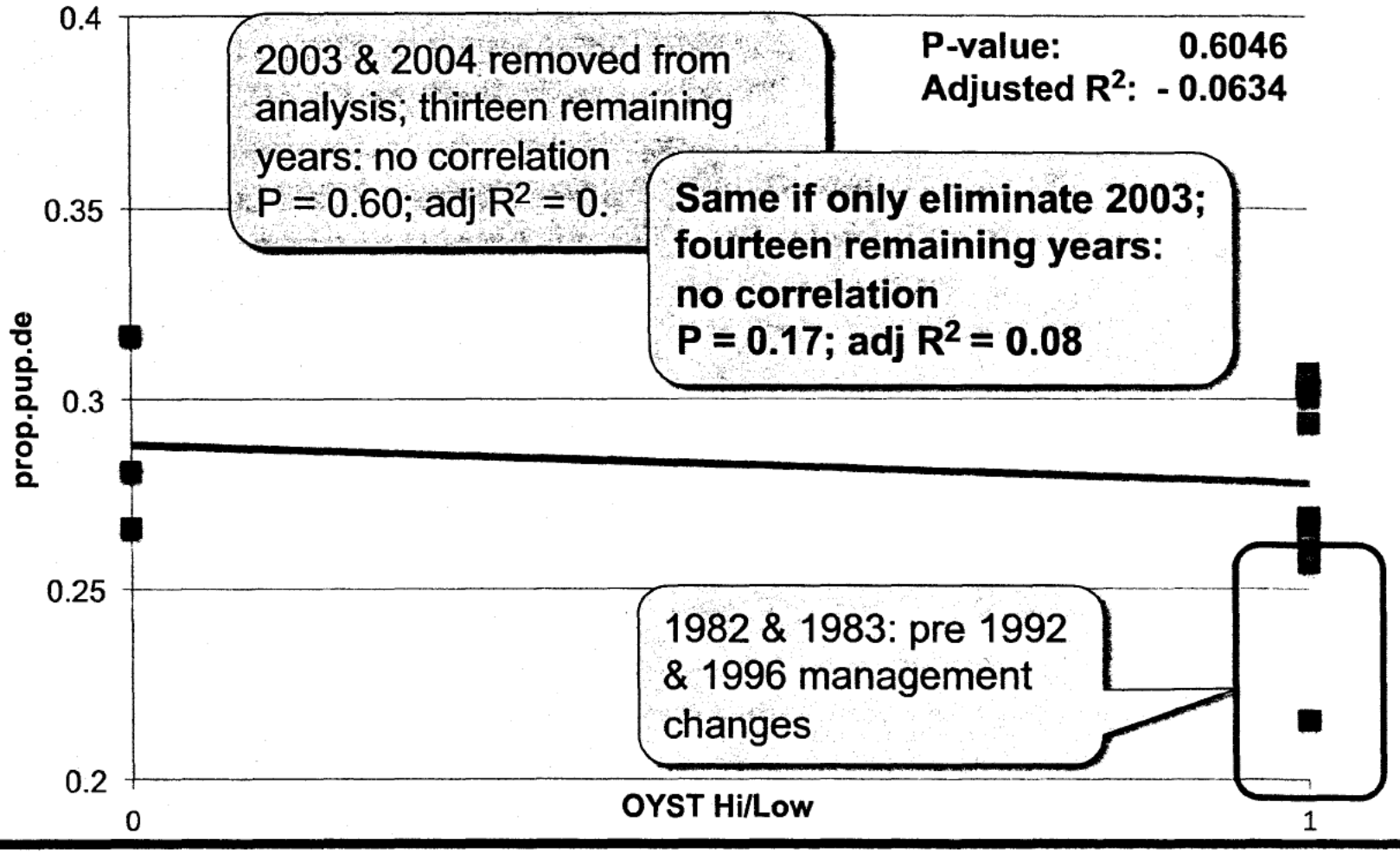




P-value no longer significant (> 0.05)

Removed 1982 & 1983 from analysis

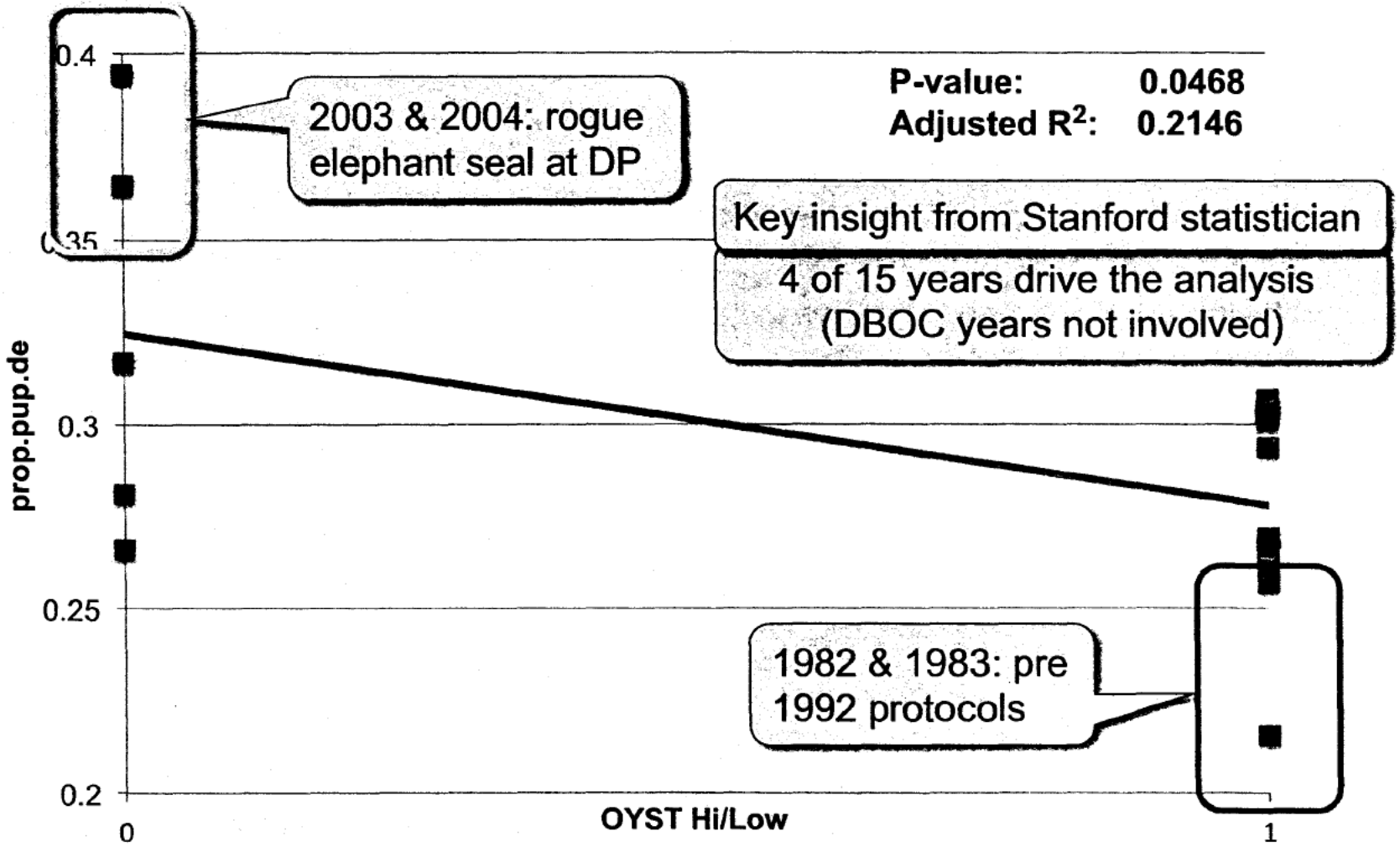
OYST Hi/Low – eliminate 2003 & 2004, or 2003 – no longer significant



Conclusion: what is driving OYST Hi/Low analysis is not DBOC years 2005-2009, and not long-term trend, but rather 2003 & 2004: if remove 2003 only, the remaining 14 years show no significance

4. No "*evidence*" that oyster farm displaced seals out of Estero

Becker's best models are driven by rogue elephant seal in 2003



OYST Hi/Low model is just barely significant; is based upon rogue elephant seal in 2003; Becker's best models are not robust to eliminating 2003 & 2004

Analysis of NPS Becker 2011: major conclusions incorrect

Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades†

1. Authors do not have "over *three decades*" of continuous data
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5. Mother Nature leads to movements of seals into & out of Estero
   Best models are 1000 times more significant than Becker's models

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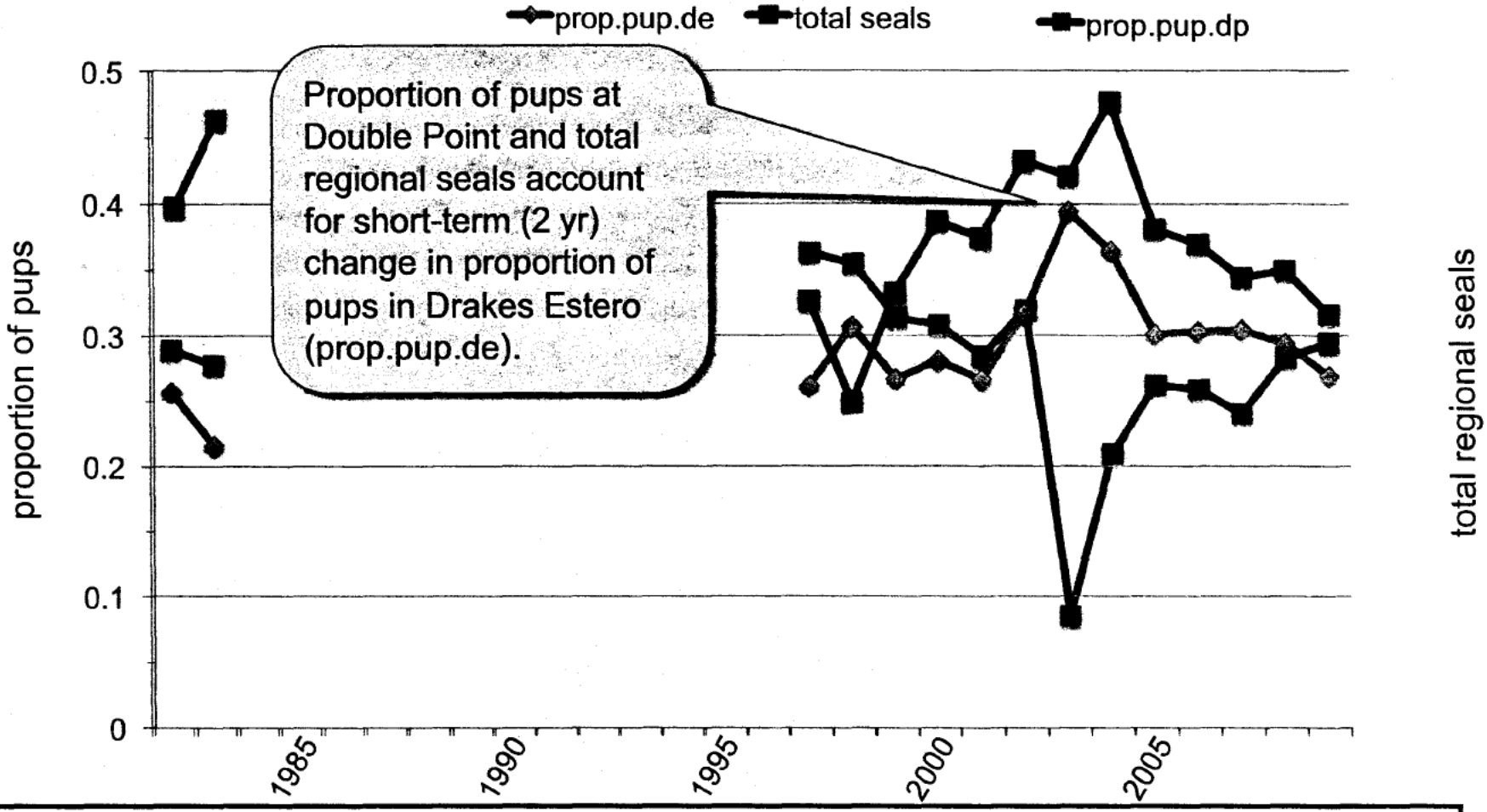
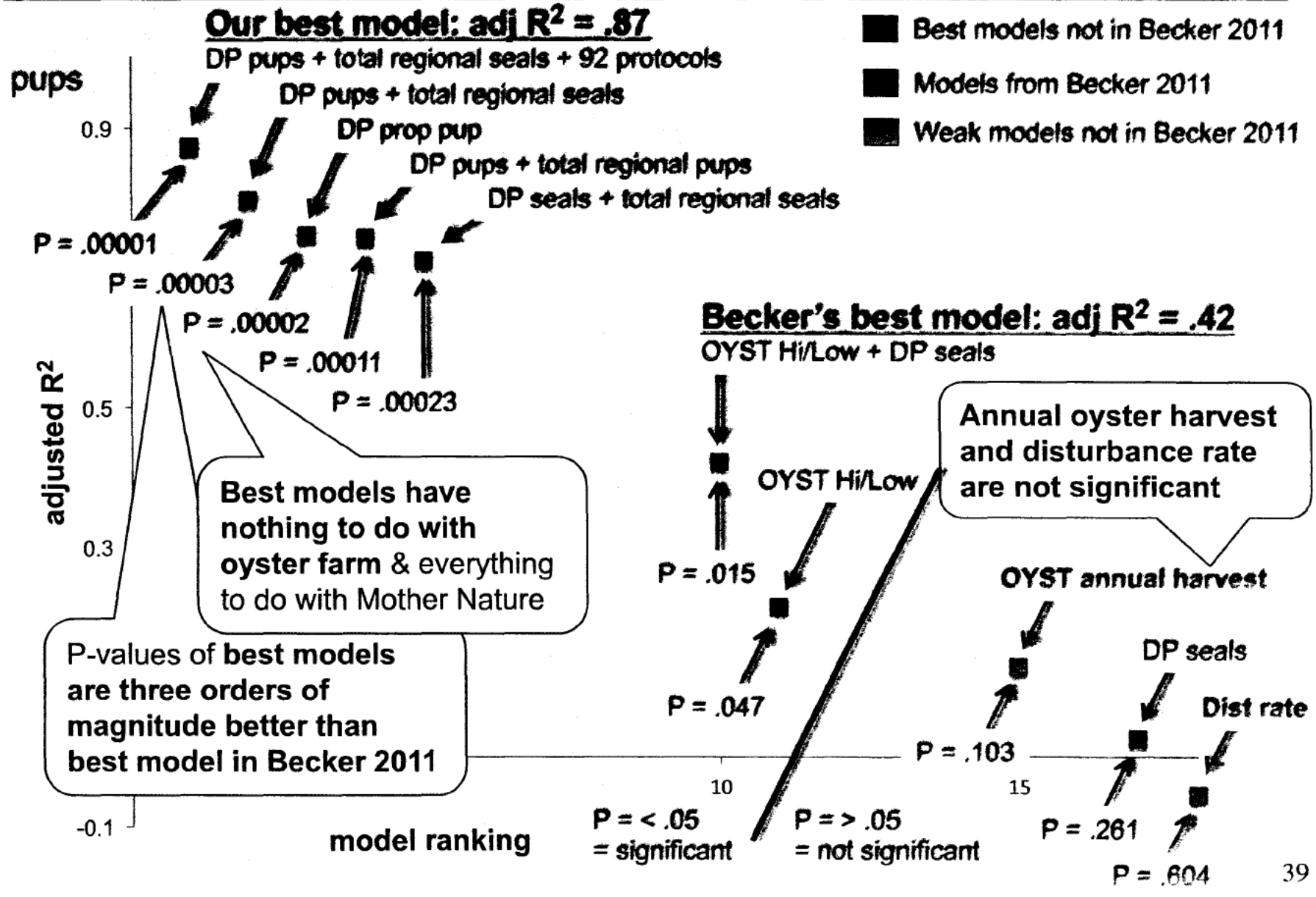


The proportion of pups at Double Point and total regional seals look better than annual oyster harvest. Q. What does statistical analysis teach us? Answer: models using these variables are 1000 times more significant.

5. Mother Nature leads to movements of seals into & out of Estero

Best models are 1000 times more significant than Becker's models



An important test of the models: how robust are the models without 2003? (i.e., without the rogue elephant seal at DP in 2003)

Top model: DP pups + total regional seals + 92 protocols

P-value: 0.00001
Adjusted R^2: 0.87

highly significant

w/o '03 only → with other 13 yrs

P-value: 0.00029
Adjusted R^2: 0.79

highly significant

Becker's best model: OYST Hi/Low + DP seals

P-value: 0.015
Adjusted R^2: 0.42

significant

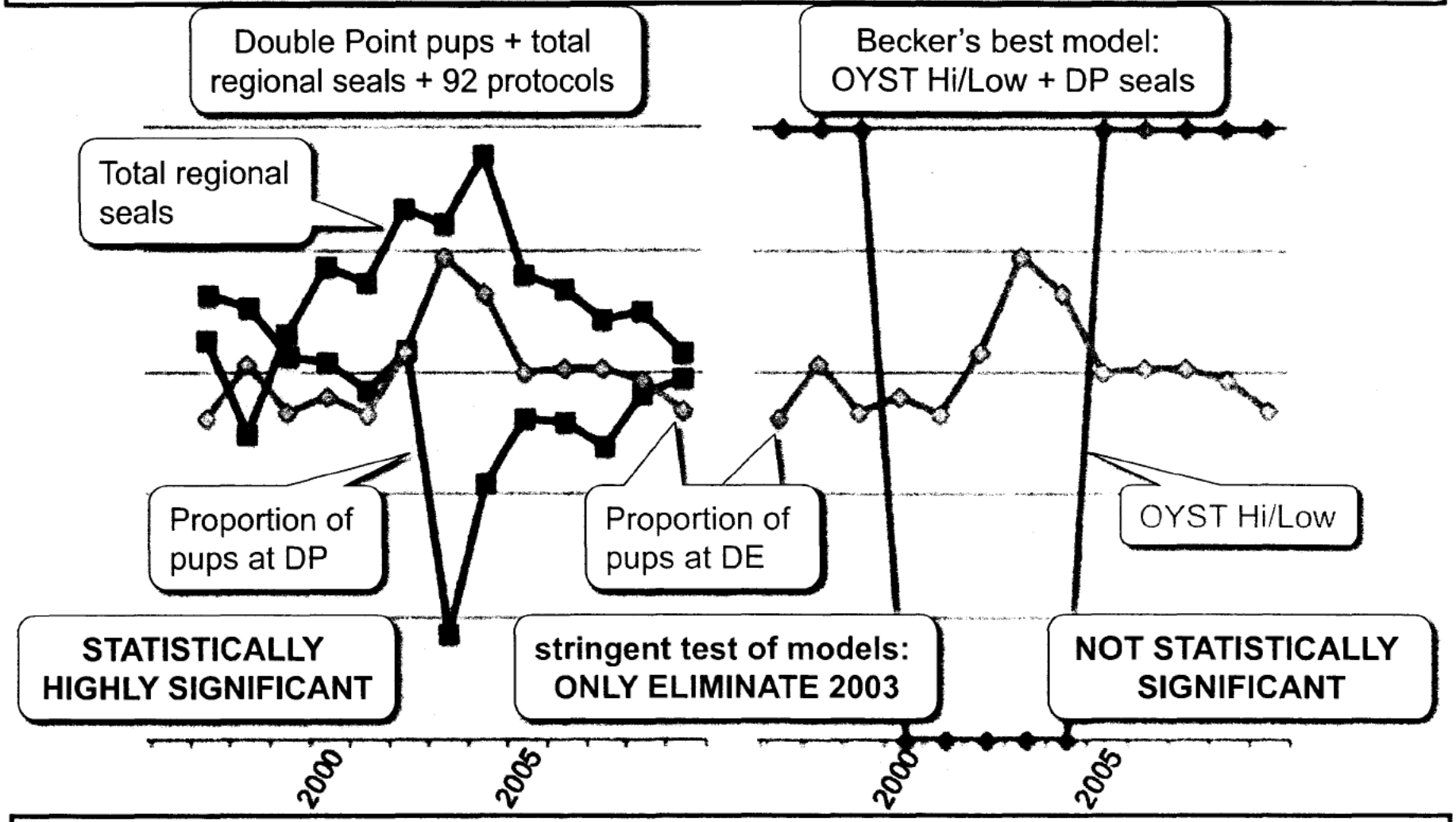
w/o '03 only → with other 13 yrs

P-value: 0.308
Adjusted R^2: 0.05

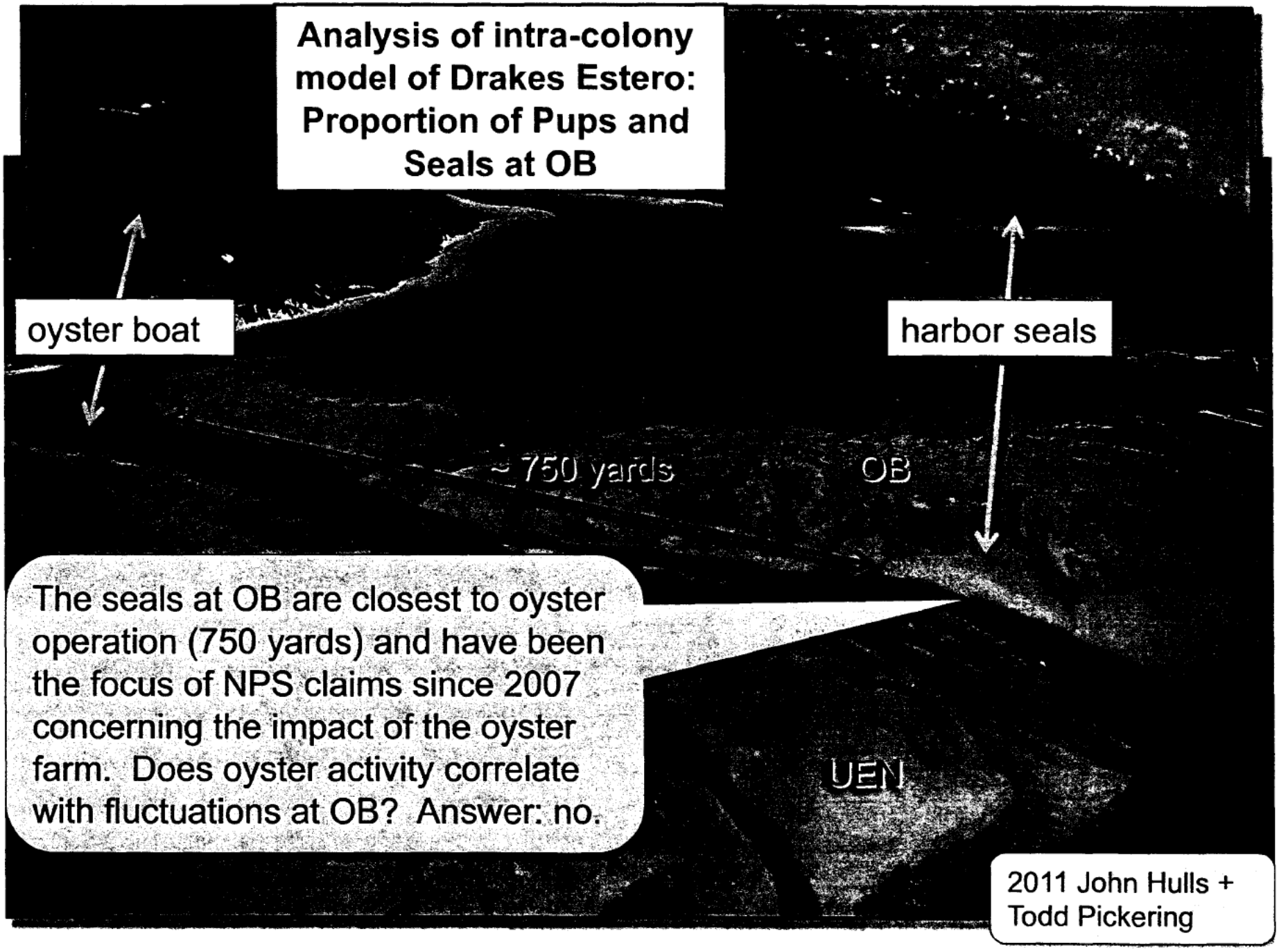
not significant

If the models represent a significant long-term pattern, then they should be significant with only 14 of the 15 years. **Becker's best models fail that test (-2003) whereas the superior models (e.g., DP pups + total regional seals) do not.**

If we test the models by eliminating 2003 (the rogue elephant seal at Double Point) and leave the remaining 14 years …



… then Becker's best model (involving OYST Hi/Low) is no longer statistically significant, whereas our best models are!


Analysis of intra-colony model of Drakes Estero: Proportion of Pups and Seals at OB
oyster boat
harbor seals
~ 750 yards
OB
The seals at OB are closest to oyster operation (750 yards) and have been the focus of NPS claims since 2007 concerning the impact of the oyster farm. Does oyster activity correlate with fluctuations at OB? Answer: no.
UEN
2011 John Hulls + Todd Pickering

Intra-Colony Models: Proportion Pups and Seals at subsite OB

notes	Dependent variable	Independent variables	P-value	Adj R^2
Top model	**OB pups**	**prop.pups.DP + total regional seals**	**0.002**	**0.645**
	OB pups	prop.pups.DP	0.071	0.200
	OB pups	OYST Hi/Low	0.088	0.172
	OB pups	Total regional seals	0.136	0.116
	OB pups	Disturbance rate	0.941	-0.090
Top model	**prop.pups.OB**	**Total regional seals**	**0.001**	**0.583**
	prop.pups.OB	prop.pups.DP	0.087	0.173
	prop.pups.OB	OYST Hi/Low	0.187	0.075
	prop.pups.OB	Disturbance rate	0.754	-0.081
Top model	**OB seals**	**Total regional seals**	**0.002**	**0.572**
	OB seals	prop.pups.DP	0.137	0.116
	OB seals	OYST Hi/Low	0.186	0.076
	OB seals	Disturbance rate	0.717	-0.077

best models for pups at OB

models that are not significant

(1)Seals and pups at subsite OB, site closest to oyster boats, **do not correlate with OYST Hi/Low or disturbance rate**.

(2)Seals and pups at OB **do correlate with Mother Nature – total regional seals and Double Point pups** along coast.

Intra-Colony Models: Proportion Pups in Upper Estero (UEN, OB, UEF) Compared to Pups in Drakes Estero and Pups in Region

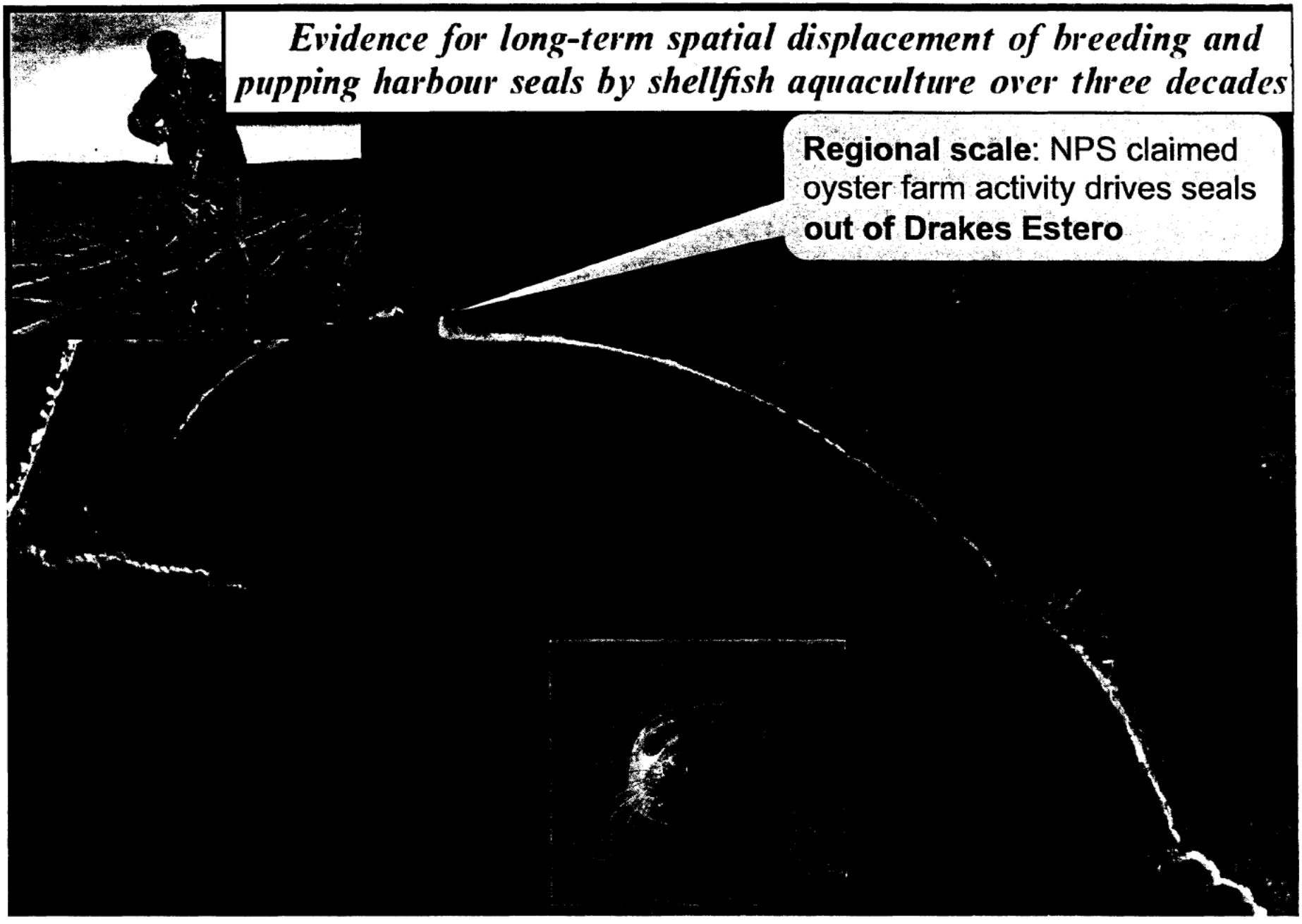
notes	model	P-value	Adj R^2
prop.pup.upper estero/ total Drakes Estero pups	**Double Point (DP) proportional pups (as a proportion over total regional pups)**	**0.00862**	**0.37900**
	Total regional seals	**0.01052**	**0.36117**
	Disturbance rate	0.58195	- 0.05115
	OYST Hi/Low	0.70276	- 0.06446
	OYST annual harvest	0.94747	- 0.07655
Prop.pup.upper estero/ total regional pups	**DP proportional pups (over t regional pups)**	**0.00032**	**0.61564**
	Total regional seals	**0.00121**	**0.53286**
	OYST Hi/Low	0.28304	0.01783
	Disturbance rate	0.63760	- 0.05799
	OYST annual harvest	0.59336	- 0.05266

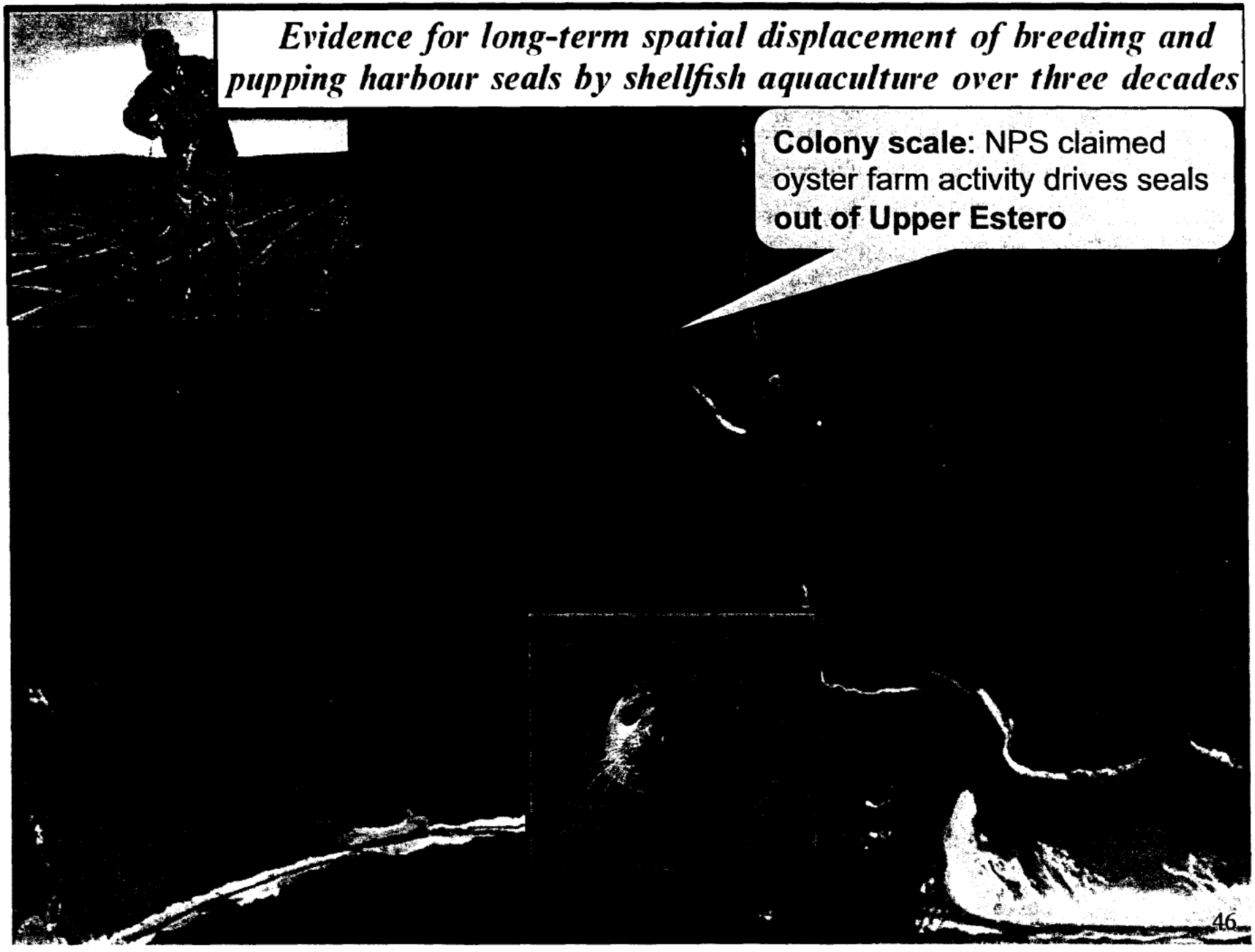
best models for pups at Upper Estero

models that are not significant

(1)Seals and pups at subsites UEN, OB, & UEF (Upper Estero), **do not correlate with OYST Hi/Low or disturbance rate.**

(2)Seals and pups at UEN, OB, & UEF **do correlate with Mother Nature – total regional seals & Double Point pups.**


Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades
Regional scale: NPS claimed oyster farm activity drives seals **out of Drakes Estero**


Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades
Colony scale: NPS claimed oyster farm activity drives seals out of Upper Estero
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Becker 2011: regional scale conclusion incorrect

analysis of NPS data: natural forces along coast drive harbor seals **INTO Drakes Estero**

increased total regional seals

seals at Double Point

rogue elephant seal in 2003

Becker 2011: colony scale conclusion incorrect

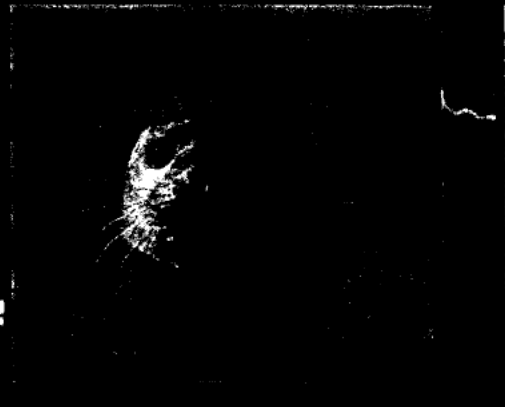
analysis of NPS data: natural forces along coast drive harbor seals **INTO Upper Estero**

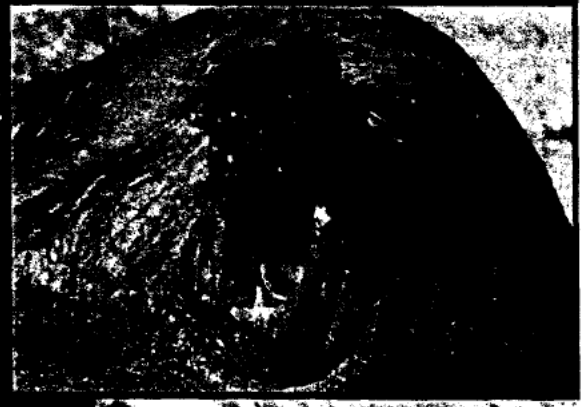
Upper Estero

increased total regional seals

seals at Double Point

rogue elephant seal in 2003





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Analysis of NPS Becker 2011: major conclusions incorrect

***Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades*†**

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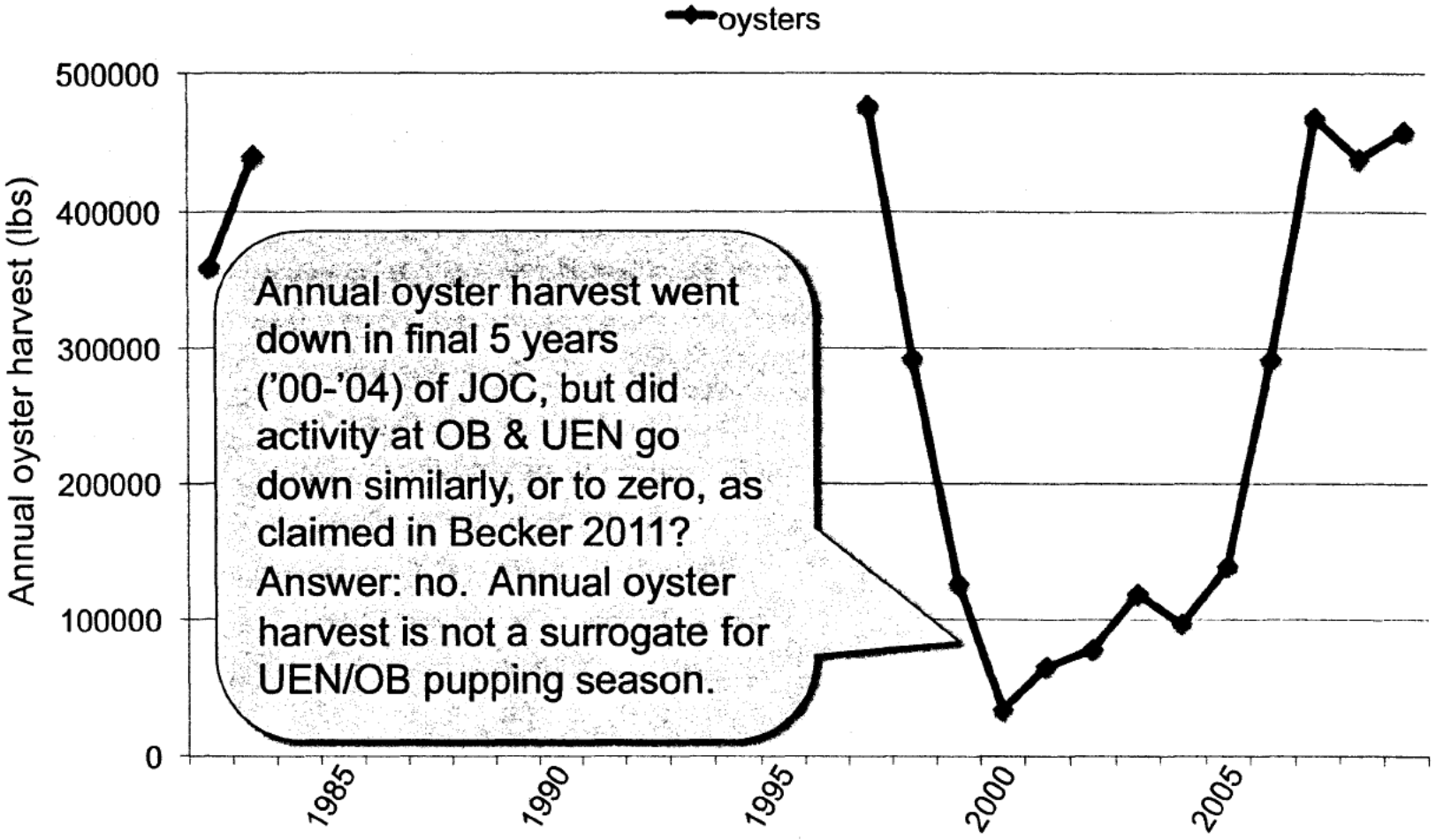
a. Annual oyster harvest is not surrogate for UEN/OB pupping season

Is annual oyster harvest a surrogate for oyster activity at OB/UEN during pupping season? A: No



annual oyster harvest

Quotes from MMC panel meeting, February 23, 2010

Kevin Lunny:
"… Becker I, II, and III are all based on annual production rates. I think this really points to a core issue that's behind this whole discussion. The core issue is communication. … ***We were never contacted and so we've never had any input, we've never had a part, we've never had a seat at the table****. We've never been asked a single question. And those data are all available."*

Lunny offered his data on February 23, 2010. Becker, Press, and Allen submitted their paper on October 14, 2010. Between those two dates, **Becker never asked Lunny for the DBOC data.**

Ben Becker:
"I fully agree with Kevin that it would be great if we had better measurements*, right time period, and all this other stuff. But we also need to think about, we need a dataset that we can go all the way back to '97, or '82 in the case of the new analysis, that is consistent.* ***Sometimes there's a trade-off between accuracy and consistency****."*

Annual oyster harvest is not a surrogate for oyster activity at UEN/OB during pupping season

year	Annual oyster harvest (lbs)	UEN/OB Mar-May oyster harvest	UEN/OB Mar-May boat harvest trips
2005	138958	8160	9
2006	291538	15184	33
2007	468000	1440	2
2008	438000	9080	16
2009	458000	22280	44

model	P-value	Adj R^2
UEN/OB Mar-May oyster harvest vs. UEN/OB Mar-May harvest boat trips	0.005	0.984
Annual oyster harvest vs. UEN/OB Mar-May boat harvest trips	0.650	- 0.317
Annual oyster harvest vs. UEN/OB Mar-May oyster harvest (lbs)	0.737	- 0.396

In April '07, DBOC stopped harvesting at UEN/OB until August (as a result of threats by Superintendent)

The data are clear – there is no relationship between annual oyster harvest vs. activity at UEN/OB during pupping season.

UEN/OB pupping season (Mar-May) harvest & harvest boat trip data have been collected by DBOC since 2005. The Marine Mammal Commission encouraged Becker in Feb 2010 to obtain these data, but he did not.

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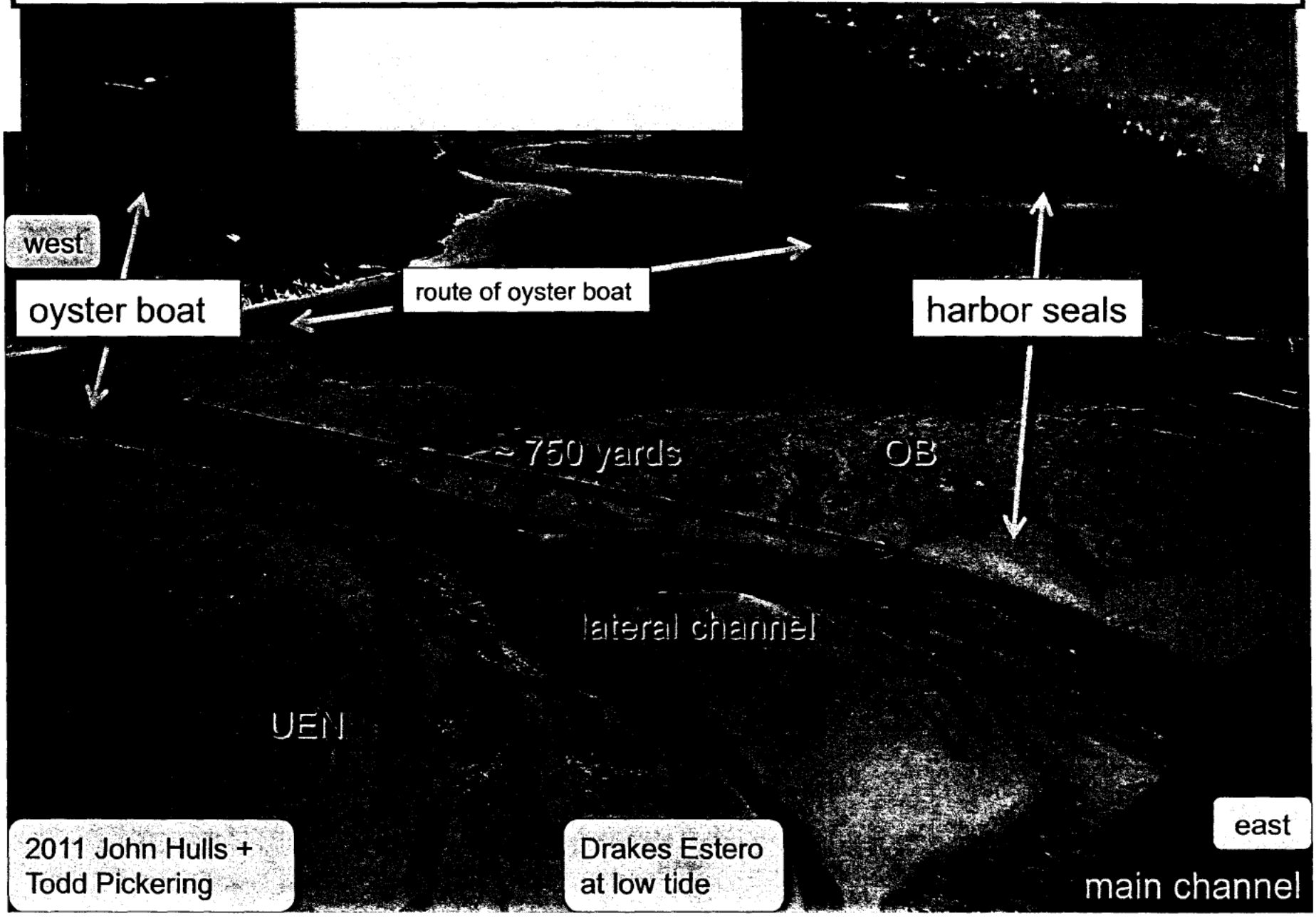
a. Annual oyster harvest is not surrogate for UEN/OB pupping season

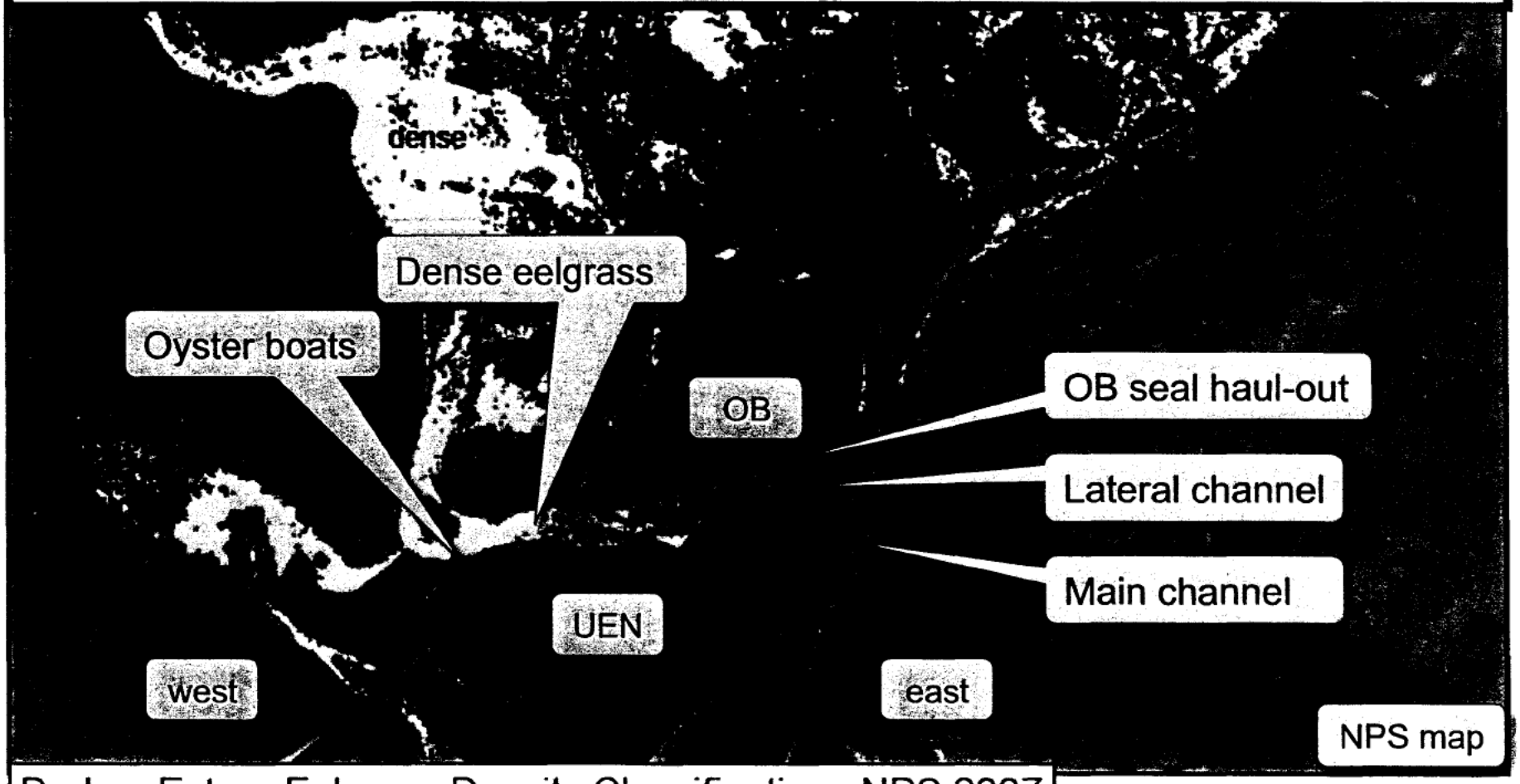
b. Seal haul-out map is misleading: seals and oysters do not overlap

Oyster boat stays more than 700 yards away from seals



Kevin Lunny: *"... You'll look at the eelgrass maps and you'll see that in the past decade or so, eelgrass has filled in the lateral channel and we don't see the harbor seals hauling out along the lateral channel now."*

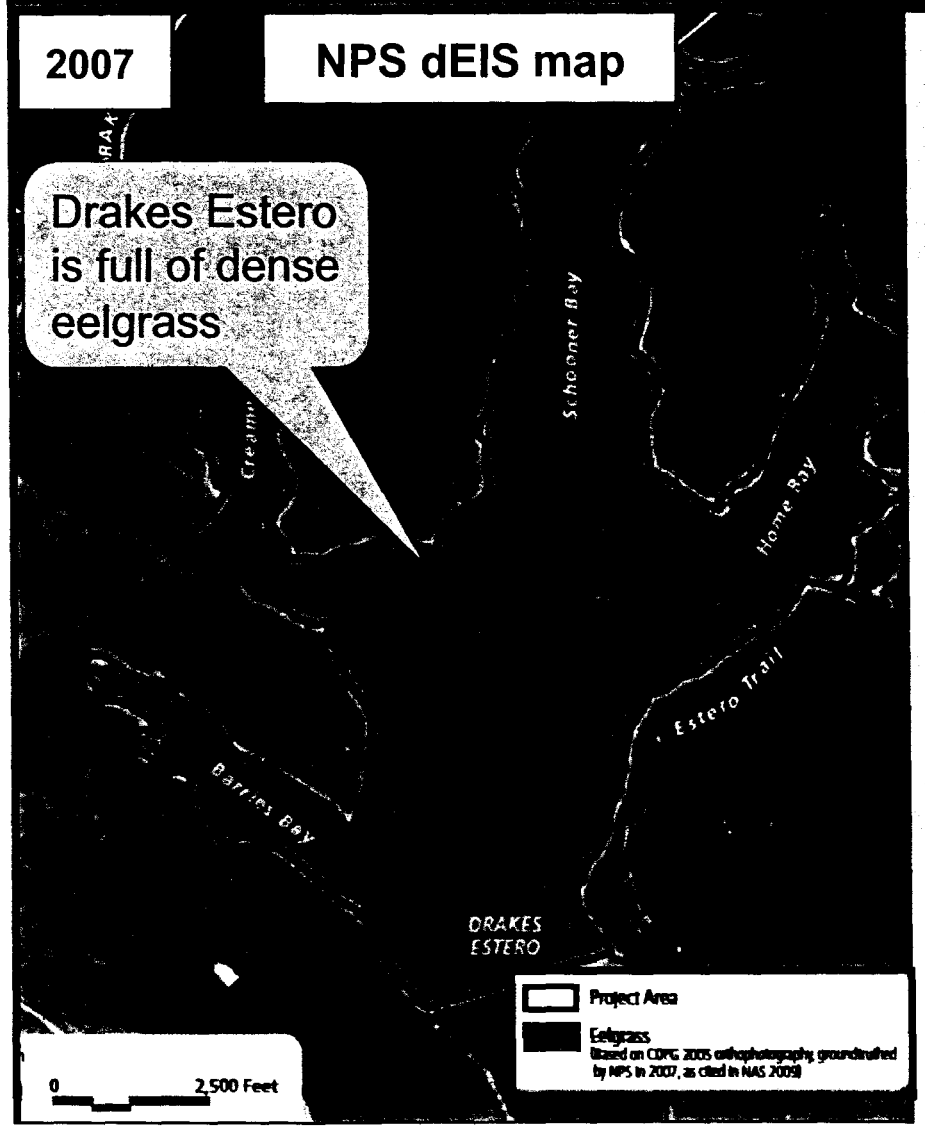
Sarah Allen: *"I concur with what Kevin's noted about changes to the lateral channel ... I agree, there is eelgrass there ..."*

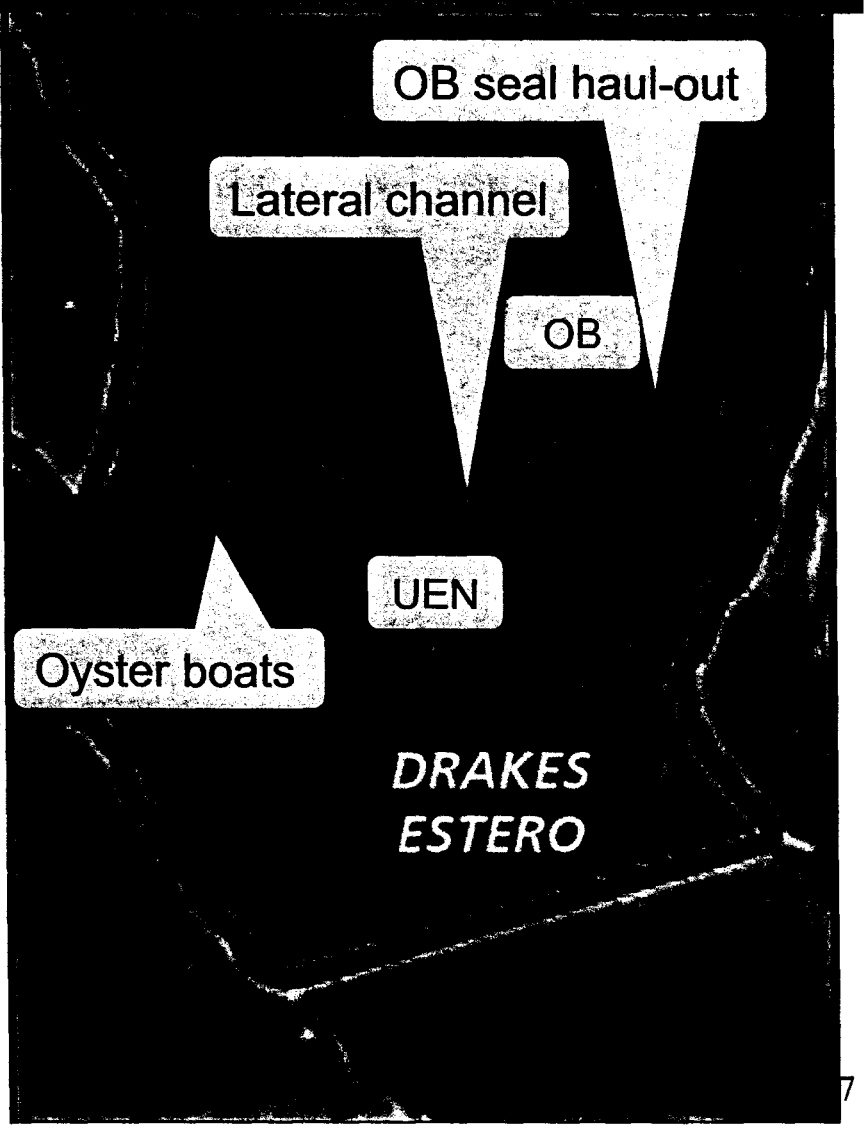


Drakes Estero Eelgrass Density Classifications NPS 2007

Draft Environmental Impact Statement

Drakes Bay Oyster Company Special Use Permit





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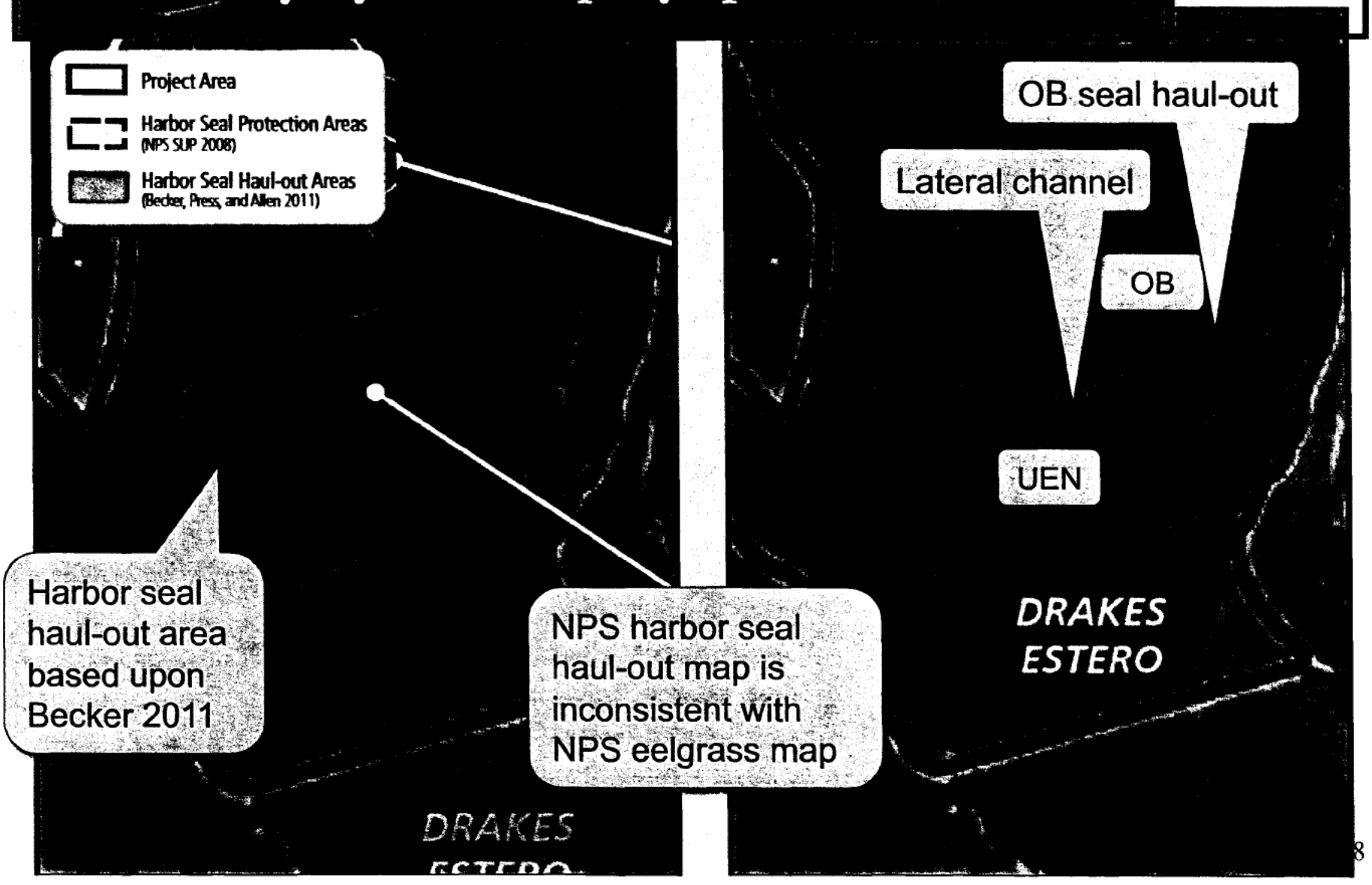
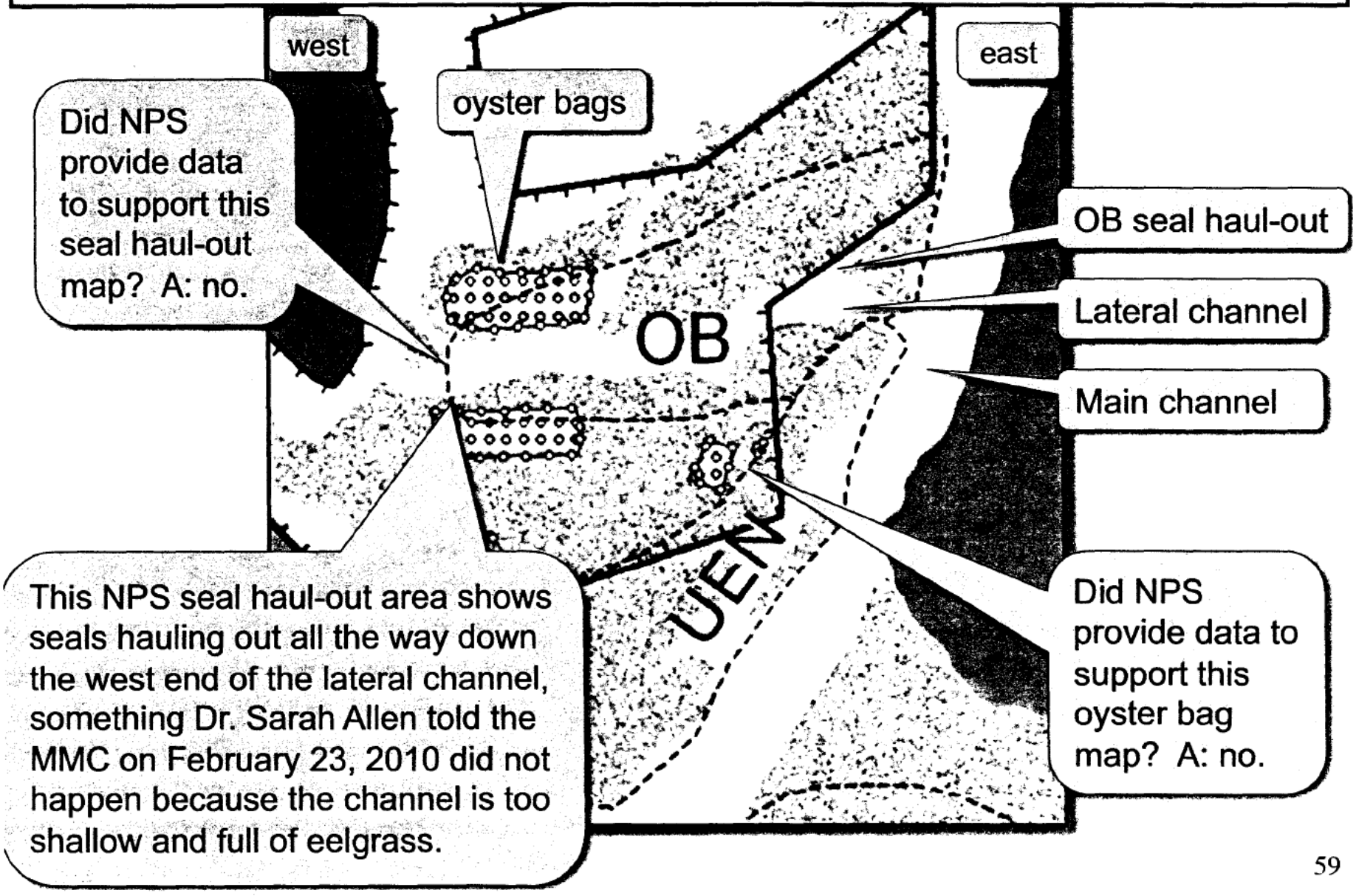


Becker's Figure 1 gave false impression that oyster bags are within seal haul-outs – map is inaccurate and misleading



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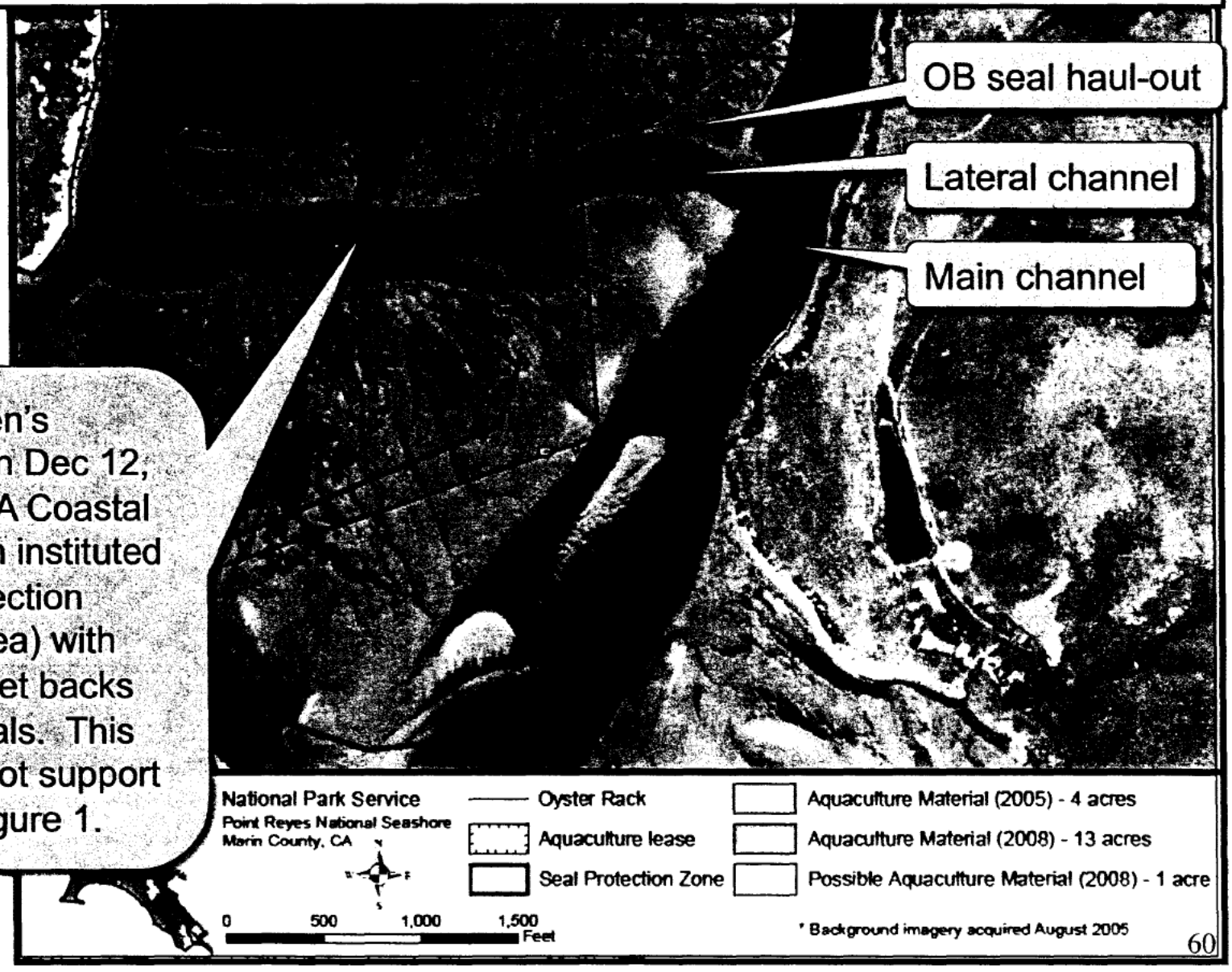
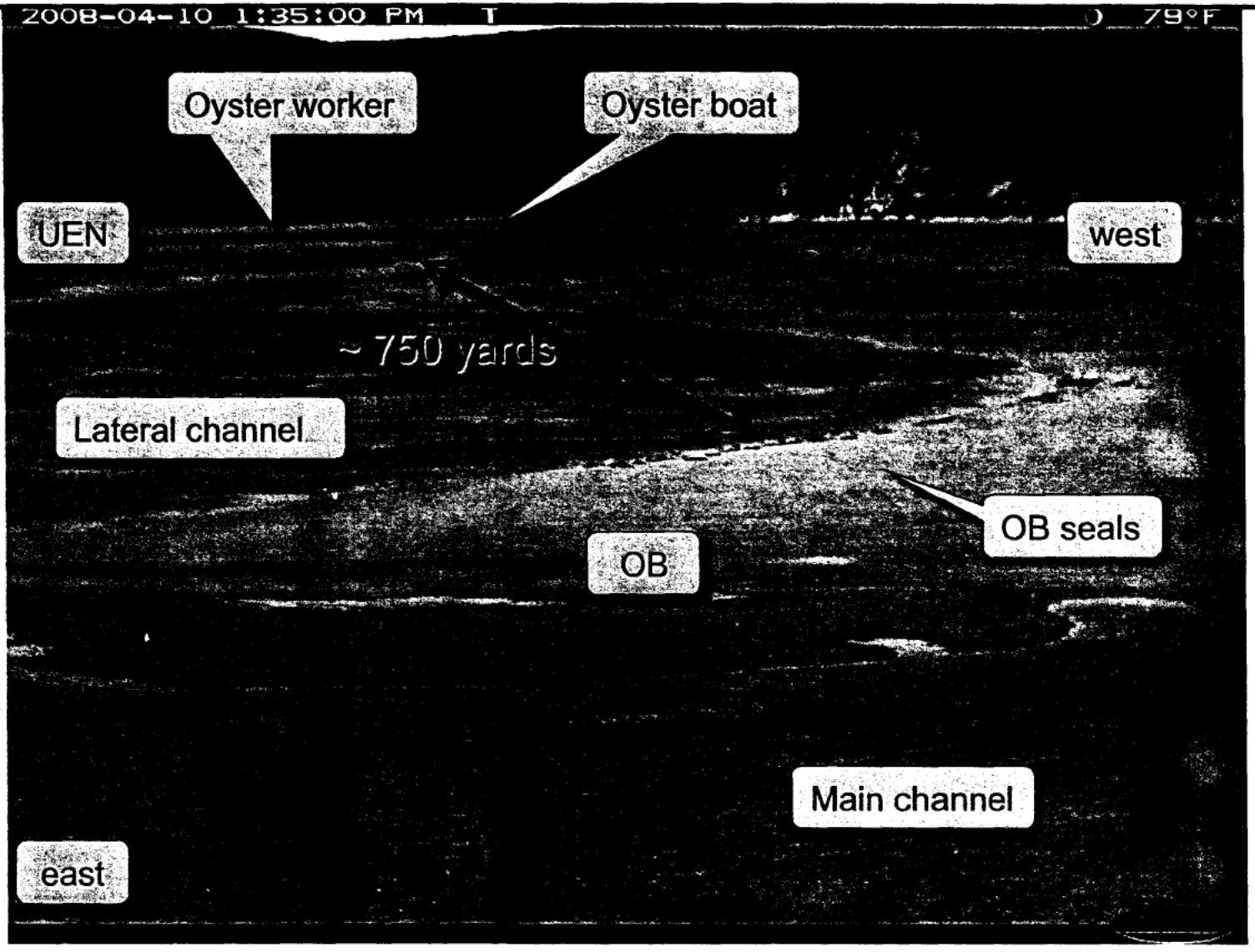


With Dr. Allen's guidance, on Dec 12, 2007, the CA Coastal Commission instituted a Seal Protection Zone (or Area) with >300 yard set backs from the seals. This map does not support Becker's Figure 1.

60

281,000 photographs from NPS secret cameras ('07-'10) show OB seals at east end of lateral channel, and oyster boats and workers at west end, well over 600 yards away



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Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades[†]

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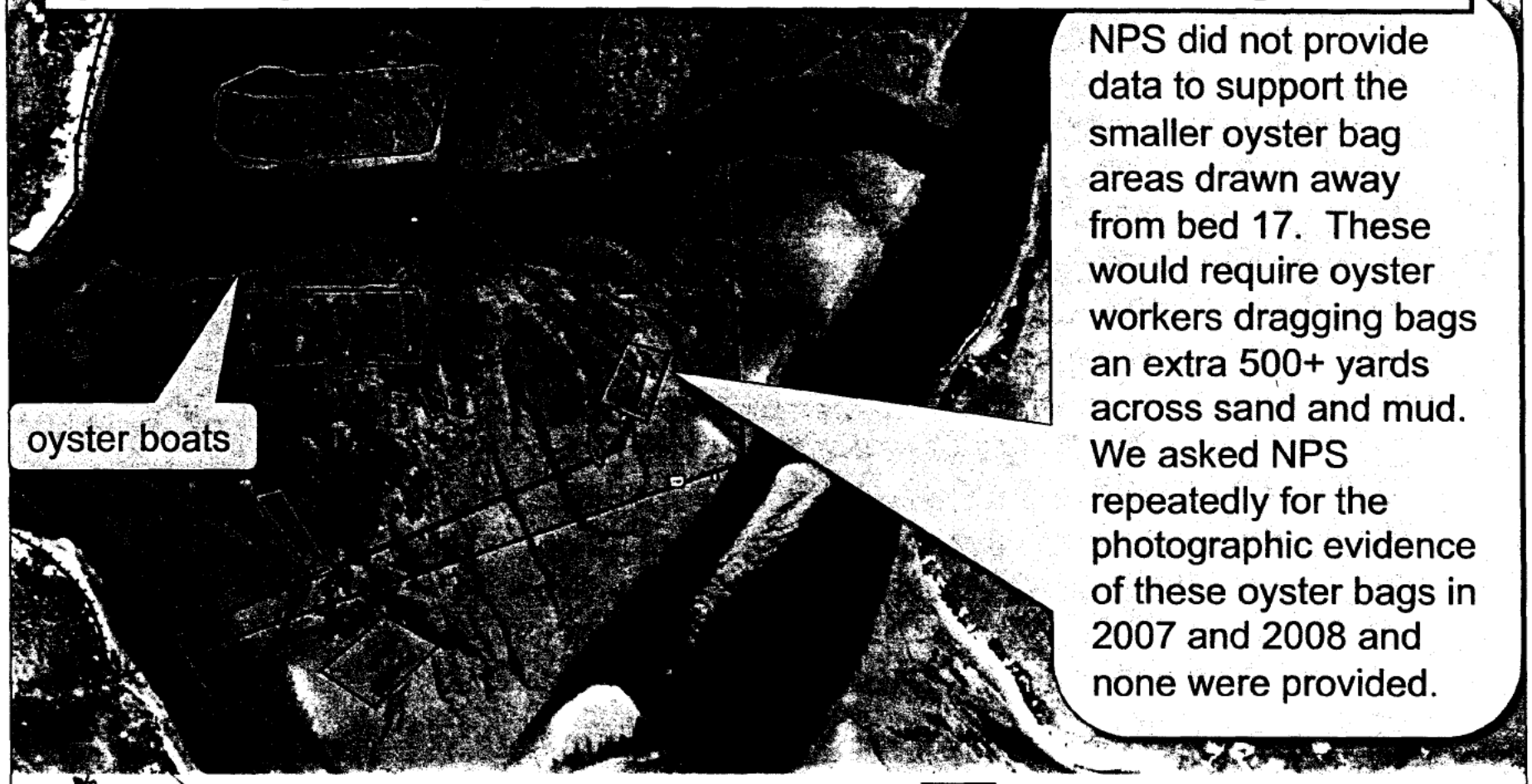
NPS scientists never got correct data; misinterpreted aerial photos

a. Annual oyster harvest is not surrogate for UEN/OB pupping season

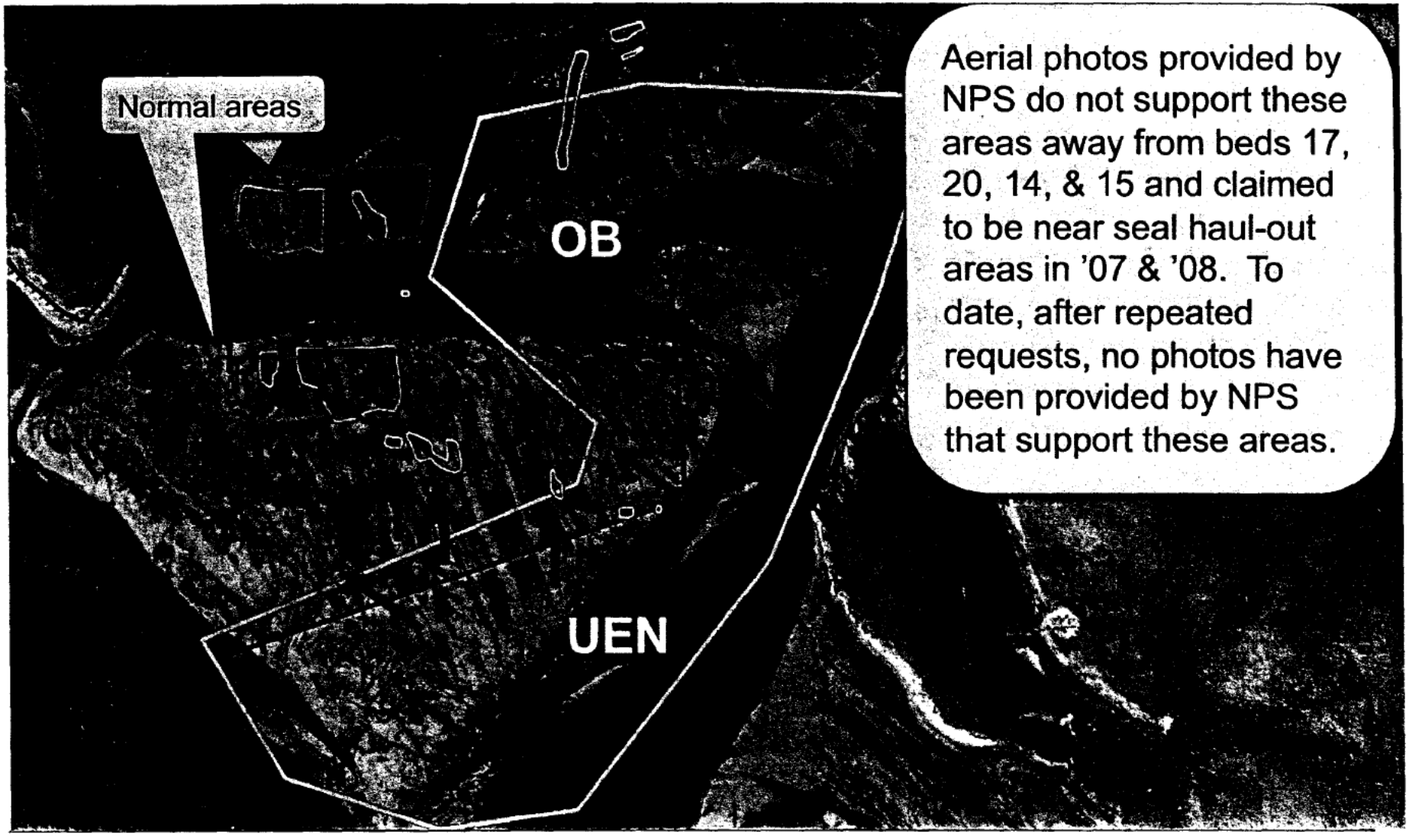
b. Seal haul-out map is misleading: seals and oysters do not overlap

c. Claims and maps of oyster bags in pupping areas are incorrect

Since 2007, NPS has claimed that DBOC has recently placed oyster bags in or near harbor seal pupping areas

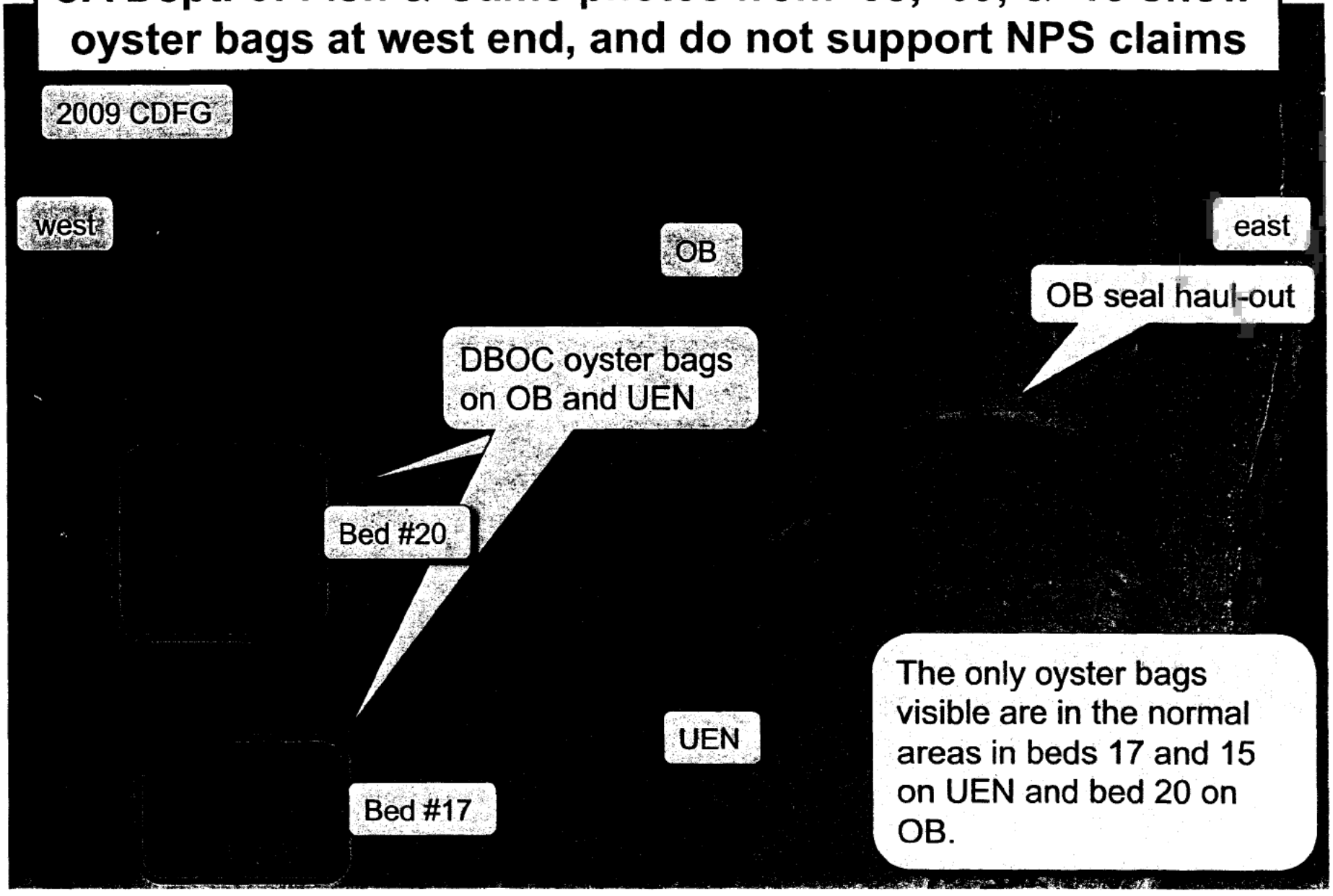


NPS did not provide data to support the smaller oyster bag areas drawn away from bed 17. These would require oyster workers dragging bags an extra 500+ yards across sand and mud. We asked NPS repeatedly for the photographic evidence of these oyster bags in 2007 and 2008 and none were provided.



We made repeated requests of NPS all summer as part of the MMC process, asking for photos of oyster bags in or near harbor seal pupping areas. **NPS was unable to provide any photos that support the NPS claim.**

CA Dept. of Fish & Game photos from '08, '09, & '10 show oyster bags at west end, and do not support NPS claims



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c. Claims and maps of oyster bags in pupping areas are incorrect

d. Claims of zero oyster bags at OB/UEN from 2000-'04 are incorrect
CDPH records show JOC continued to harvest from UEN & OB

Becker 2011 claimed no oyster activity at UEN/OB in '00-'04

We asked NPS for all data (i.e. photographs & notebooks) supporting the numbers in this Figure.

What is the basis for Becker 2011 claim that JOC had no oyster activity at UEN/OB in 2000-2004?

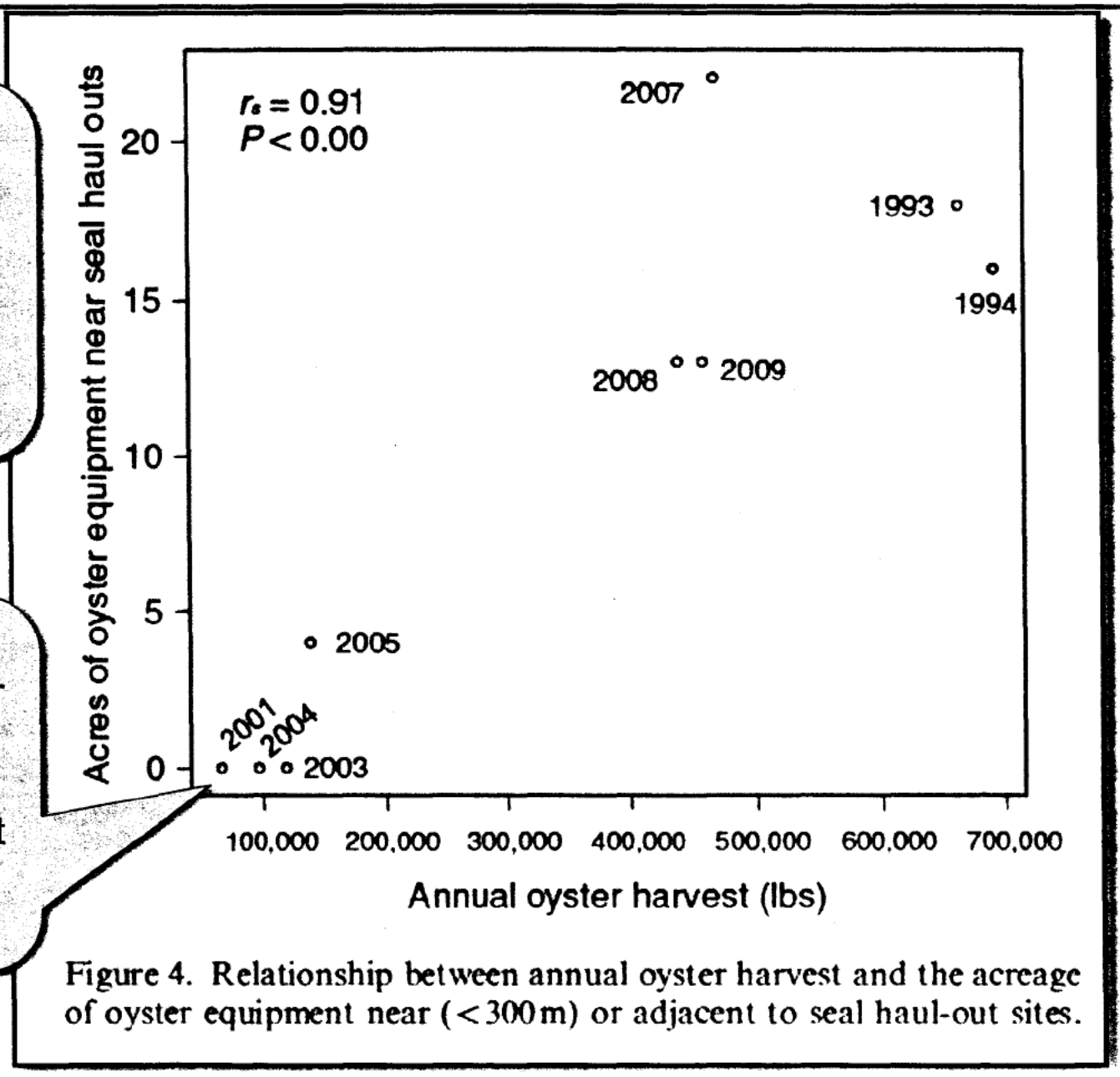


Figure 4. Relationship between annual oyster harvest and the acreage of oyster equipment near (<300m) or adjacent to seal haul-out sites.

Becker 2011 made incorrect inferences in Table A1

Table A1.

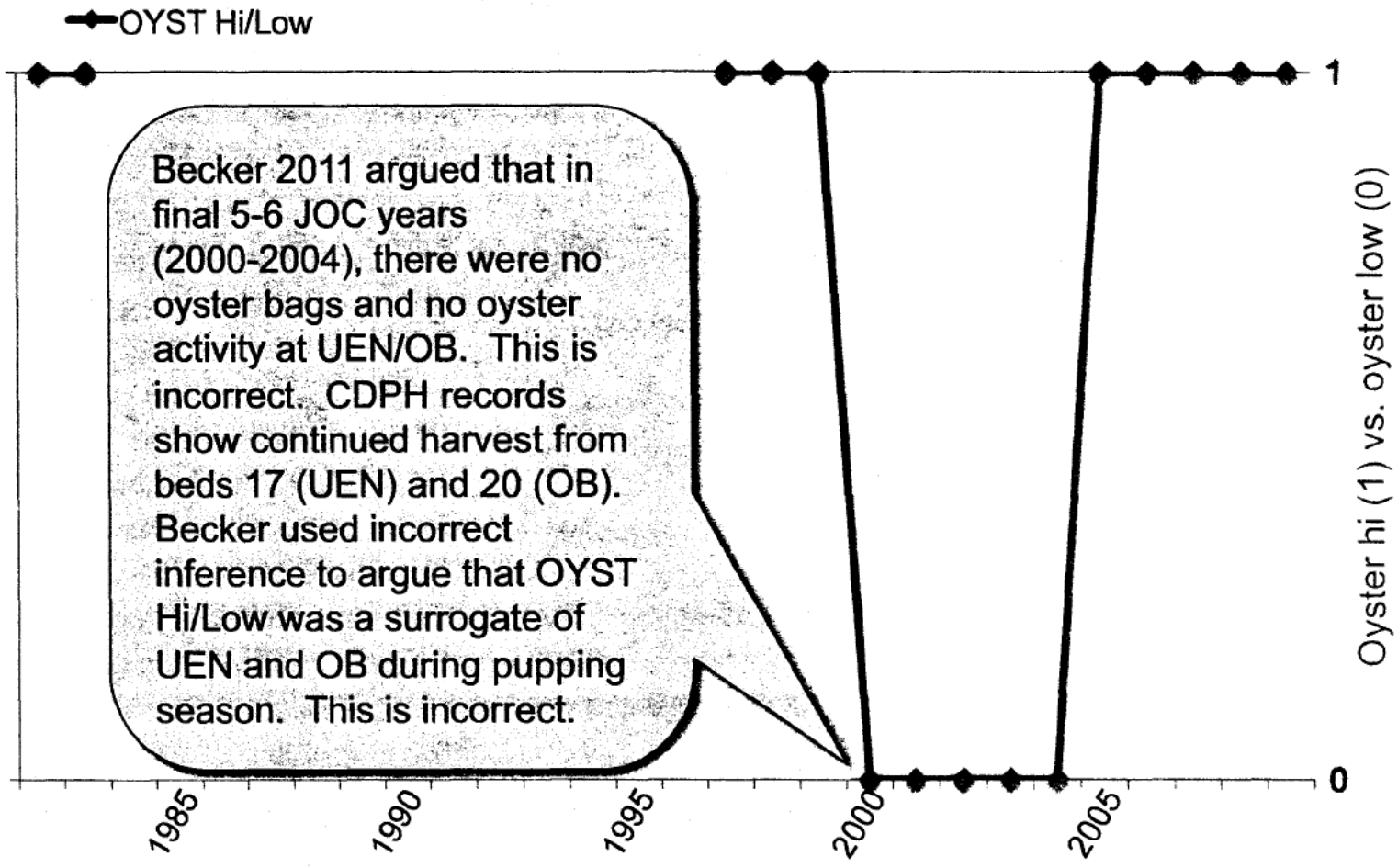
Year	Oyster harvest (lbs)	Inferred level of mariculture use of sandbars near seals	Source(s) of inference
1997	476,791	high	harvest data
1998	292,188	high	harvest data, higher than 2005
1999	125,749	modelled high & low	slightly higher than 2000-2004, declining
2000	34,094	low	lower than 2002-2004
2001	65,676	low	aerial image of absence of bags
2002	78,064	low	DTP, pers. obs, harvest data
2003	118,643	low	aerial image of absence of bags
2004	96,754	low	DTP, pers. obs, harvest data
2005	138,958	high	aerial image of bags, increasing harvest
2006	291,538	high	increasing harvest, bags in '05
2007	468,000	high	aerial image of bags
2008	438,000	high	aerial image of bags
2009	458,000	high	aerial image of bags

OYST Hi/Low is based upon this "inferred" level of activity at UEN/OB during pupping season

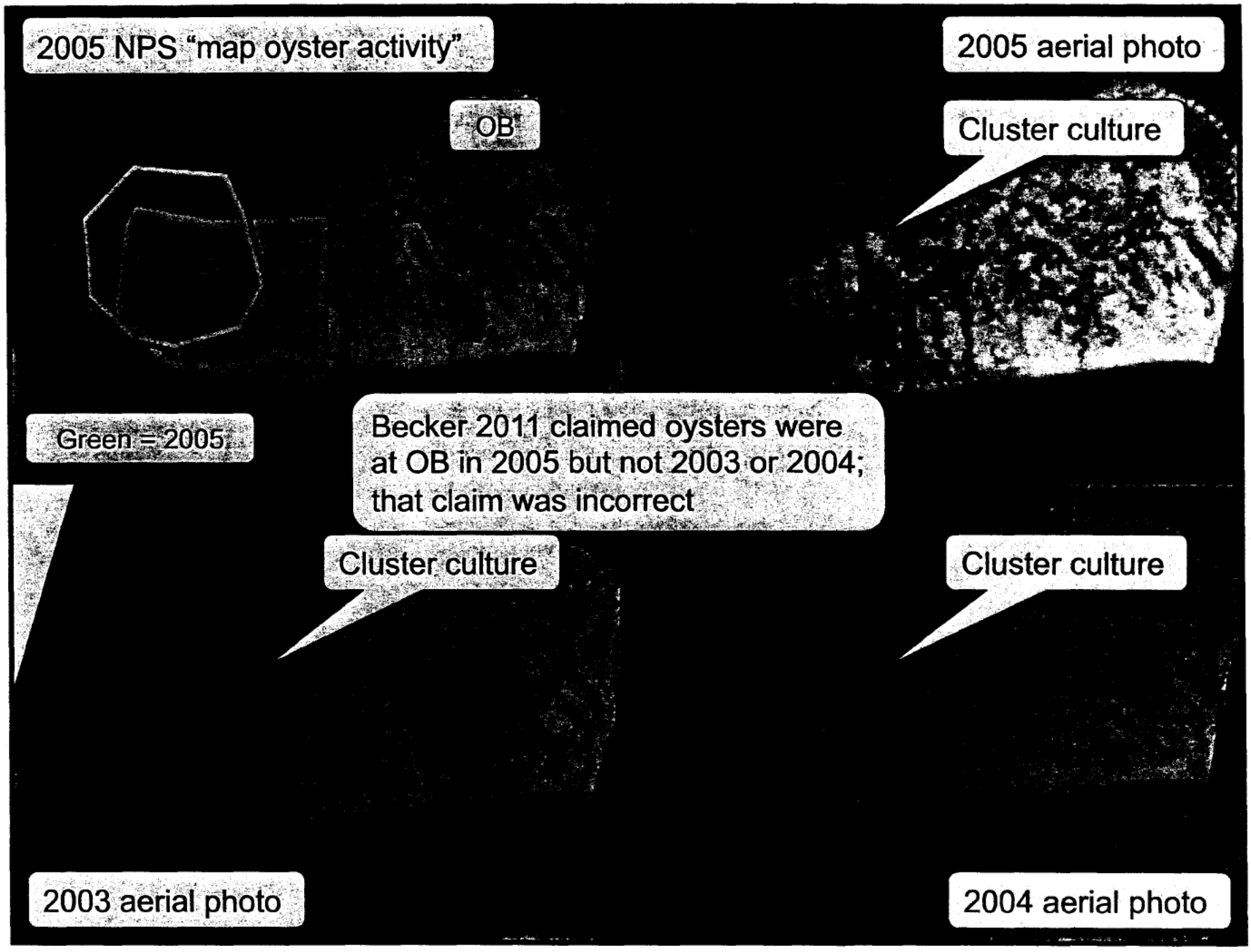
Becker's "inferences" for UEN/OB pupping season activity came from aerial photos, harvest data, and David Press observations

But Becker failed to obtain the right data from CDFG, CDPH, and former JOC employees and owners.

Becker used OYST Hi/Low categorical designation based upon NPS inferences as surrogate for activity at UEN/OB during pupping season



OYST Hi/Low categorical oyster activity


2005 NPS "map oyster activity"
2005 aerial photo
OB
Cluster culture
Green = 2005
Becker 2011 claimed oysters were at OB in 2005 but not 2003 or 2004; that claim was incorrect
Cluster culture
Cluster culture
2003 aerial photo
2004 aerial photo

Former Johnson's Oyster Company owner, manager, and foreman claim JOC harvested from OB & UEN from '00 to '04

April 21, 2011

To whom it may concern:

Before Drakes Bay Oyster Company began in 2005, every year since 1984 to the present, oyster bag culture was used on Bull Point, in areas 29 and 30 and on Berries Bar in harvest areas 14, 20 and 17.

Jorge Mata

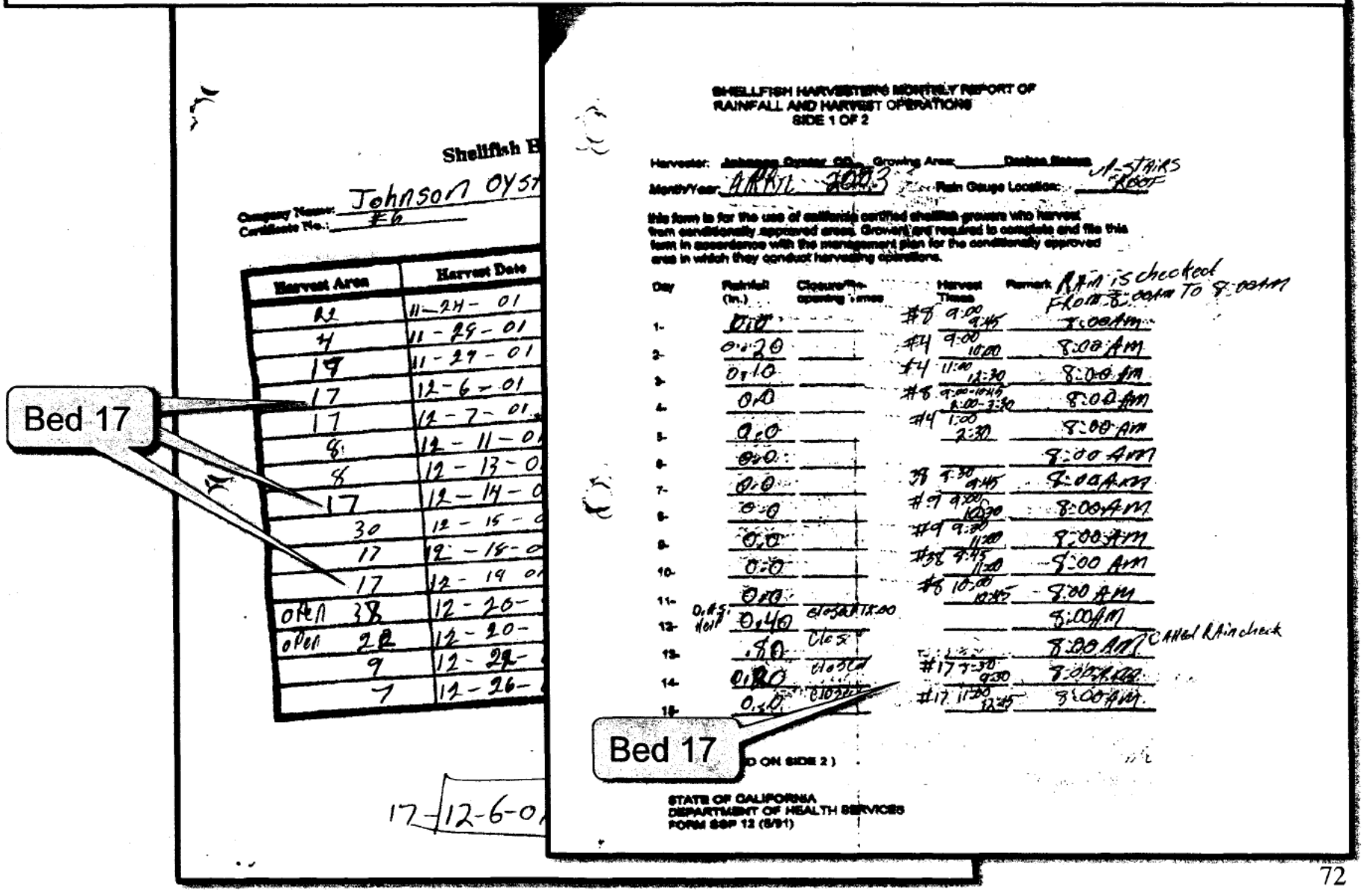
We received statements from three key people, all asserting that JOC continued to harvest oysters from bed #17 (UEN), bed #20 (OB), and neighboring beds throughout 2000-2004, even as overall production decreased. Bed #17 is the only place where JOC could harvest after rainfall (only place in CA where CDPH permits harvesting after rainfall).

(1) Jorge Mata, former JOC foreman and current DBOC foreman;

(2) Nellie Gamez, former JOC office manager who collected records;

(3) Mark Johnson, former JOC co-owner

California Dept. of Public Health records of oyster harvest during rainy season show harvest from bed #17 in '01 to '04



In contrast to Becker 2011, the years 2003, 2004, & 2005 were nearly identical in terms of oyster bags at UEN/OB

Becker 2011 claimed there were no oysters harvested at OB & UEN in last five JOC years (2000-2004), and DBOC increased activity in 2005. This was incorrect.

- **It is contradicted by the CDFG aerial photographs.**
- **It is contradicted by CDPH records.**
- **It is contradicted by JOC and DBOC employees and owners.**

Had Becker obtained documents and data from CDPH and CDFG, he would have learned that JOC harvested from UEN & OB in 2000-2004.

Had Becker talked to former JOC employees or owners, he would have learned that JOC harvested from UEN & OB in 2000-2004.

Had Becker talked to Lunny, as MMC recommended, he would have learned about the oyster culture systems seen in the photos.

Analysis of NPS Becker 2011: major conclusions incorrect

***Evidence for long-term spatial displacement of breeding and pupping harbour seals by shellfish aquaculture over three decades*†**

1. Authors do not have "over *three decades*" of continuous data
13 years of data, 14 year gap; authors cherry picked '82 & '83

2. Analysis reveals no "*long-term spatial displacement*" out of Estero
Rather short-term displacement of seals INTO Estero in 2003 & 2004

3. Rogue elephant seal at Double Point in 2003 killed ~ 40 harbor seals
Displaced over 100 pups INTO Estero; took two years to recover

4. No "*evidence*" that oyster farm displaced seals out of Estero
Becker's best models are driven by rogue elephant seal in 2003

5. Mother Nature leads to movements of seals into & out of Estero
Best models are 1000 times more significant than Becker's models

6. Authors used incorrect seal maps, oyster maps, & inferences
NPS scientists never got correct data; misinterpreted aerial photos

Draft Environmental Impact Statement
Drakes Bay Oyster Company Special Use Permit

NPS Science & Implications for the Oyster Farm EIS

by Dr. Corey Goodman
October 16, 2011
Dance Palace, Point Reyes Station, CA

Sponsored by:
Tomales Bay Association (TBA) and
Alliance for Local Sustainable Agriculture (ALSA)

Draft Environmental Impact Statement

Top 10 questions to ask NPS about the science in the EIS

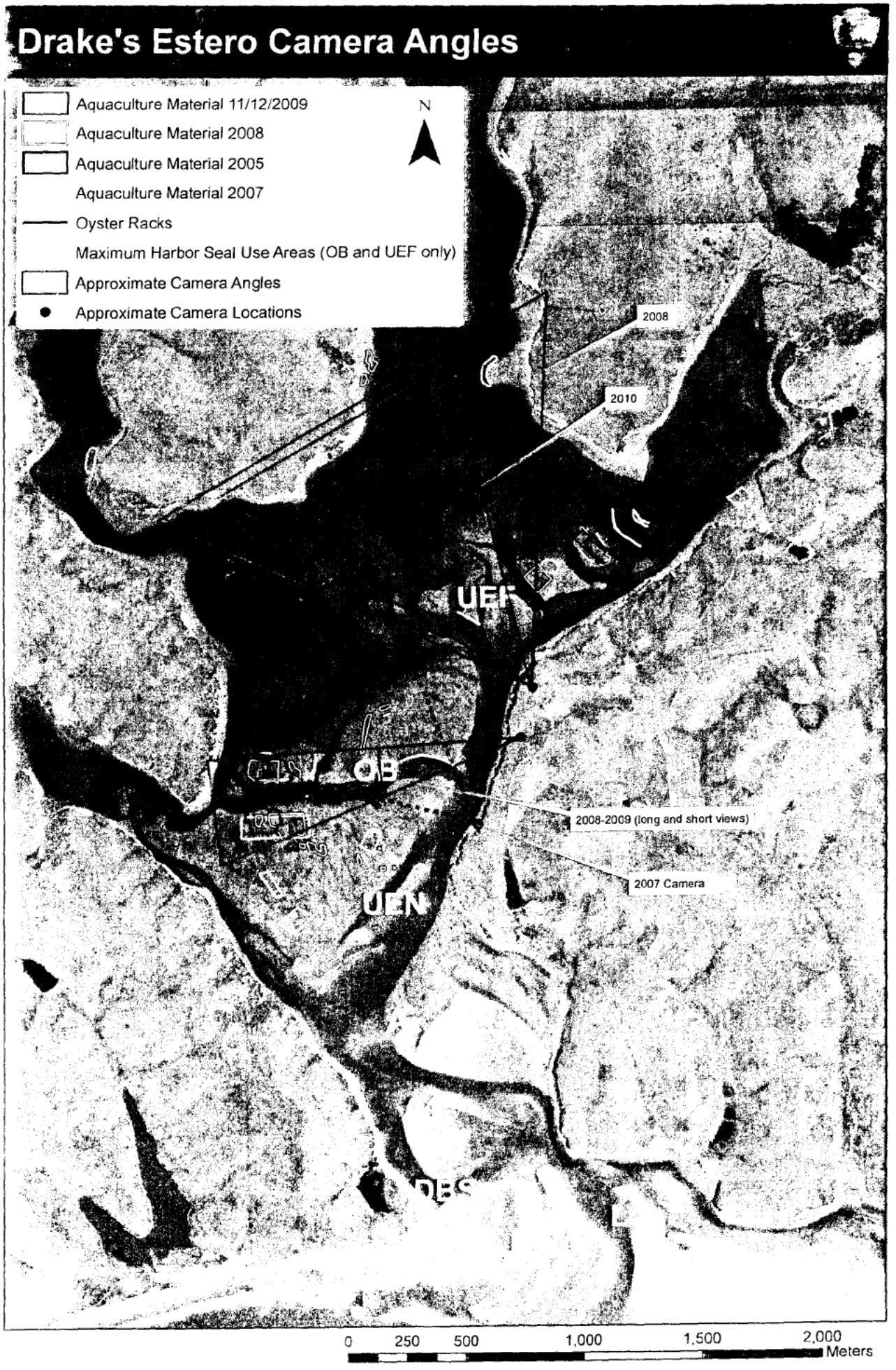
1. **NAS Report**: Why doesn't the EIS follow the NAS conclusion of no major adverse impact, as Senator Feinstein legislatively instructed NPS to do? Why does NPS find just the opposite?
2. **"*Potential*" Impacts**: After a decade of scientific studies, and countless millions of taxpayer dollars, why is this EIS about future "*potential*" impacts and not actual data of impacts?
3. **Special-Status Species**. How come NPS concluded in 1998 that DBOC was not a threat to endangered species, whereas in 2011, the EIS says the opposite about the same species?
4. **Red-Legged Frogs**. If red-legged frogs can't live in salt water, why are they listed in this EIS as being a "*potential*" impact of DBOC? Does NPS have any evidence for a real impact?
5. **Eelgrass**. If the NAS said eelgrass has doubled in coverage since the early 1990s, and oysters help clarify the water, why does the EIS describe eelgrass as negatively impacted?

Draft Environmental Impact Statement

Top 10 questions to ask NPS about the science in the EIS

6. **Harbor Seals**. Concerning the harbor seal impacts we've been hearing about since 2007, what happened to earlier NPS claims about an 80% decline in seals & DBOC disturbances?
7. **NPS Secret Photos**. Given that NAS thought minute-to-minute photos would resolve the controversy, why does the EIS dismiss 281,000 photos showing no DBOC disturbances?
8. "***Displacement***" **of Seals**. NPS describes a long-term displacement of harbor seals **OUT** of the Estero, but don't the data show a short-term displacement of seals **INTO** Estero?
9. **Rogue Elephant Seal**. Wasn't the rogue elephant seal at Double Point in 2003 and not the oyster farm the cause of the short-term movement of seals **INTO** Estero in 2003 & 2004?
10. **Lack of NPS Data**. After many years of NPS claims of overwhelming harm to seals by DBOC, is the best NPS has to offer the hypothetical potential future impacts in the EIS?

Drake's Estero Camera Angles



Anthropogenic Sources of Actual Disturbance Events
Drakes Estero
Subsites OB, UEF, and UEN
Numbers in parentheses taken from Goodman's analysis of 2008 and 2009 camera notes.

Year

Breeding Season: March - May

	aircraft	clammer	non-motorboat*	motorboat	oyster workers	hikers
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
2002	0	1	1	0	0	0
2003	0	0	0	0	0	0
2004	0	0	0	1	0	0
2005	1	0	0	0	0	0
2006	0	0	0	1	0	0
2007	1	0	0	6	0	0
2008	0	0	0 (2)	1 (2^)	0	0
2009	1	0	0	0	0	0
2010	0	0	0	0	0	0
Total	3	1	1	9	0	0

* Drakes Estero closed to all boats except DBOC.
^ Dismissed by Goodman with no explanation on pg 17, item (d)

Year

Molting Season: June and July

	aircraft	clammer	non-motorboat*	motorboat	oyster workers	hikers
2000	0	0	0	0	0	0
2001	0	0	1	0	0	0
2002	0	0	1	0	0	0
2003	1	0	0	1	0	0
2004	0	0	2	0	0	0
2005	0	0	1	0	0	0
2006	0	0	2	0	0	0
2007	0	0	0	0	0	0
2008	0	0	0	0	0	0
2009	0	0	0 (4)	1^	0	0
2010	1	0	1	0	0	0
Total	2	0	8	2	0	0

* Drakes Estero closed to all boats except DBOC in June. All observations occurred in July.
^ Not a DBOC motorboat.

Year

August - February

	aircraft	clammer	non-motorboat	motorboat	oyster workers	hikers
2000	0	0	0	1	0	0
2001	0	0	1	0	0	0
2002	0	0	4	0	0	0
2003	0	0	2	0	0	0
2004	0	0	0	0	0	0
2005	0	0	1	0	0	0
2006	0	0	3	0	0	0
2007	0	0	6	0	0	1
2008	0	0	0	1	0	0
2009	0	0	0	0	0	0
2010	0	0	2	0	0	0
Total	0	0	19	2	0	1

Drake's Estero Aquaculture and Seal Habitat
Legend
Aquaculture Material 2005
Aquaculture Material 2007
Aquaculture Material 2008
Aquaculture Material 11/2009
Seal Protection Zone
Aquaculture lease
N
0
125
250
500
750
1,000
Meters

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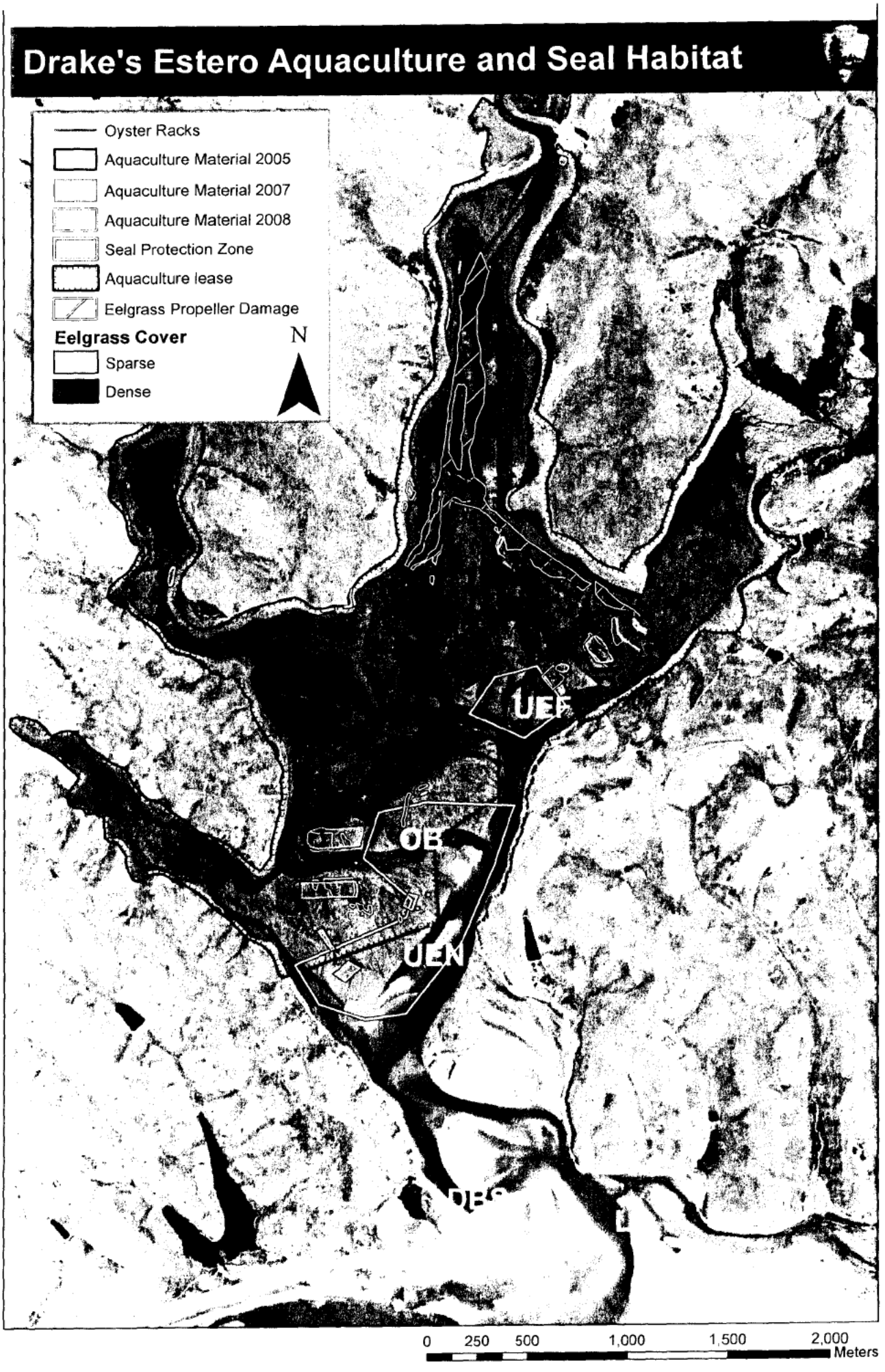
Drake's Estero Aquaculture and Seal Habitat
Oyster Racks
Aquaculture Material 2005
Aquaculture Material 2007
Aquaculture Material 2008
Seal Protection Zone
Aquaculture lease
Eelgrass Propeller Damage
Eelgrass Cover
Sparse
Dense
N
UEF
OB
UEN
0 250 500 1,000 1,500 2,000
Meters

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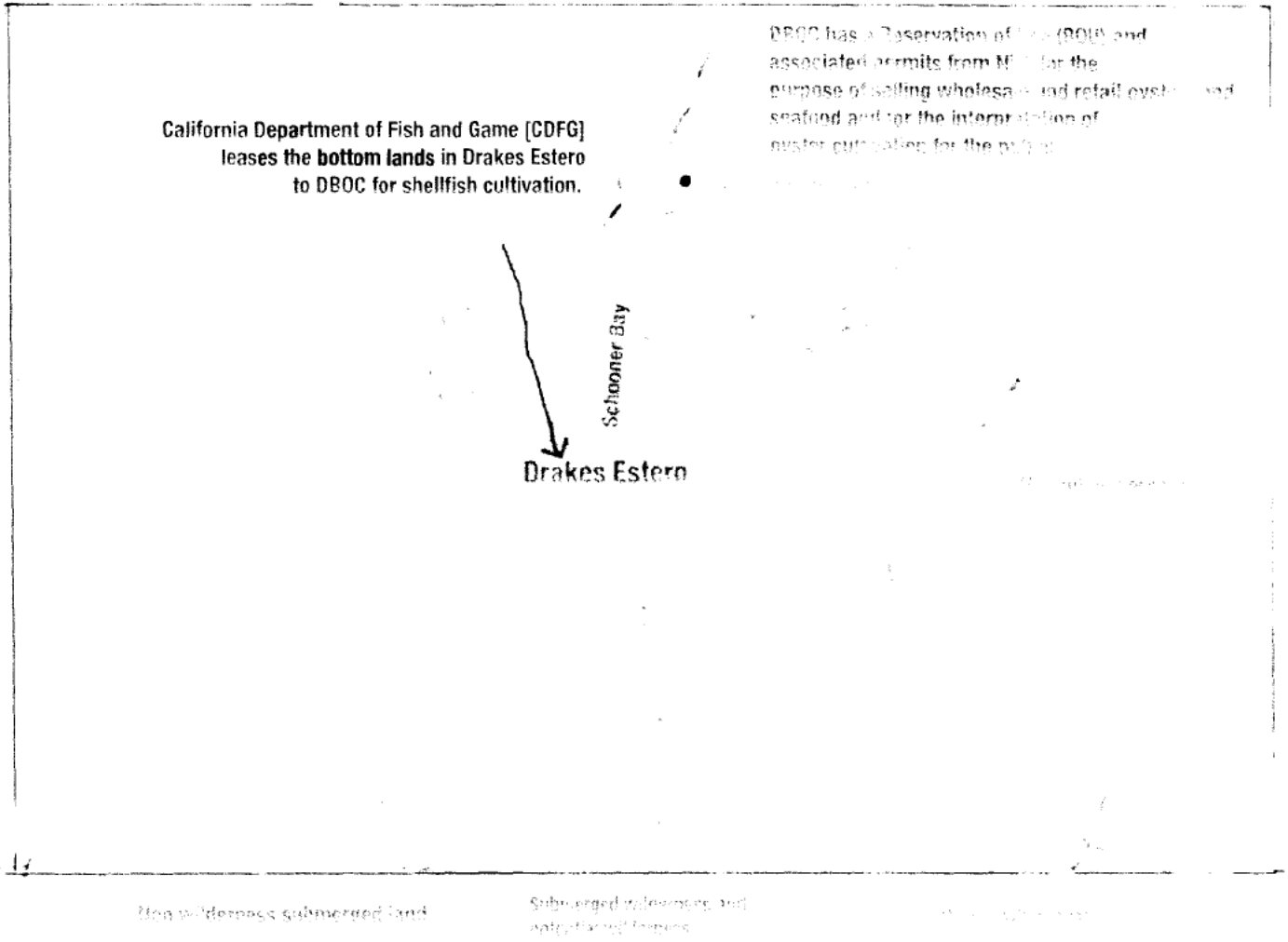


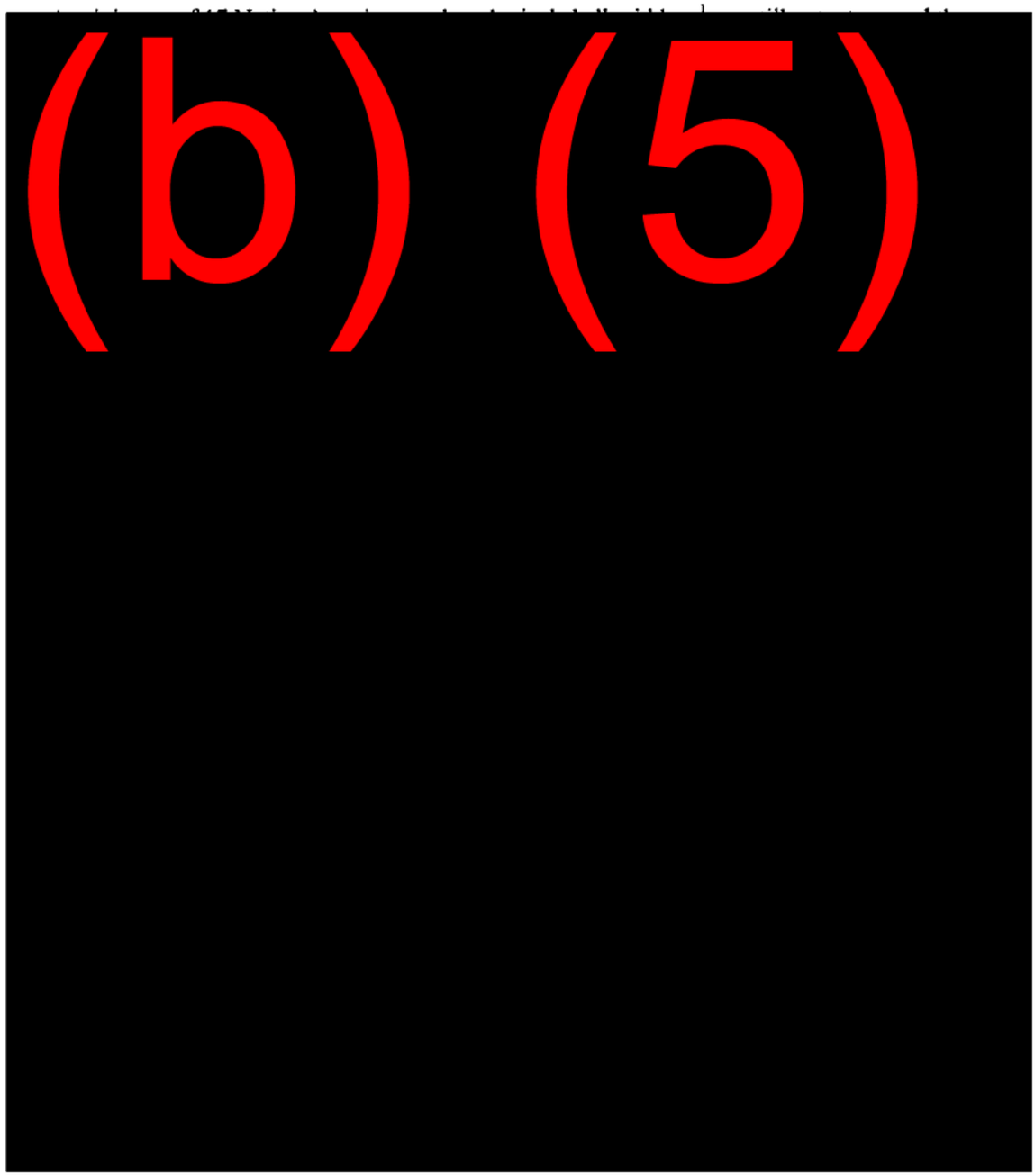
Note that the portion of Drakes Estero near the Drakes Bay Oyster Farm is not potential wilderness and none of the land surrounding Drakes Estero is potential wilderness or wilderness

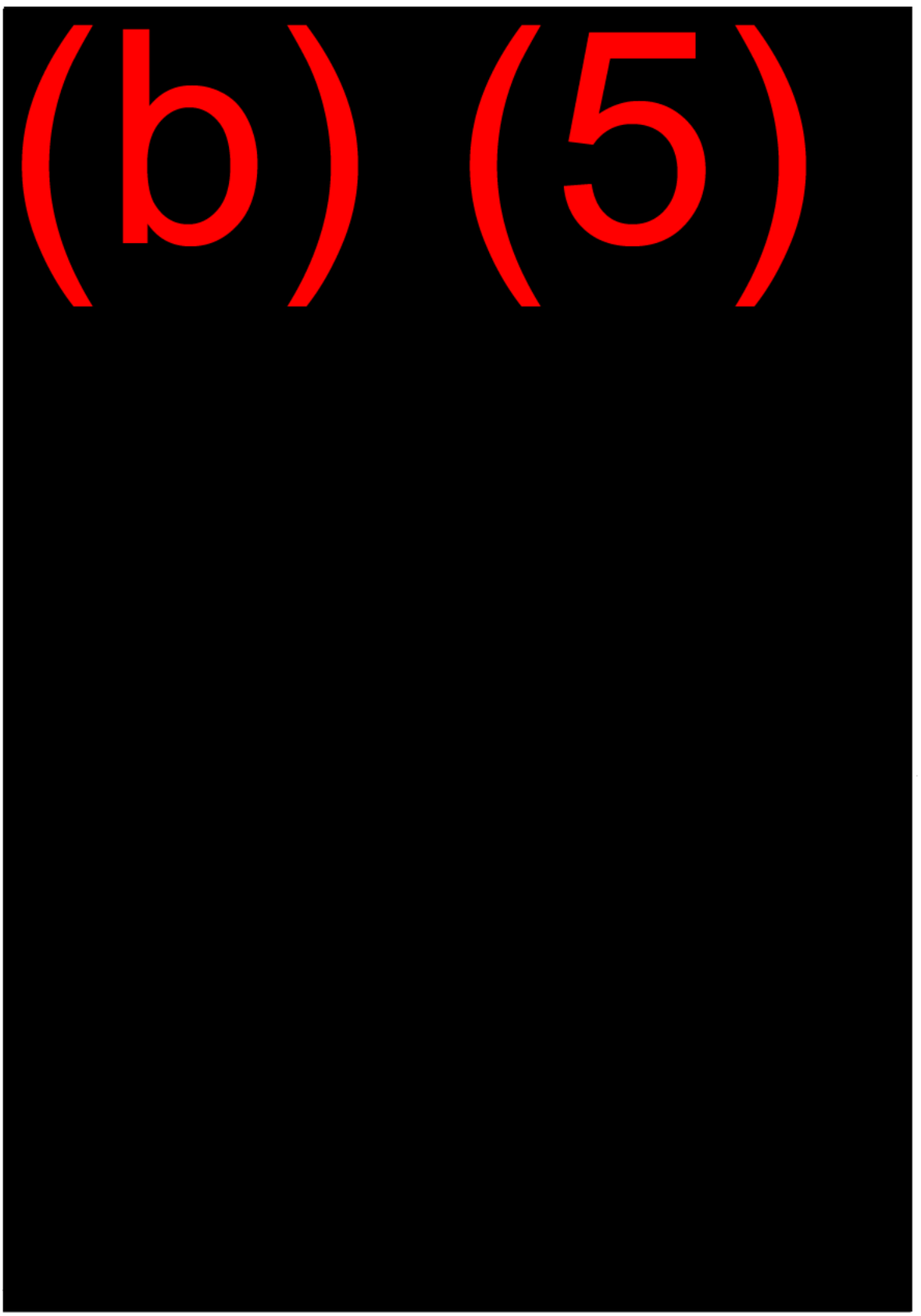
Briefing Statement:
Little Archaeological Evidence of the Olympia Oyster (*Ostrea lurida)* at Drakes Estero, Point Reyes National Seashore, California

Administrative Draft – Under Peer Review

Mark O. Rudo, Archaeologist
National Park Service, Pacific West Region
June 1, 2009

Point Reyes Archaeology: Background Information

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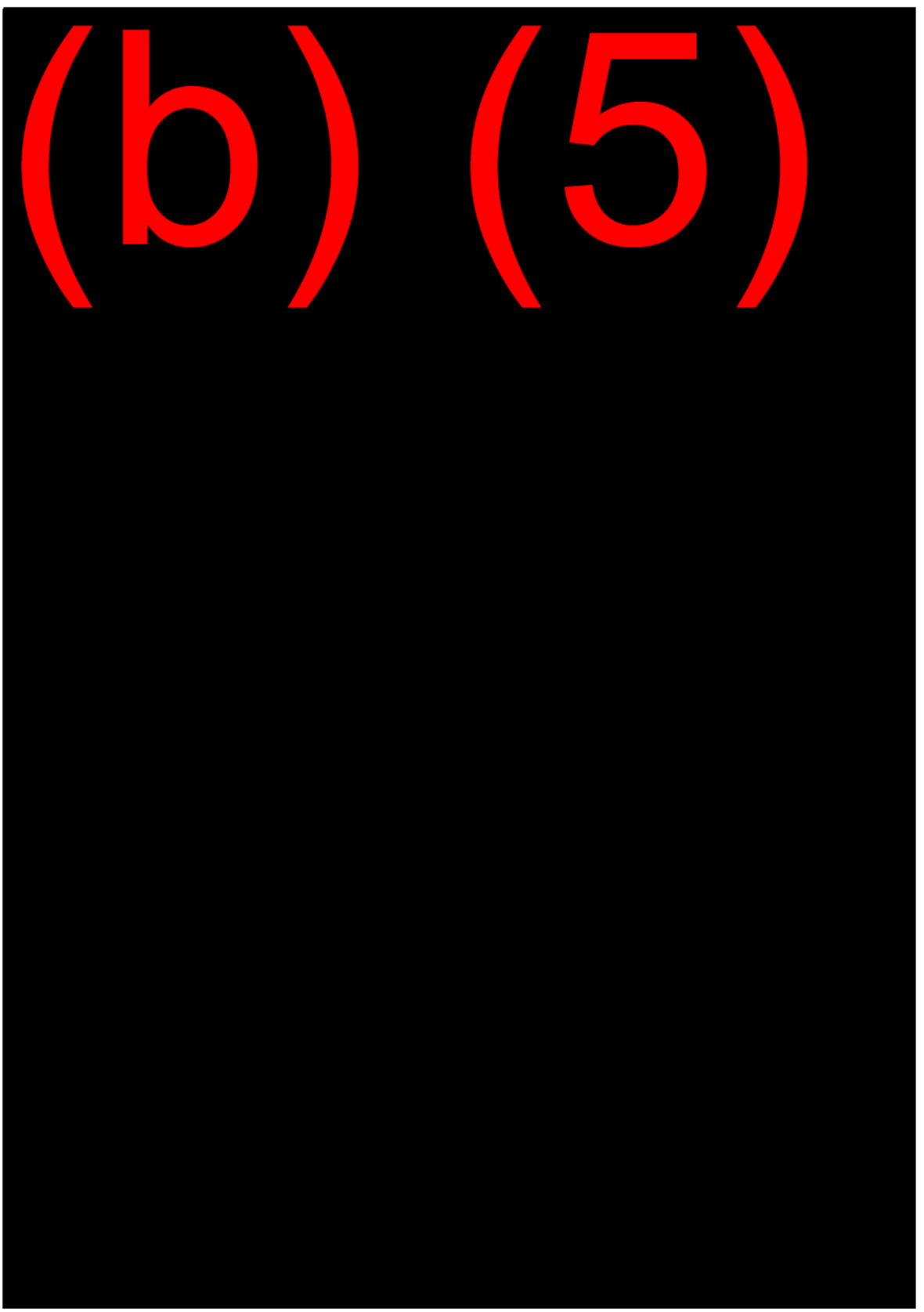
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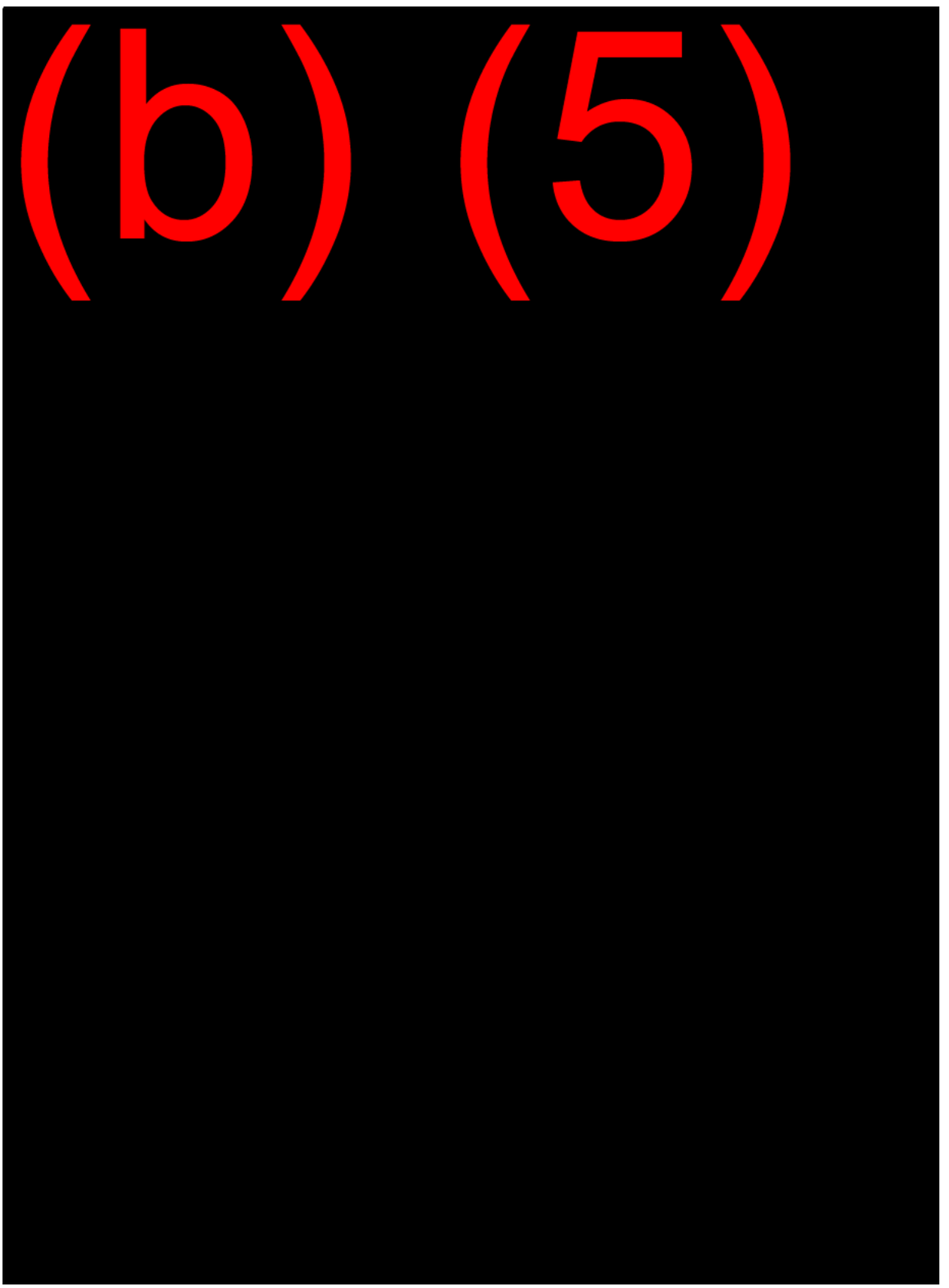
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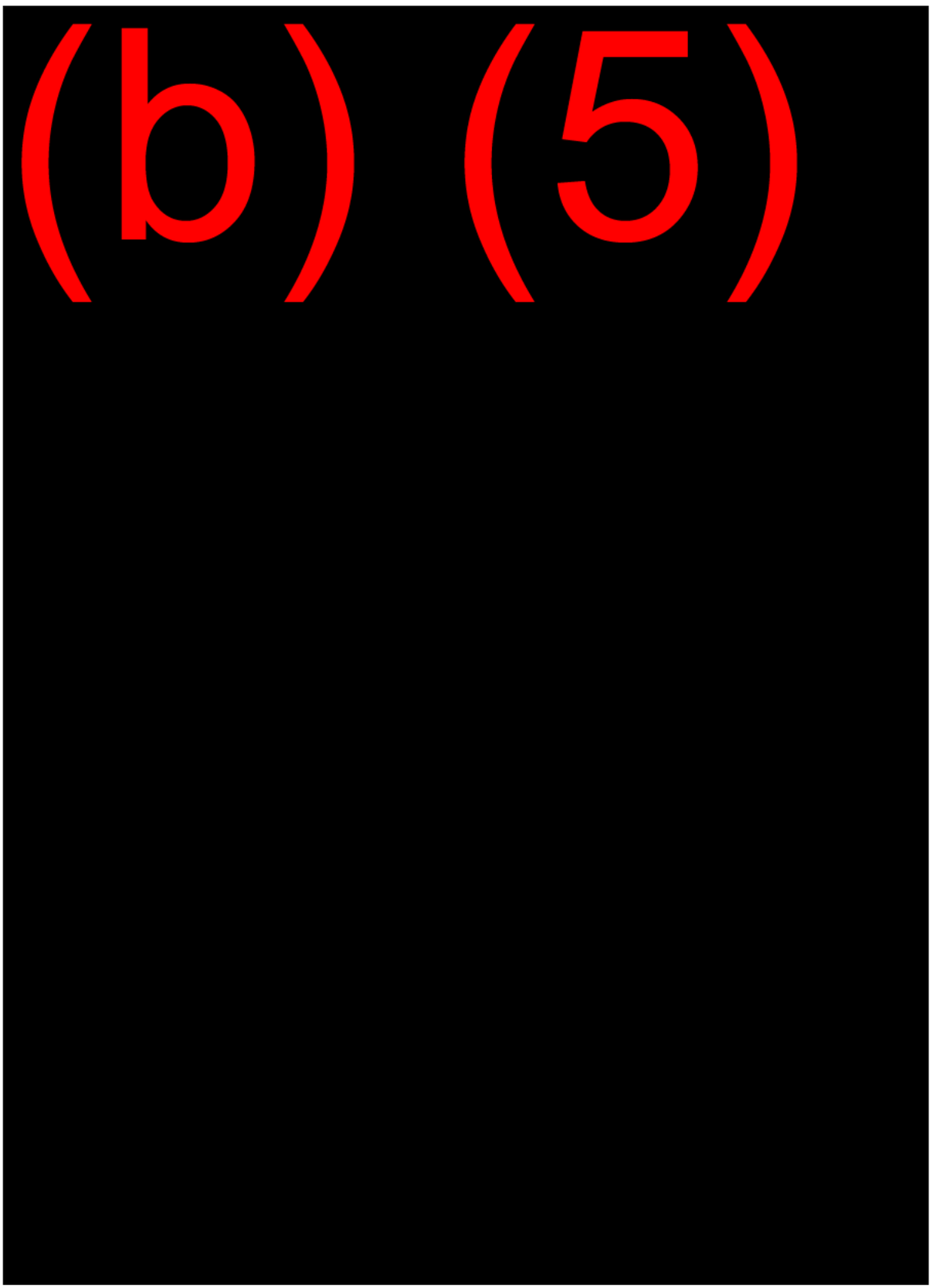
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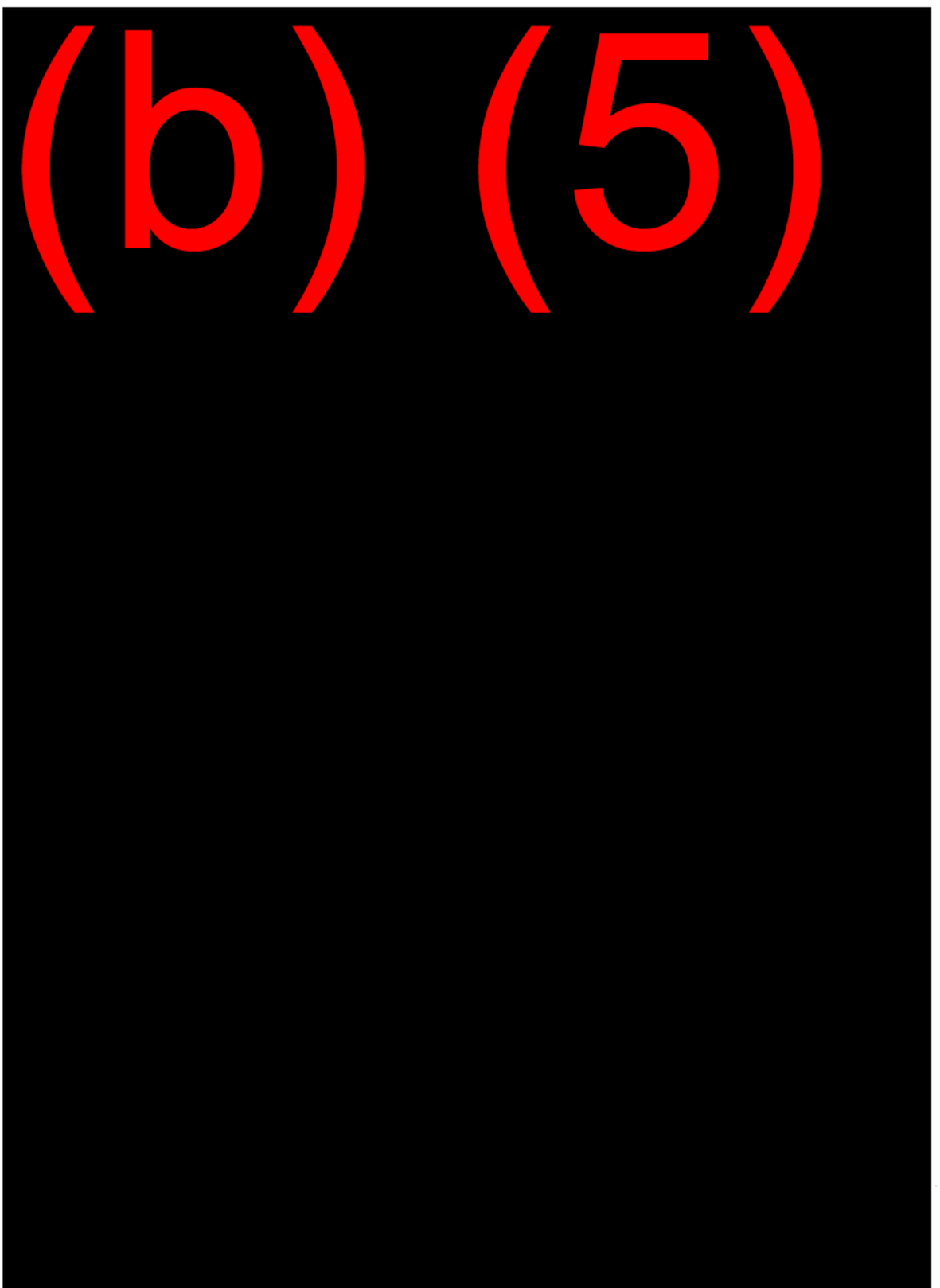
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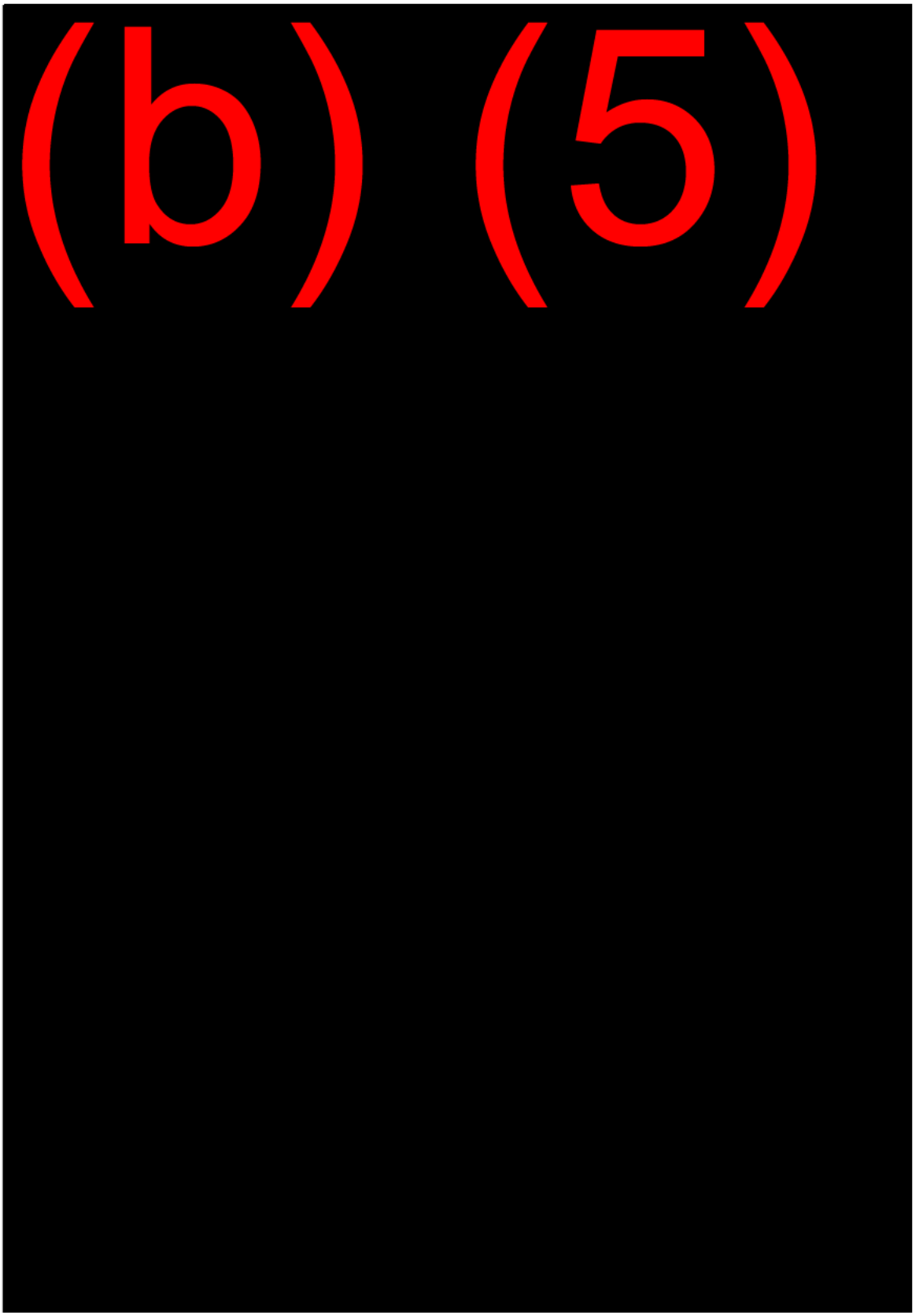
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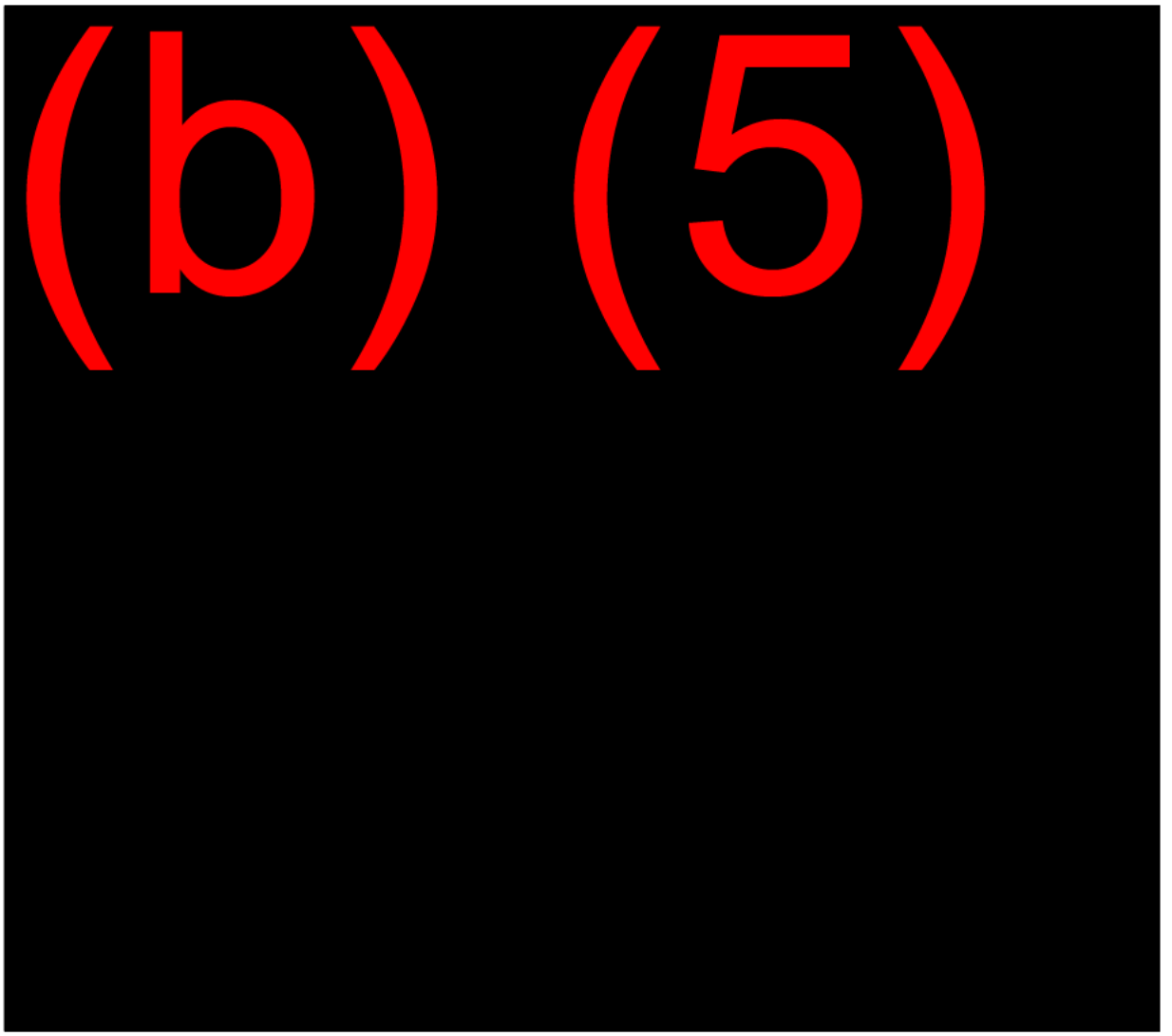
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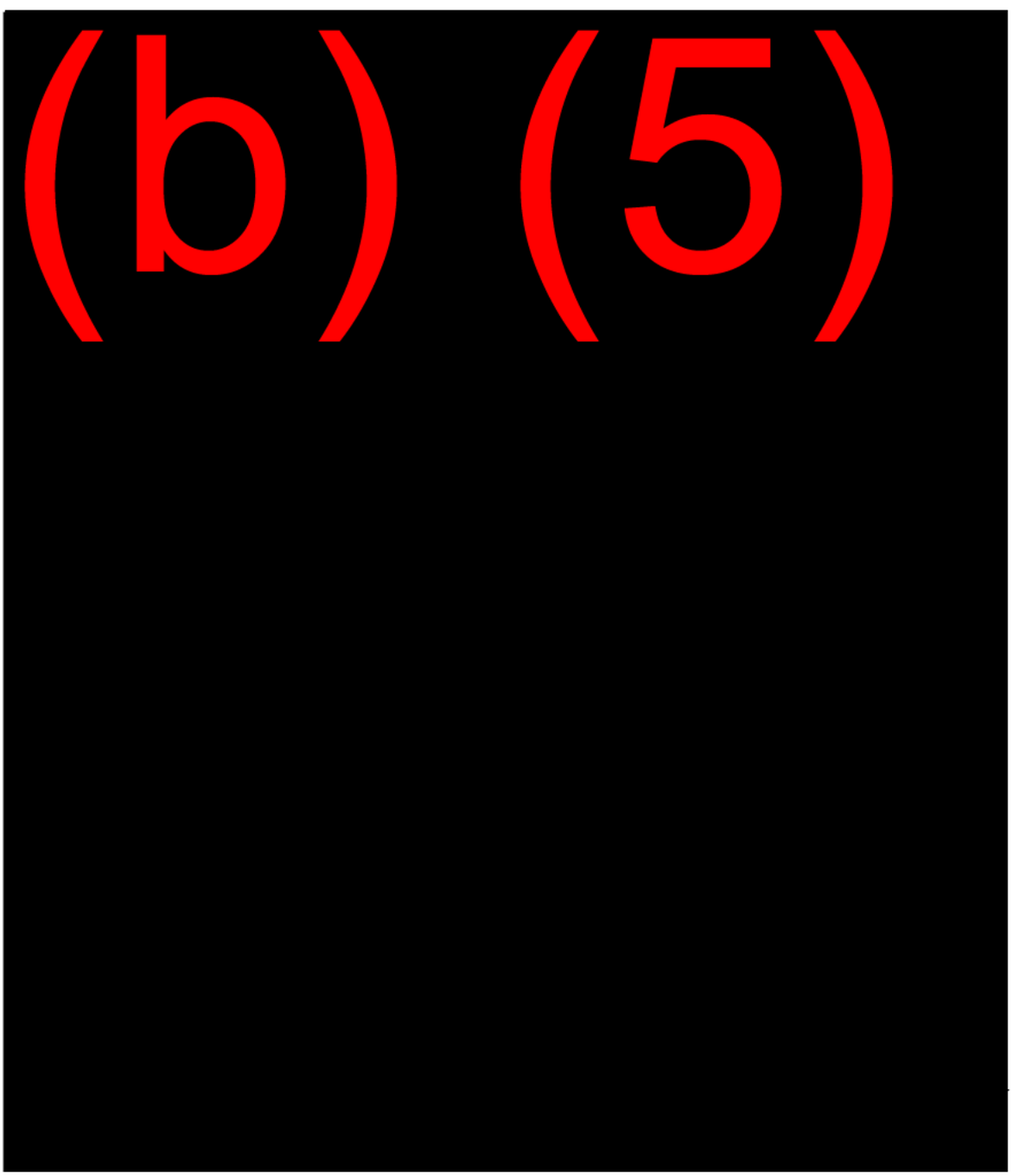
Critical Review:
A Historical Perspective on the National Research Council's Report "Shellfish Mariculture in Drakes Estero"

Timothy Babalis, Historian
National Park Service, Pacific West Region
June 9, 2009



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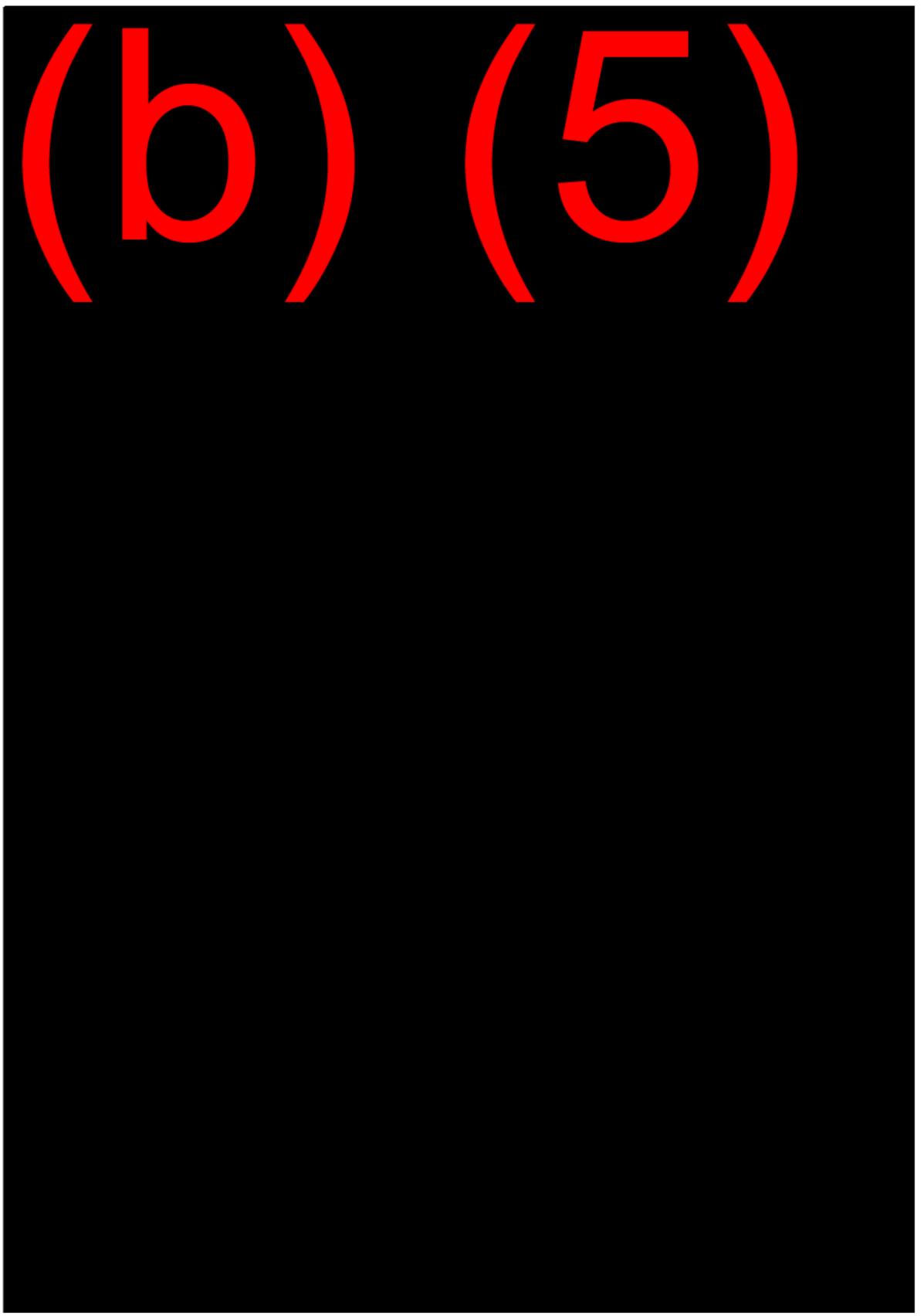
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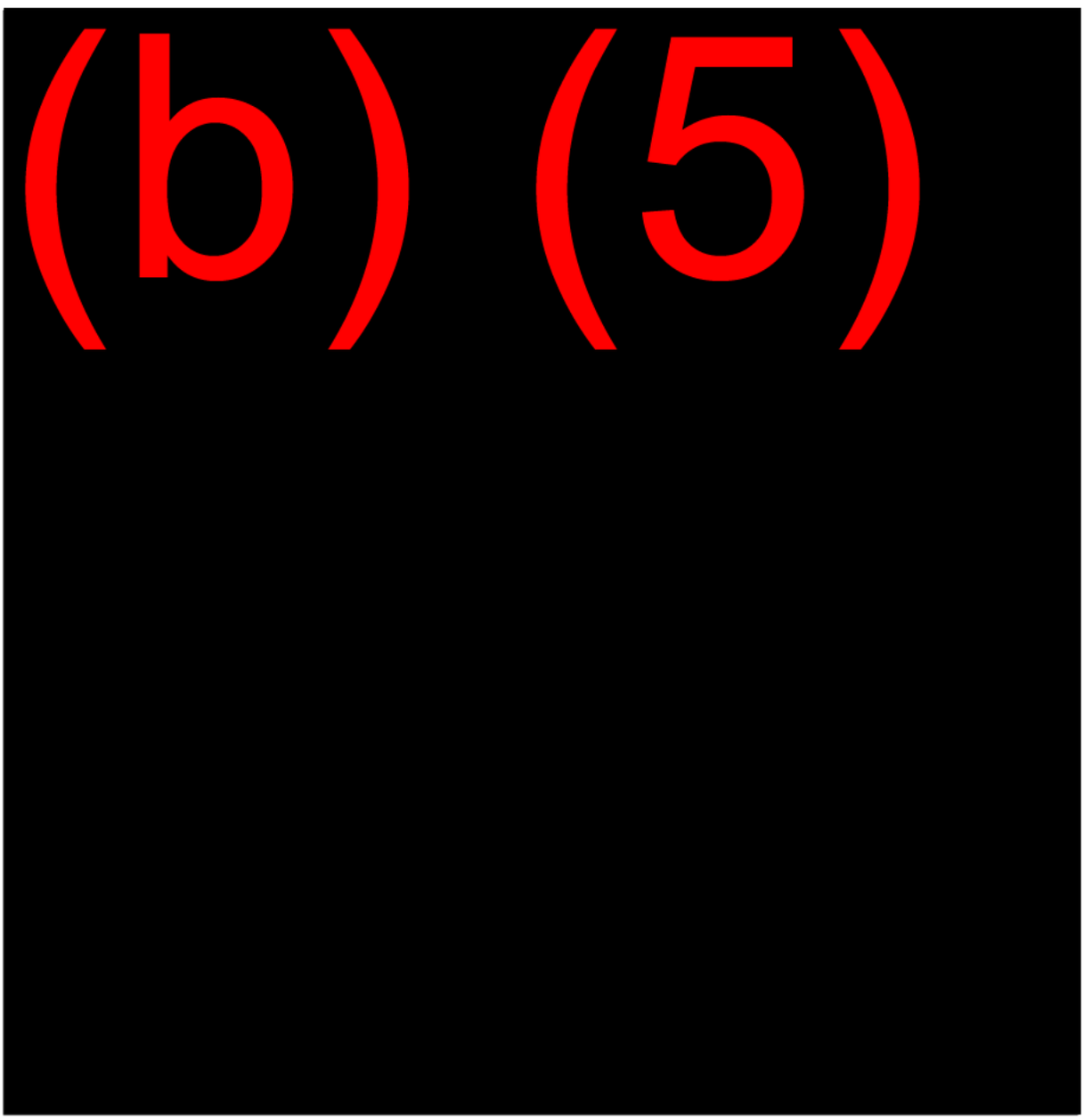
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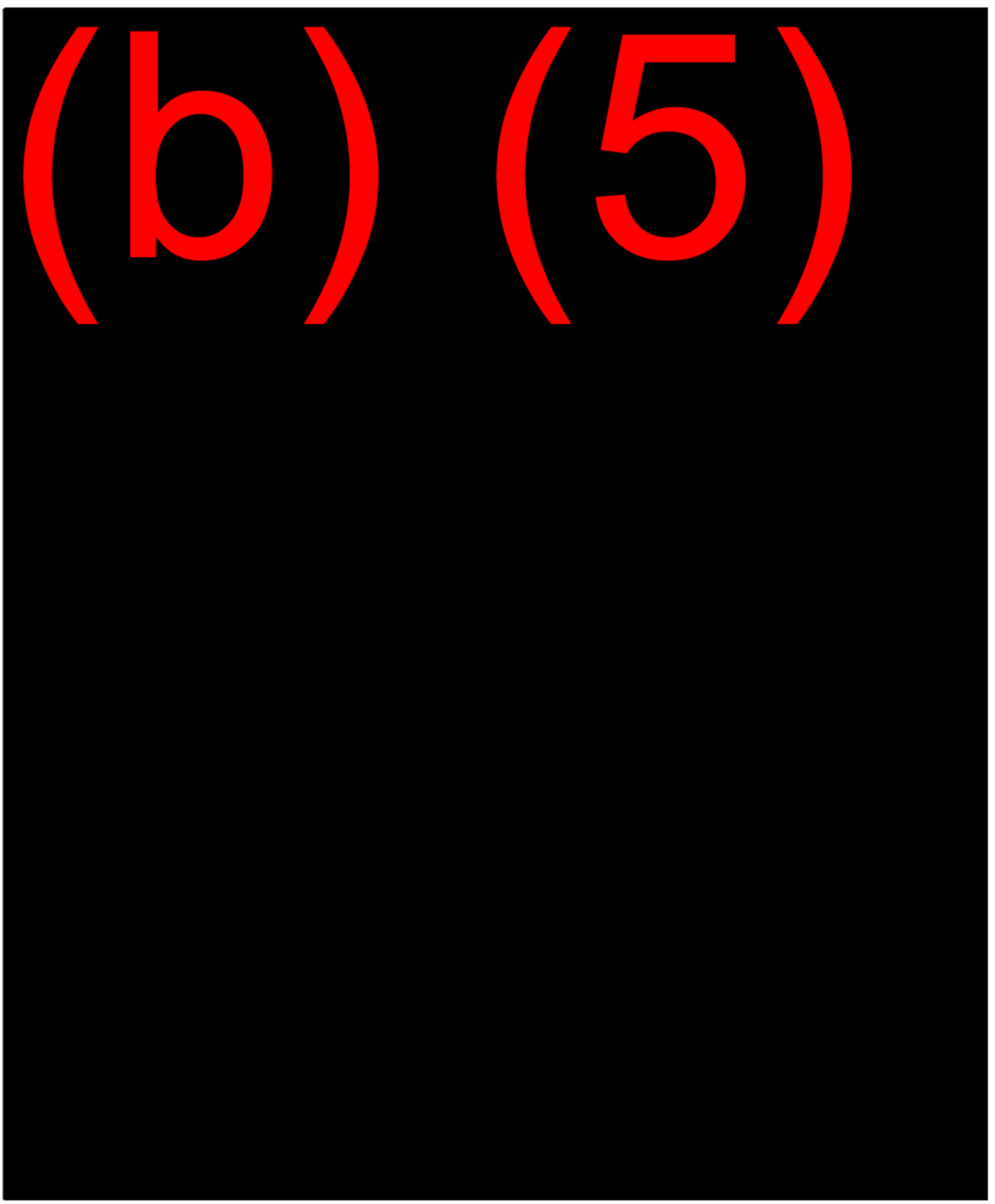

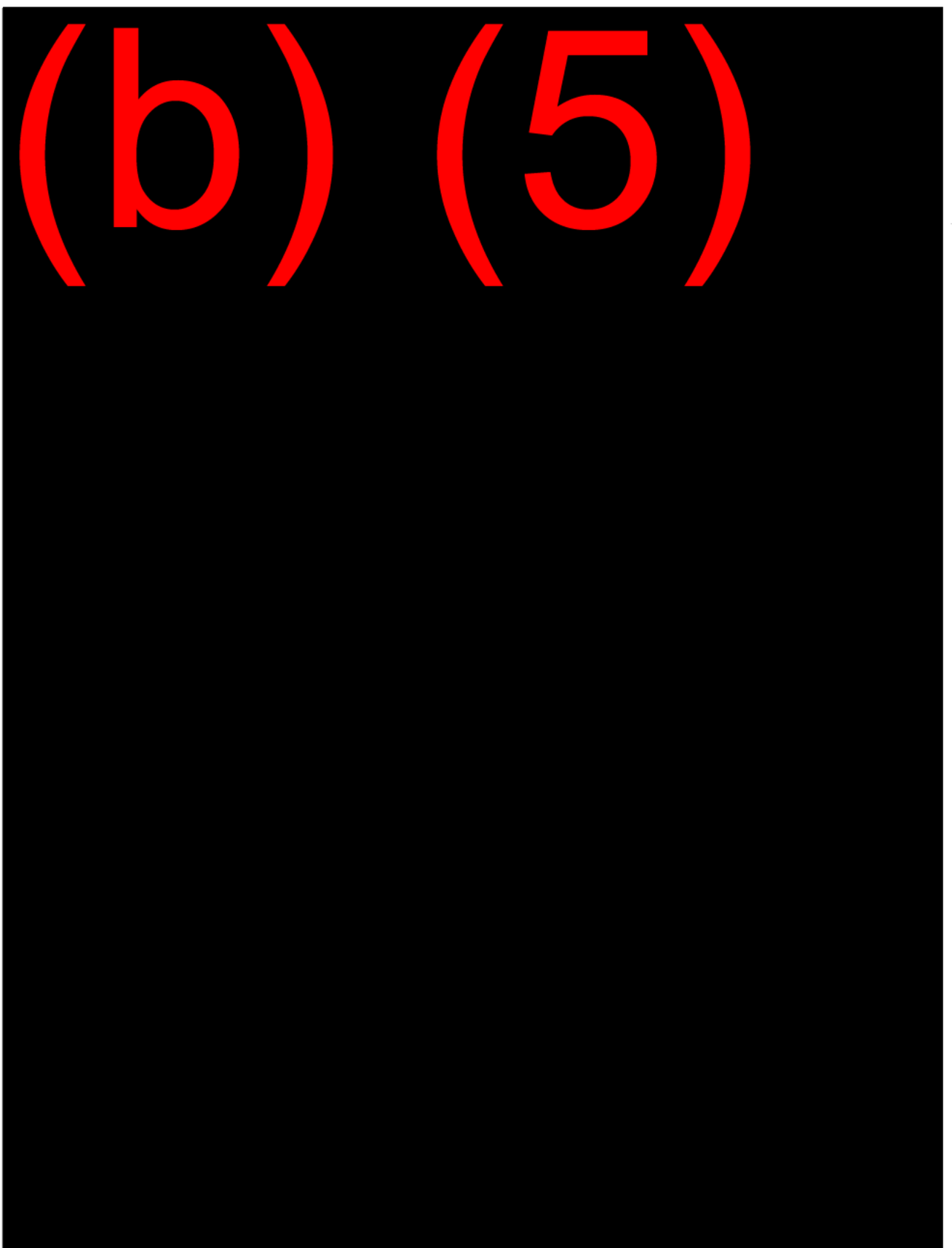
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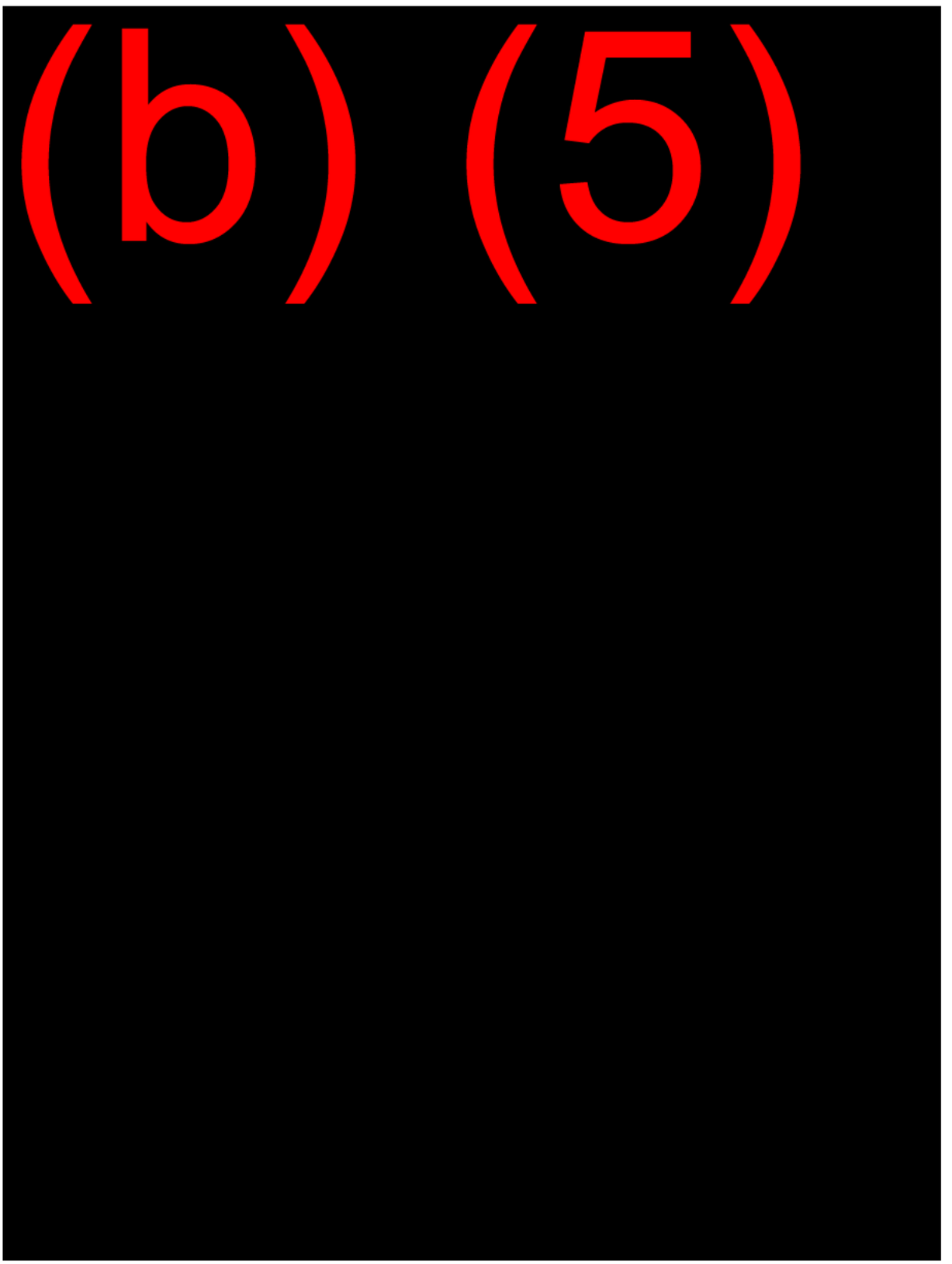
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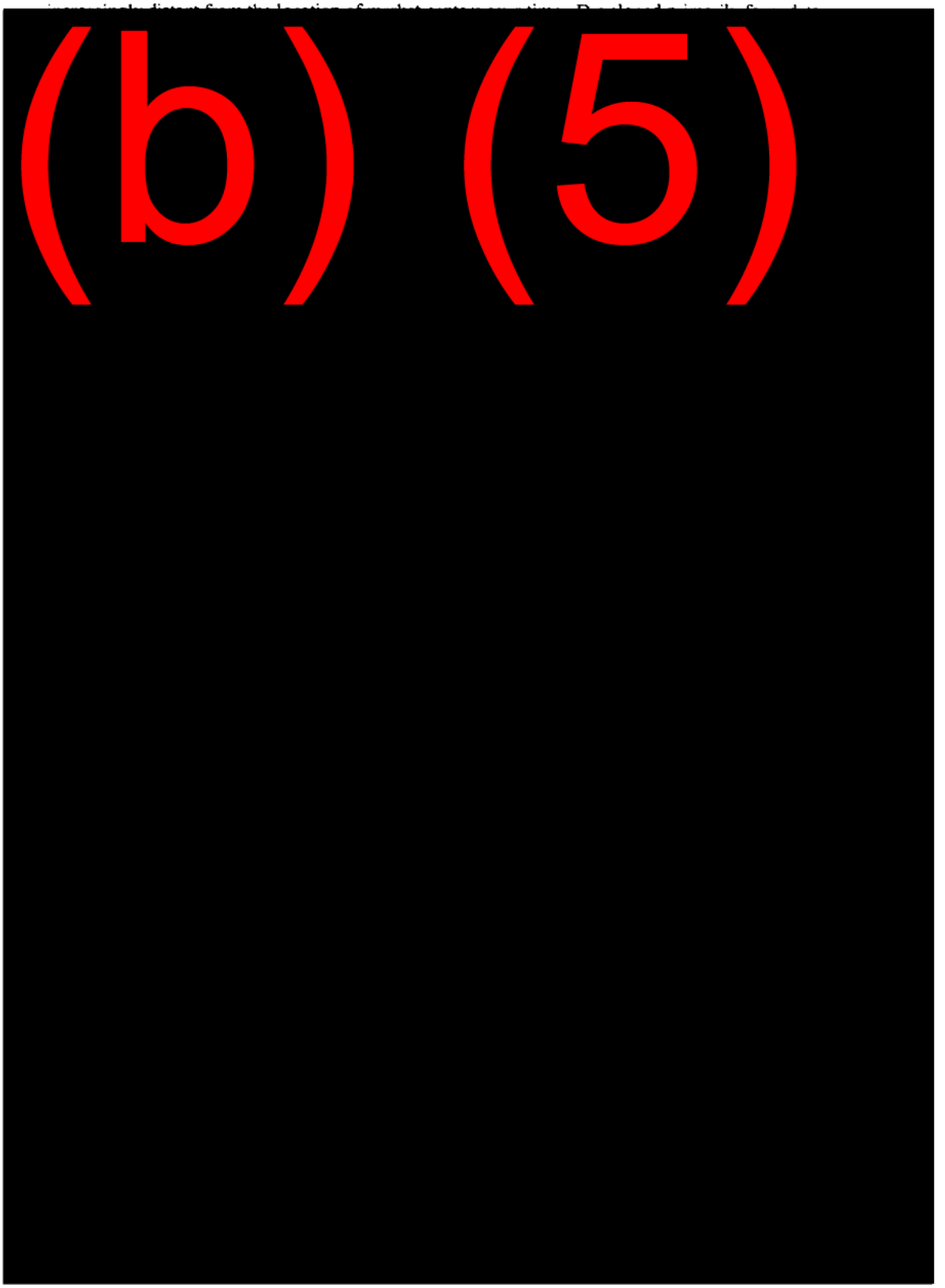
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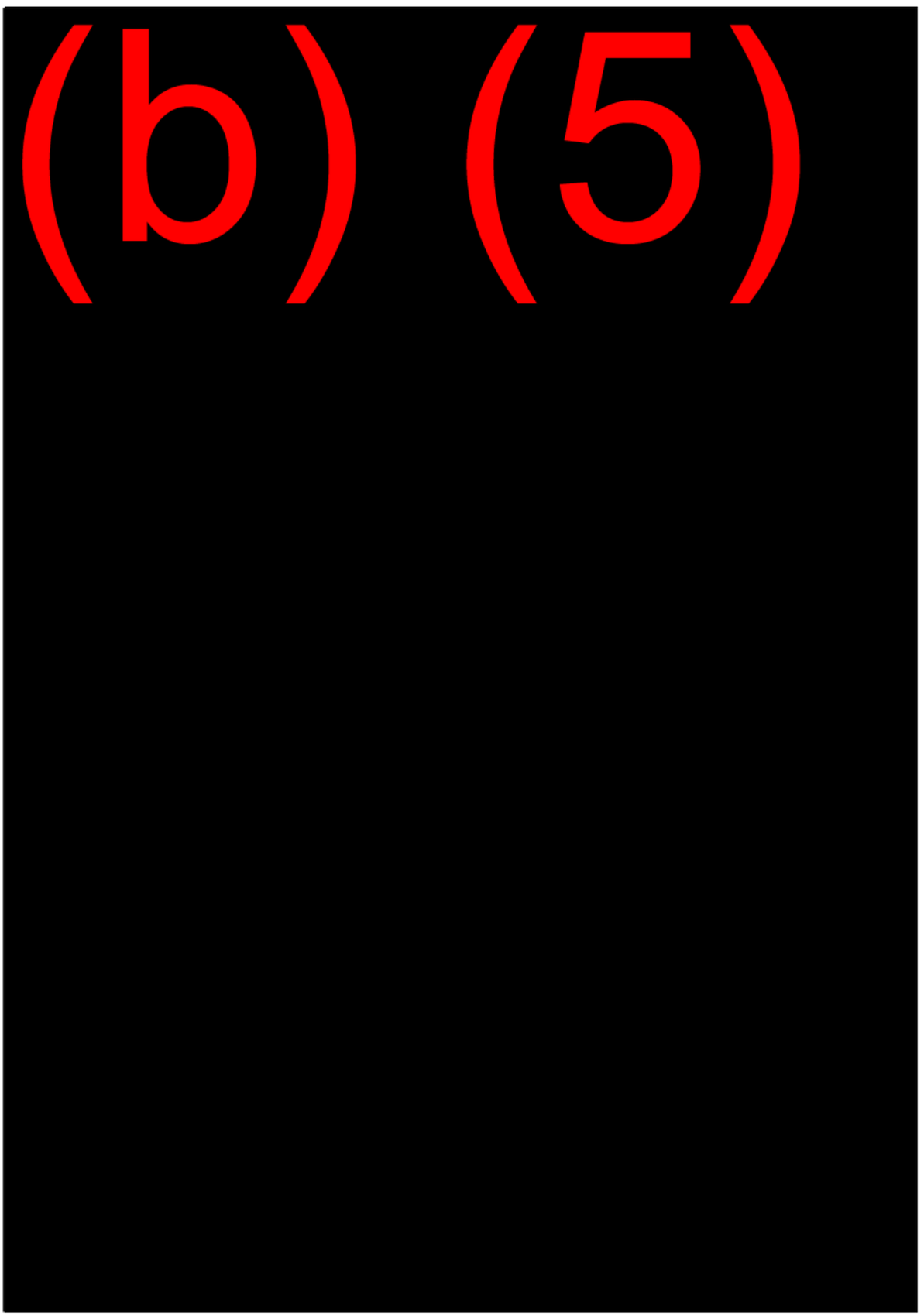
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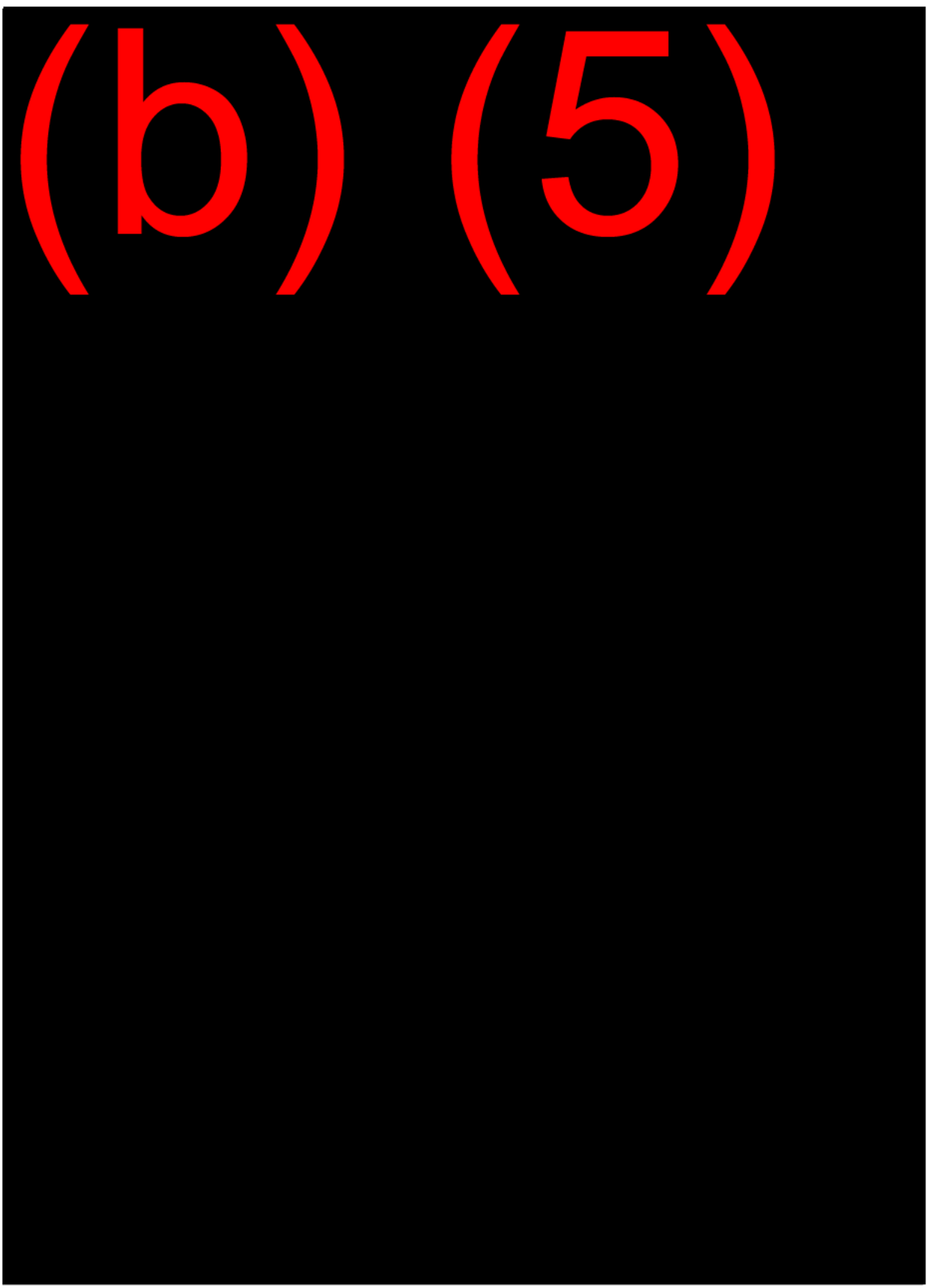
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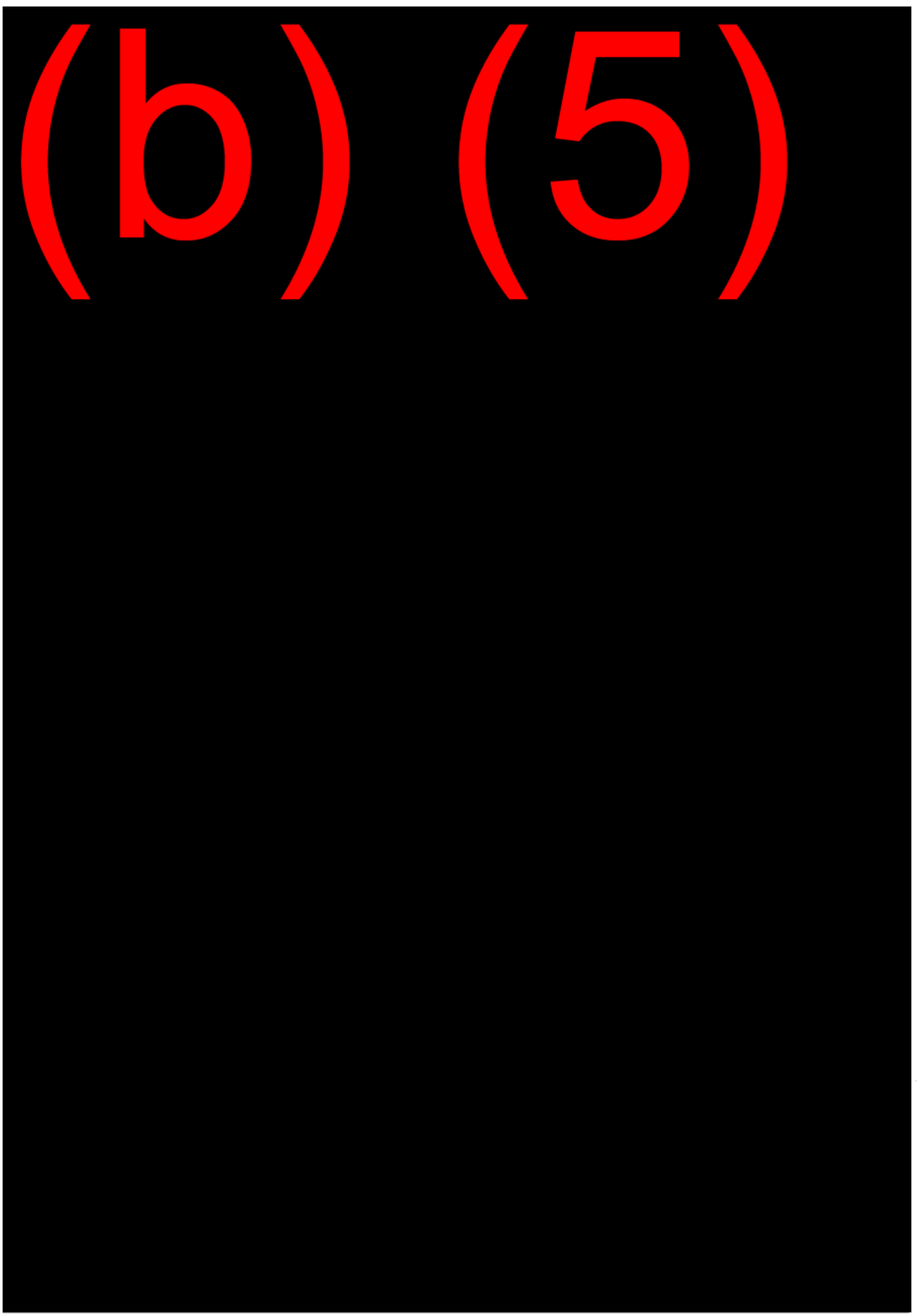
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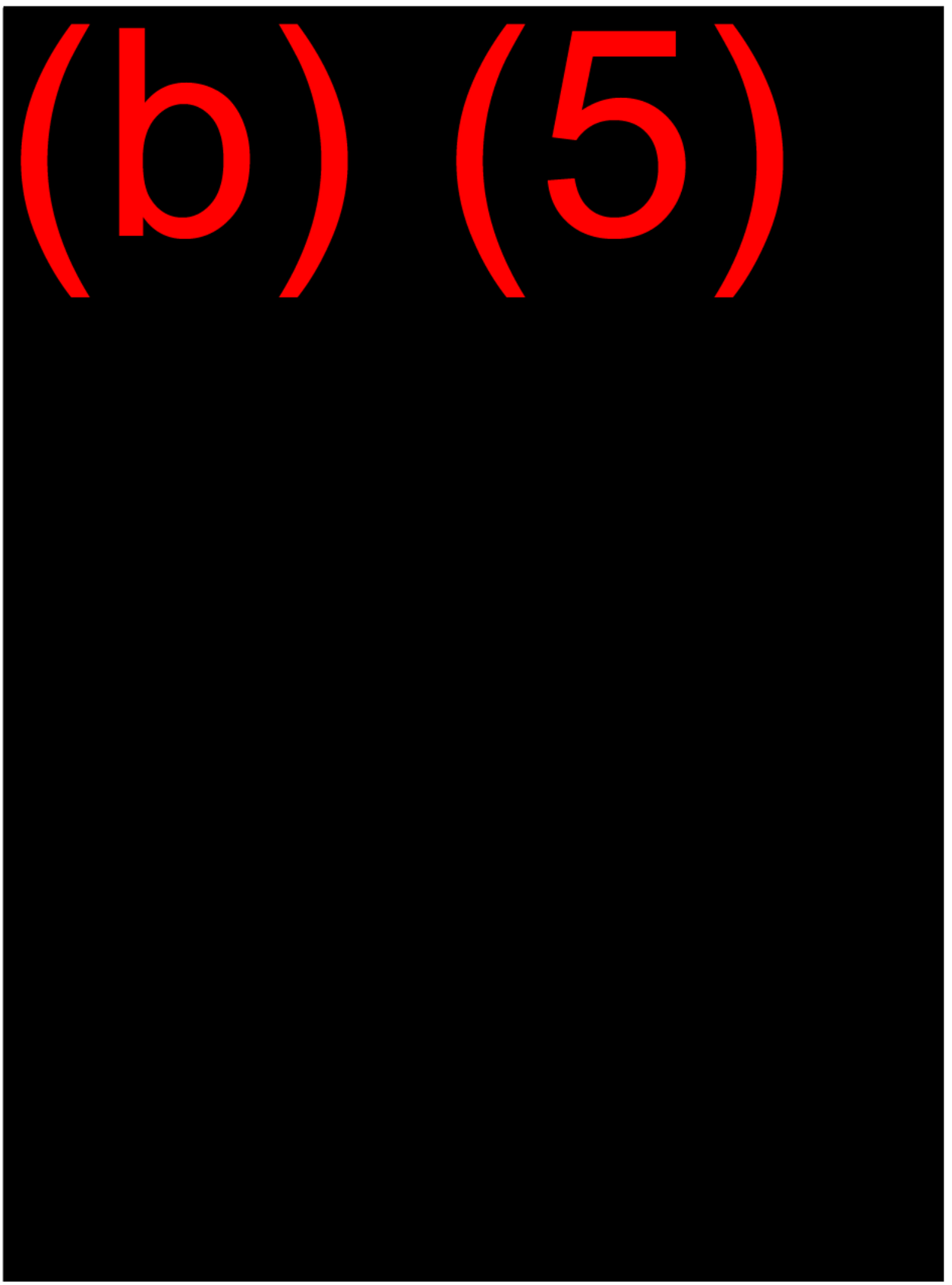
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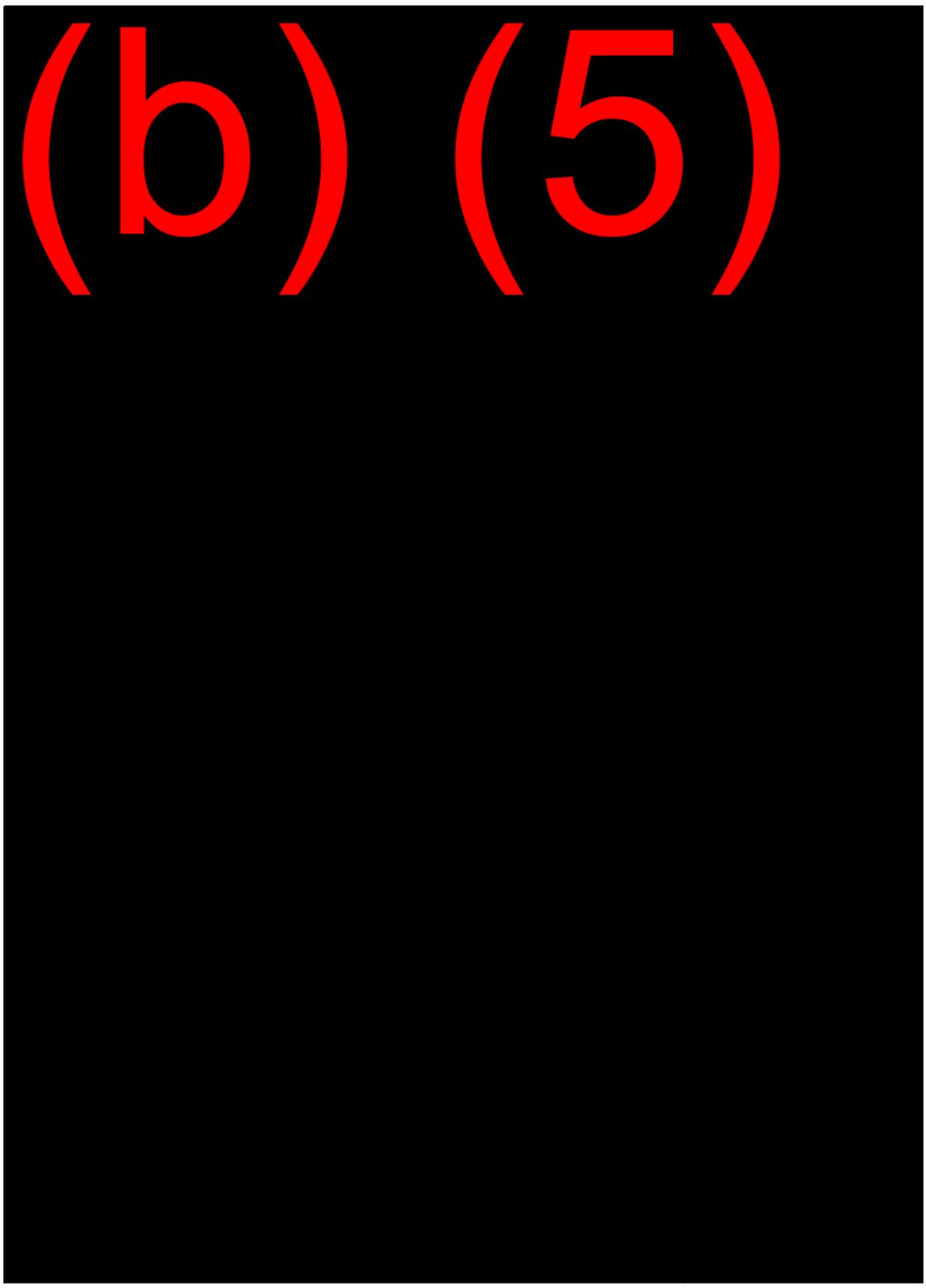
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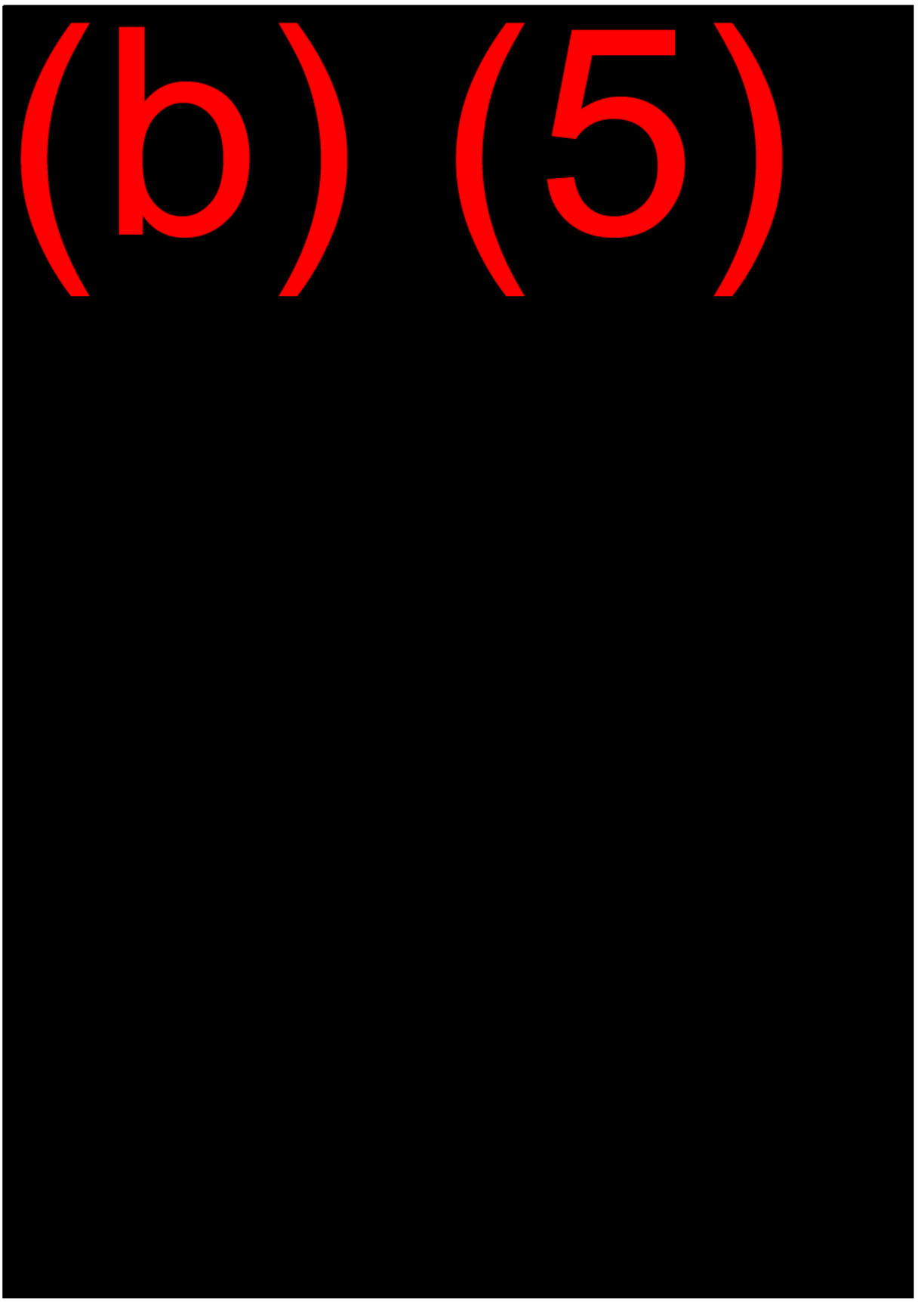
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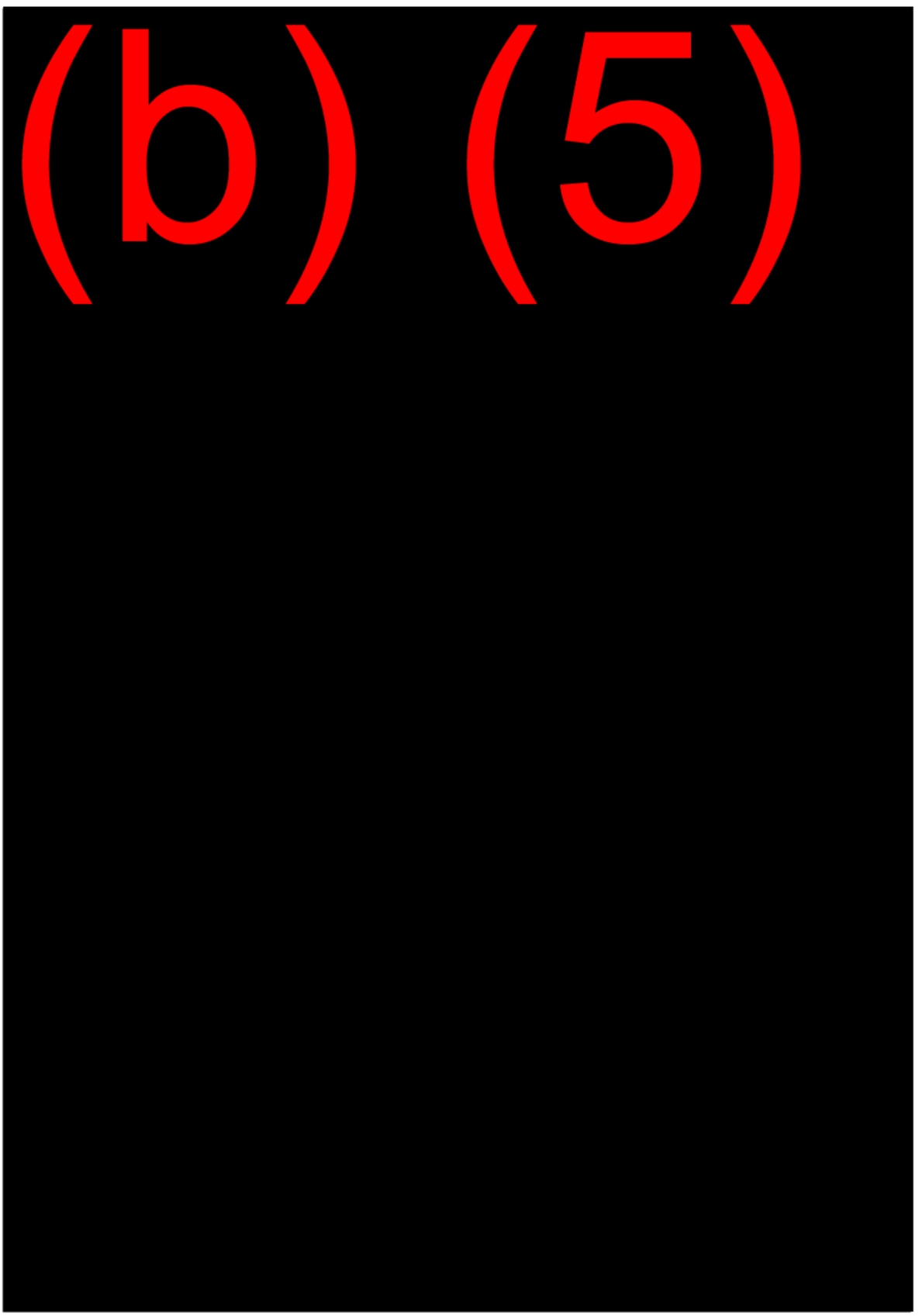
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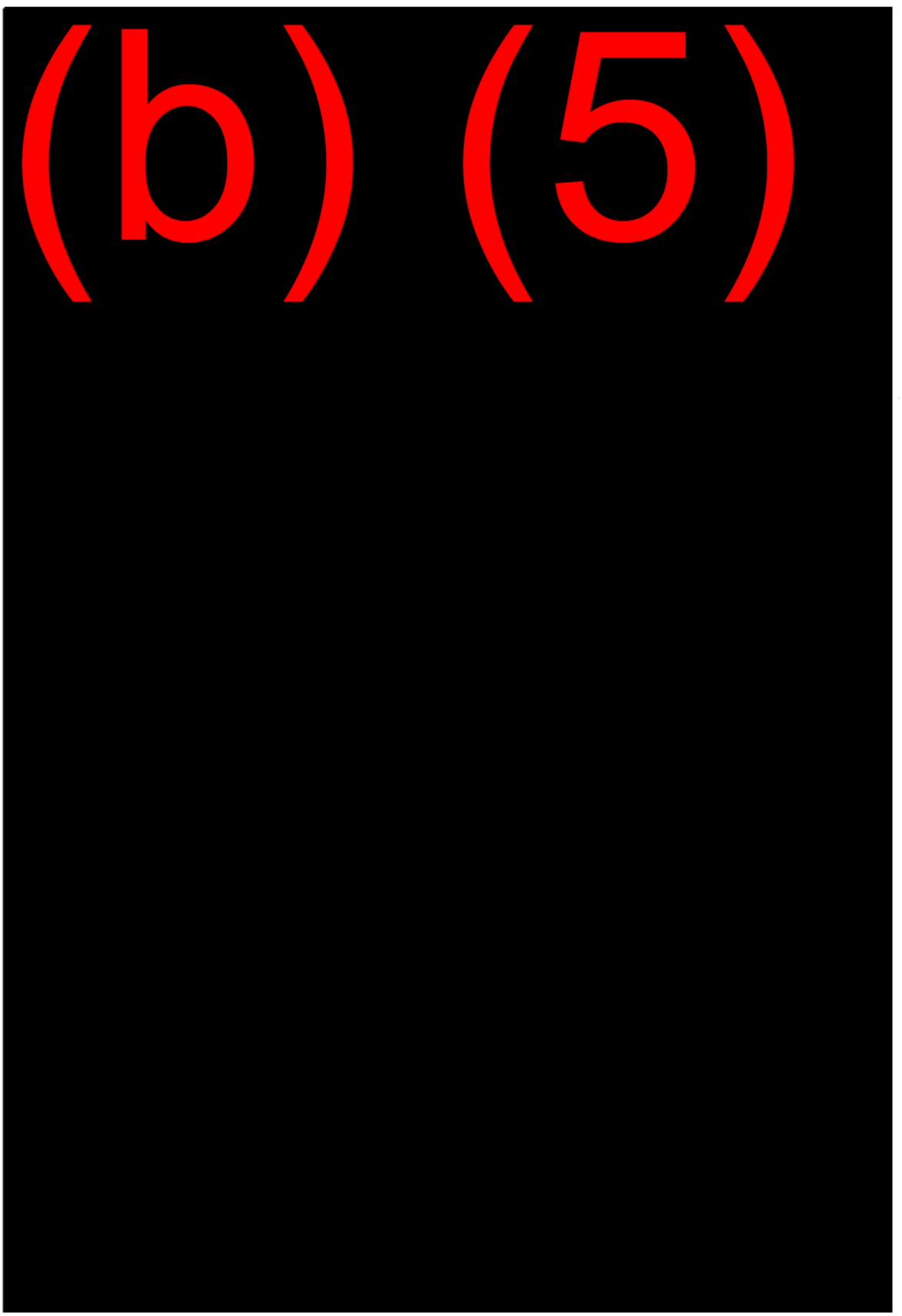
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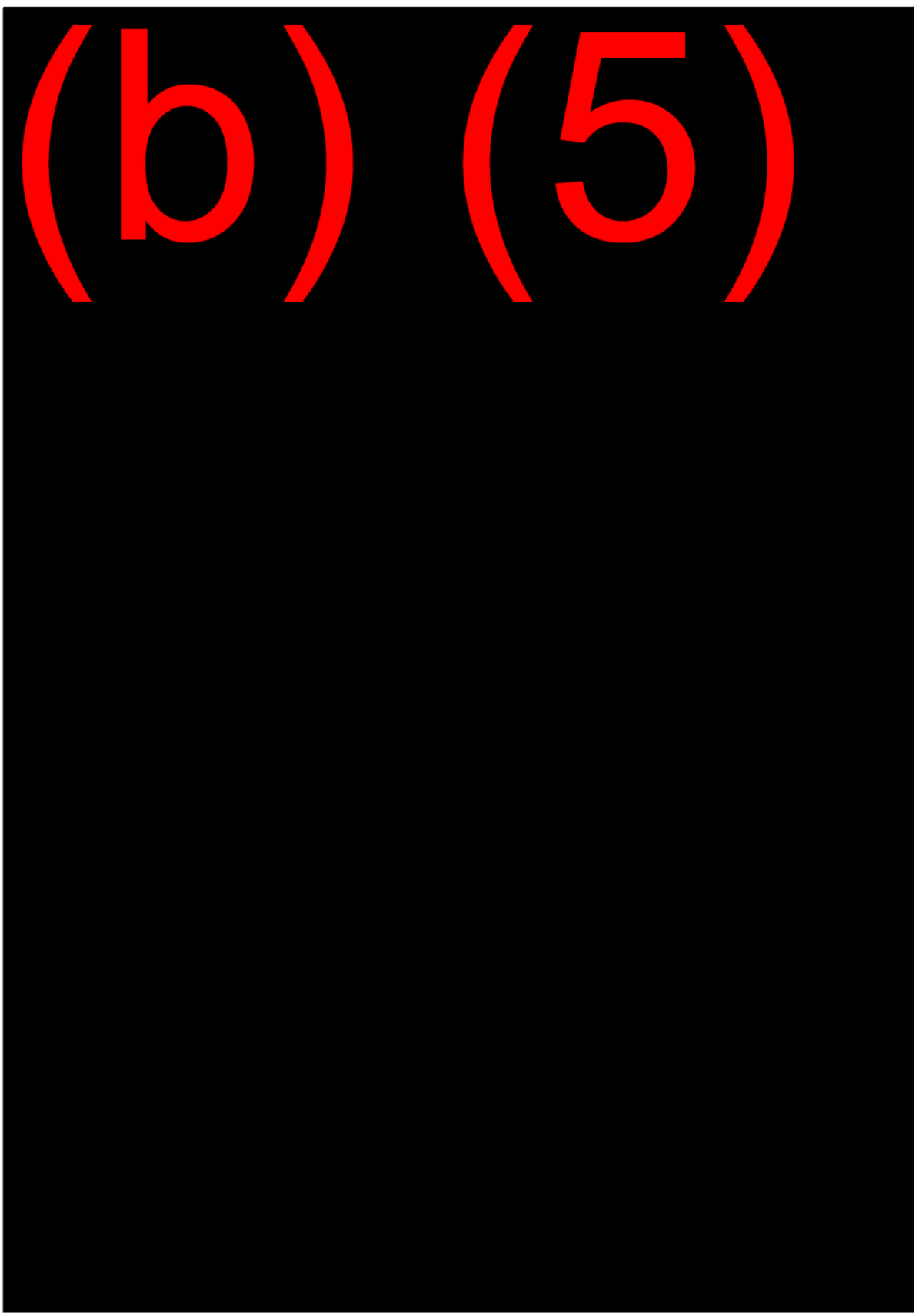
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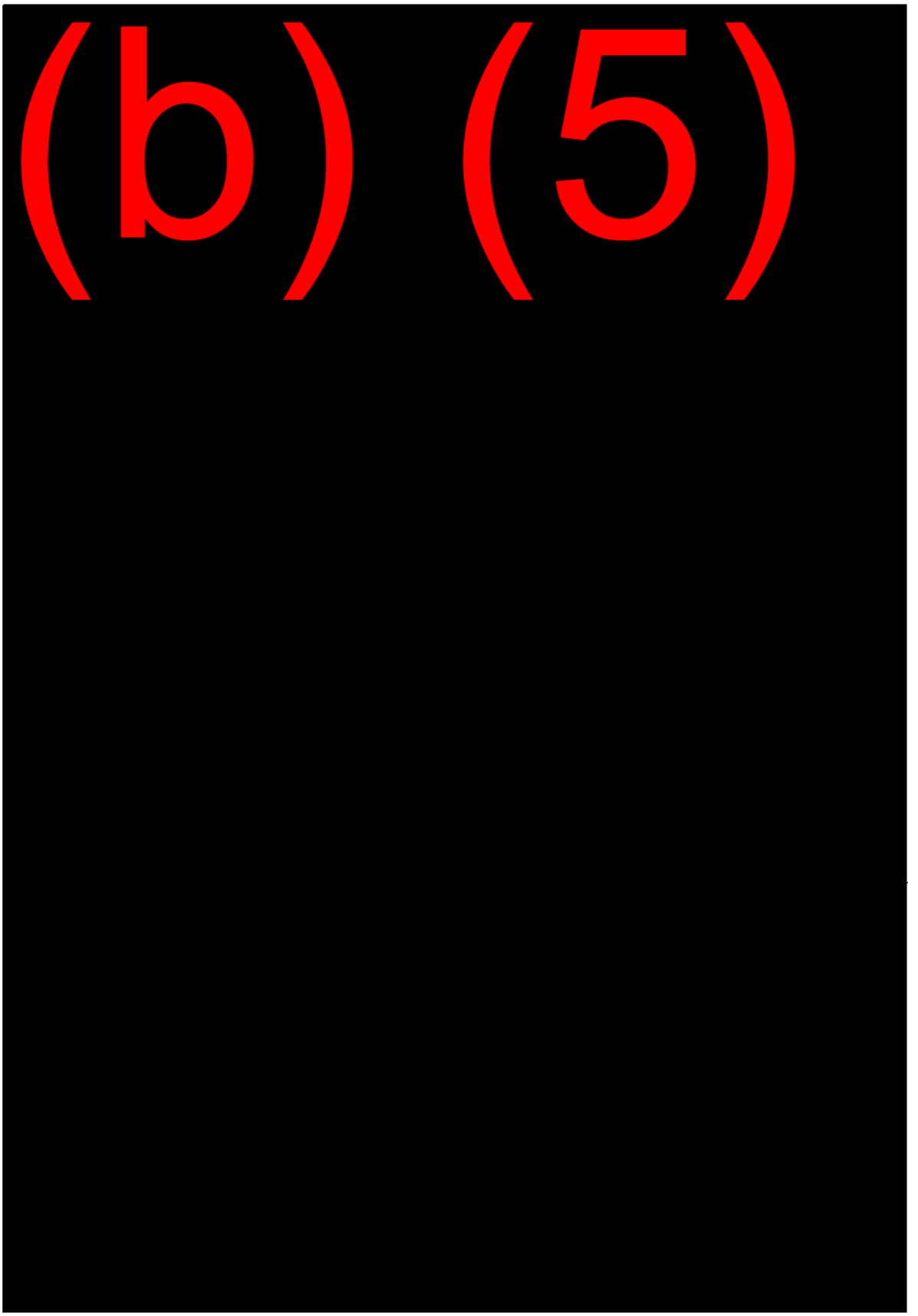
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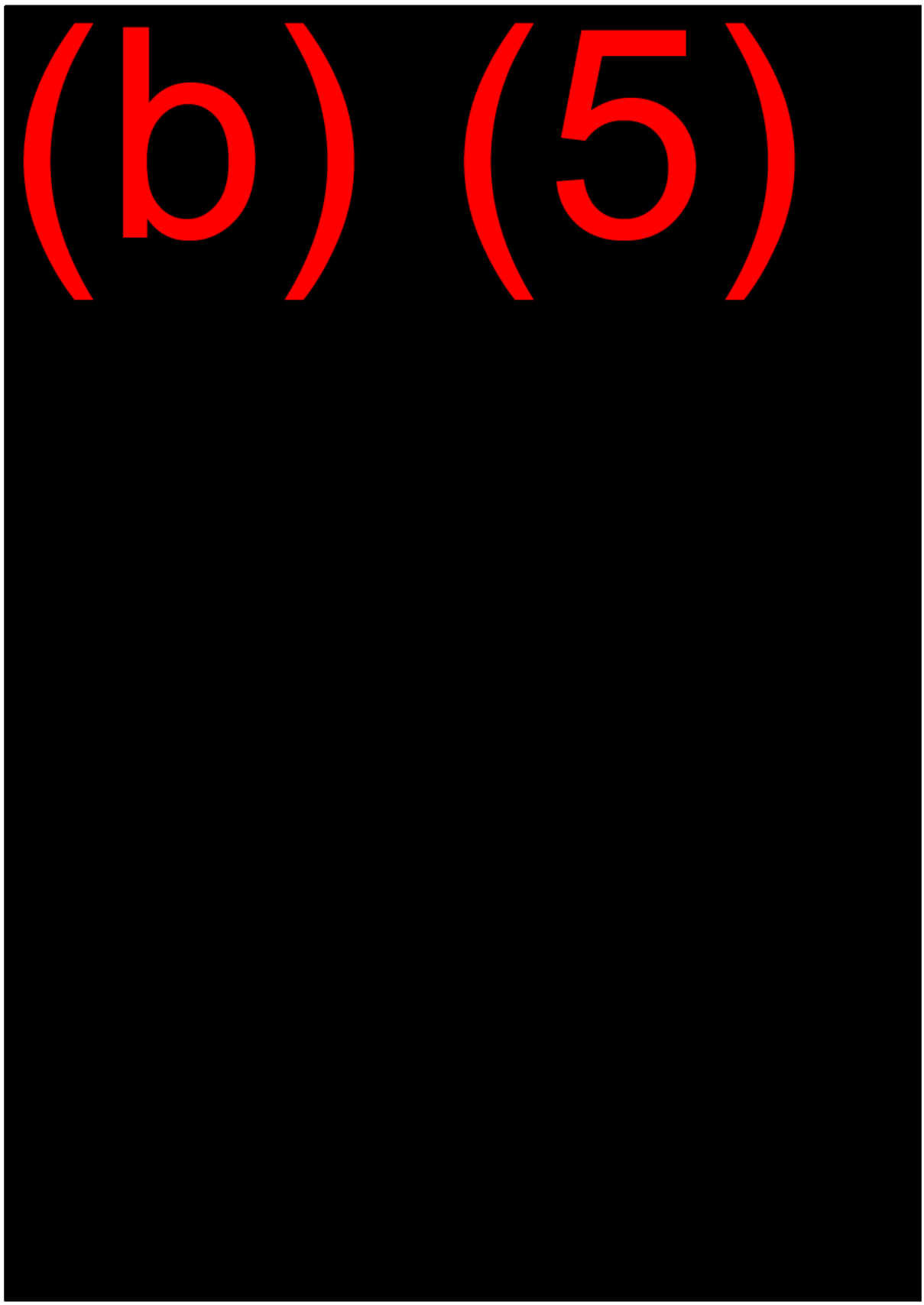
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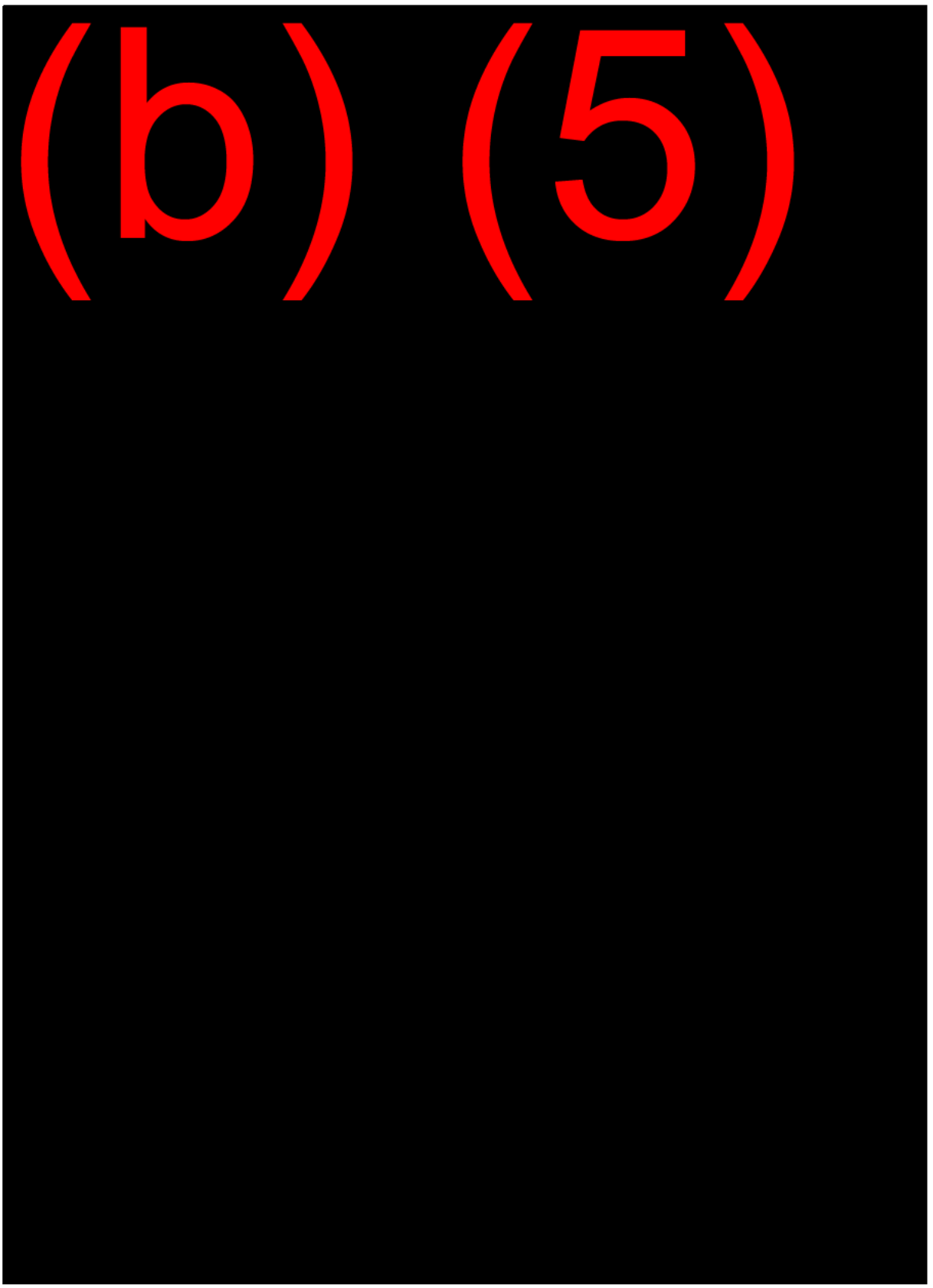
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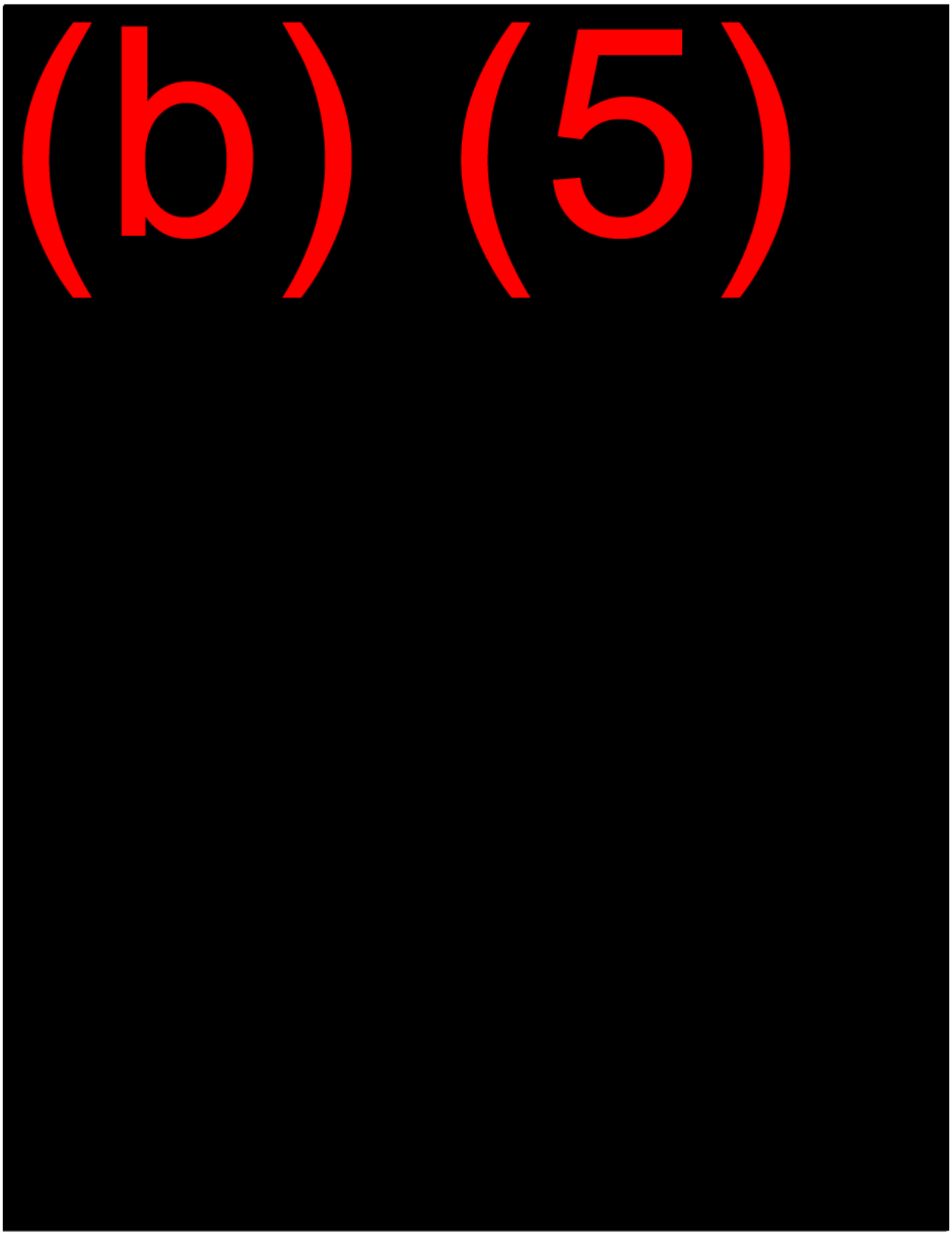
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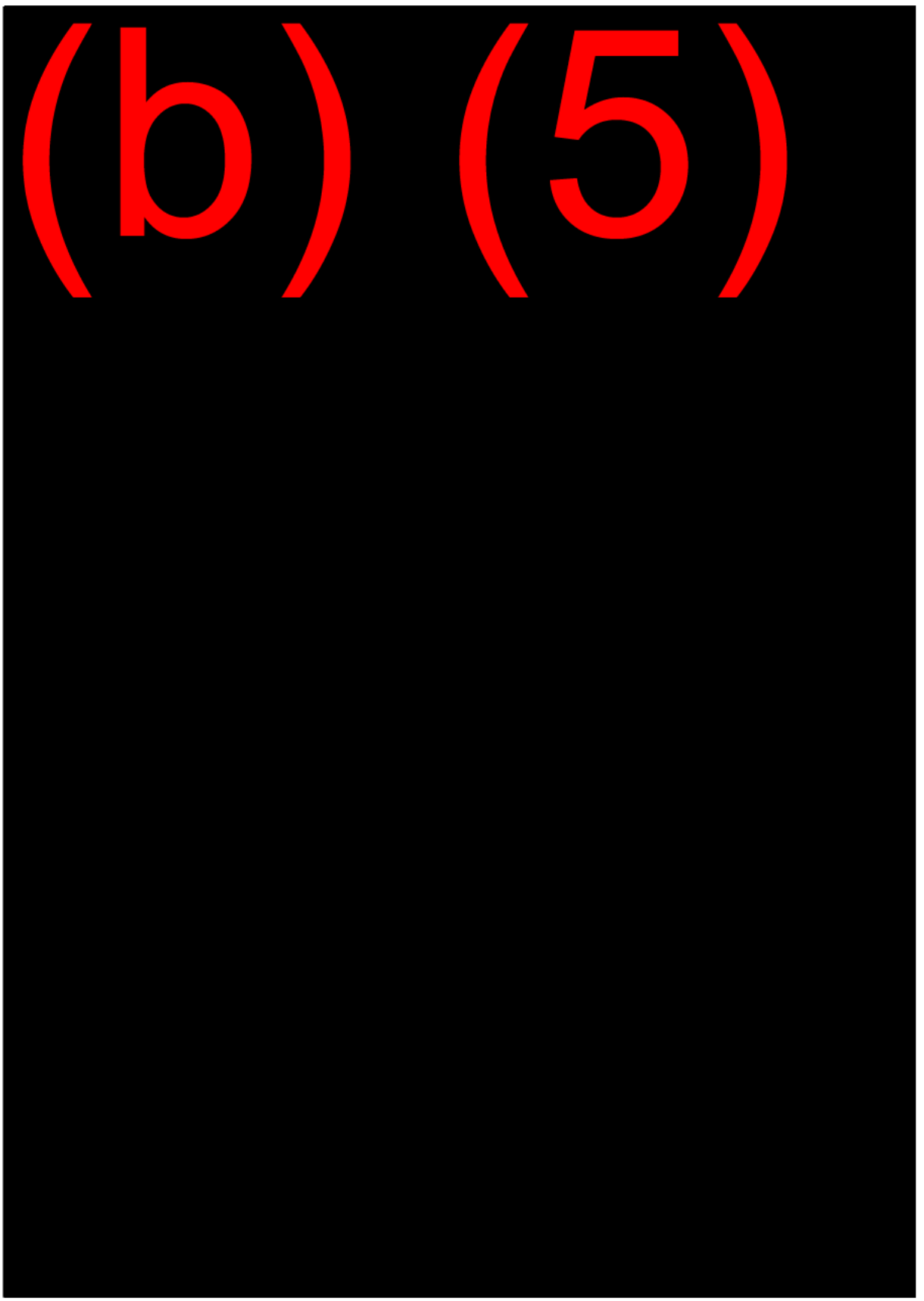
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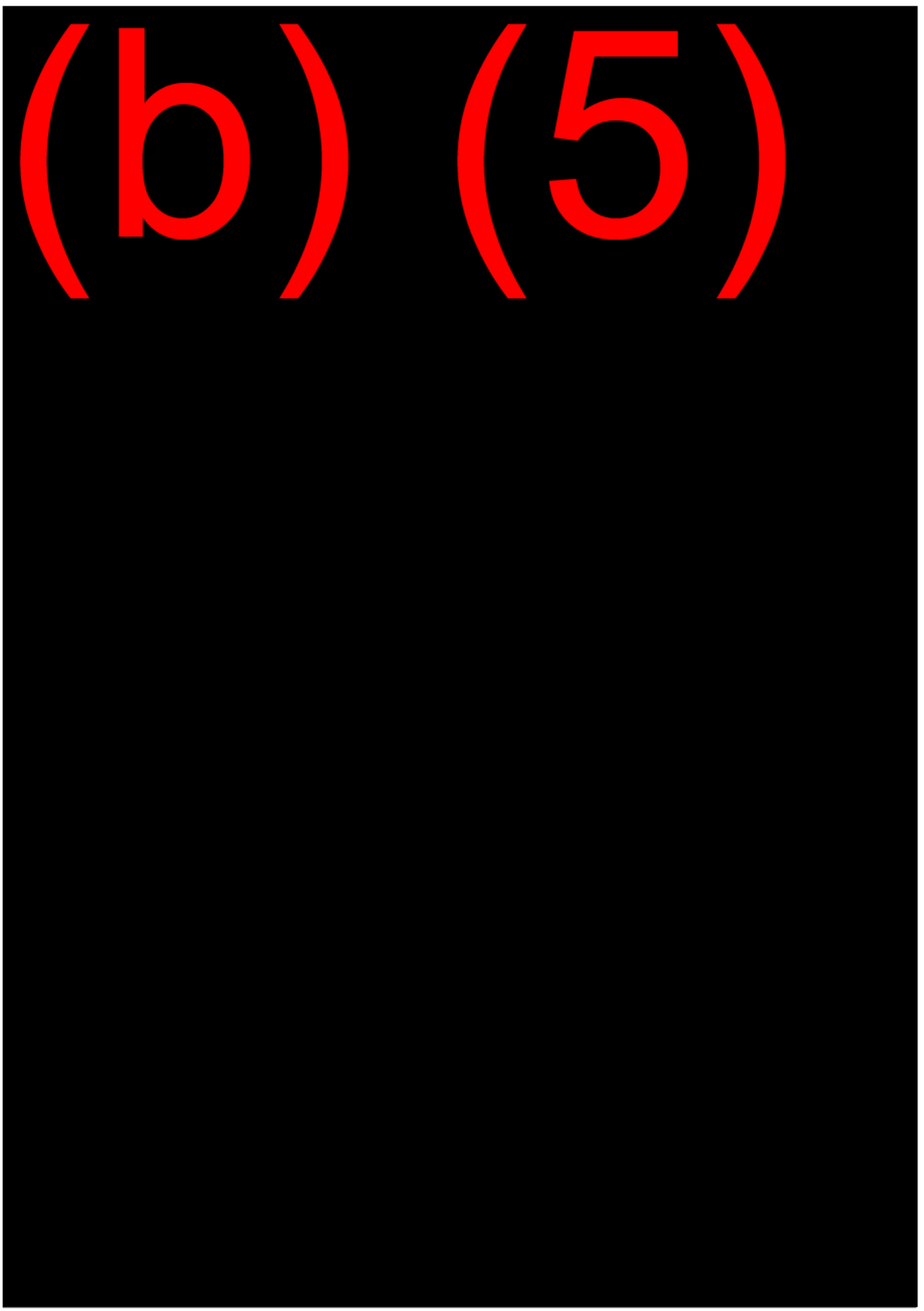
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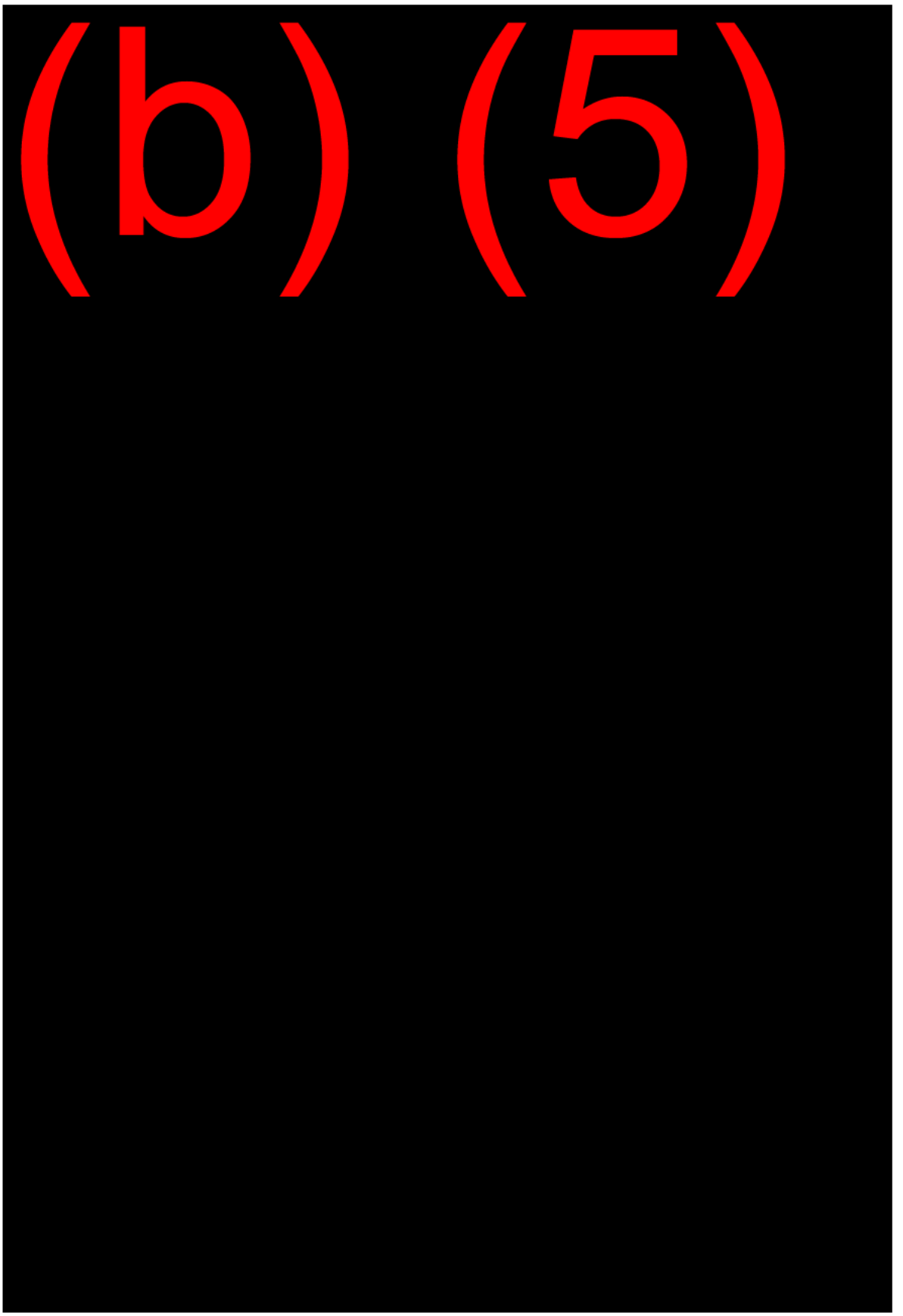
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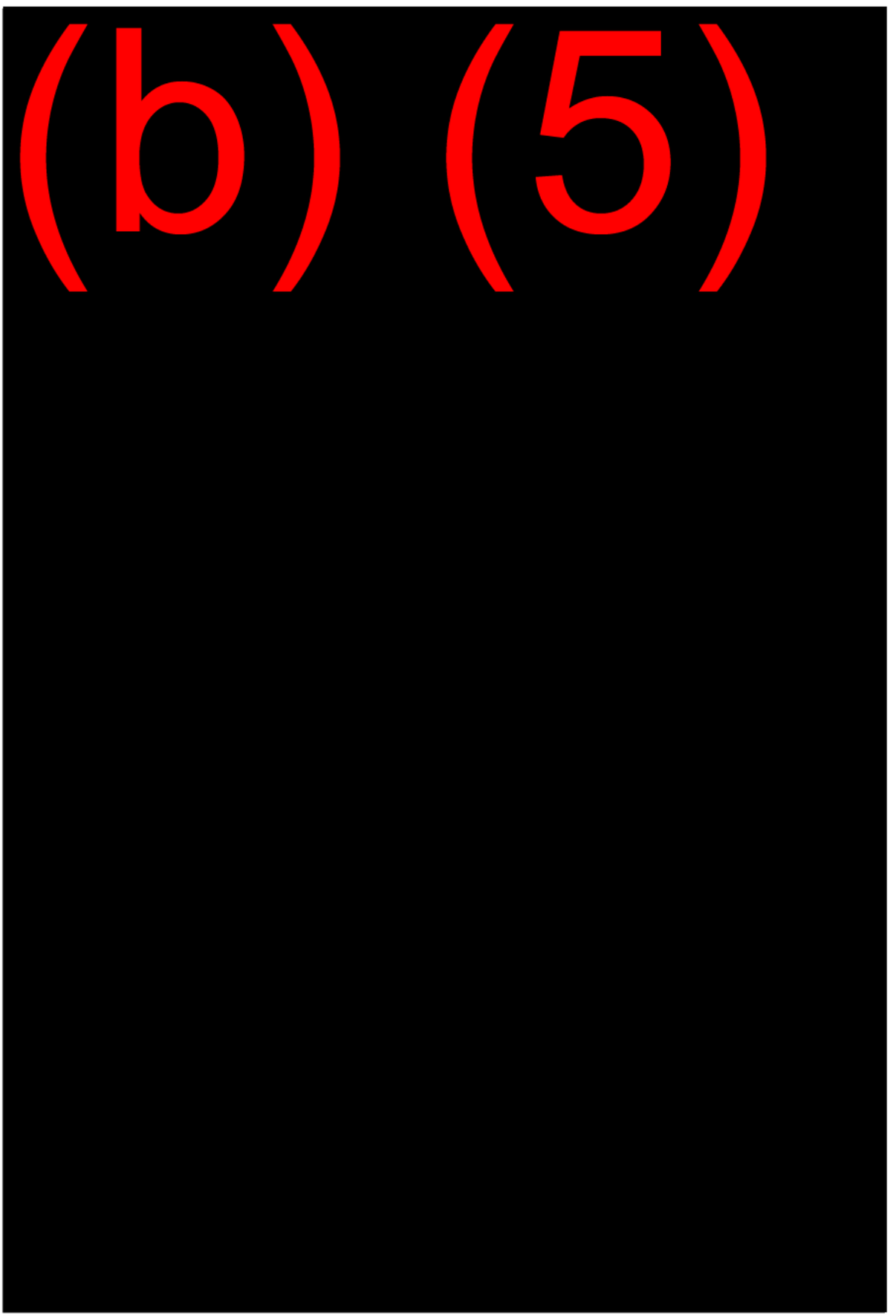
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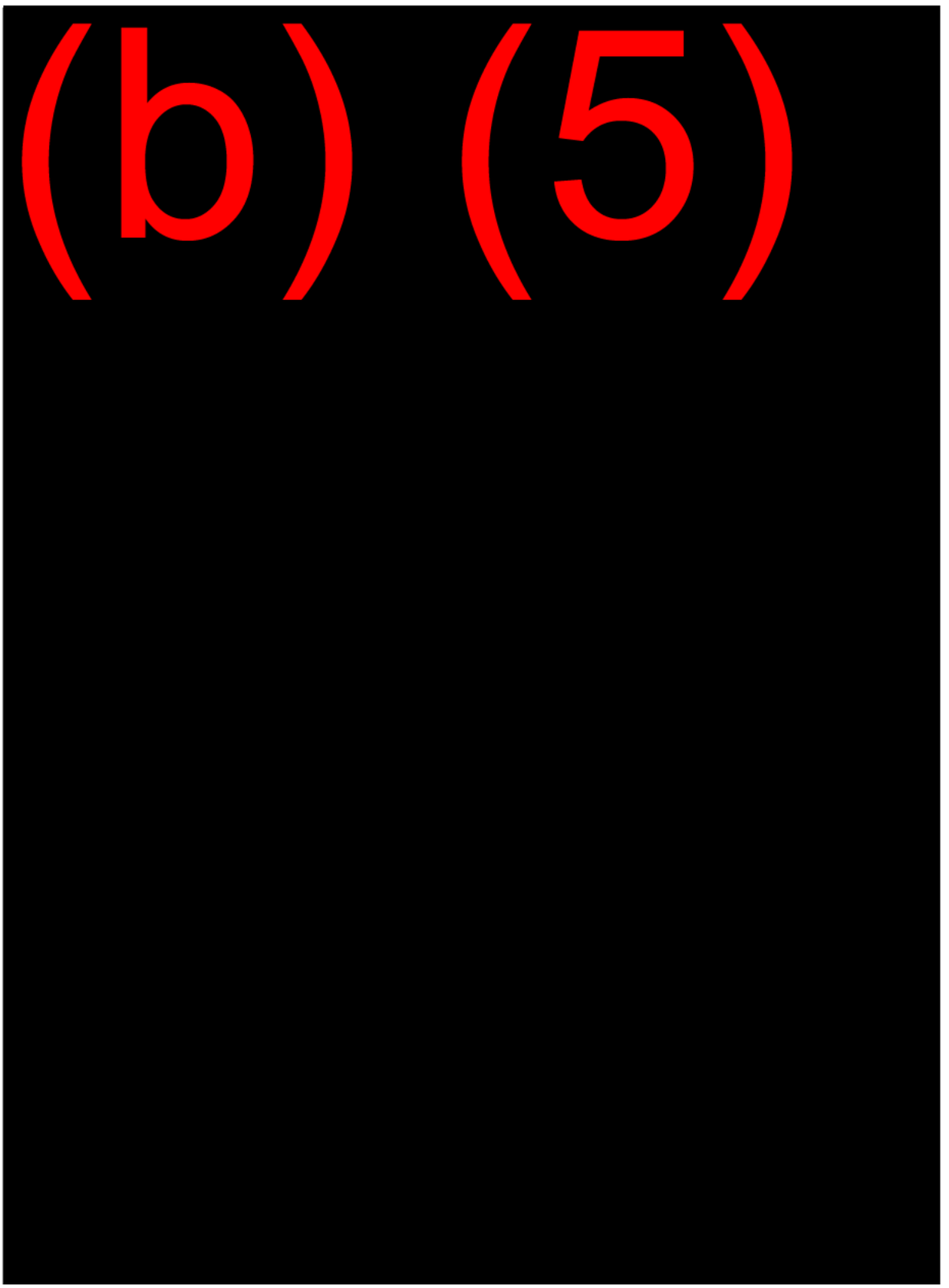
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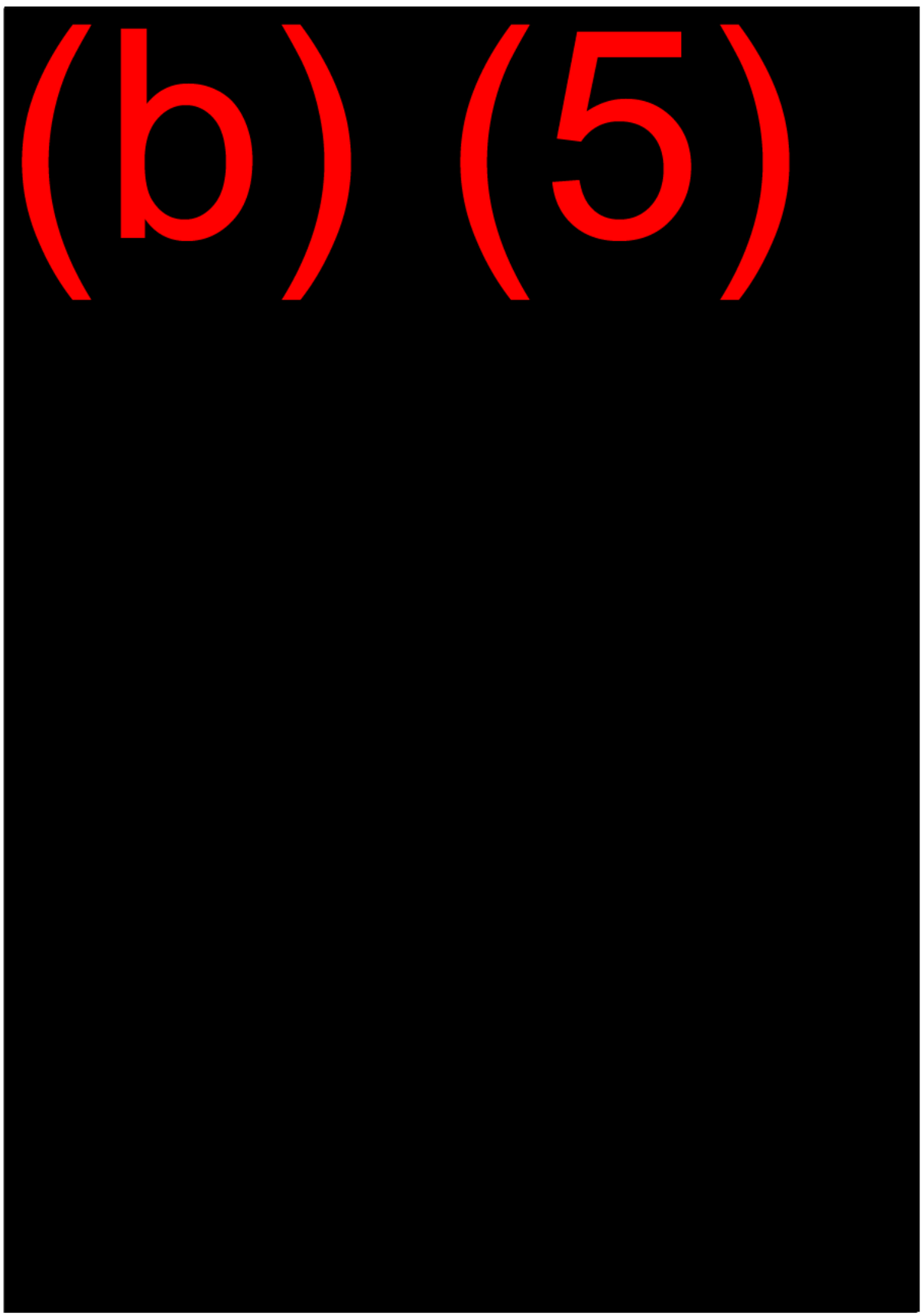
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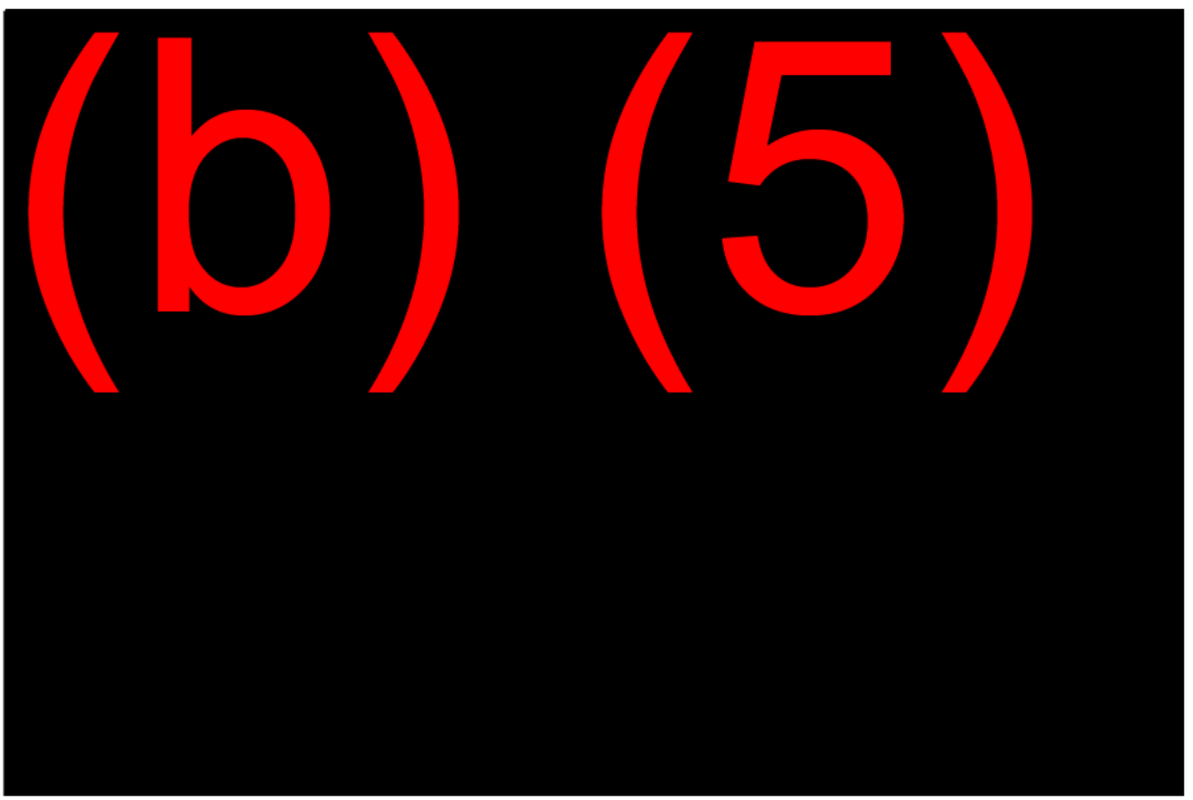
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Form 10-114
Rev. Jan. 00

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service
Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2008
Reviewed 20
Reviewed 20
Expires November 30, 2012

Long Term X
Short Term

Permit # MISC-8530-6000-8002
Type Park Code No. #
Point Reyes National Seashore

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on April ____, 2008 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP"); the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"); the land designated as the "Well Area" on the map attached hereto as Exhibit D ("Drakes Bay Oyster Company Well Area"); and the land designated as the "Sewage Area" on the map attached hereto as Exhibit E ("Drakes Bay Oyster Company Sewage Area"). Collectively, the areas so designated shall be referred to as the "Premises." The Premises governed by this Permit do not include the area designated as the ROP Area on the map attached hereto as Exhibit B.

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Use of the area designated as the "Well Area" on the map attached hereto as Exhibit D for the purpose of supplying water for the Drakes Bay Oyster Company facilities using Permittee well, pump, and pipelines. Use of the area designated as the "Sewage Area" on the map attached hereto as Exhibit E for the purpose of use and maintenance of existing sewage pipeline and sewage leachfield to service the Drakes Bay Oyster Company facilities. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required		Not Required X	Amount:
LIABILITY INSURANCE:	Required X		Not Required	Amount: As set forth in Article 15 of this Permit.

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year, plus an amount to be determined by appraisal for the use of the Sewage Area and the Well Area including water use.

PERMITTEE: Kevin Lunny (Signature) Drake's Bay Oyster Co. (Organization) 4/22/08 (Date)

Authorizing Official: George T. Turnbull (Signature) George Turnbull, Deputy Regional Director 4/22/08 (Date)

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D: Map – Drakes Bay Oyster Company Well Area

EXHIBIT E: Map – Drakes Bay Oyster Company Sewage Area

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described In this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Members of the general public visiting the Drakes Bay Oyster Company operation may park in the adjacent NPS parking area and walk over to the SUP or ROP areas.

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, which can include occasional inspections required by Agencies, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area. To comply with this paragraph, Permittee will not encourage barbecuing in the SUP Area. Picnic tables will be provided by the NPS at the adjacent parking area.

k) Unauthorized discharge into the estuary is prohibited. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, Permittee will ensure that Permittee and Permittee's officers, agents, employees, and contractors comply with Applicable Laws regarding pets, including the NPS regulation at 36 C.F.R. § 2.15.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

a) If Permittee and Permitter disagree about an issue related to this Permit, they will first make a good faith effort to resolve such issue at the Park level. If they are unable to resolve the issue at the Park level, Permittee may request a review of the issue by the Regional Director.

b) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) Production of all shellfish species shall be capped at the "current production level" as determined under the California Coastal Commission Consent Order No. CCC-07-CD-04.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed without the prior approval of the Permitter. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) To minimize the chances of introducing invasive species or pathological microorganisms to Drake's Estero, Permittee will only import shellfish in the form of larvae and seed. Within 30 days of the Commencement Date, Permittee shall produce sufficient evidence, for the review and approval of the Permitter, that larvae and seed from outside sources have been certified by the California Department of Fish and Game ("CDFG")

to be free of pathogens. If the Permitter determines that the documentation is insufficient, Permittee shall cease from importing larvae within 30 days of receiving notification of the determination from the Permitter.

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from hauled out seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel is authorized during the pupping harbor seal closure period.

c) Permittee's agreement to the provisions of this Permit does not waive Permittee's ability to take contrary positions with regard to similar provisions with other Agencies.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs, provided that Permittee and Permitter acknowledge that certain repairs are necessary to comply with Applicable Laws. Permittee will make such repairs at its sole cost and expense in compliance with Applicable Laws.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable

Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site, without the presence of an NPS archeological monitor.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) Except as set forth in Section 3(k) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS laws, regulations, and policies.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species, except for the cultivation of the shellfish species authorized by this Permit.

c) On a case by case basis, the Permitter will evaluate incidences of depredation caused by Permittee and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles or for standard household cleaners. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes, except as authorized by Applicable Laws.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past,

ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any final report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e). Notwithstanding the foregoing, neither Permittee nor Permitter shall be required to provide a report under this Section 14(e) if such report is protected by attorney-client privilege.

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's

insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and

expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Except as provided in Paragraph 3(g), Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences shall be maintained in good condition and shall be timely repaired in conformance with Applicable Laws. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) New lighting under Permittee's control of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road from Sir Francis Drake Boulevard to the SUP Area will be maintained by the NPS. The Park will respond in a timely manner to Permittee and/or visitor complaints regarding the condition of the main entrance road. Notwithstanding the foregoing, Permitter may enter into a road maintenance contract with Permittee.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines within the Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall maintain the sewage pipeline and sewage leachfield in the "Sewage Area."

i) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws as required by law. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee relate to the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. Permitter will pay for the preparation of NEPA or NHPA documents. If there is litigation regarding NEPA or NHPA compliance, it will not trigger the indemnification requirements of Article 16.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit..

22) PENALTY

a) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

a) At the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage

resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

EXHIBIT A

Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior

Permit Type

- ROP
- SUP

Oyster Racks

- Active
- Dilapidated

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

Map Location

N
W E
S

0 0.5 Miles

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

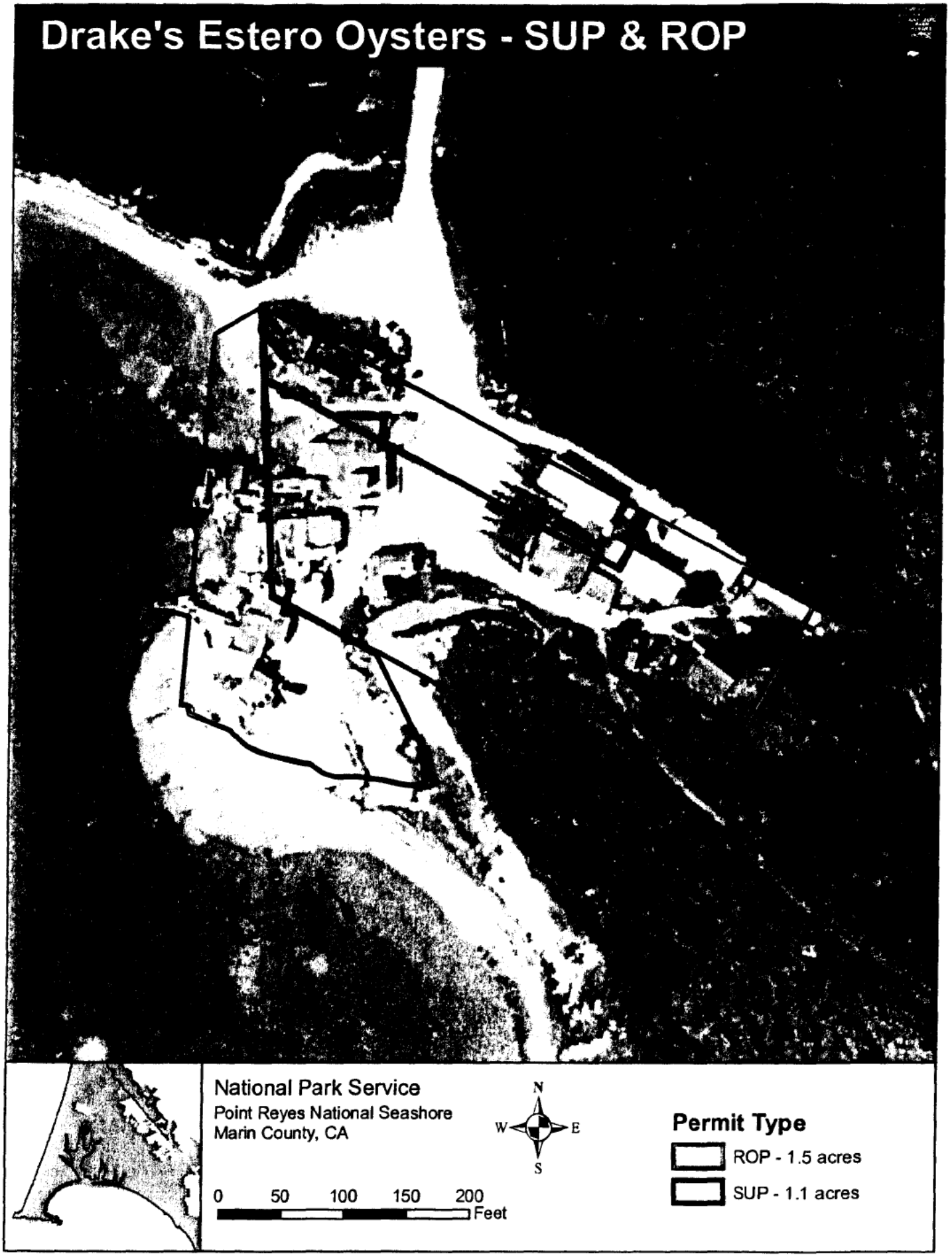
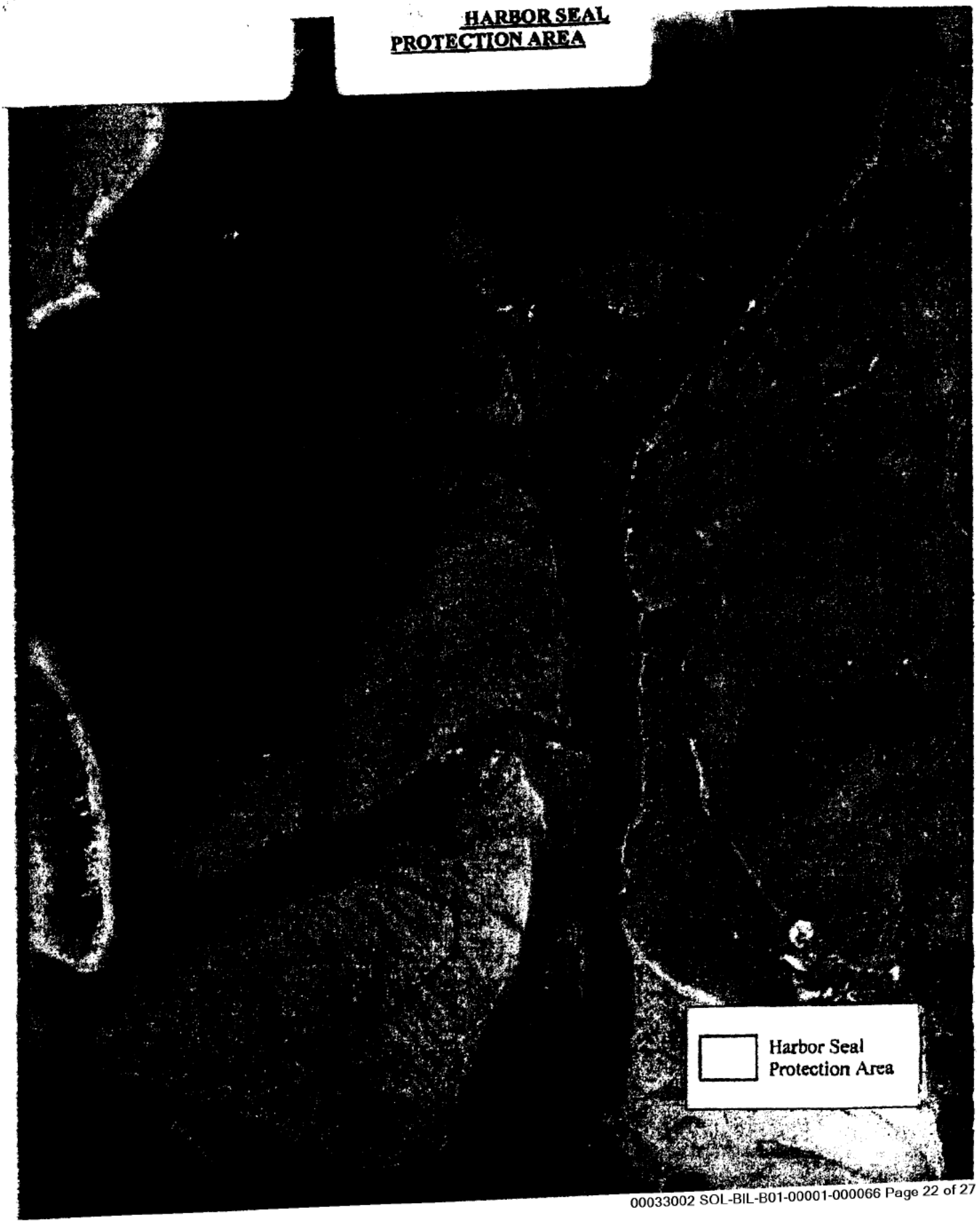

Drake's Estero Oysters - SUP & ROP
National Park Service
Point Reyes National Seashore
Marin County, CA
N
W
E
S
0
50
100
150
200
Feet
Permit Type
ROP - 1.5 acres
SUP - 1.1 acres

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol

HARBOR SEAL PROTECTION AREA



Drakes Estero Aquaculture and
Harbor Seal Protection Protocol

The following items are mutually agreed to for protection of harbor seals in and adjacent to the Harbor Seal Protection Areas identified in the Map, attached hereto and incorporated herein by reference ("Protocol Map"):

1. During the breeding season, March 1 through June 30, the "Main Channel" and "Lateral Channel" of Drakes Estero will be closed to boat traffic. During the remainder of the year, the Lateral Channel and Main Channel are open to boat traffic outside of the protection zone.

2. During the breeding season, Permittee boats may use the "West Channel" at low speed while maintaining a distance of at least 100 yards from hauled out seals.

3. Throughout the year, all of Permittee's boats, personnel, and any structures and materials owned or used by Permittee shall be prohibited from the harbor seal protection areas identified on the Protocol Map. In addition, all of the Permittee's boats and personnel shall be prohibited from coming within 100 yards of hauled out harbor seals.

EXHIBIT D

Map – Drakes Bay Oyster Company Well Area

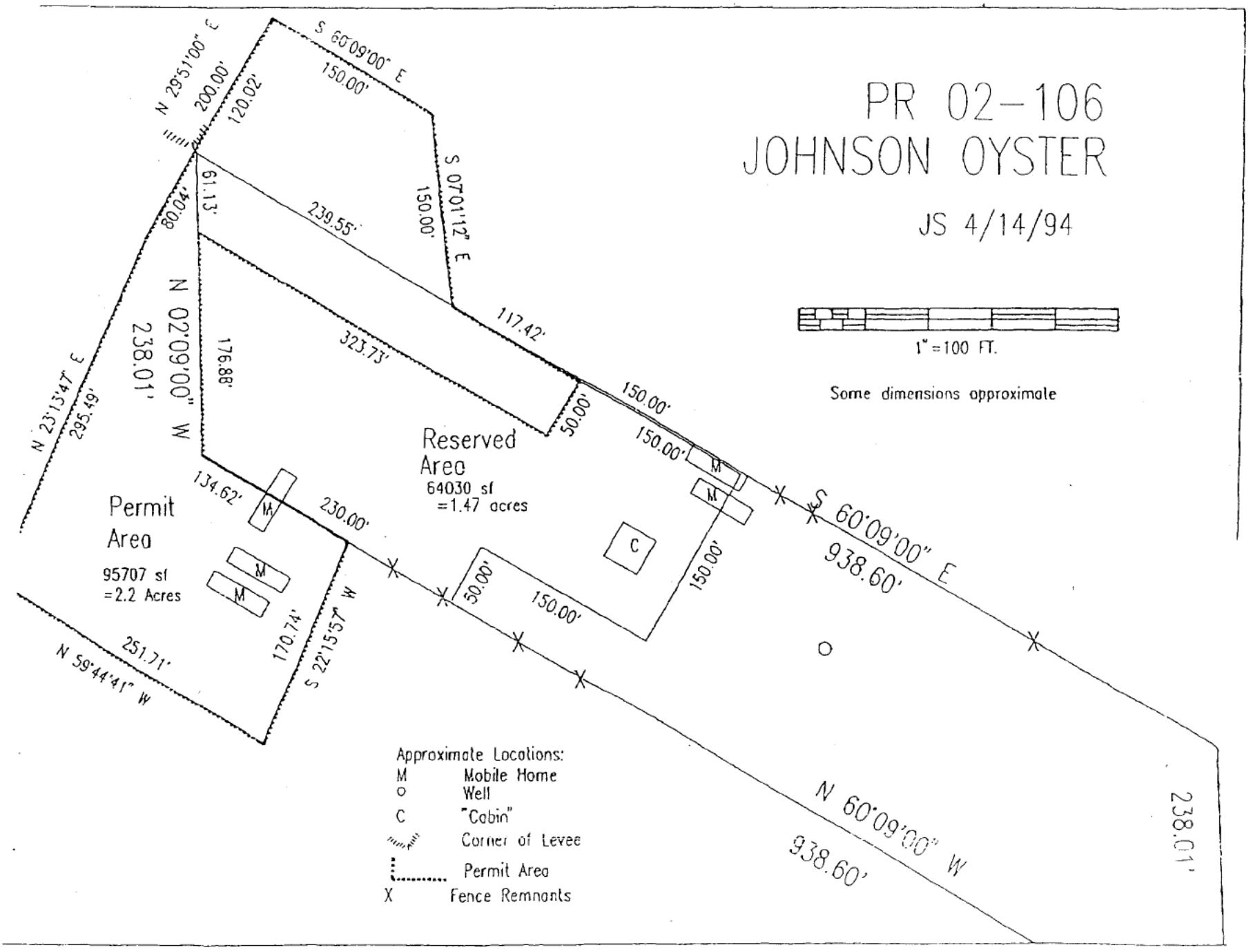


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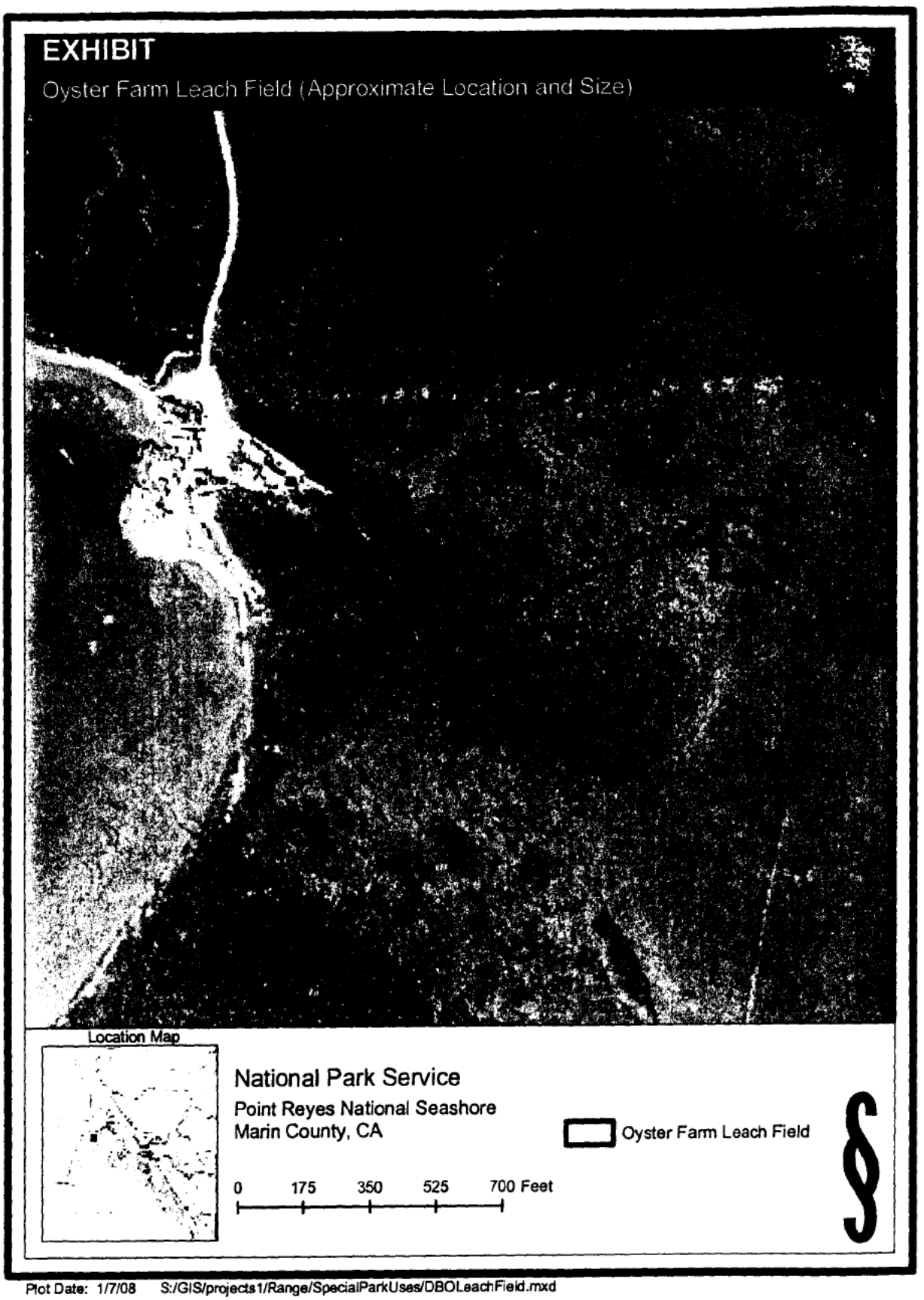
EXHIBIT E

Map – Drakes Bay Oyster Company Sewage Area



Plot Date: 1/7/08 S:/GIS/projects1/Range/SpecialParkUses/DBOLeachField.mxd

Statement of Principles
Regarding NEPA evaluation for
Special Use Permit for Drakes Bay Oyster Company

- The Parties are NPS and Drakes Bay Oyster Company (DBOC). For the purposes of this document, DBOC consists of the owners of DBOC and its representatives.
- Parties will have at least one in-person meeting prior to public scoping. Prior to the initial meeting, NPS will advise DBOC of any scientific, technical, or other information that the NPS believes should be considered during the NEPA process. NPS agrees to consider in good faith any additional information DBOC believes is appropriate for consideration. If NPS determines that any of the information submitted by DBOC is not necessary or relevant to the NEPA process, NPS will explain its rationale in the scoping report, the NEPA documents, or the administrative record for the NEPA process. DBOC will endeavor to provide all such information to the NPS at this initial meeting.
- If the NPS needs information regarding DBOC's operations, DBOC will provide timely responses to NPS requests for such information.
- NPS, in cooperation with DBOC, will prepare a schedule for completing NEPA review. Such schedule will include specific target dates for scoping, public hearings (if appropriate), the release of the EA for public comment, the public comment period, and the issuance of the FONSI or the initiation of an EIS. If NPS determines that an EIS is necessary, the same coordination efforts set forth herein will also apply in the preparation of the EIS.
- NPS will consider DBOC's interests in applying for and receiving a special use permit in developing the purpose and need for the NEPA document.
- DBOC shall prepare a description of their operations for NEPA evaluation, which NPS shall consider in good faith. NPS will consult in good faith with DBOC on the purpose and need of the project as needed, particularly during impact analysis, to assist in improving the preferred alternative to avoid, mitigate or otherwise address any adverse impacts.
- After the National Academy of Sciences produces its first report (specific to Drakes Estero) and NPS and DBOC meet and confer in good faith regarding same, the NPS will begin preparing the those portions of the NEPA document concerning off-shore activities, including sections concerning the affected environment, alternatives, environmental consequences, and mitigation measures, unless otherwise agreed to by the Parties. Notwithstanding the foregoing, NPS may begin preparing those portions of the NEPA document concerning offshore activities that analyze air quality, cultural resources and the socioeconomic environment.
- NPS agrees to consult with DBOC in good faith in the design of any further scientific or technical studies to assist in NEPA evaluation of the project.
- As part of public scoping, DBOC may provide comments regarding proposed alternatives, and the NPS will consider such comments.
- DBOC may provide formal comments during the public comment period for the NEPA document.

- DBOC will not be required to cover the cost of preparing the NEPA document. If there is litigation regarding NEPA compliance, it will not trigger the indemnification requirements set forth in the Special Use Permit.
- The Parties will exert best efforts to effectuate the principles set forth herein.
- The Parties will enter into a Memorandum of Understanding or similar agreement consistent with the principles set forth herein as soon as practicable. The NEPA actions contemplated by the principles set forth herein shall be initiated after the Parties enter into the Memorandum of Understanding or similar agreement. Notwithstanding the foregoing, NPS may initiate the contemplated NEPA actions if the Parties are unable to enter into a Memorandum of Understanding or similar agreement within sixty (60) days of the date of this Statement of Principles; provided, however than any such actions shall be consistent with this Statement of Principles and the Parties will continue to make best efforts to enter into a Memorandum of Understanding or similar agreement.

IT IS SO AGREED:

Drakes Bay Oyster Company

By: _____ Dated: 4/22/08
Kevin Lunny

National Park Service

By: _____ Dated: 4/17/2008
Jonathan B. Jarvis
Regional Director
Pacific West Region

LEGAL_US_W # 58722736.1

United States Department of the Interior

OFFICE OF INSPECTOR GENERAL
Washington, DC 20240

JUL 21 2008

Memorandum

(b) (5)

Attachment

Investigative Report

Point Reyes National Seashore

Report Date:
Date Posted to Web:

This report contains information that has been redacted pursuant to 5 U.S.C. §§ 552(b)(2), (b)(6), and (b)(7)(C) of the Freedom of Information Act. Some references indicating gender were written in the masculine form to protect the identities of individuals and to facilitate the reading of the report. Supporting documentation for this report may be requested by sending a written request to the OIG Freedom of Information Office.

RESULTS IN BRIEF

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(b) (5)

BACKGROUND

(b) (5)

LAND ACQUISITIONS

Drakes Bay Oyster Company

(b) (5)

(b) (5)

G Ranch

(b) (5)

(b) (5)

WILDERNESS ACT of 1964

(b) (5)

PRNS WILDNERNESS ACT of 1976

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DETAILS OF INVESTIGATION

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PART I: SCIENTIFIC MISCONDUCT

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Sheltered Wilderness Report

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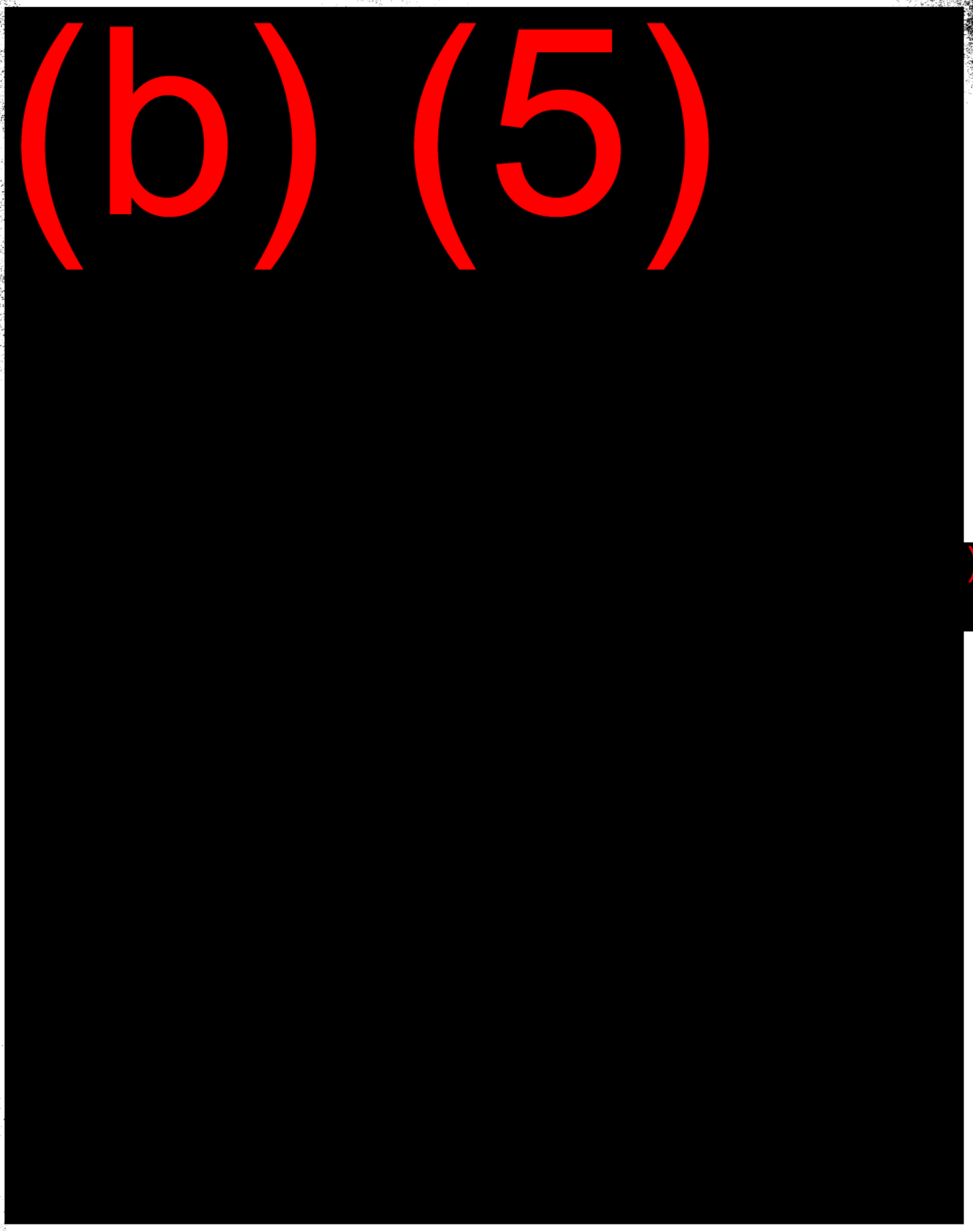
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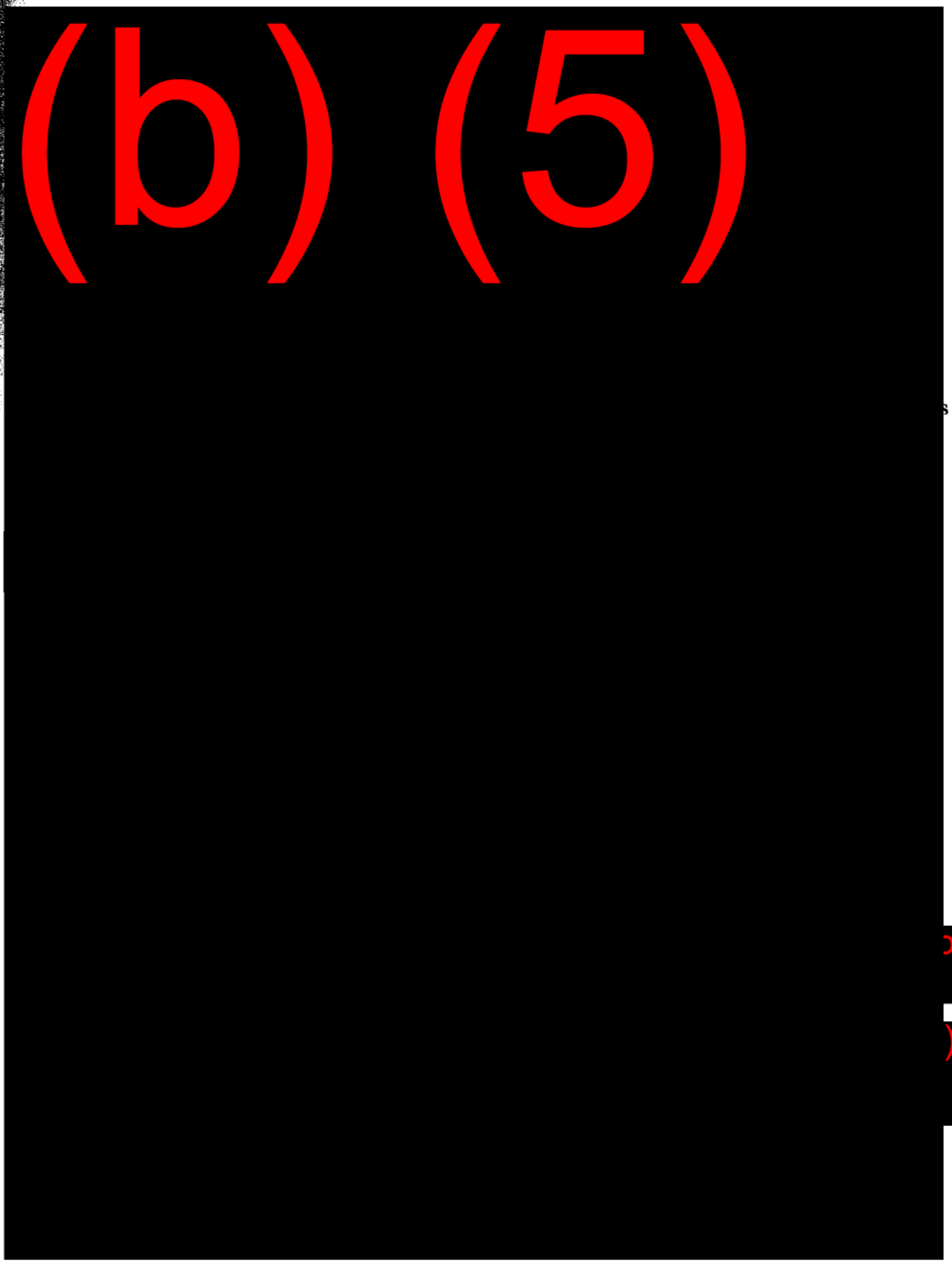
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Impact of Oyster Feces on Sedimentation

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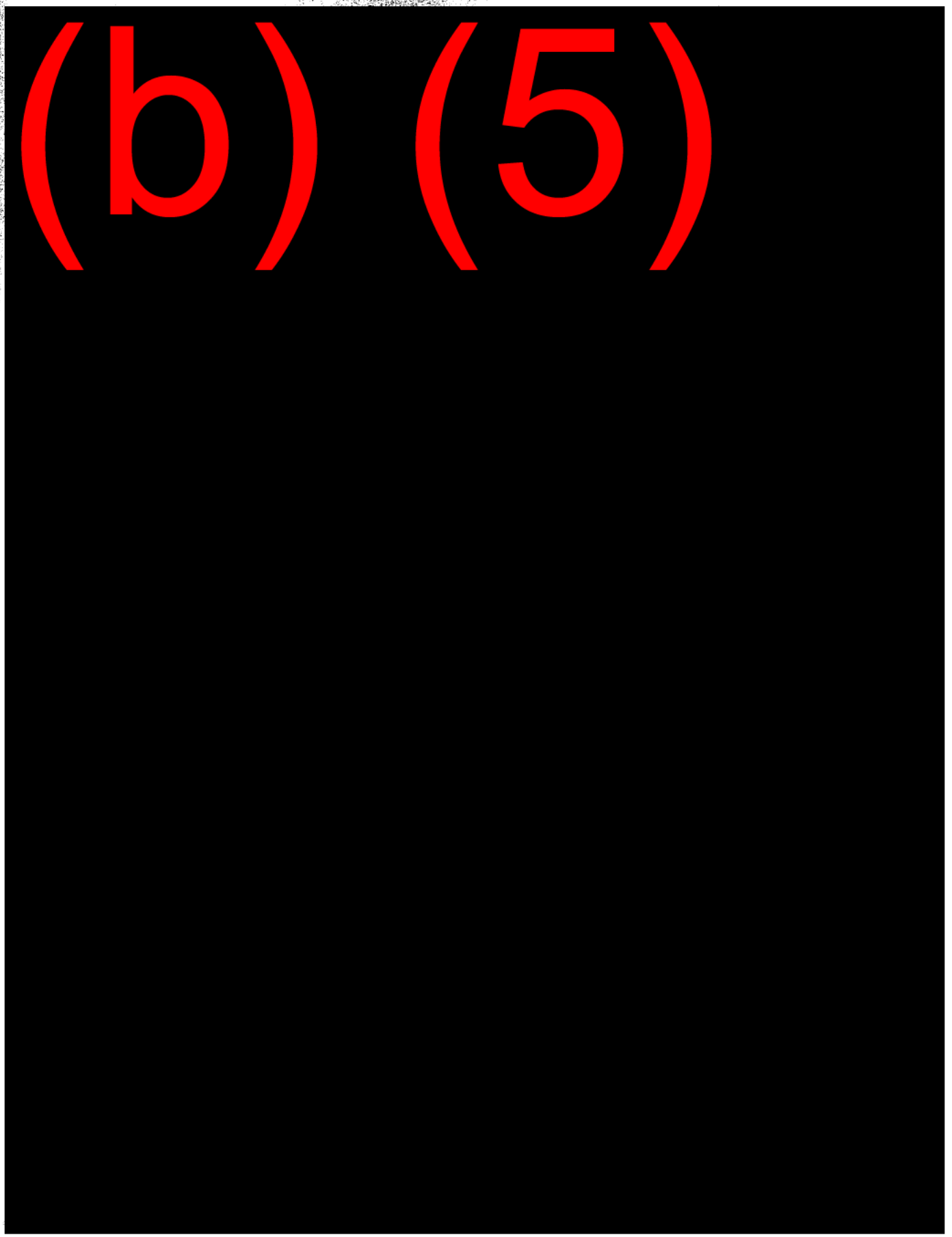
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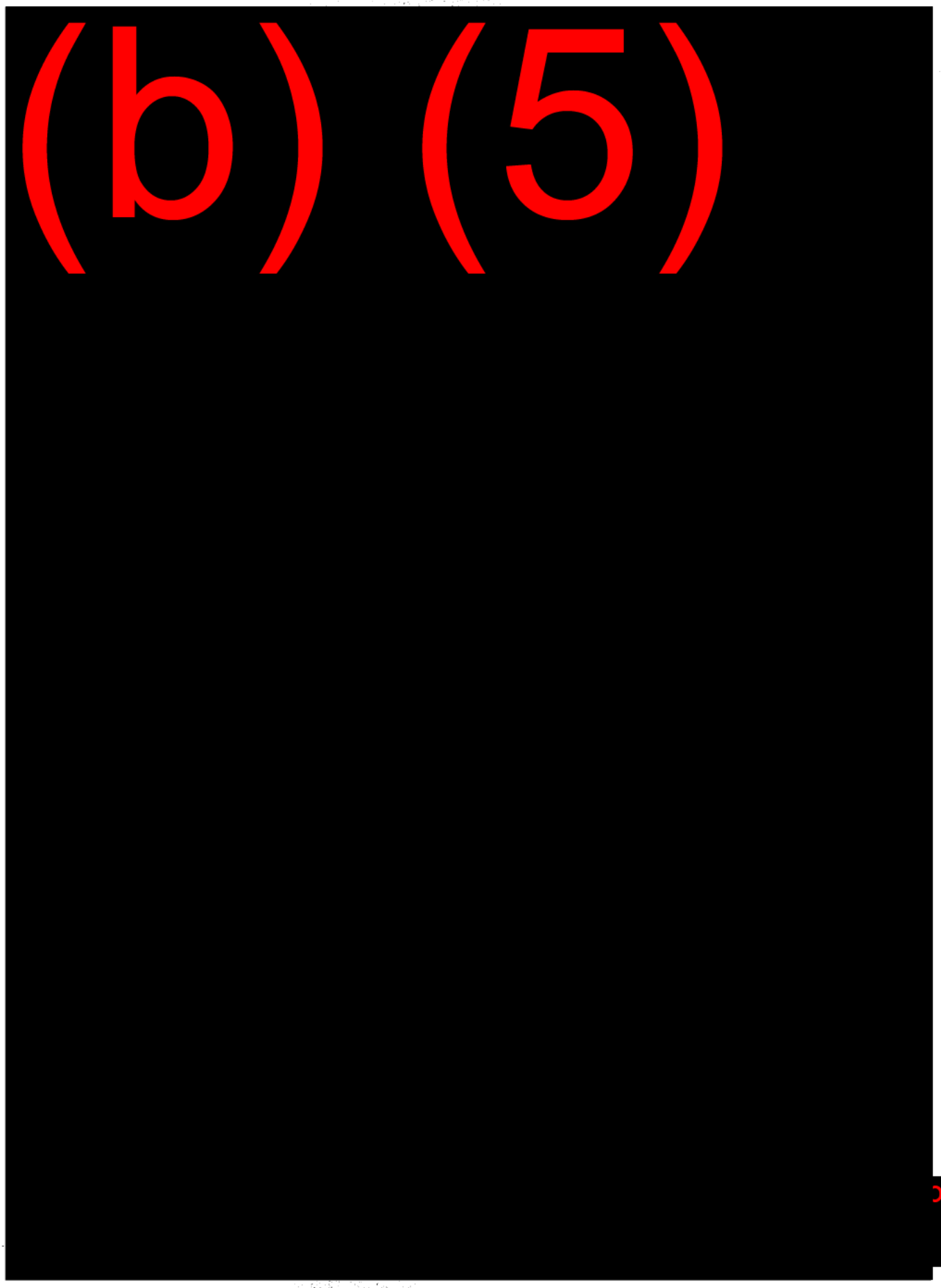
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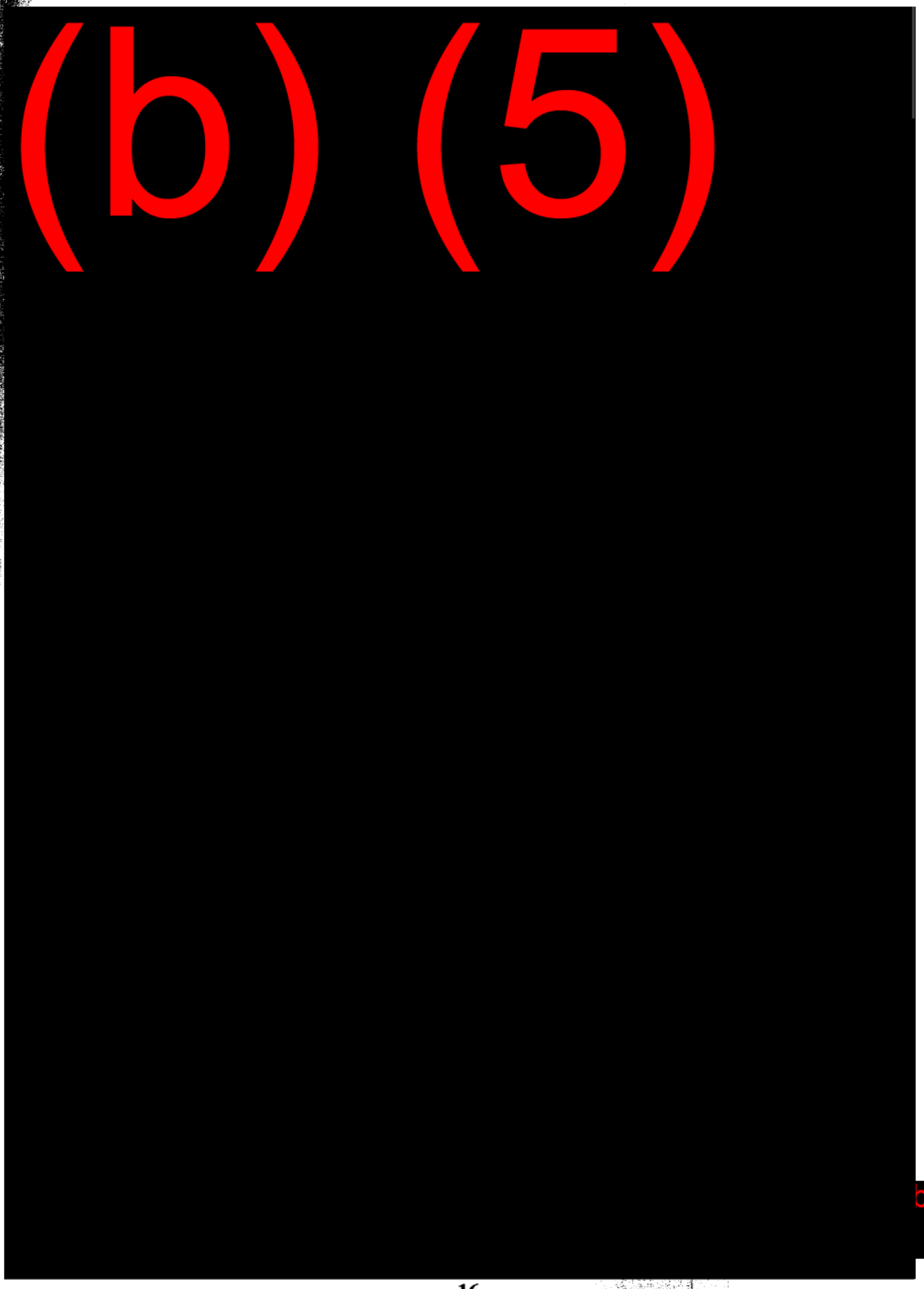
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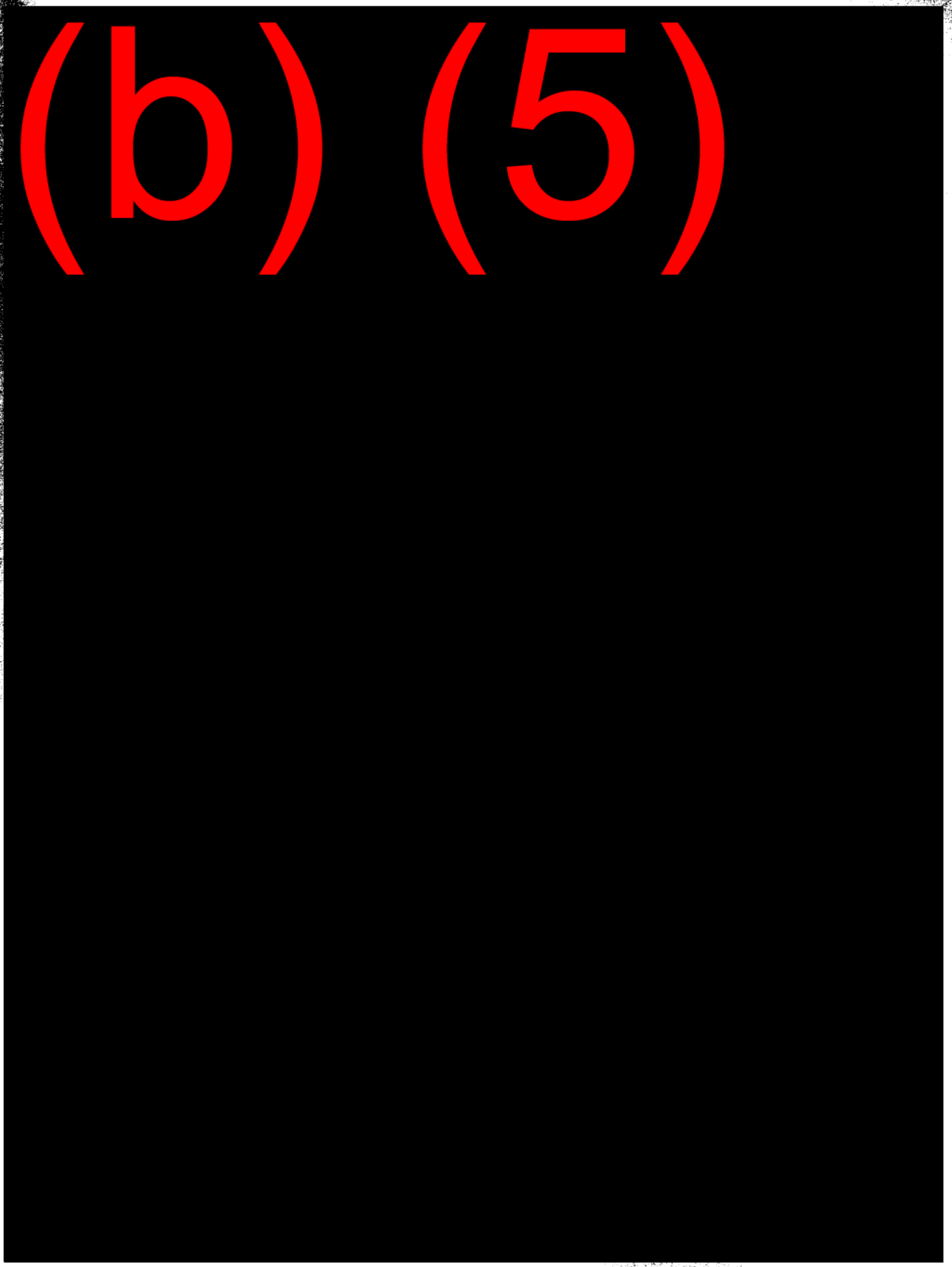

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Impact of Oyster Mariculture on Eelgrass

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Impact of Oyster Mariculture on Fish Composition and Non-Native Species

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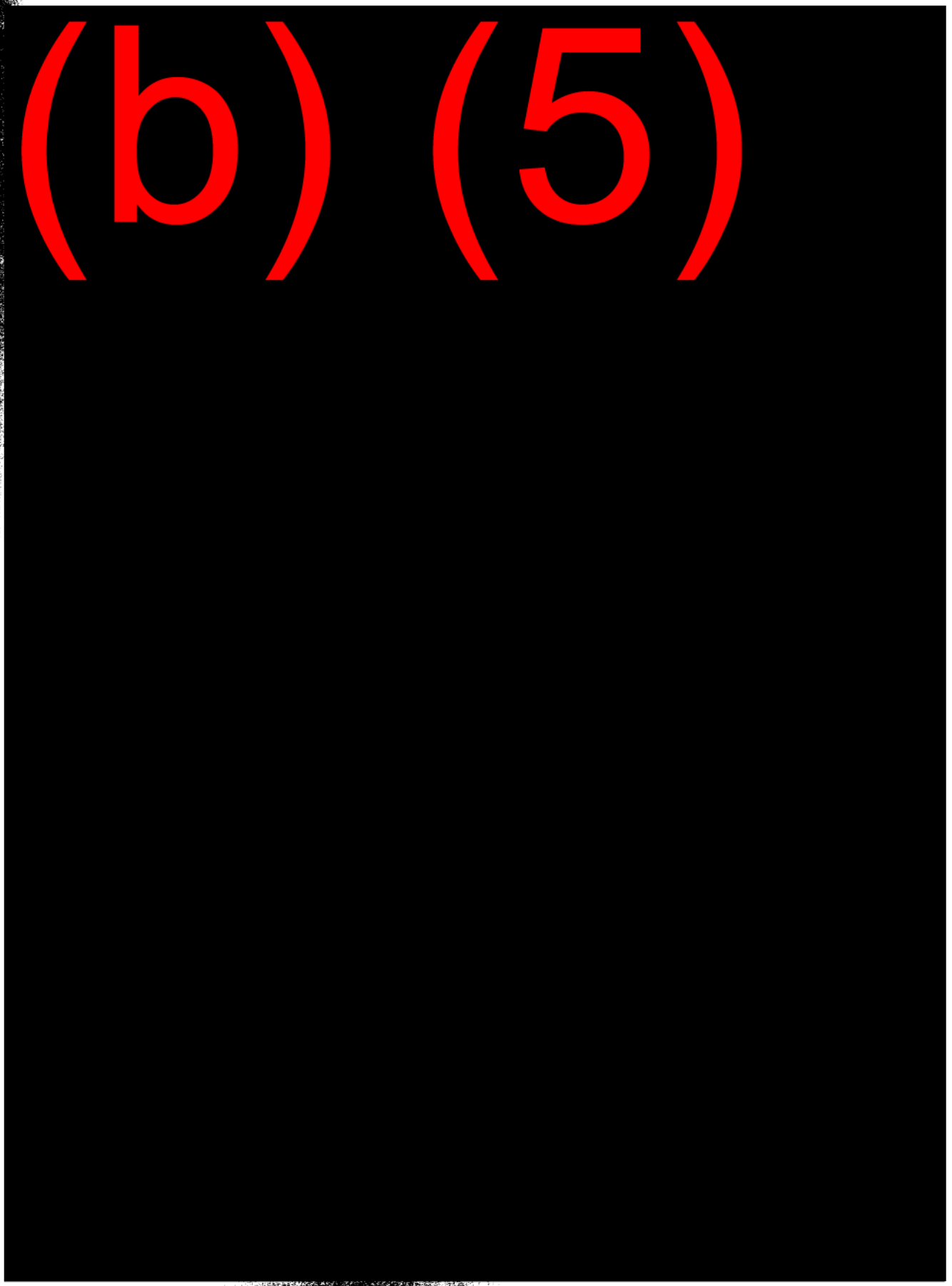
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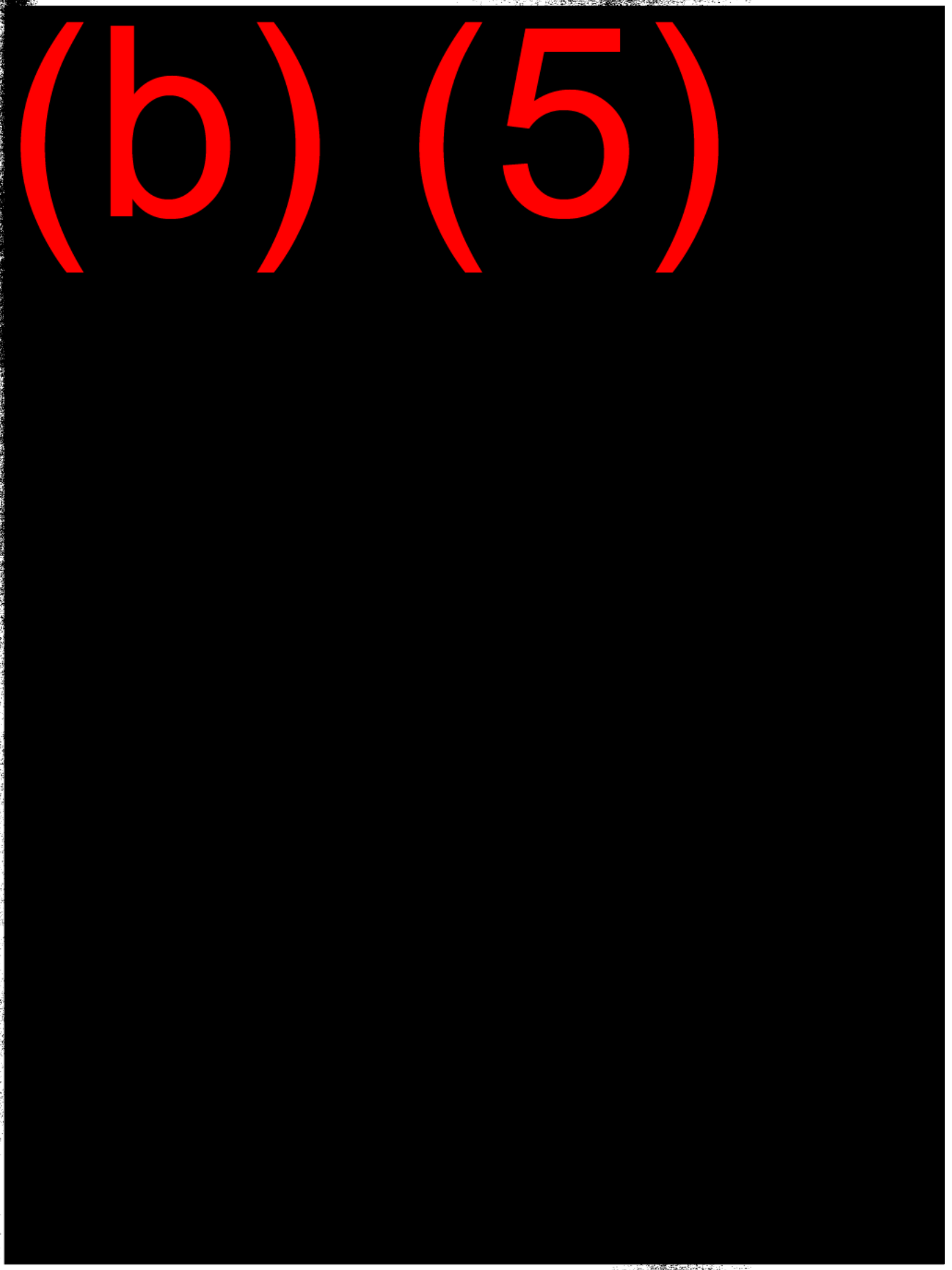
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Harbor Seals in Drakes Estero

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Statements before the MCBS on May 8, 2007

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Differing Seal Maps

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NPS "Scientific Code of Conduct"

(b) (5)

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Part II: DISPARATE TREATMENT

(b) (5)

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DBOC Signage

(b) (5)

Road Maintenance

(b) (5)

(b) (5)

Intention to Oust DBOC Prior to 2012

(b) (5)

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[redacted]

Proposal to Introduce Native Oysters to Drakes Estero

[redacted]

00033002 SOL-BIL-B01-00001-000068 Page 37 of 54

(b) (5)

Clearing the Cease and Desist Order

(b) (5)

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Interpretation of Wilderness Act

(b) (5)

Restrictions on G Ranch

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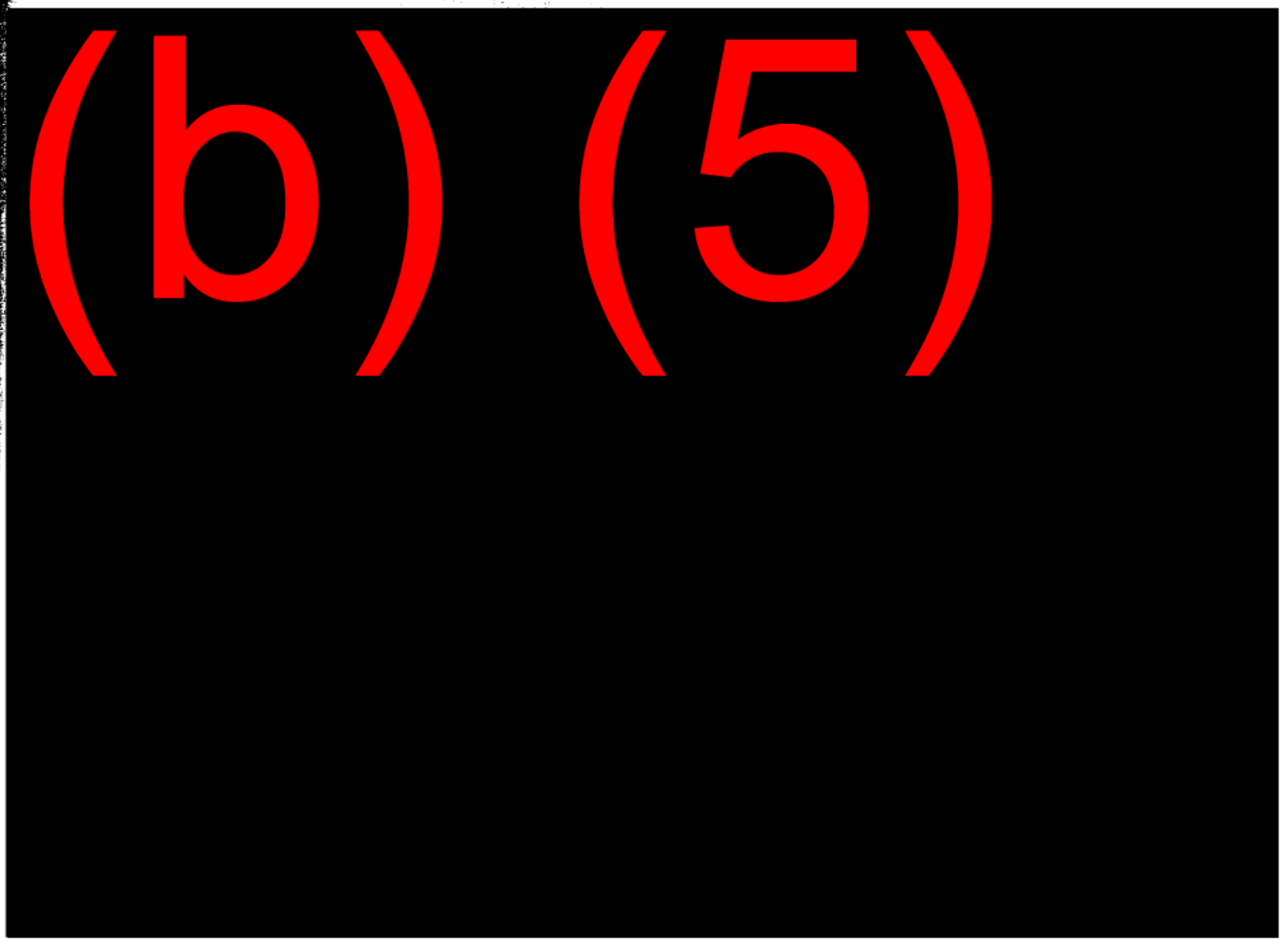
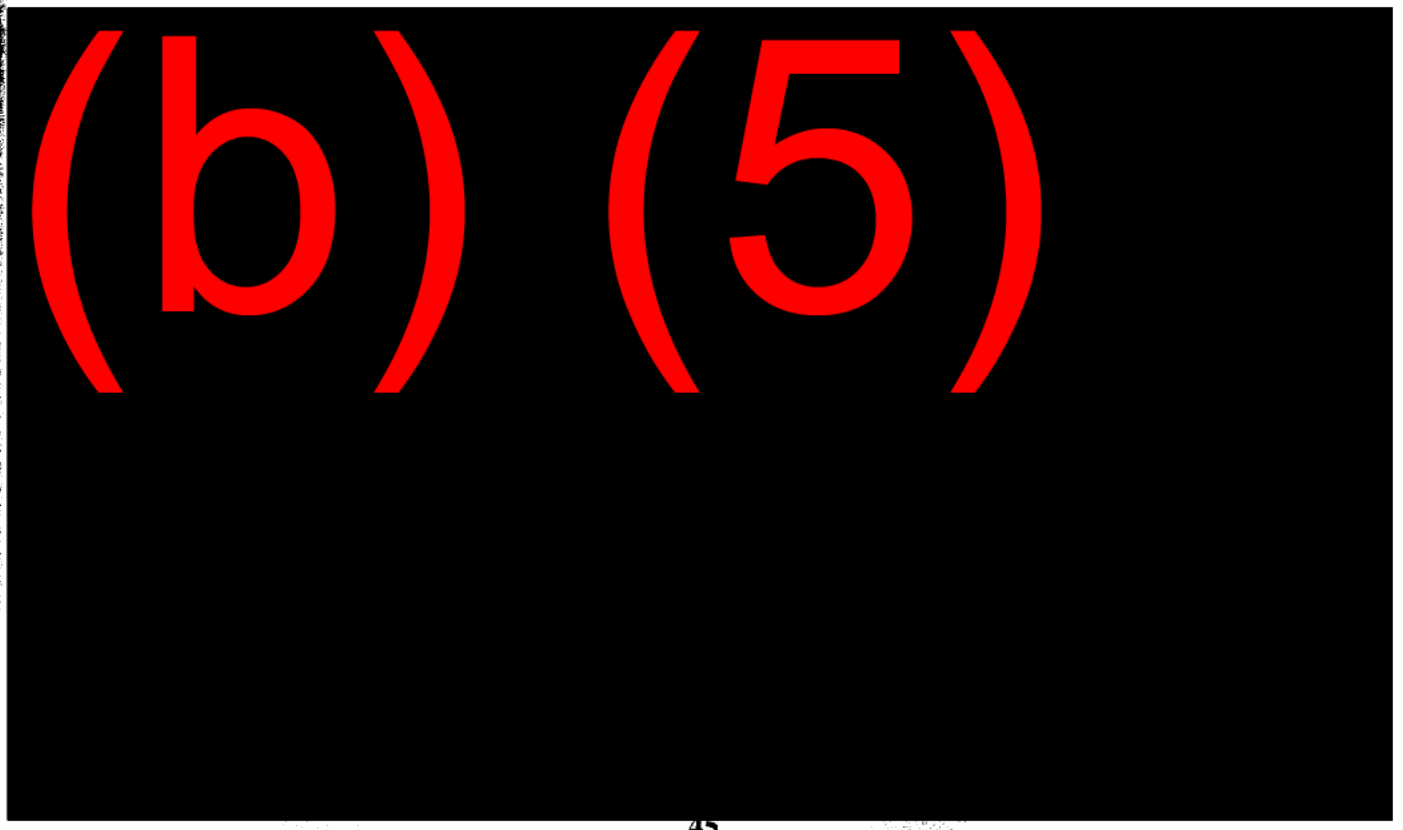


Freedom of Information Act Requests By Corey Goodman



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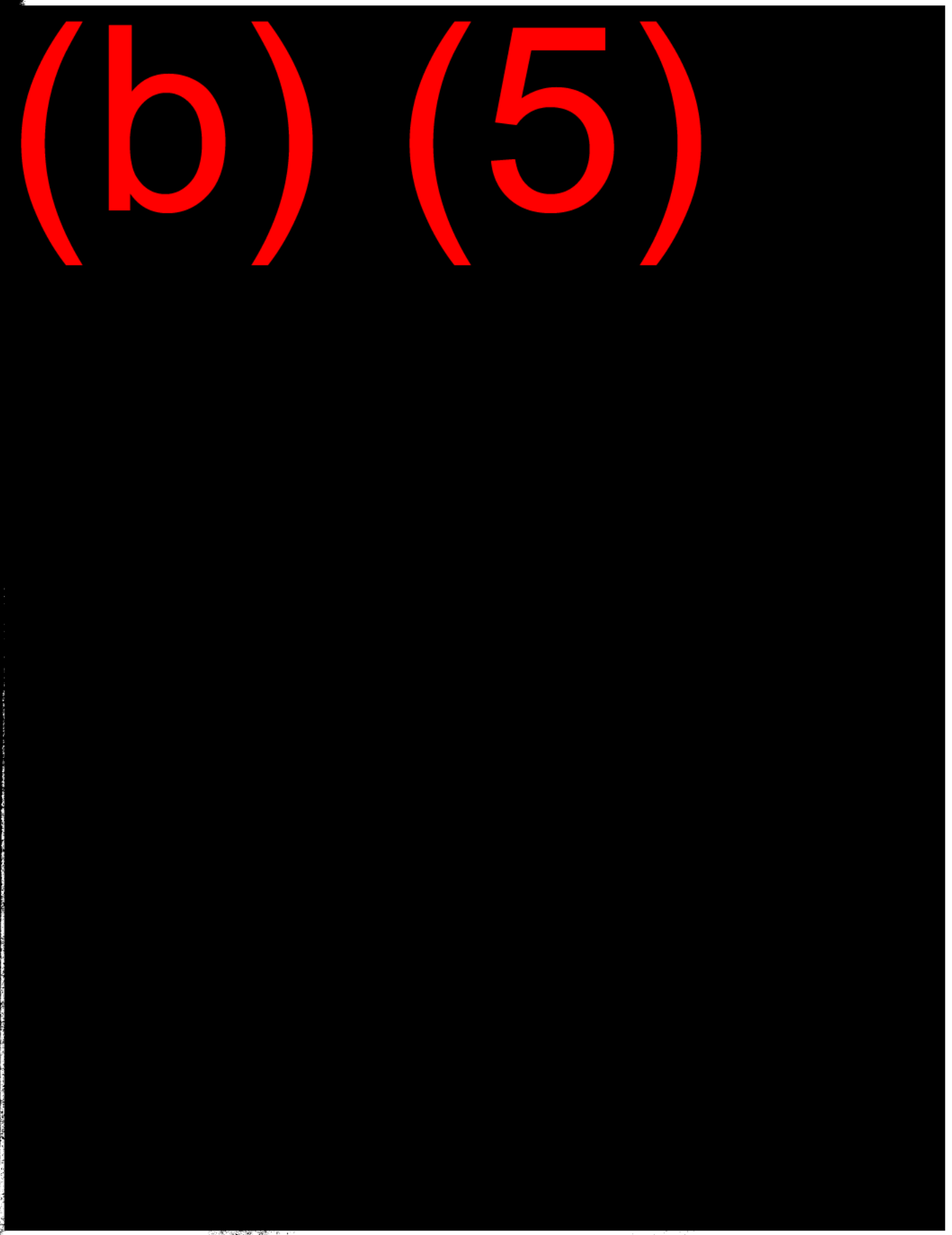
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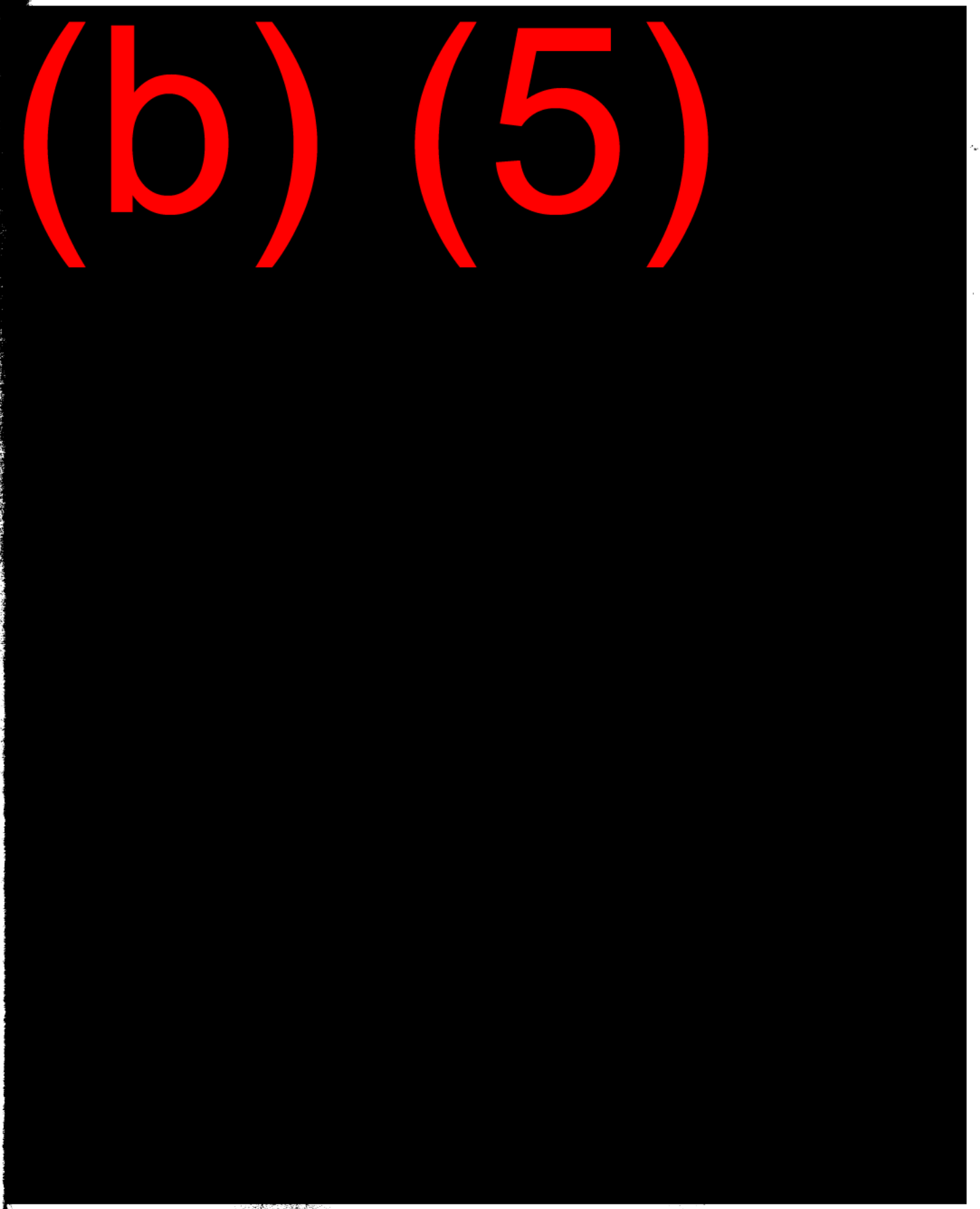
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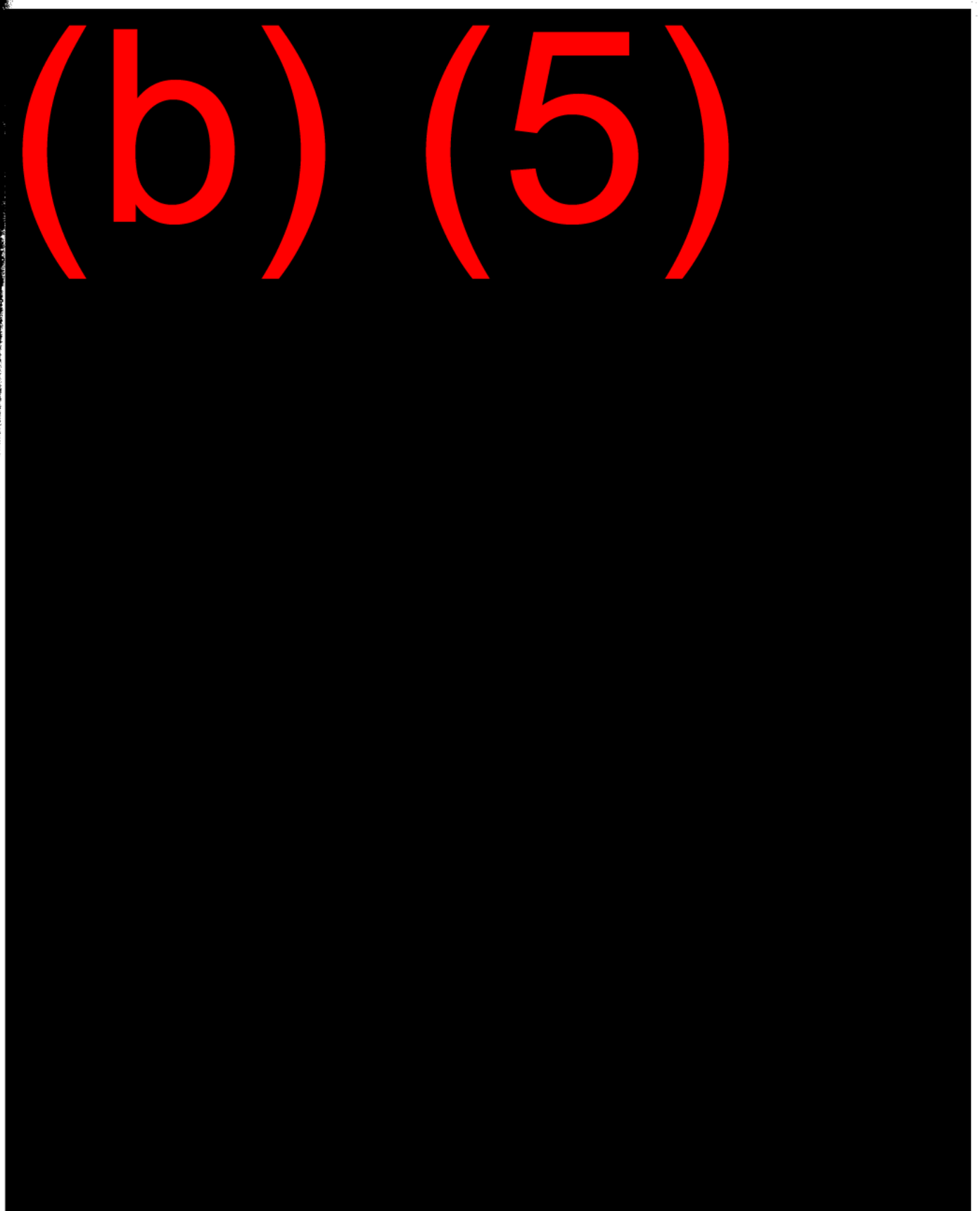
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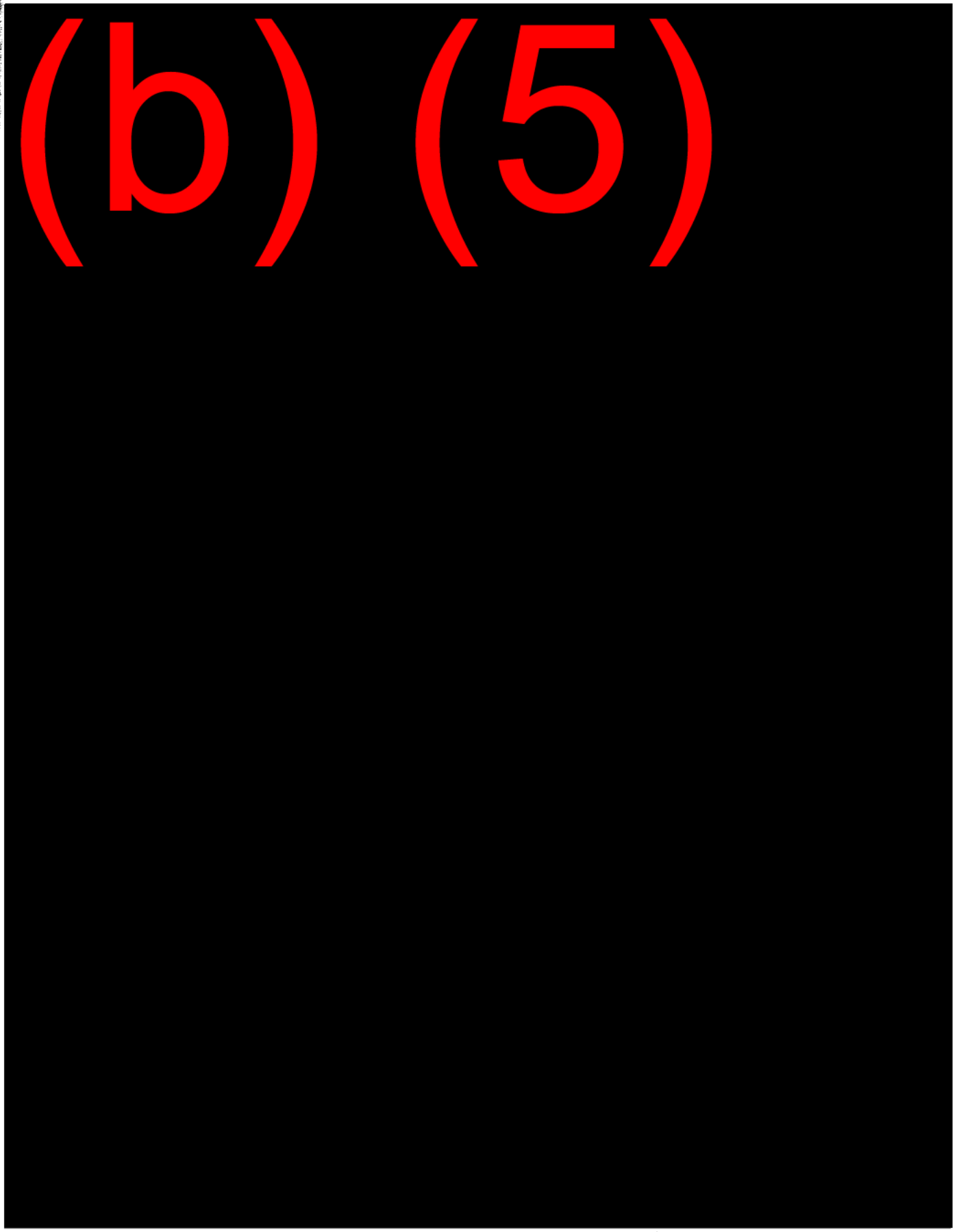
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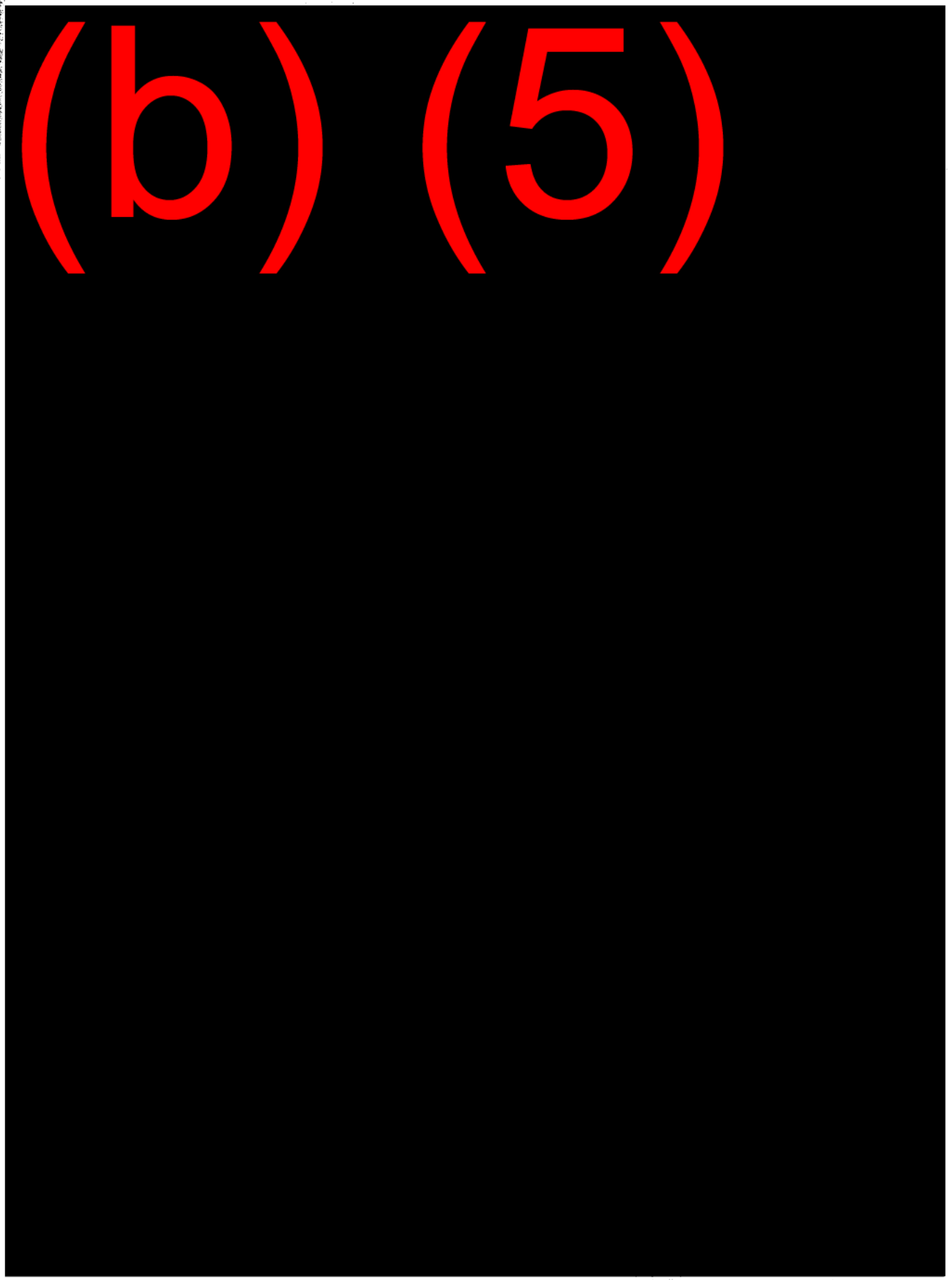
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(A)

EXHIBIT C

EXHIBIT "C"

Reserving to Vendor, its successors and assigns, a terminable right to use and occupy the above-described property, as delineated on Exhibit "D", attached, together with the improvements situated thereon, for a period of 40 years for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items, the interpretation of oyster cultivation to the visiting public, and residential purposes reasonably incidental thereto, subject to the following:

Definitions

The term "Director" as used herein means the Director of the National Park Service, and includes all his duly authorized, delegated representatives.

The term "Vendor" as used herein means the Johnson Oyster Company, a California Corporation, and its successors and assigns.

1. The premises reserved by Vendor hereunder shall at all times be maintained in a safe, sanitary, and sightly condition, open to reasonable inspection by the Director, and meeting all Federal, State, and County health, sanitation, and safety standards applicable to operation of and residence within areas engaged in the processing and retail sale of oysters.

2. Utility services related to the reserved premises, including but not limited to water, electricity, sanitation, and garbage disposal are the sole responsibility of Vendor. Garbage and debris shall be disposed of by Vendor outside the boundary of the Point Reyes National Seashore. Use of the existing trash and garbage dumps on the reserved premises shall be discontinued and the dumps shall be restored to a natural condition by Vendor.

3. Oyster shells may be disposed of within the boundaries of the Point Reyes National Seashore and may be stockpiled for a reasonable period of time on the premises for use as follows:

a) Upon approval and under an agreement with the Fish and Game Department and other State of California regulatory authorities, some shells may be ground up and deposited uniformily on the water bottom allotments.

b) Some shells may be used for surfacing the road southerly from Sir Francis Drake Highway to the premises including the parking area on the reserved premises and the parking area on the adjacent land under special use by the Vendor. Approval of the Superintendent will be required prior to deposition of shells anywhere else within the Seashore for road surfacing purposes.

c) Some shells may be used for seed purpose in oyster propagation.

d) Some shells will be maintained to offer as gifts to the visiting public.

4. Vendor shall not commit waste upon the reserved premises and shall at all times maintain them in a neat and sightly condition.

5. A permanent residence shall be maintained upon the reserved property, occupied by a responsible employee of Vendor.

6. Vendor shall abide by all rules and regulations pertaining to National Park System areas.

7. No permanent or temporary structure, sign or other improvement of any type whatsoever shall be erected by Vendor in or upon the reserved premises or improvements without the prior written approval of the Director.

8. Vendor and its employees shall take all reasonable precautions to prevent fires in and about the reserved premises, and shall cooperate with the Director in fire extinguishment in the reserved premises and areas immediately adjacent to the reserved premises.

9. During the term of Vendor's reservation, Vendor shall be solely responsible for all claims arising from use of the reserved premises by visitiors, and shall carry extended coverage liability insurance protecting against such claims in an amount and of a type agreed by the Director, to be sufficient for this purpose.

10. During the term of occupancy, the Vendor shall carry fire and extended coverage insurance to the full insurable value of the improvements. The insured under said fire and extended coverage insurance shall be the Vendor and the United States of America as their interests may appear. In case of loss, the Vendor may replace the improvements with equivalent structures. Should the Vendor elect not to rebuild, all insurance proceeds shall be divided between the United States and the Vendor as their interests may appear.

11. Upon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property for the herein described purposes, provided however, that such permit will run concurrently with and will terminate upon the expiration of State water bottom allotments assigned to the Vendor. Any permit for continued use will be issued in accordance with National Park Service regulations in effect at the time the reservation expires.

12. Upon expiration of Vendor's reservation, or the extended use period by permit, it shall remove all structures and improvements placed upon the premises during the period of its reservation. Any such property not removed from the reserved premises within 90 days after expiration of Vendor's reservation shall be presumed to have been abandoned and shall be

presumed to have been abandoned and shall become the property of the United States of America, but this shall in no way relieve Vendor of liability for the cost of removal of such property from the reserved premises.

13. Disputes concerning performance under the terms of this reservation shall be determined by the Secretary of the Interior or his duly authorized representative in a manner consistent with due process of law.

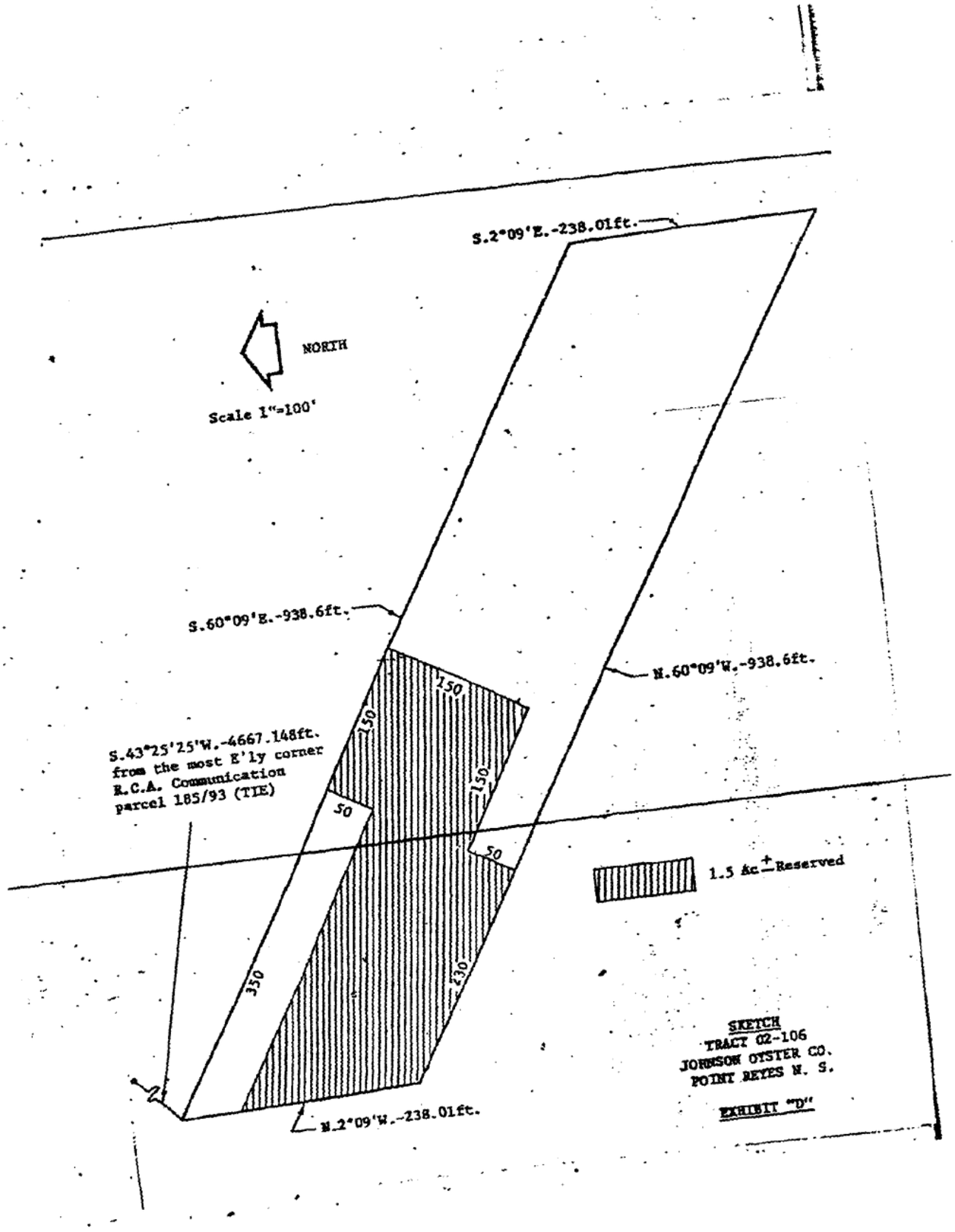
14. Should Vendor elect to dispose of any unused portion of the remainder of its reserved occupancy, the United States of America shall be afforded a right of first refusal to acquire the same.

15. A special use permit will be issued by the Director to Vendor for public interpretation of oyster cultivation by Vendor or adjacent premises, effective concurrently with Vendor's reservation.

16. Vendor shall keep the reserved premises open to the public for the interpretation of oyster cultivation and processing.

17. Vendor, its successors and assigns, shall pay the possessory interest tax during the term of use and occupancy.

18. Vendor cannot conduct a restaurant operation on the premises without prior written approval of the Director.


S.2°09'E.-238.01ft.
NORTH
Scale 1"=100'
S.60°09'E.-938.6ft.
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150
150
150
50
50
350
430
S.43°25'25"W.-4667.148ft.
from the most E'ly corner
R.C.A. Communication
parcel 185/93 (TIE)
1.5 ac± Reserved
N.2°09'W.-238.01ft.
SKETCH
TRACT 02-106
JOHNSON OYSTER CO.
POINT REYES N. S.
EXHIBIT "D"

(B)

Form 10-114
Rev. Aug. 86
OMB No. 1024-0026

UNITED STATES DEPARTMENT OR THE INTERIOR
National Park Service

Special Use Permit

Name of Use Parking and Launching Space

Date Permit Reviewed 19__ _____
Reviewed 19__ _____
Reviewed 19__ _____
Expires 1997 Nov. 15

Long Term X
Short Term _____

Permit # WRO (Region) PORE (Park) 6000 (Type) 306 (No #)
Point Reyes National Seashore
Name of Area

Johnson Oyster Co. (Name or Permittee) of P.O. Box 68, Inverness, CA 94937 (Address) (415) 669-1149 (Phone)

is hereby authorized during the period from (Time 12:01a.m. day 15 Month 11 19 92), through (Time 11:59 p.m. day 14 Month 11 19 97), to use the following described land or facilities in the above named area:

Two and two tenths (2.2) acres of tract 02-106 as shown on the attached sketch as agreed in discussions during meetings relative to acquisition and the reservation of a portion of Tract 02-106.

For the purpose(s) of: To continue providing parking space for Seashore and Johnson Oyster Co. visitors, including an area for launching canoes, kayaks or other non-motorized boats.

Authorizing legislation or other authority (RE- NPS-53 Appendix 1):

NEPA Compliance: CATEGORICALLY EXCLUDED X EA/FONSI ___ EIS ___ OTHER APPROVED PLANS ___

PERFORMANCE BOND: Required ___ Not Required X Amount $ _____

LIABILITY INSURANCE: Required X Not Required ___ Amount $100,000.00

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $ 250.00 semi-annually.

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE _____ _____
Signature Date

Authorizing Official _____, _____ _____
Signature Superintendent Date

Additional Authorizing Official (If Required) _____, _____ _____
Signature Title Date

CONDITIONS OF THIS PERMIT

1. The permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all applicable laws and regulations of the area.

2. Damages - The permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the permittee is authorized to make of the land described in this permit.

3. Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this permit or derive, either directly or indirectly, any pecuniary benefit to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company, if the permit be for the benefit of such corporation.

4. Assignment - This permit may not be transferred or assigned without the consent of the Superintendent, in writing.

5. Revocation - This permit may be terminated upon breach of any of the conditions herein or at the discretion of the Superintendent.

6. The permittee is prohibited from giving false information, to do so will be considered a breach of conditions and be grounds for revocation: [Re: 36 CFR 2.32 (4)].

7. Permittee will comply with applicable public health and sanitation standards and codes.

8. The following provisions constitute Condition 4 in accordance with Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967.

NONDISCRIMINATION. If use of the resource covered by their permit will involve the employment by the permittee of a person or persons, the permittee agrees as follows:

(a) The Permittee will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The permittee will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Permittee agrees to post in conspicuous places, available to employees and applicants for employment notices to be provided by the Superintendent setting forth the provisions of this nondiscrimination clause.

(b) The Permittee will, in all solicitations or advertisements for employees placed by or on behalf of the Permittee, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(c) The Permittee will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Superintendent, advising the labor union or workers' representative of the Permittee's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, as amended, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Permittee will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Permittee will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the Superintendent and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Permittee's noncompliance with the nondiscrimination clauses of this permit or with any of such rules, regulations, or orders, this permit may be cancelled, terminated or suspended in whole or in part and the Permittee may be declared ineligible for further Government contracts or permits in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of labor, or as otherwise provided by law.

(g) The permittee will include the provisions of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontract or purchase order as the Superintendent may direct as a means of enforcing such provisions including sanctions for noncompliances: Provided, however, that in the event the Permittee becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Superintendent, the Permittee may request the United States to enter into such litigation to protect the interests of the United States.

Append Special Park Conditions

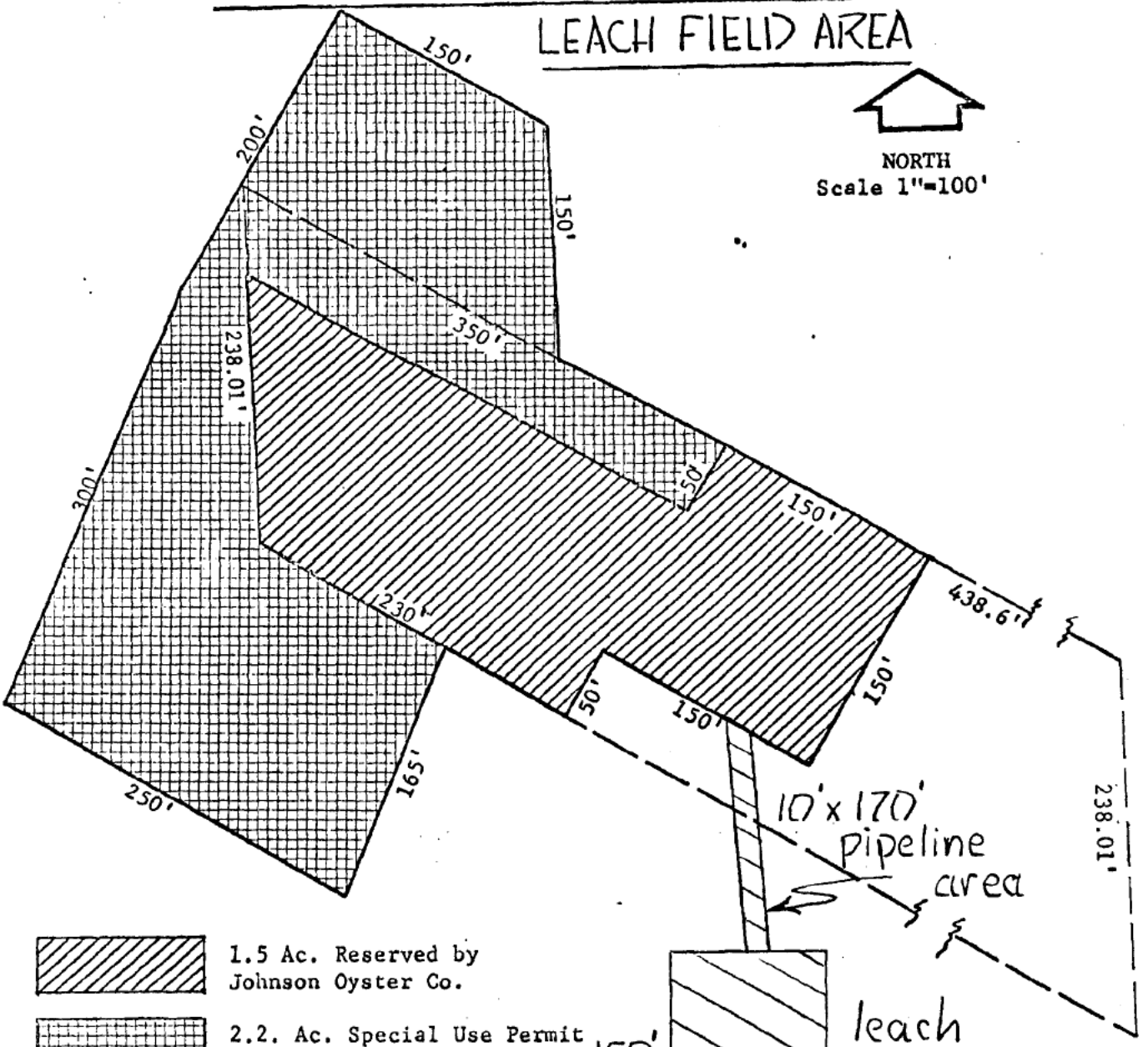
9. The issuance of this permit does not convey any right, title, interest or estate in or to the land covered by the permit.

10. This permit may be reissued for additional periods providing the land is not needed for Park purposes and the permit has not been terminated for a breach of conditions.

11. Permittee agrees to pay the Marin County Possessory Use Tax, if applicable, or other taxes if properly assessed by the County or the State.

12. Permittee agrees to meet State or County environmental requirements and requirements imposed by the California Coastal Zone Conservation Commission.

SEPTIC SYSTEM PIPELINE AND LEACH FIELD AREA



SKETCH
Reserved area and special use permit Johnson Oyster Co. Point Reyes N. S.

I

State of California—Health and Human Services Agency

Department of Health Services

California Department of Health Services

SANDRA SHEWRY
Director

DRAFT

ARNOLD SCHWARZENEGGER
Governor

August 18, 2006

TO: DRAKES BAY OYSTER COMPANY

SUBJECT: 12-YEAR SANITARY SURVEY REPORT: SHELLFISH GROWING AREA CLASSIFICATION FOR DRAKES ESTERO, CALIFORNIA

The 12 year Sanitary Survey Report for Drakes Estero is enclosed for your information. There is a 30-day comment period, which will conclude on Friday, September 15, 2006. Please submit any comments to me. If you have any questions or need more information on this subject, please call me at (510) 412-4633.

Sincerely,

Jill Baltan

Jill Baltan
Environmental Scientist
jbaltan@dhs.ca.gov
850 Marina Bay Pkwy.
Richmond, CA 94804

Technical Report **#06-13**

SANITARY SURVEY REPORT
SHELLFISH GROWING AREA CLASSIFICATION
FOR
DRAKES ESTERO, CALIFORNIA

California Department of Health Services
Division of Drinking Water and Environmental Management
Environmental Management Branch

Prepared by

Jill Baltan
Environmental Scientist
Preharvest Shellfish Unit

August 2006

SANITARY SURVEY AND SHORELINE SURVEY
DRAKES ESTERO LEASE: M-438-01 & M-438-02

I. EXECUTIVE SUMMARY

This is the 12-year Sanitary Survey Report for Drakes Estero Aquaculture Leases M-438-01 and M-438-02, located in the Point Reyes National Seashore. These state leases are issued to Mr. Kevin Lunny, Drakes Bay Oyster Company, by the California Department of Fish and Game. The Sanitary Survey Report is issued in conformance with the requirements of the National Shellfish Sanitation Program Model Ordinance (2003). The National Shellfish Sanitation Program requires that a Sanitary Survey be performed by the shellfish authority prior to the classification of the growing area for harvest of shellfish for human consumption, and then at least every 12 years thereafter. In California, this authority is the California Department of Health Services, Environmental Management Branch, Preharvest Shellfish Sanitation Unit.

The Sanitary Survey is the written evaluation report of all environmental factors, including actual and potential pollution sources, which have a bearing on water quality in a shellfish growing area. The Sanitary Survey Report includes the data and results from a shoreline survey, a survey of bacteriological water quality, an evaluation of the hydrographic, meteorological, and geographic characteristics, and an analysis of all these data. The results of this evaluation and analysis are used to determine the appropriate growing area classification.

Drakes Estero, Marin County, California, is located within the Point Reyes National Seashore, approximately 50 miles northwest of San Francisco. A single oyster farm has operated in the Estero since 1954. Johnson's Oyster Company was a family run business in Drakes Estero from 1954 until 2005. A significant development since the last sanitary survey was the purchase of the oyster company in January 2005 by a local rancher, Kevin Lunny, who now owns the California Department of Fish and Game leases. The name of the business was changed to Drakes Bay Oyster Company. The oyster company operates in the Estero on two state aquaculture leases with a combined area of 1,060 acres.

Most of the leased area in the Estero is classified *Conditionally Approved*, except for two areas. There is a 25 acre portion near the mouth of the Estero that is classified *Approved*. Also, there are several areas in the Estero that are functionally classified *Prohibited*. A small area immediately offshore from the Drakes Bay Oyster Company plant is classified *Prohibited*, and the inner reaches of three of the bays in Drakes Estero are not classified and therefore considered *Prohibited*. There are two rainfall thresholds for the *Conditionally Approved* areas. The majority of the *Conditionally Approved* area is closed for 3 days after more than 0.75 inch of rain falls within a 24-hour period. Inner Schooner Bay is closed for 7 days after more than 0.7 inch of rain falls within a 24-hour period.

Drakes Estero and its watersheds are contained entirely within the Point Reyes National Seashore. The Estero is recognized as one of the most pristine estuaries on the west coast. There is no urban or industrial development and very few people reside within its watersheds. Therefore the pollution impacts to Drakes Estero are minimal compared to

some other shellfish growing areas in California. Drakes Estero contains the only growing area with an *Approved* classification in the state. The pollution sources are solely non-point sources. The most significant potential non-point source of pollution is rainfall runoff from cattle pasturelands in the watershed. Other potential sources include waste from the local sewage systems, waste from wildlife, and overboard discharges from recreational boat use.

Beef and dairy cattle ranches surround the Drakes Estero shoreline. There are approximately 1000 cattle in the Drakes Estero watershed, with some animals coming very close to the shoreline. During storm events, rainfall from cattle pastureland enters the Estero either directly (e.g., hillside runoff) or indirectly (e.g., via a tributary to the Estero). Most of the microbiological pollution found in Drakes Estero is observed after rainfall events and presumably can be traced back to cattle that occupy the surrounding watershed. Tributaries discharge into the Estero at the inner reaches of its four bays, and these are the areas most impacted after rainfall events.

Potential impact from humans associated with Drakes Bay Oyster Company has decreased since the mid-1990s. In the mid-1990s the septic system could not meet the capacity of the approximately 90 people who lived on-site, and the leach field reportedly failed. A new septic system was installed in 1998 that has an increased capacity, and the number of employees who reside on the property has decreased significantly. In addition, a second septic system was installed in 2005 that collects waste from the plant operations. Therefore, the oyster company has significantly reduced the impact from its own operations.

There is a large migrant population of birds that utilize the Estero during the winter. It is difficult to assess the impact of birds on water quality in shellfish growing areas, but results from fecal coliform monitoring suggest that impacts from birds are minimal. A significant number of harbor seals haul out onto Drakes Estero mudflats during pupping season in spring and early summer months.

Recreational use of Drakes Estero has increased in the last 12 years. Specifically, there are more kayakers that put in and paddle in the Estero. Results from monitoring suggest that kayakers have minimal impact to the Estero. However, fecal discharge from boats is usually sporadic and unpredictable and therefore difficult to monitor. In addition, discharges from boaters impose a more significant threat to water quality because of their direct contact with the oysters and because human waste has greater potential to contain harmful pathogens.

During the 2005-2006 winter season there were several incidences of elevated fecal coliform concentrations during open harvest conditions in three of the bays in Drakes Estero. Three potential sources were identified as possible origins of the contamination. These sources were higher than average runoff due to the extreme amount of rainfall that occurred from January to April 2006, changes in cattle grazing practices in the Home Bay watershed, and faulty septic systems at the Home ranch complex located at the head of Home Bay. At the end of April 2006, the National Park Service abandoned the septic

system at the main house and capped the effluent line for a second system. Based on estimates of bacterial and viral die-off rates, Home Bay was closed for three weeks after the system was capped. Samples collected from Home Bay on May 30, 2006 showed that water quality in Home Bay was within NSSP limits, and Home Bay was reopened for harvesting. The National Park Service is working with cattle ranchers to improve the cattle management practices in the Point Reyes National Seashore. Some management practices have been implemented which help keep cattle away from waterways during wet weather months. More of these practices should be implemented to keep cattle away from the shoreline, specifically during months of rainfall. Historic data from Drakes Estero shows that water quality is more heavily impacted during periods of heavy rainfall. More rainfall related data should be collected to determine whether a cumulative rainfall threshold should be established.

Results from water quality sampling at all primary sample stations show that the *Conditionally Approved* growing areas consistently meet National Shellfish Sanitation Program classification standards during open periods. The *Approved* growing area also meets National Shellfish Sanitation Program standards for its classification.

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Abbreviations

This document contains numerous acronyms and abbreviations. In general, an abbreviation will be given in parentheses ( ) following the first time a title or term is used, and the abbreviation will be used in almost all cases in place of that term later. The following alphabetical list of abbreviations used in this document is provided for the convenience of the reader:

CDFG = California Department of Fish and Game
CDHS = California Department of Health Services
CDHS/FDB = California Department of Health Services, Food and Drug Branch
CDHS/PSSU = California Department of Health Services, Preharvest Shellfish Sanitation Unit
DBOC = Drakes Bay Oyster Company
FC = Fecal coliform bacteria
g = grams
JOC = Johnson Oyster Company
mL = milliliters
MPN = Most probable number
NPS = National Park Service
NSSP = National Shellfish Sanitation Program
PRNS = Point Reyes National Seashore
WQ = Water quality

ACKNOWLEDGMENTS

CDHS would like to acknowledge the assistance of the following agencies and individuals that provided assistance in compiling information for this report:

California Department of Fish and Game
California Regional Water Quality Control Board, San Francisco Bay Region
Marin County Department of Community Development Services
Marin County Environmental Health Services
National Park Service
Point Reyes National Seashore
Point Reyes Bird Observatory
University of California Cooperative Extension

III. DESCRIPTION OF THE GROWING AREA

A. LOCATION AND SITE DESCRIPTION

Drakes Estero is located in western Marin County, California, approximately 50 miles northwest of San Francisco (Figure 1). The Estero mouth is located at the Estero's south end, and opens into Drakes Bay. Drakes Estero has the appearance of an open hand with a main body that is connected to four bays. From west to east the bays are: Barries Bay, Creamery Bay, Schooner Bay, and Home Bay (Figure 2). Drakes Estero covers about 2.8 square miles at high tide. Drakes Estero is characterized by relatively shallow water; low tide reveals several expanses of mud and sandy flats within the center of the main body as well as along the shoreline. In the body of the Estero, trending north-south, is a main channel that eventually leads to the Estero mouth. The deepest waters in the Estero are located in the main channel (23 - 26 feet) (Anima, 1991). In the northern portion of the main body and in the bays there are extensive beds of eelgrass (Elliott-Fisk et al. 2005).

(b) (5)

Drakes Estero and Estero de Limantour share a mouth and are therefore considered a single estuarine system. These two esteros also have a single watershed system, which is called the Drakes Estero watershed (Figures 3). The Drakes Estero watershed has a total area of approximately 31 square miles, including the Estero (Figure 3). Its watersheds lie entirely within the park boundaries of the Point Reyes National Seashore (PRNS), which is part of the National Park Service (NPS). Several perennial streams discharge into the Drakes Estero watershed system. Major streams are Laguna, Muddy Hollow, Glenbrook, Main Home Creek, East and North Schooner and Creamery Creeks. Minor watersheds are Limantour, North Home Ranch and Barries Bay Creek (Brannon Ketcham, NPS, pers. comm.) (Figure 4). The Estero is surrounded by ranches, but its watershed includes wilderness area (Figure 3).

(b) (5)

Shell mounds near the Drakes Estero shoreline bear evidence that there has been shellfish harvesting from the Estero for thousands of years (Stewart & Praetzellis, 2003). Shellfish mariculture has occurred in the Estero at least since the 1930s. Drakes Estero is one of the largest commercial shellfish aquaculture areas in California. One certified commercial harvester operates in Drakes Estero, the Drakes Bay Oyster Company (DBOC). It grows and harvests shellfish on two state aquaculture leases that consist of 1060 acres (Table 1). The state water bottom leases issued to DBOC cover a large portion of Drakes Estero, including a portion of the four bays: Barries Bay, Creamery Bay, Home Bay, and all but the central channel of Schooner Bay (Figure 5). The leases are granted by the California Fish and Game Commission and administered by the California Department of Fish and Game (CDFG). Current production is entirely Pacific oysters (*Crassostrea gigas*). The methods of culture are submerged lines and bottom bags. Submerged lines are suspended from racks and bottom bags are placed on shallow mudflats. Both racks and mudflats are designated as oyster 'beds'. Shellfish product is sold both in the shell and as shucked product. The approximate locations of individually numbered oyster beds are shown in Figure 5. These beds are currently used by DBOC, other beds in the Estero are inactive and not shown on the map.

(b) (5)

The onshore facilities of DBOC are located on the northeastern end of Schooner Bay. These facilities occupy five acres of land that are within the boundaries of the Point Reyes National Seashore (PRNS). Johnson Oyster Company (JOC) was granted a lease by the National Park Service for use of the onshore property through the year 2012. After Mr. Lunny purchased the mariculture company from the Johnsons he removed several of the buildings on the property. There are currently four structures associated with oyster harvesting and production, and five residential structures on the property.

B. CLASSIFICATION HISTORY

Six companies have farmed oysters in Drakes Estero since 1934. The original leased area contained 6000 acres and included Estero de Limantour (Tom Moore, CDFG, pers. comm.). By 1955 the leased area had decreased to 2130 acres. Johnson's Oyster Company was the sole oyster company in Drakes Estero from 1954 until January 2005 when the business was sold to Kevin Lunny. In December 2005 the sale of JOC to Mr. Lunny was completed and the name of the business changed to Drakes Bay Oyster Company.

(b) (5)

In 1972 the National Park Service (NPS) purchased the five acres occupied by the land-based portion of JOC's business. Since then the oyster company has leased the property from NPS and has the option to continue doing so until 2012. Parts of PRNS are wilderness and the remainder is potential wilderness. The land-based portion of DBOC is classified by NPS as potential wilderness. Legislature has appointed NPS to convert potential wilderness areas to wilderness when possible. However, it has also encouraged continuation of farming practices already in existence. If the land-based portion of DBOC and the submerged portion of Drakes Estero are converted to wilderness in 2012, oyster mariculture may no longer be permitted.

The California Department of Health Services (CDHS) originally classified shellfish growing waters in Drakes Estero in 1982, when it was established that portions of the Estero were subject to intermittent microbiological pollution. It was determined that the major source of contamination came from dairy operations located in the immediate watershed, above Schooner and Home Bays. The pollution from these sources occurred primarily during rainstorms. Therefore, in 1982 most of the Estero was classified as *Approved*, while Schooner and Home Bays were classified as *Conditionally Approved*.

(b) (5)

In spring 1991, a verbal agreement between NPS and JOC was established whereby the oyster company agrees to minimize harvesting and planting activities during the harbor seal pupping season that occurs during spring and early summer months. DBOC limits its summer harvesting and planting in the *Approved* area located in the outer Estero (Figure 5).

In 1994, the entire Estero was reclassified to *Conditionally Approved* because coliform data showed that primary water quality (WQ) stations in the Estero were impacted by rainfall related pollution. The Estero was closed to harvesting when rainfall exceeded

0.75 inch within a 24-hour period; the closure period was three days (72 hours) (Hansgen, 1994). A small area immediately offshore from the JOC plant remained classified *Prohibited.*

In 1995, the shellfish grower was given the responsibility of performing the monthly compliance water quality sampling in the shellfish growing areas (Gomsi, 1995). In accordance with a signed sampling plan from 1995, DBOC conducts its own sampling of the shellfish growing water and samples are analyzed at a State certified laboratory. Environmental Management Branch (EMB) staff provides training for samplers and monitors sampling activity of Drakes Bay Oyster Company.

In 1995, the inner reaches of Home, Creamery and Barries Bays were declassified to unclassified. Areas that are not classified are considered *Prohibited.* This was done because water quality sample sites 10, 11, and 12 in the inner reaches of Home, Creamery and Barries Bays, respectively, exceeded National Shellfish Sanitation Program (NSSP) criteria during open harvest conditions (Gomsi, 1995).

In 1997 JOC converted from sampling under the Adverse Pollution Conditions (APC) strategy to the Systematic Random Sampling (SRS) strategy. This change facilitated CDHS's ability to audit the self-monitoring program that was implemented in 1995. It also helped ensure that water quality samples were collected each month (Gomsi & Langlois, 1998).

CDHS worked with JOC to determine whether a portion of the main body of the Estero might be suitable for reclassification to *Approved.* Two new stations (WQ stations 16 and 17) and two existing stations (WQ station 13 and 14), located in the middle of the Estero, were sampled under adverse pollution conditions from 1994 to 1997. Results from this sampling showed that the body of the Estero has very good water quality. Water samples collected from station 17 had a geometric mean of 4, and one of 18 samples exceeded a fecal coliform (FC) concentration of 43 most probable number (MPN). Water samples collected from WQ 13 had a geometric mean of 4 and two of 59 samples exceeded the concentration of 43 MPN. Other sites in the body also had very good water quality, and it was recommended that sampling be continued at these sample sites to "better define the relationship between water quality and rainfall at these sites" (Gomsi and Langlois, 1998). A 25-acre parcel located in the outermost portion of the growing area was reclassified to *Approved* in January 1998. This site is represented by water quality station 17 (Figure 5).

In 1999 it was determined that fecal coliform concentrations in the inner portion of Schooner Bay increased beyond acceptable limits with rainfall less than the 0.75 inch threshold and did not decrease within the three day closure period. A second rainfall threshold was established for inner Schooner Bay, represented by water quality station 8 (Figure 5). The new rainfall threshold was .7 inch of rainfall in a 24-hour period and the new closure period was seven days (Langlois, 1999).

The current classification status of the Estero is as follows: the majority of the Estero is classified as *Conditionally Approved*, with two rainfall thresholds. One threshold (0.7

inch) is for inner Schooner Bay and the other (0.75 inch) is for the remaining portion of the *Conditionally Approved* areas in Drakes Estero. There are several small portions of the Estero that are classified as *Prohibited*; a 50-foot radius around the oyster plant in inner Schooner Bay and the inner reaches of the three other bays. A 25-acre portion is classified *Approved* near the mouth of the Estero (Figure 5).

IV. POLLUTION SOURCE SURVEY

Drakes Estero is recognized as one of the most pristine estuaries on the west coast. However, it is potentially impacted by intermittent pollution from several non-point sources. The following is a description of fecal contamination from potential point and non-point sources that may impact the water quality of Drakes Estero.

A. POTENTIAL NON-POINT SOURCES

(b) (5)

"Non-point sources" of pollution are those sources that cannot be attributed to a specific discharge location. Sources of pollution that can be attributed to a specific site or location are known as "point sources". The sources of pollution that adversely affect water quality in Drakes Estero are non-point sources.

1. Runoff from Cattle Pasture Land.

(b) (5)

Drakes Estero is surrounded by ranches that have been in operation for over 100 years. These ranches are located on PRNS land, and operate under Special Use Permits administered by NPS. The ranches are designated historical landmarks, and are recognized for their contribution to local commerce as well as to the area's cultural history (Statement for Management, 1993).

(b) (5)

There are nine cattle ranches located in the Drakes Estero watershed (Table 2, Figure 3). The ranches contain primarily beef cattle with some dairy cattle. No dairy or other confined animal waste ponds are located in the Estero watershed, and have not been in the watershed for at least two decades. The old dairies that were located in the Drakes Estero watershed were converted to cattle operations many years ago. Dairies are thought to contribute more pollution than cattle ranch operations, therefore it is expected that this transition has decreased the amount of pollution entering the Estero. The last dairy in the Drakes Estero watershed, D Ranch, closed in 1998 (Brannon Ketcham, NPS, pers. comm.), although its dairy barn and pond were located outside of the Estero's watershed. It now operates as a cattle ranch. The E Ranch, which borders portions of Barries Bay and Creamery Bay, is a holding area for dairy cattle; the actual dairy facilities are located at the A Ranch, which is located outside of the Estero watershed on the Point Reyes peninsula. Rainfall runoff from cattle pastureland enters the Estero as hillside runoff and via the tributaries. Table 2 lists acreage and the number of animals for each operation in the watershed.

(b) (5)

There are approximately 1000 cattle in the Drakes Estero watershed. Cattle are responsible for the majority of the microbial pollution found in Drakes Estero. Distributions of fecal coliform concentrations in Drakes Estero correlate with distribution of cattle. Highest fecal coliform concentrations were found in Schooner Bay and the Schooner Bay watershed contains the greatest number of cattle (approximately 500 cattle). The watersheds of the other three bays contain about 100-200 cattle each. Variations in fecal coliform densities observed in these three bays may be explained by proximity of cattle to the tributaries and shoreline of each of the bays.

Grazing practices have an immediate effect on water quality in Drakes Estero. Fecal coliform produced by cattle located higher in the watershed adhere to soil particles as it travels through the watershed towards the tributaries or the Estero. Increased retention time in the watershed allows for increased die-off and lower pathogen concentrations reaching the Estero. In contrast, fecal coliform produced by cattle located in or near the tributaries or the shoreline enter directly into the Estero without being abated. Cattle are frequently observed along the shoreline of Drakes Estero, and are also known to enter some of the creeks. This is probably one of largest impacts to Drakes Estero water quality.

(b) (5)

Some ranchers in the Drakes Estero watershed have implemented best management practices (BMPs), including Kevin Lunny, whose family owns the historic G ranch that borders part of the northwest corner of the Drakes Estero shoreline. Some of the actions implemented by the ranchers include fencing streams to keep cattle out, and, in the rainy season, directing grazing away from pasturelands close to waterways. It is expected that these types of management practices will help improve water quality in Drakes Estero. It is anticipated that future resource management projects will be implemented in the Drakes Estero watershed and that NPS will be involved in their execution.

(b) (5)

2. DBOC Septic Systems.

Very few residences are located in the Drakes Estero watershed and all are served by onsite sewage disposal systems (e.g., septic tank and leach field systems). Historically (since the 1970s) the system of greatest concern has been the one located at the DBOC facility itself at the head of Schooner Bay. The system had a history of failure, but in the last decade several improvements have made their waste collection system significantly more effective. A new septic system was installed in 1998, which has a larger capacity than the previous one, and the number of people residing on the property decreased from ninety (in the 1990s) to nine (as of February 2006). In addition, DBOC installed a separate septic system in 2005 to collect the commercial waste produced by plant operations (primarily shucking).

The current septic system, installed in 1998, serves the residential facilities and the public restroom, and has a 27-bedroom capacity. In the late 1980s and early 1990s the number of people residing on the property increased significantly, which led to the failure of the septic system in 1994. Now there are five residential structures: two wood framed structures and three trailers, with 12 bedrooms and approximately nine people residing on the property. The leach field is located east of the septic tank, approximately 3000 feet away at an elevation of 260 feet (Kevin Lunny, DBOC, pers. comm.). The leach field consists of 2400 linear feet and has four zones that are manually switched every three months. The system has a serial overflow design. The County of Marin requires that the system be inspected by a registered sanitarian on a quarterly basis as prescribed by its Operating Permit (Armando Allegria, Marin County Environmental Health Services, pers. comm.).

All plant wastes were discharged into the Estero via a holding pond until 2005. A second septic system was installed in 2005 to collect commercial wastewater that is generated. The leach field for this new system is located in the reconditioned old field used by JOC's original septic system (prior to 1998). Three drains in the plant bring waste to this system: in the temporary shucking container, in the plant, and in the future retail area.

3. Industrial Wastes

No industrial wastes enter Drakes Estero, with the minor exception of non-hazardous wastewater associated with oyster washing from the DBOC plant itself. Waste water from the oyster washing and shucking operations was previously disposed into a sump, approximately 50 feet north of the plant, which was installed under a waiver from the California Regional Water Quality Control Board, San Francisco Bay Region. In summer 2004 the California Department of Health Services, Food and Drug Branch (CDHS, FDB) ceased shucking operations at the JOC shore facility. JOC temporarily moved its shucking operations to Santa Rosa, California, but shucked there for less than a year. All shucking operations ceased from summer 2005 until February 2006. DBOC has resumed shucking in a portable building, and the wastewater enters the dedicated septic system. DBOC intends to resume shucking in the original plant, but will have to complete the permitting process required for renovating the building's structure before it can.

(b) (5)

The company still brings harvested oysters from the Estero and washes them at the facility during open harvest conditions. The wastewater from this activity reenters Inner Schooner Bay adjacent to the dock, which is within the closure zone. When Inner Schooner Bay is closed, but the outer Estero is open, DBOC washes harvested oysters on-site in the growing area.

A small *Prohibited* area was established at the upper end of Schooner Bay because of the residential units, the commercial operations, and the on-site septic system. This area extends approximately 50 feet outward in all directions from the shucking plant loading area. The *Prohibited* zone was established to prevent the use of these near-shore waters for wet storage or relaying due to the possibility of accidental contamination from the on-shore facilities. While the potential pollution produced at the shoreline facilities has been effectively contained, there is still considerable human, animal (pets) and boat traffic in the area, and CDHS/PSU considers it prudent to maintain the *Prohibited* status of the 50-foot radius around the plant. Sampling station 8 (Figure 5) is located outside the *Prohibited* area within the inner Schooner Bay *Conditionally Approved* area at the former water intake pipe for the shucking plant.

4. Wildlife

(b) (5)

Drakes Estero is a haven for a large number of bird species, particularly during the winter months. The impact of birds on the water quality of Drakes Estero has not been determined but may be a reason for occasional higher fecal coliform counts at some of the stations. Birds may have intermittent impacts on Drakes Estero water quality in winter months, but historically there have been very few occurrences of elevated FC

concentrations during open harvest conditions. This suggests that the impact from birds is insignificant.

Drakes Estero is also home to a substantial population of harbor seals, estimated by the Point Reyes National Seashore (PRNS) to be about 400 to 600 resident individuals, increasing to 1200 - 1500 animals, including pups, during the breeding season from March through July (Sarah Allen, PRNS, pers. comm.). California Sea Lions and Northern Elephant Seals are rare visitors in the Estero, but do occur regularly outside the Estero mouth, primarily around the Pt. Reyes headlands. No specific studies have been made of the coliform contamination from marine mammals, in particular harbor seals, in the Estero. The effect could be significant, at least locally in and near the popular haul-out areas. Impact from these animals would occur during summer months, however and FC concentrations are consistently very low in the summer. The Company has agreed with an NPS request to minimize harvesting and planting activities on the mudflats in the *Approved* area during the harbor seal pupping season (March 1 through June 30).

(b) (5)

The Point Reyes National Seashore supports healthy populations of coastal blacktail deer, coyote, bobcat, rabbits, and numerous other kinds of mammalian wildlife. Their combined impact on water quality in Drakes Estero is considered insignificant.

5. Boats and Other Watercraft.

Drakes Estero is accessible to boats at the DBOC Schooner Bay facility and via Drakes Bay. Access from Drakes Bay is possible only during high tides; the shallow nature of the Estero, and the presence of a sand bar across its mouth, discourage boaters from entering. The only watercraft on the Estero are the DBOC work boats and barges, and an increasing number of canoes and kayaks launched at Schooner Bay. Blue Waters Kayaks is the only kayak company that brings guided tours to the Estero, although private individuals also kayak on the Estero. The kayak company does not rent kayaks to individuals to paddle on the Estero. Blue Waters Kayaks provides its tour groups with education regarding potential threats to public health, and bring bags for customers who may get ill while on the water. In the year 2004-2005 500 kayak groups entered the Estero (Kevin McKay, NPS, pers. comm.). Blue Waters Kayaks does not take tours to the Estero during the harbor seal pupping season, from March 1 to July 1 (John Granatir, owner of Blue Waters Kayaks, pers. comm.). NPS monitors bacteria in the area where the kayakers put their boats in the water at the head of Schooner Bay, north of the plant facility. Water samples are collected and analyzed for total coliform, *Escherichia coli (E. coli)* and *Enterococcus*. Results from this monitoring suggest that kayakers have minimal impact to this particular area. No monitoring is done in the waters where kayakers traverse, however, and fecal and/or oral discharge from boats would be a sporadic and unpredictable occurrence and therefore difficult to monitor.

(b) (5)

B. POTENTIAL POINT SOURCES

There are no point sources of pollution located in the Drakes Estero watershed. No wastewater treatment plants (WWTPs) discharge effluent to Drakes Estero, nor to any

tributaries to the Estero. Therefore, no prohibited areas are established as safety zones around WWTP point source dischargers. Drakes Estero contains no marinas, so no prohibited areas of this type are necessary.

V. HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

A. TIDES

The tides in Drakes Estero are characterized by semi-diurnal inequality. Data collected by the National Ocean Service at Point Reyes show a 10-year mean tidal range (Mean Low Water to Mean High Water) of 3.9 feet, and a diurnal tidal range (Mean Lower Low Water to Mean Higher High Water) of 5.7 feet (NOAA, 1996-2006). The mouth of Drakes Estero is kept perpetually open due to tidal scouring, so tidal exchange is a significant factor in rapidly restoring and maintaining high water quality in the Estero. Flushing rates are highest at the mouth of the Estero, and slowest within the inner reaches of the bays.

B. CURRENTS

Currents in Drakes Estero are tidally driven. The highest currents occur near the mouth of the Estero; and range between 1.08 ft/s and 1.55 ft/s (Anima, 1991). Over a period of years a sand spit forms that extends from the west side of the mouth and projects eastward across the mouth. Once the sand spit is formed, it is scoured away. This causes the location of the mouth to shift over years from west to east and back again (Figure 7). This cycle of generation and destruction takes place over decades, but in a year 262.5 feet of sand can be built up or scoured away (Anima, 1991). Tidal flushing may be significantly effected by the position of the Estero mouth, which may in turn impact water quality.

C. RAINFALL

Total annual precipitation at Point Reyes averaged 24.5 inches a year from 2002-2005 (Figure 8). Precipitation in the region is strongly seasonal and sporadic (storm event controlled), even during the rainy season. The rainy season normally extends from October through April, accounting for about 91 percent of the annual precipitation (Figure 8). Most days during the winter, however, receive little rainfall. The number of days with measurable precipitation (0.01 inch or more) averages only 73 days per year.

D. WINDS

The effects of wind blowing across Drakes Estero can be significant. Strong northerly or southerly winds have been observed to influence tidal flow and height. In addition, wind blowing over some reaches in the Estero can make the water choppy, which can contribute to mixing bottom sediments into the water column.

E. RIVER DISCHARGES

Drakes Estero and Estero de Limantour are considered a single estuarine system because the two esteros share a single mouth leading to Drakes Bay; the waters of these two esteros co-mingle (Figure 2). Therefore they have a single watershed, called the Drakes Estero watershed. The Drakes Estero watershed covers an area of about 31

square miles, of which the Estero itself (3.1 square miles) represents about ten percent. There are several perennial streams and a few ephemeral streams that comprise the Drakes Estero watershed (Figure 4). Major streams are Laguna, Muddy Hollow, Glenbrook, East Home Ranch, East and North Schooner Creek and Creamery Bay Creek. Minor watersheds are Limantour Creek, North Home Ranch and Barries Bay Creek. Some of the creeks drain primarily wilderness areas, while other creeks drain areas used by cattle. Creeks located in wilderness areas have lower fecal coliform concentrations than those utilized by cattle (Ketcham, 2001). Cattle use, as well as the Mt. Vision fire in 1995, have degraded some stream beds. This has resulted in more sediment entering the streams and increased sedimentation in the Estero.

(b) (5)

F. SUMMARY

The circulation of Drakes Estero is almost completely tidally driven. Tidal amplitude may be strongly influenced by strong northerly or southerly winds. Freshwater has very little influence on circulation because the freshwater input is episodic and very small relative to the tidal prism of the Estero and its bays.

During extreme hydrographic conditions Estero water floods into the oyster company's plant area. Extreme high tides (over 6 feet), rainfall and winds can all combine to bring water over the Estero banks and into the DBOC plant area. This occurs once or twice a year (Kevin Lunny, pers. comm.).

VI. WATER QUALITY STUDIES

The National Park Service has performed or supported several research projects either within the Estero itself or in its watershed. The following is a summary of water quality data that has been generated from the Estero or its watershed.

A. WATER QUALITY STUDIES

2001- Point Reyes National Seashore. Water Quality Monitoring Project.
Several creeks in the Drakes Estero watersheds are monitored for fecal coliform concentrations, nutrients and sediments. East Schooner, Home Ranch, Muddy Hollow and Laguna Creeks were monitored from 1999 through 2004, and Creamery Creek was monitored from 2001 through 2004. FC concentrations in creeks located in wilderness areas were an order of magnitude less than FC concentrations in creeks that flow through ranch lands. Creeks located in ranchlands had high fecal coliform concentrations independent of rainfall suggesting that cattle physically enter the creeks. Of the streams that run through pasturelands, Creamery Creek contained FC concentrations at least two-fold higher than Home Ranch Creek or East Schooner Creek.

B. RESEARCH IN DRAKES ESTERO

(b) (5)

Two studies have investigated the potential impacts of oyster farming on the biological communities in Drakes Estero. These studies found that the oyster farming operations and structures do not have a negative impact on the biological communities in Drakes Estero (Elliott-Fisk, et al. 2005, Wechsler, 2005).

B. ANALYSIS OF CDHS WATER QUALITY DATA

1. Water Quality Monitoring Background

Compliance with growing area criteria is determined from bacteriological analyses of water samples collected at each primary sampling station. These data must comply with the fecal coliform standards established in the NSSP Model Ordinance (2003), Chapter IV. The applicant conducted compliance sampling in accordance with a self-monitoring agreement between the grower and CDHS. CDHS/PSU personnel collected additional samples in the growing area and throughout its watershed.

The NSSP Model Ordinance (2003), Chapter IV, states that *Conditionally Approved* areas must meet *Approved* area water quality standards when open to shellfish harvesting for human consumption. This standard is: "The fecal coliform median or geometric mean MPN of the water does not exceed 14 MPN per 100 mL and the ninetieth percentile of the data set consisting of the past three years of data cannot exceed an estimated ninetieth percentile value for FC of 43 MPN/100 mL".

Six primary water quality (WQ) stations represent the *Conditionally Approved* portions of the two leases and one primary water quality station (WQ 17) represents the *Approved* area on lease M-430-01 (Figure 5). At least 30 samples are required from each primary station in the growing areas to determine proper classification. Secondary water quality stations were previously established to help determine the impacts of non point sources of pollution on the shellfish growing areas (Figure 2). The samples analyzed to reevaluate the current growing area classifications were collected from July 1, 2003 through June 30, 2006. In addition approximately 140 samples from the twelve-year period July 1, 1994 through June 30, 2006 were examined. For both the *Conditionally Approved* areas and the *Approved* area, one sample was considered for each month and the designated compliance sample was used when possible. If there were multiple samples in a month and none were distinguished as the compliance sample, then the first sample collected in that month was used for the evaluation. For reevaluation of the current growing area classifications, only data collected during times of open harvest were included for the *Conditionally Approved* areas.

Prior to 1997, samples were collected whenever possible during periods of adverse pollution conditions, such as immediately following a rainstorm that did not exceed the closure threshold, or on the first day of reopening following a rainfall closure. In 1997, JOC began conducting routine water quality monitoring under the NSSP's systematic random sampling (SRS) strategy. Under this system, samples are collected on prearranged dates, which are scheduled well in advance so as not to bias the selection of sampling times. If a given growing area is closed on the scheduled date, then samples are to be collected on the first day of reopening for that area. Sampling in the *Approved* area shall always occur on the scheduled date.

The closed data that were used to calculate the ninetieth percentile were composed of samples that were collected under both the Adverse Pollution Condition Strategy (APC) (1994-1997) and the systematic random strategy (1997-2006). This may influence the analysis if the years when samples were collected according to the APC strategy contain more rain related samples than the years when SRS was used to schedule sample collection. From 1994–2006 there were approximately 60 samples collected during rainfall events (i.e., at least .1 inch of rain fell in a 24-hour period in the previous three days), and these data points are relatively evenly distributed through the twelve years of data.

Samples are collected one foot below the surface of the water in 100 milliliter (mL) sterile bottles. Samples are stored in an insulated container and maintained at 4° Celsius during transport to the laboratory. All samples are assayed for fecal coliform (FC) bacteria. The Sonoma County Public Health Laboratory assayed most samples collected during the study period. This laboratory uses the modified A-1 multiple tube fermentation technique for estimating bacterial density. The reporting unit for this method is the most probable number (MPN) per 100 milliliters (mL) for water and MPN/100 grams (gm) for shellfish samples.

2. Water Quality Monitoring Data Interpretation

Samples collected from July 1, 2003 to June 30, 2006 were analyzed to determine whether the growing area meets its current classifications. Water quality in the *Approved* area meets the NSSP standard for the *Approved* classification. Water quality in *Conditionally Approved* areas in Drakes Estero meets NSSP criteria for samples collected both during open harvest conditions and almost all stations during open and closed harvest conditions (except water quality station 8, which exceeded NSSP criteria for the ninetieth percentile) (Table 3). However, the ninetieth percentile standard in the *Conditionally Approved* areas was exceeded when considering samples that were solely collected during closed harvest conditions (Table 3, Figure 9). These results are expected in an area impacted by rainfall related pollution (e.g. hillside runoff and creek discharge). Observed fecal coliform concentrations were higher in the bays than in the body, and generally higher in the inner bays than in the mid bays. While overall water quality in Drakes Estero is very good, there were incidences of elevated fecal coliform concentrations that occurred during open harvest periods. Most of these incidences occurred during high rainfall events. More rainfall data should be collected to determine whether a cumulative rainfall threshold should be established.

Evaluation of Current Classifications:

Approved area:

The *Approved* area is represented by water quality station 17 (Figure 5). Samples collected during adverse pollution conditions (24-48 hours after rainfall exceeding 0.75 inch in a 24-hour period) have shown that the entire body of the Estero has very good water quality. The geometric means and ninetieth percentiles were significantly below the NSSP standard (Table 3). The *Approved* area meets the requirements for the *Approved* classification.

Conditionally Approved areas:

The three-year geometric means and ninetieth percentiles were significantly below the NSSP standard during open harvest conditions at all primary stations (Table 3). Geometric means and ninetieth percentiles were also determined from samples that were collected during both open and closed conditions. At most sites three-year geometric means and ninetieth percentiles of samples collected during open and closed harvest conditions were also less than the NSSP standard, although higher than those considered solely during open harvest conditions (Table 3). Ninetieth percentile values calculated from closed harvest samples exceeded NSSP standards (43 MPN) at all primary stations. These results demonstrate that the current rainfall thresholds in Drakes Estero are appropriate, and the growing areas meet the requirements of the *Conditionally Approved* classification.

Long-term trends in Drakes Estero Water Quality:

Twelve years of data were examined to evaluate long-term trends in Drakes Estero water quality. Twelve-year geometric means during open conditions were approximately the same as three-year geometric means during open conditions (Tables 3 and 4). Twelve-year ninetieth percentiles during open conditions were higher than three-year ninetieth percentiles at all stations except WQ station 13 and WQ station 7. There was no significant difference between the ninetieth percentile at water quality station 13 in the three-year analysis and the twelve-year analysis. The three-year ninetieth percentile at station 7 was approximately 12.5% higher than the twelve-year ninetieth percentile. During the winter 2005-2006 there was degradation in the water quality in Home Bay; represented by WQ station 7. This may explain why the three-year ninetieth percentile value is higher than the 12-year ninetieth percentile value at WQ station 7. An analysis of trends in fecal coliform data shows that water quality in Drakes Estero is variable, and is subject to periods of degradation.

Continuous ninetieth percentile values determined from open condition samples were calculated in 30 sample increments from 1994 to 2006 and plotted to examine long term trends in fecal coliform concentrations (Figure 10). Under NSSP guidelines, the ninetieth percentile should not exceed 43 MPN. Barries Bay (WQ 4) and Schooner Bay (WQ 8) contained increased concentrations of FC from 1998 to 2001 (Figure 10). Barries and Home Bays contained increased FC concentrations from 2002-2005. These periods may correspond to El Nino events that occurred in 1997-1998 and 2002–2003. Generally, higher than average rainfall is associated with El Nino events that occur along the central California coast. Rainfall records for these years are patchy, so actual rainfall data is not available. If these periods of increased FC concentrations do correspond to El Nino years and higher than normal rainfall it provides evidence that high cumulative rainfall is a factor that has significant impact on water quality in Drakes Estero. The body of the Estero has had consistently very low fecal coliform concentrations for the past twelve years (Figure 10).

In 1998, the ninetieth percentile at water quality station 8 exceeded the 43 MPN standard. It was determined that the rainfall threshold was not properly managing water quality in Inner Schooner Bay. As a result of this exceedance the rainfall threshold for Inner Schooner Bay (represented by water quality station 8) was decreased from 0.75 to 0.7 inches, and the closure period was extended from 3 to 7 days. After the rainfall threshold was changed, the ninetieth percentile at water quality station 8 decreased to values significantly less than the 43 MPN NSSP standard (Figure 10).

FC distributions:

Fecal coliform concentrations are lowest in the body of the Estero and higher in the bays (Figure 11). Mid-bay FC concentrations were usually lower than inner bay FC concentrations (Table 4, Figure 6). Two factors determine FC distributions in Drakes Estero. Hillside runoff and creek discharge introduce FC bacteria into the Estero.

Creeks can receive FC bacteria from runoff or when cattle physically enter the creeks. Tidal exchange is primary factor that flushes FC out of the Estero.

Highest fecal coliform densities were observed in Schooner Bay (represented by water quality stations 8 and 9) (Tables 3 and 4). The second worst water quality has been observed in Barries Bay, but recently the second worst has been Home Bay. Creamery Bay (represented by water quality station 15) has historically had the lowest fecal coliform concentrations of the four bays. Generally, samples from secondary sites in the inner bays are underrepresented.

In the last 12 years, almost all incidences of elevated fecal coliform concentrations (over 43 MPN) were associated with rainfall. Most of these occurred during rainfall closures, but some occurred during open harvest conditions (i.e. high FC concentrations occurred when rain did not cause a closure, or after reopening following a rainfall closure). Most cases of elevated FC concentrations during open conditions occurred in the inner bays, none occurred in the body of the Estero (Figure 11), the others occurred in the mid-bays. Increased concentrations of FC are correlated with increased rainfall. There is also a correlation between fecal coliform concentrations and salinity. Almost all cases of elevated fecal coliform concentrations occurred in water that contained less than 30 parts per thousand salinity. Ninetieth percentile values during closed conditions were four times higher at bay sites than at Estero body sites (Table 3). At all sites in the Estero, lowest fecal coliform concentrations were observed during months with little to no rainfall (June through September) (Figure 11).

Recent Issues in Water Quality:

In winter 2005-2006 there was a significantly higher incidence of elevated FC concentrations during open harvest conditions. They were all associated with rainfall events and they all occurred in the bays of the Estero. It became evident that existing rainfall closure rules were not effectively managing water quality in the Estero's bays. The primary locations impacted were Home and Schooner Bays. It appeared that there was a new source of contamination affecting Drakes Estero. An investigation into the watershed led to the identification of three potential sources: 1) higher than average runoff due to the extreme amount of rain that fell this season, 2) changes in cattle grazing practices in the Home Bay watershed, and 3) faulty septic systems at Home Ranch located at the head of Home Bay.

Northern California received a record amount of rainfall in winter 2005-2006. The average cumulative rainfall from January through April at Drakes Estero is approximately 12 inches, compared to the 20 inches that fell from January through April in 2006. The soil became supersaturated such that very small amounts of rainfall resulted in runoff. An increased amount of runoff will introduce greater amounts of fecal coliform to the Estero.

A different manager is operating the 200 cattle located at Home Ranch. This person has allowed the cattle to come very close to the Home Bay shoreline during winter

months while the previous manager kept cattle away from the shoreline during the rainy season. Cattle close to waterways have a greater impact on water quality than those that are kept further up in the watershed. Practices that keep cattle away from waterways will reduce the manure loading, and therefore decrease the potential for impacts on water quality from grazing live stock. "It has been shown that providing a water trough, as an alternative drinking source, may reduce the instream fecal deposition during the winter by as much as 90 percent" (Moore et al. 1993).

(b) (5)

It was also discovered that the septic system associated with the main house at Home Ranch was failing. The system was already designated for replacement, but the work may not start until late summer 2006 due to the large amount of water in the soil. In the mean time the septic system has been abandoned, the tank has been filled and the waste and effluent lines have been capped off. A portable toilet has been placed at the property and the resident is not able to discharge gray water.

The septic system produces the most alarming threat to the growing areas because human waste has the potential to carry more harmful pathogens than cattle waste. As a result, CDHS applied an automatic three-week closure from the time that the septic system was abandoned to allow for both bacterial and viral die-off. Fecal coliform concentrations in Home Bay on June 1st were less than 1.8 MPN at both water quality stations 7 and 20. Therefore, water quality in Home Bay was within NSSP standards, and the growing area was reopened. The combined impact of rainfall and cattle is an ongoing threat to Drakes Estero water quality.

(b) (5)

VII. CLOSURE CRITERIA

A. RAINFALL CLOSURES

(b) (5)

Drakes Estero is classified for commercial shellfish production in accordance with the National Shellfish Sanitation Program (NSSP) Manual of Operations, Part I, Section C. The majority of the Estero is classified *Conditionally Approved* (Figure 6). The *Conditionally Approved* area is subject to rainfall closure periods in accordance with rainfall closure and reopening rules established in the "Management Plan for Commercial Shellfishing in Drakes Estero, California". There are two different rainfall closures that have been established for Drakes Estero. The demarcation between the two thresholds is water quality station 8 in Schooner Bay. The portion of Schooner Bay north of water quality station 8, and including station 8, will be closed for harvesting of shellfish for human consumption immediately after 24-hour cumulative rainfall of 0.7 inch is exceeded, and will remain closed for seven days. The rest of the *Conditionally Approved* area of Drakes Estero will be closed for harvesting of shellfish for human consumption after 24-hour cumulative rainfall of 0.75 inches is exceeded and will remain closed for three days. The *Approved* portion of Drakes Estero is not regulated by rainfall closure rules, and is always open for harvest, barring an emergency closure.

(b) (5)

B. OTHER CLOSURES

Areas determined to be exposed to chronic pollution sources have been designated as permanent *Prohibited* zones, where shellfish mariculture is always *Prohibited*. These are located in the inner areas of all the bays in the Estero (Figure 5).

Other closures occur during emergency pollution events that adversely affect bay water quality, and will cause a closure of the shellfish growing areas.

VIII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

There are few potential sources of pollution either in Drakes Estero or its watershed, and they are all non-point sources. The primary source of pollution to the Estero comes from fecal waste produced by cattle in the watershed, which is washed into the Estero during times of rainfall. Proximity of cattle to waterways presents one of the largest potential threats to water quality in Drakes Estero. Some cattle management practices have been implemented to help keep cattle away from waterways during winter months. NPS should encourage and assist more ranchers to implement these management practices. Cattle should not have access to the Drakes Estero shoreline. The majority of Drakes Estero has been classified *Conditionally Approved* because of the predictable water quality degradation that occurs following rainfall, and rainfall closures prevent shellfish harvesting from occurring during these times. Water quality in the body of the Estero is least affected by impacts caused by runoff from pasturelands. Sporadic periods of water quality degradation may occur during periods of higher than average rainfall (such as during El Nino years) when rainfall thresholds may not be adequate to ensure safe water quality. More rainfall related data should be collected to determine whether a cumulative rainfall threshold should be established.

B. RECOMMENDATIONS

- Continue with the *Conditionally Approved* and *Approved* Classifications.
- Continue with the Self-Monitoring Plan for Water Quality.

Educational literature should be posted by NPS and DBOC citing the delicate nature of the Drakes Estero ecosystem and should advise the public that no waste should be discharged into the waters of the Estero.

- Perform rainfall related sampling in Drakes Estero to determine whether a cumulative rainfall threshold should be established. Samples should be collected in the outer Estero within 24 hours after the .75-inch rainfall threshold has been exceeded and the seven-day cumulative rainfall total is at least one inch.

The ranchers and NPS should work together to implement cattle management practices that will decrease the manure load entering Drakes Estero. Specifically, cattle should be moved higher into the watershed, and away from creek beds during wet weather months. Additionally, cattle should be kept away from the Drakes Estero shoreline.

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Drake's Estero Oysters
Aquaculture Lease & Seal Haulout Areas

(K)

State Aquaculture Lease
Wilderness Waters
Harbor Seal Haulout
Astragalus pycnostachys
SUP Area - 1.08 Acres
RUP Area 1.5 Acres

Map Location

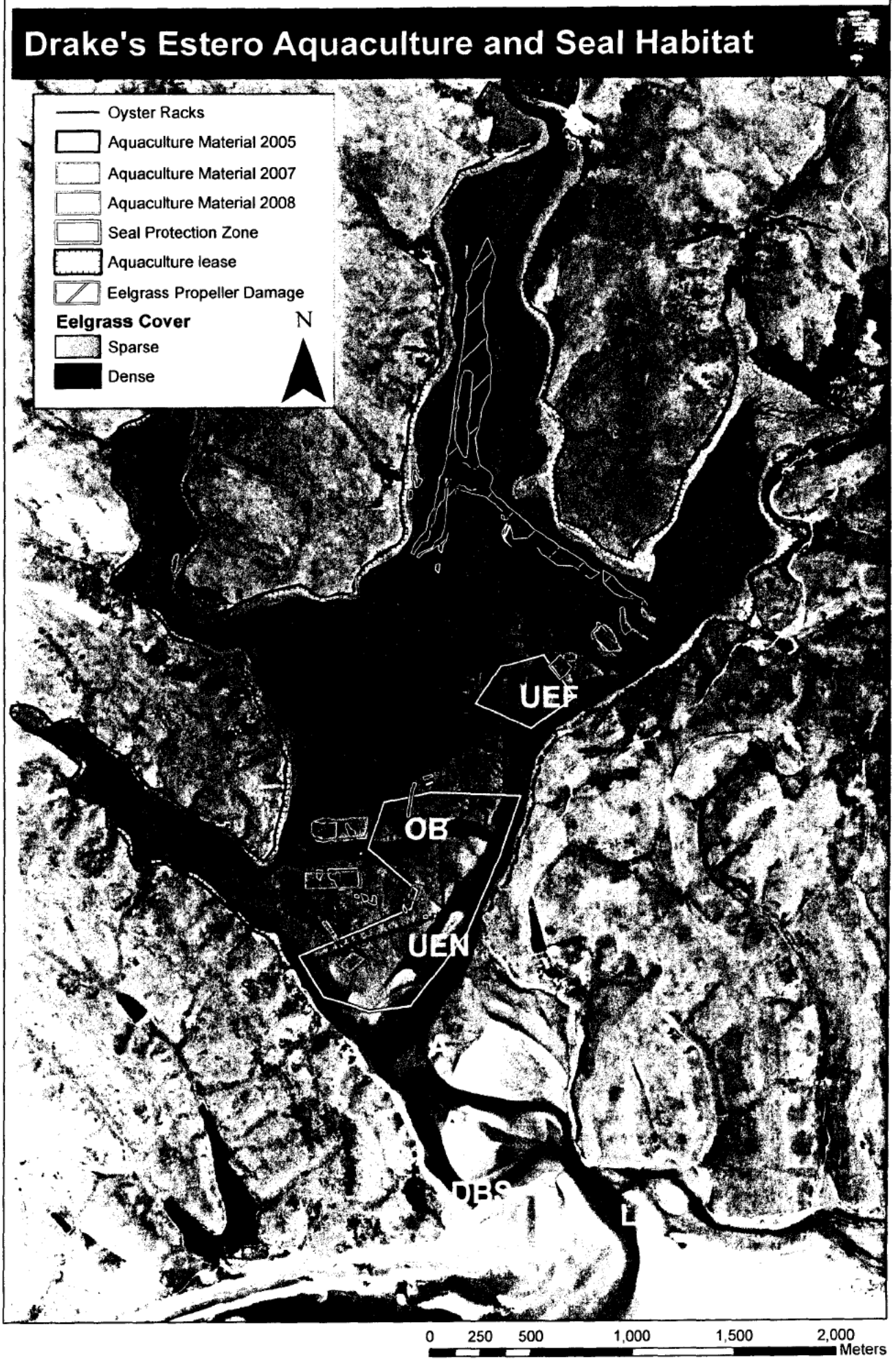
National Park Service
Point Reyes National Seashore
GIS Team

N
W E
S

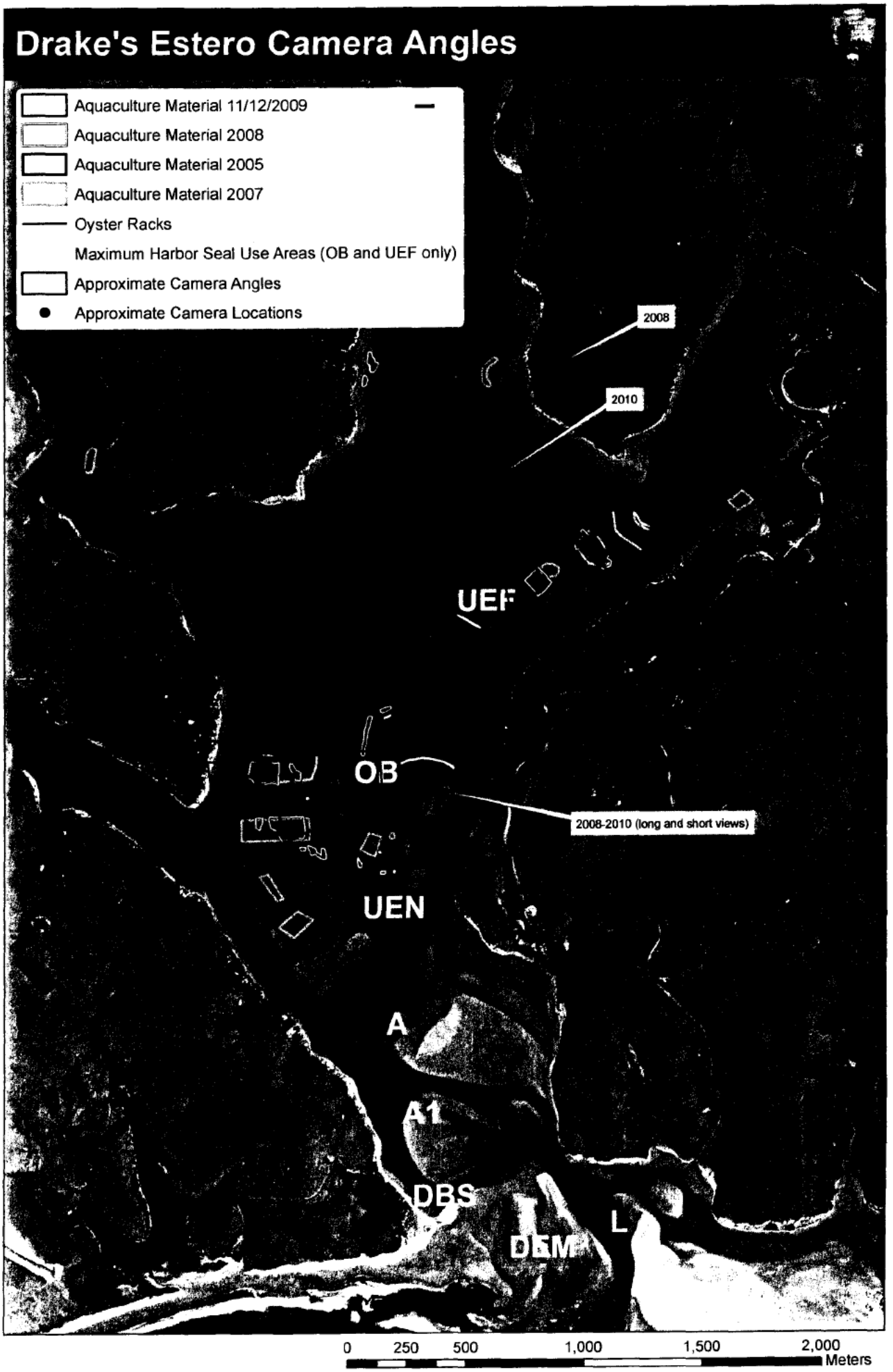
0 0.5 1 Miles

Plot date: May 17, 2005 s:/gis/projects1/Neubad/Johnsons/Drakes Estero Oyster lease & Drakes Estero.mxd

Drake's Estero Aquaculture and Seal Habitat



Drake's Estero Camera Angles



Trip Report
Drakes Estero
4/26/07
3:45-5:00 PM

Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Thursday during the afternoon low tide to count harbor seals for the peak pupping season count.

I arrived at 3:45 PM and began counting the seals at A and A1 sandbars. At 3:50 PM I noted a white boat (@20 ft long) with outboard motor and two people aboard in the east end of the OB seal haul out site. The boat was fowled in eelgrass and the operators were poling through the eelgrass bed. Once half way along the channel going west, they used the engine again. I did not see the number of seals present before the boat was there; however there were only 5 (2 pups) when I began surveying and I saw seal heads in the water. There were seal drag marks on the sand bar indicating other seals may have been present and several fresh wet seals were hauling out on UEN, an adjacent sand bar. Also on previous day 4/25, a volunteer counted 21 (8 pups) on the OB haul out. When the boat went by the seals at 3:55 PM, all flushed into the water except one lone seal. Seals on UEN raised their heads but I did not see any enter the water. The boat continued west along the channel and flushed around 120 Black Brant that were in the eelgrass beds in the channel.

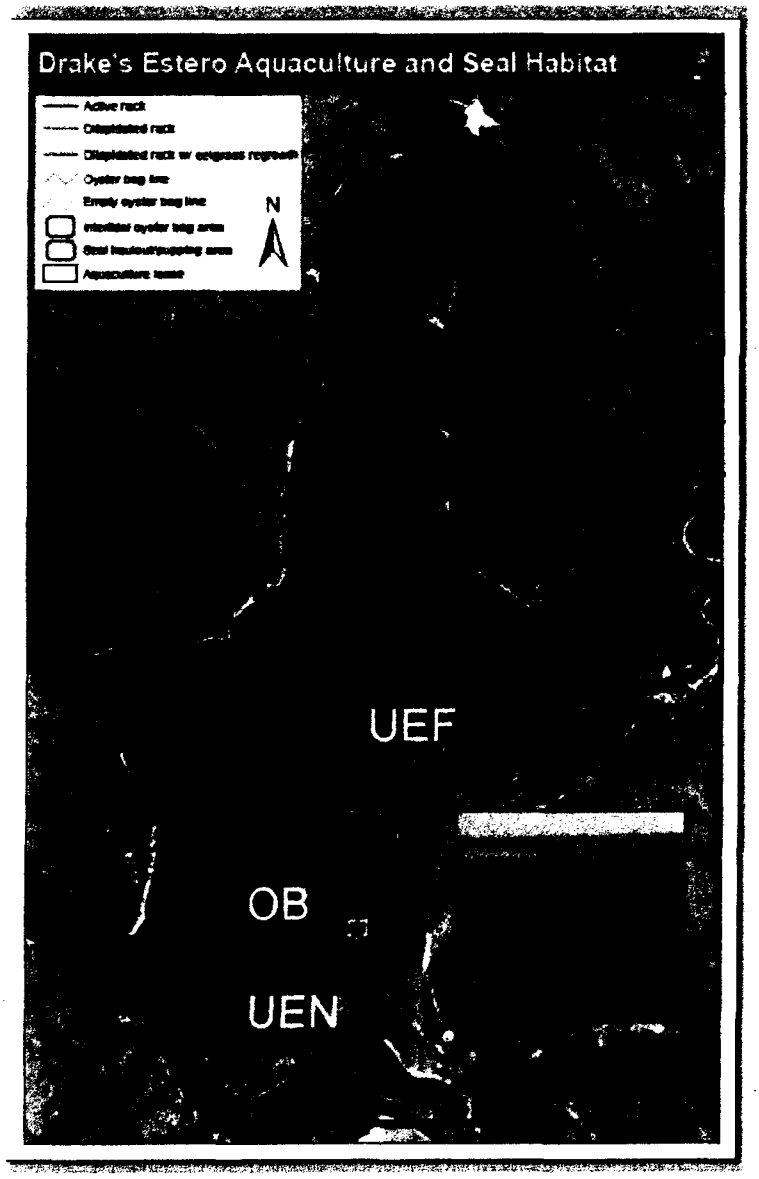
The boat then landed at around 4:10 PM about 2/3 of the way along the channel going west on the OB channel on the north west side where many oyster bags are located. Two men got off the boat, one taller in a green slicker and another in yellow slicker pants. They remained on the site until around 4:38 OM. During this time, they checked bags and added around 30 more bags onto the sandbar on the north west side of the sand bar and closer to the seals. During the interim time, 6 (2) seals hauled out at OB. When the boat proceeded back down the channel going east towards the seals at 4:55 PM, 5 seals flushed into the water included 2 mother-pup pairs at OB, another 3 mother pup pairs flushed at UEN sand bar, and around 75 seals alerted at UEN but did not enter the water. Additionally, around 200 black brant were flushed that were in the eelgrass beds in the channel after previously being flushed by the boat. At 4:58 PM, the boat then proceeded up into Home Bay. I terminated the survey at 5:00 PM.

A total of around 90 seals including around 50 pups were disturbed by the boat, and of these, I observed 14 seals including 7 pups directly flushed into the water. From previous research, we know that females with pups are more disturbed than adult males or immature seals. Additionally, around 320 black brant were flushed while in eelgrass beds.

During surveys of the estero, I again observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because this is the peak pupping season, mothers with pups are hauling out all over UEN, including near where the oyster bags are

located. There also appeared to be more bags on UEN, in addition to the bags added to OB today. Again, the bags were adjacent to and directly on the haul out sites where the seals historically hauled out in the past three decades of surveys that I have conducted.

Map of Drakes Estero – red circle indicates where seals and Black Brant were disturbed.



036 (b) (6) 65

Nam (b) (6) No.

Period

Hours Rate Amount

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
My∞ 7:58A	∞ 4:31P	8:06B	8:06	
♌ 7:58A	♌ 4:46P	8:18B	16:24	
♌ 8:04A	♌ 4:43P	8:12B	24:36	
♎ 8:00A	♎ 4:46P	8:18B	32:54	
♑ 7:56A	♑ 4:44P	8:18B	41:12	

B = Automatic Break Deduction

Signature

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041 (b) (6) 64

Nam

Period

Hours Rate Amount

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
My∞ 8:00A	∞ 4:31P	8:00B	8:00	
♌ 8:01A	♌ 4:46P	8:18B	16:18	
♌ 8:04A	♌ 4:43P	8:12B	24:30	
♎ 8:08A	♎ 4:47P	8:12B	32:42	
♑ 8:08A	♑ 4:43P	8:06B	40:48	

B = Automatic Break Deduction

Signature

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043 50

Name (b) (6) No.

Period

Hours Rate Amount

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
My∞ 8:02A	∞ 5:02P	8:30B	8:30	
♌ 8:03A	♌ 4:38P	8:06B	16:36	
♌ 8:03A	♌ 4:44P	8:12B	24:48	
♎ 8:05A	♎ 4:46P	8:12B	33:00	
♑ 8:07A	♑ 4:43P	8:06B	41:06	

B = Automatic Break Deduction

Signature

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6-5 Cost Codes

Drakes Bay Oyster Company

09/24/07

06:08 PM
kevin
Page # 1

actrec.jobnme

Cost Code#	Description	Unit	Division	Comp Code1	Wage Max	Comp Code2	Department	Notes
10.000	Cultch Punching / Bagging		1 - Production					
20.000	Cultch Loading/Unloading tanks		1 - Production					
30.000	Cultch Seed to/from Nursery		1 - Production					
40.000	Cultch Seed Stringing		1 - Production					
50.000	Cultch String Planting		1 - Production					
60.000	Cultch Harvesting / Landing		1 - Production					
65.000	Purchase Oysters		1 - Production					
70.000	Splitting Singles from Cluster		1 - Production					
80.000	Rack Repairs		1 - Production					
90.000	Beach Clean Up		1 - Production					
100.000	Cluster Crew Supervision		1 - Production					
110.000	Stick Larvae Setting		1 - Production					
120.000	Stick Loading / Unloading		1 - Production					
130.000	Sticks to / from Nursery		1 - Production					
140.000	Stick Planting		1 - Production					
150.000	Stick Harvesting / Landing		1 - Production					
160.000	Stick Cluster Splitting		1 - Production					
200.000	Processing Supervision		1 - Production					
210.000	Shucking		1 - Production	21131 - Canneries - Fis				
220.000	Grading / Canning		1 - Production					
230.000	Packing / Storing		1 - Production					
300.000	Singles Crew Supervision		1 - Production					
310.000	Singles Material Preparation		1 - Production					
320.000	Singles Setting		1 - Production					
330.000	Singles Screening		1 - Production					
340.000	Singles Bagging / Re-planting		1 - Production					
350.000	Singles Grow Area Preparation		1 - Production					
360.000	Singles Harvesting / Landing		1 - Production					

Cost Code#	Description	Unit	Division	Comp Code1	Wage Max	Comp Code2	Department	Notes
370.000	Singles Washing / Packing		1 - Production					
390.000	Farmers Market		1 - Production					
395.000	Smoke Oysters		1 - Production					
450.000	**EQUIPMENT SECTION		1 - Production					
452.000	INSURANCE		1 - Production					
453.000	LEASE PAYMENTS		1 - Production					
454.000	DEPRECIATION		1 - Production					
456.000	TAX/LICENSE		1 - Production					
458.000	EQUIP INTEREST		1 - Production					
460.000	*MAJOR REPAIR		1 - Production					
462.000	*MINOR REPAIR		1 - Production					
463.000	90 DAY BIT INSPECTION		1 - Production					
464.000	*LIGHT MAINT.		1 - Production					
465.000	FULL ENGINE SERVICE		1 - Production					
466.000	TIRES		1 - Production					
467.000	TRANSMISSION SERVICE		1 - Production					
468.000	HYDRAULIC SYSTEM SERV		1 - Production					
469.000	COOLING SYSTEM SERVIC		1 - Production					
470.000	FUEL SYSTEM		1 - Production					
471.000	WELDING REPAIRS		1 - Production					
472.000	STEEL FABRICATION		1 - Production					
473.000	ELECTRICAL REPAIRS		1 - Production					
474.000	BRAKES		1 - Production					
475.000	SUSPENSION		1 - Production					
476.000	ENGINE REPAIR		1 - Production					
477.000	TRANSMISSIONS		1 - Production					
478.000	DIFFERENTIAL REPAIR		1 - Production					
479.000	HYDRAULIC REPAIR		1 - Production					
480.000	UNDERCARRIAGE		1 - Production					
481.000	COOLING SYSTEM REPAIR		1 - Production					
482.000	BODY & FENDER		1 - Production					
483.000	STEERING		1 - Production					
484.000	DRIVELINE REPAIRS		1 - Production					
485.000	WEAR PART REPLACEMEN		1 - Production					

6-5 Cost Codes

Continued

Cost Code#	Description	Unit	Division	Comp Code1	Wage Max	Comp Code2	Department	Notes
486.000	SAFETY EQUIPMENT		1 - Production					
487.000	WHEEL BEARINGS		1 - Production					
488.000	DIFFERENTIAL SERVICE		1 - Production					
489.000	*PAID TIME OFF		1 - Production					
490.000	*OFFICE		1 - Production					
491.000	*TRAVEL TIME		1 - Production					
492.000	*STAND BY		1 - Production					
493.000	*INVENTORY		1 - Production					
494.000	*COMMUNICATIONS		1 - Production					
495.000	*SUSPENSE		1 - Production					
496.000	YARD WORK		1 - Production					
500.000	Retail Store / Phone Orders		1 - Production					
510.000	Purchase Resale Products		1 - Production					
550.000	Sales		1 - Production					
560.000	Deliveries		1 - Production					
600.000	Bookeeping		1 - Production					
610.000	Water / Product Sampling		1 - Production					
620.000	General Facility Maintenance		1 - Production					
710.000	Cut and wrap		1 - Production					

Drakes Bay Oyster Company

Job # _____ Day: FRIDAY Date: 4/13/09

Supervisor: _____

Employee Number	Employee Name	Cost Code	Hours	Equipment Number	Equipment Name	Hours
	(b) (6)	620	2			
		340	6			
	(b) (6)	340	6			
		310	2			
	(b) (6)	330	4			
		310	2			
		340	2			

Invoice Number	Material	Cost Code			Vendor Name	

Notes:

Drakes Bay Oyster Company

Job #_____ Day:_____ Date: 4/13/07

Supervisor:_____

Employee Number	Employee Name	Cost Code	Hours	Equipment Number	Equipment Name	Hours
	(b) (6)	210	8			
		10	8			
		210	8			
		210	7			
		210	8			
		210	8			

Invoice Number	Material	Cost Code			Vendor Name	

Notes:

Drakes Bay Oyster Company

Job #

Day: Tues

Date 5/8/07

Supervisor:

Employee Number	Employee Name	Cost Code	Hours	Equipment Number	Equipment Name	Hours
50	(b) (6)	L60	8			
64	(b) (6)	L60	8			
65	(b) (6)	L60	8			

Invoice Number	Material	Cost Code			Vendor Name	

Notes:

Drakes Bay Oyster Company

Job #

Day: Tuesd Date: 5/8/07

Supervisor: (b) (6)

Employee Number	Employee Name	Cost Code	Hours	Equipment Number	Equipment Name	Hours
13	(b) (6)	70	8			
41		70	8			
69		70	4			
68		150	2			
		70	6			
27	(b) (6)	70	2			
72		150	1			
		70	6			
66	(b) (6)	150	2			
		70	6			
71	(b) (6)	150	2			
		70	6			
9	(b) (6)	150	2			
		610	2			
		70	4			

Invoice Number	Material	Cost Code			Vendor Name	

Notes:

Drakes Bay Oyster Company

Job #

Day: TUES

Date: 5 T 6 07

Supervisor (b) (6)

Employee Number	Employee Name	Cost Code	Hours	Equipment Number	Equipment Name	Hours
1	(b) (6)	10	8			
6		10	8			
1		40	8			
2		40	8			
1		40	8			
		10	8			
6	(b) (6)	40	8			

Invoice Number	Material	Cost Code			Vendor Name	

Notes:

(P)

003

(b) (6) #10

Name _____ No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
7:59A	4:36P	8:06B	8:05	
7:55A	4:35P	8:12B	16:19	
8:00A	9:30	9¹	25	
9:00A	4:57P	7:30B	25:48	

B = Automatic Break Deduction

Signature

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014

(b) (6)

Name [redacted]

Period (b) (6)

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
	8:00	8:00		
			40:48	

B = Automatic Break Deduction

Signature

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009

(b) (6) No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
[illegible]	4:31P	9:00e	8:00	
[illegible]	5:07P	8:36e	16:36	
[illegible]	4:37P	8:06e	24:42	
[illegible]	8:00A	8:00		
[illegible]	4:31P	8:00e	32:42	
			40:42	

B = Automatic Break Deduction

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028

(b) (6) [redacted]

24

No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
7:58A	4:32P	8:06B	8:06	
7:57A	6:21P	9:54B	18:00	
5:54P	5:52P	1:00	19:00	
6:51P	7:24P	0:36	19:36	
8:06A	7:09P	10:36B	30:12	

B = Automatic Break Deduction

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013

Nam (b) (6) No. _____

Per _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
Last	Week			
Don't	know	why	is	here
	Lun			
(b) (6)				

B = Automatic Break Deduction

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Signature

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029

(b) (6)

No. 27

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
6:11A	4:33P	9:54B	9:54	
4:44P	4:53P	0:12	10:06	
8:01A	10:00A	2:00	12:06	
7:57A	3:00:00A	2:06	14:12	
5:55P	6:22P	0:30	14:42	
5:34A	10:00:00A	4:24	19:06	
5:11P	6:54P	1:42	20:48	
2:26P	2:34P	0:06	20:54	
6:51P	7:24P	0:36	21:30	
6:15A	5:18P	10:36B	32:06	

B = Automatic Break Deduction

Signature

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025

#69

Name (b) (6) No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
7:06A	3:32P	7:54B	7:54	
8:03A	4:31P	8:00B	15:54	
8:03A	4:30P	8:00B	23:54	
7:57A	4:37P	8:12B	32:06	
7:54A	4:31P	8:06B	40:12	

B = Automatic Break Deduction

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021

(b) (6) #70

Name _____ No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
[redacted]	[redacted]	[redacted]	[redacted]	
[redacted]	4:39P	7:54B	1248	
12:25P	4:53P	4:30	20:18	
11:41A	5:02P	5:24	25:42	
8:21A	5:18P	8:30B	34:12	
8:10	5:01	8.5	~~5:00~~	4/30
8:10				5/1

B = Automatic Break Deduction

Signature

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022 Cliberto #19

Name (b) (6)

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Mon 7:51A	5:10P	8:48s	8:48	
4:30A	4:00PM	11 1/2		
5:08A	1:43P	8:06s	16:54	
4:15A	3:06P	10:24s	27:18	
4:35A	1:35P	8:30s	35:48	
4:30A	12:31P	7:30s	43:18	

B = Automatic Break Deduction

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023 (b) (6)

68

Nam (b) (6) No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
7:49A	4:28P	8:12B	8:12	
8:00A	4:33P	8:05B	16:18	
7:58A	4:31P	8:06B	24:24	
7:51A	4:35P	8:12B	32:36	
7:57A	4:41P	8:12B	40:48	

B = Automatic Break Deduction

Signature

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027

66

(b) (6)

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Rp 6:55A	3:31P	8:06B	8:06	
7:58A	4:30P	8:00B	16:06	
7:57A	4:29P	8:00B	24:06	
7:48A	4:34P	8:18B	32:24	
7:41A	4:28P	8:18B	40:42	

B = Automatic Break Deduction

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001 (b) (6) 63

Nam (b) (6) No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
8:00A	4:30P	8:00B	8:00	
8:02A	4:32P	8:00B	16:00	
8:00A	4:32P	8:00B	24:00	
8:00A	4:31P	8:00B	32:00	
8:02A	4:35P	8:06B	40:06	

B = Automatic Break Deduction

Signature

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007 (b) (6) #51

Na (b) (6)

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Sp 8:04A	4:33P	8:00B	8:00	
8:02A	4:30P	8:00B	16:00	
7:59A	6:39P	9:12B	26:12	
8:00A	4:33P	8:06B	34:18	(b) (6)
8:02A		8,0	42.18	
	4:37P			

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008

56

Name (b) (6) No. _____

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
8:03A	4:33P	8:00B	8:00	
8:02A	4:33P	8:00B	16:00	
8:00A	4:32P	8:00B	24:00	
	4:34P			
8:02A	4:38P	8:06B	32:06	

B = Automatic Break Deduction

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02[redacted] (b) (6)

L47

Na[redacted] (b) (6)

Perio[redacted]

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Tu 7:01A	W 3:31P	8:00B	8:00	
W 7:59A	W 4:29P	8:00B	16:00	
Th 8:00A	Th 4:29P	8:00B	24:00	
F 7:58A	F 4:33P	8:06B	32:06	
Sa 8:00A	Sa 4:28P	8:00B	40:06	

B = Automatic Break Deduction

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006

33

(b) (6)

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
8:10A	11:01A	2:54	2:54	

B = Automatic Break Deduction

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010

#17

Nam[redacted] No. _____

Peri[redacted] _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Sp 8:00A	4:33P	8:06B	8:06	
M 7:58A	4:33P	8:06B	16:12	
T 7:51A	4:33P	8:12B	24:24	
W 7:57A	4:41P	8:12B	32:36	
Th 8:01A	4:39P	8:06B	40:42	

B = Automatic Break Deduction

Signature

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011

#21

Nam (b) (6) No. _____

Perio _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Tu 8:00A	4:33P	8:06B	8:06	
W 7:58A	4:33P	8:06B	16:12	
Th 7:51A	4:33P	8:12B	24:24	
F 7:57A	4:41P	8:12B	32:36	
Sa 7:59A	4:39P	8:12B	40:48	

B = Automatic Break Deduction

Signature

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026 [redacted] 13

Name [redacted]

Period _____

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Apr 22 6:56A	22 3:32P	8:06B	8:06	
23 7:59A	23 4:31P	8:06B	16:12	
24 7:58A	24 4:32P	8:06B	24:18	
25 7:59A	25 4:32P	8:06B	32:24	
26 7:53A	26 4:30P	8:06B	40:30	

B = Automatic Break Deduction

Signature

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012 (b) (6)

Name

Period

Hours _____ Rate _____ Amount _____

START IN	STOP OUT	WORKED HOURS	ACCUMULATED TOTAL	TASK COMMENTS
Sa 8:00A	Sa 4:32P	8:00B	8:00	
Su 7:57A	Su 4:32P	8:06B	16:06	
M 7:56A	M 4:32P	8:06B	24:12	
Tu 7:53A	Tu 4:31P	8:06B	32:18	
W 7:59A	W 11:03A	3:06	35:24	

B = Automatic Break Deduction

Signature

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(R)

Drakes Bay Oyster Company

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Inverness, CA 94937
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kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

February 3, 2009

Dr. Susan Roberts
Executive Director
Ocean Studies Board
National Academy of Sciences
500 Fifth Street, NW
Washington, DC 20001

Re: Drakes Estero seal haulout maps

Dear Dr. Roberts,

At the demand of Senator Feinstein, the NPS chose the NAS Ocean Studies Board to independently review the scientific claims made by Point Reyes National Seashore (PRNS) scientists regarding Drakes Estero. Your panel is expected to reveal whatever misconduct is found. The items to review include the Drakes Estero, A Sheltered Wilderness Estuary Report, public testimony, newspaper articles, etc.

It is important to bring one very important issue to your attention. The subject is about a seal haulout map that was provided to the Marin Count Board of Supervisors (BOS) on May 8, 2007. The PRNS staff provided the BOS a map that differs from the map that the PRNS staff provided DBOC. The map provided to the BOS was changed so that more of the oyster bags present on the sand bars now appeared to be "in" the seal haulout area.

The map provided to the BOS did not include a revision date. No one was told that the map had been changed. We recognized that the map was changed when Don Neubacher and Sarah Allen gave their presentations to the Board and showed them the (new) map in May 2007.

The map and their presentation were used to allege serious harm to seals by the Lunny Family and their workers. However, the oyster bags did not move. Only the lines on the map moved so that the existing oyster bags would be included within the new lines.

The Department of the Interior Inspector General (DOI IG) investigated the NPS officials for misconduct. The DOI IG found instances of scientific misconduct by PRNS scientists and published their findings in a report dated 07/22/09. The new, undated map released at the May 2007 BOS meeting was one of the issues reviewed by the Inspector General. As your panel is charged with identifying where the PRNS public scientific claims are

not supported by facts, it is vital that your panel include these particular issues in its review and subsequent report. We have previously submitted the IG's report to your panel, but it is important to highlight this issue in particular.

The IG report reads, in part:

Differing Seal Maps

The complainants stated that in May 2007, NPS provided the MCBS with an altered harbor seal site map that Allen gave to Lunny in 2005, which wrongfully indicated that DBOC was encroaching on seal habitats in the estero. The OIG confirmed that NPS updated the 2005 map. The original indicates a plot date of May 17, 2005, but the 2007 version provides no indication of its creation [redacted]

At the OIG's request, the PRNS Cartographic Technician overlaid both versions on a single map of the estero for comparison purposes. The 2007 map defined a circular area near the center of DBOC's aquaculture lease as a seal "haulout/pupping area" that was not identified on the 2005 map as such. In addition, a pre-existing seal site from the 2005 map was extended in the 2007 map. Although the more recent version indicated a more extensive encroachment of bags on seal habitats, both versions of the map reflected oyster bags within prohibited areas.

Allen explained that the pre-existing seal site from the 2005 map that was extended on the 2007 map was a "lateral channel" that Lunny knew he was not supposed to use. She referred to a 1992 agreement between the Johnson Oyster Company and NPS that indicated as much. A review of the 1992 Record of Agreement between NPS, the National Marine Fisheries Service, the California Department of Fish and Game, and the Johnson Oyster Company reflected that the lateral channel was closed to boat traffic from March 15 through June 1 and that during the entire month of June, the channel "should be used as little as possible." Allen further explained that the new area circled on the 2007 map was not circled on the 2005 map because it was not a primary pupping area, which she was focused on showing Lunny in 2005. It illustrated a place where seals hauled out of the water.

The IG found that the maps were, in fact, changed to include more oyster bags. The IG ignored the change in the map because they were under the impression that "both versions of the map reflected oyster bags within ***prohibited areas***." This is completely FALSE.

Sarah Allen referred to the 1992 seal protection protocols to substantiate this claim. There were no prohibited areas in these protocols or in any other rules. In fact, the current 1992 protocols specifically allow shellfish production in these areas. The protocols instruct us *how*, as oyster farmers, to conduct ourselves in these areas during pupping season.

This IG report publicly states that DBOC was growing oysters in prohibited areas. The NPS misrepresented the facts to the Department of the Interior's Inspector General. The IG is still apparently unaware that they were not told the truth.

The IG Report is a public report and it contains statements made by the NPS that are not supported by the scientific facts that were available to the NPS when they made their claims. This public report has not been corrected and continues to damage our business and our reputation.

DBOC has not broken any rule. DBOC did not have ANY oysters in prohibited areas in 2007 or any time before that. No agency or individual has EVER told DBOC that oysters were located in a prohibited area. No agency or individual has EVER asked or told DBOC to move a single oyster for any reason – prohibited area or not.

Another misrepresentation is also found in the above excerpt from the DOI IG Report. Apparently, to justify the change in seal haulout maps, Sarah Allen told the investigator that the new undated 2007 map was extended to include the "'lateral channel' that Lunny knew he was not supposed to use". We did know when we could and when we couldn't use the lateral channel and we adhered to those rules. Nevertheless, NPS made this false statement.

The 2005 and the undated 2007 seal haulout maps (attached) show that the expanded area in the 2007 map includes more of the existing growing area, not only the lateral channel. If the goal of the changed map was to include the lateral channel, it would have been easy to change the lines to include the lateral channel. Instead, the NPS changed the lines to include most of the existing oyster bags.

The NPS changed the seal haulout map. The NPS told no one. The NPS did not identify on the map that the map had been changed. The NPS did not tell DBOC of any change in the haulout area, yet the NPS used the new, undisclosed map to suggest harm was being caused by DBOC and DBOC was not following the rules.

Specifically, your panel is charged to answer this question: *What conclusions can be drawn from the body of scientific studies, and how do they compare with what the NPS presented to the public?* We ask that your panel fulfill its charge by addressing the NPS science presented before you by NPS, which has been shown to be false, but has become part of the public record against us and our family and our farm.

Please address the following NPS science and conclusions presented before your panel and entered into the public record by NPS:

1. NPS publicly stated that oyster bags were placed in prohibited areas by DBOC.
2. NPS publicly stated that they changed a harbor seal haulout map to include the lateral channel.

These two scientific misrepresentations still remain in the public record. They continue to harm DBOC and the Lunny family by remaining uncorrected. It is clearly the responsibility of your panel to review these misrepresentations by PRNS scientists to the IG and include these examples of misconduct in your report. They are, in fact, claims made by the NPS scientists that are not supported by the facts that were available to them.

Sincerely,

Kevin Lunny Nancy Lunny

(5)

Drakes Bay Oyster Company

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(415) 669-1149
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nancy@drakesbayoyster.com

February 10, 2009

Dr. Susan Roberts
Executive Director
Ocean Studies Board
National Academy of Sciences
500 Fifth Street, NW
Washington, DC 20001

Re: Seal haulout areas of Drakes Estero

Dear Dr. Roberts,

It is clear that much of the controversy at Point Reyes revolves around the claims of harm to harbor seals by the Drakes Bay Oyster farmer. Not just a minimal adverse effect, but a "national emergency" caused by the oyster farmer. This is telling the public that the Lunnys refuse to listen to the rules and, therefore, are intentionally causing harm to the seals. The Point Reyes National Seashore Superintendent told our county supervisor that we were criminals because of the intentional harm to a federally protected marine mammal. We knew this was not true. We know the rules. Our staff knows the rules. We were never told by the NPS, or anyone else, that we were disturbing seals or were otherwise causing harm to the seals. We were, and are, deeply offended.

The following excerpt from the Department of the Interior Inspector General's report on an investigation into misconduct by Federal officials at PRNS brings up a very important question that we have been asking all along: Where are the actual seal haulout areas in Drakes Estero?

> According to Allen, oyster bags were placed in seal haul-out areas for the first time in 2007 due to DBOC's dramatic increase in production. She said that according to the State of California, DBOC planned to increase its production of oysters from about 3 million in 2006 to about 9 million in 2007.
>
> Allen recalled that she informed Neubacher about DBOC's oyster bags being placed in prohibited areas in mid or early April 2007. She said she did not talk to Lunny about it because her job was to guide policy, not to manage. She said she did not know if Neubacher had contacted Lunny about the issue. She described NPS as being in "a reactive mode" to DBOC's increased production.

The oysters have always been placed only in traditional growing areas. CDFG maps confirm this. CDPH maps confirm this. NPS maps confirm this.

The seals haul out along the main channel in Drakes Estero. They stay very near the channel where deep water is available. For decades this has been understood and accepted. All maps have reflected this. In 2005, after the Lunny family took over the operations of the oyster farm, the NPS started changing the maps. The population of seals did not appear to have changed. The habits of the seals did not appear to have changed. The historic oyster beds did not move. The only thing that changed is the lines on the NPS seal haulout maps. Following NPS's unexplained, huge expansion of the "haulout area", the NPS began to allege harm to the seals because of DBOC's existence in this "new" seal habitat area. In actuality, what occurred was that this new mapping of the haulout area encroached into the oyster beds that have always been used as oyster beds.

Why would the NPS now begin to include these expansive islands as haulout areas? Seals never use these newly included areas. We only see seals utilizing the beaches within about 10 yards of the deep channel. We have never seen the seals hauled out anywhere else. We have never seen the seals hauled out along the edges of the lateral channel, probably because it is so shallow. At low tide, the lateral channel is too shallow to navigate with a boat and too shallow for a seal to swim. Seals do haul out near the end of the lateral channel where it connects with the deeper main channel. The 1992 interagency seal protection protocols already closed the lateral channel during pupping season so that boats would not disturb seals at the end of the channel.

We have attached a few of the harbor seal haulout maps. In 2005, after the Lunny family became the operators of the oyster farm, the NPS produced new maps showing that the harbor seals expanded their haulout areas into locations where they have never been before. What changes in seal habits in 2005 support the map changes? For decades, none of the oyster beds were considered to be in what the NPS is now calling "seal habitat". Is the claim that DBOC expanded into harbor seal habitat supported by the science that was available?

A temporary prohibited area was first established by the California Coastal Commission in December of 2007. The CCC admitted that they were not provided with and had not looked at the NPS harbor seal database and that the only document that they received from the NPS regarding seals was the April 27, 2007 trip report alleging that DBOC disturbed seals on that day. We know that DBOC was not responsible for this disturbance. The CCC imposed this new restriction based on the "precautionary principle". They were very clear that their restrictions would be modified or removed once the issues were actually analyzed. In April of 2008, the NPS imposed this same arbitrary "prohibited area" that was created by the CCC with no data analysis whatsoever. The NPS also agreed that their restrictions would be altered or removed based on future analysis of the data.

Decades of harbor seal monitoring data has been provided to your panel. The data are very clear. The data show that unrestrained seashore visitors cause most of the disturbances to the harbor seals– visitors continuously flush literally thousands of seals into the water. It also clearly shows that disturbances caused by the trained staff at the

oyster farm are functionally zero. This supports the fact that the 1992 haulout map is correct and the protocols are working effectively.

Specifically, your panel is charged to answer this question: *What conclusions can be drawn from the body of scientific studies, and how do they compare with what the NPS presented to the public?* We ask that your panel fulfill its charge by addressing the NPS science presented before you by NPS, which has been shown to be false, but has become part of the public record against our family and our farm.

Please address the following NPS science and conclusions presented before your panel and entered into the public record by NPS:

1. Did the harbor seals change their behavior in 2005 to justify the huge expansion of haulout areas as shown on NPS new maps?
2. Is the claim that DBOC expanded into harbor seal habitat supported by the science that was available?
3. Did DBOC place bags in prohibited areas in mid or early 2007?
4. Do Sarah Allen's allegations of harm caused by DBOC affect decision making at PRNS? At other shellfish growing areas nationwide?

Certainly, no prohibited areas even existed through the 2007 pupping season. After this obvious misrepresentation of the facts, Allen went on to say that "her job was to guide policy". One of the questions that your panel has been asked to answer is: *Have these decisions affected NPS decision making?* The answer to this question would appear to be obvious.

Attached are a series of maps showing seal haulout areas.

1. The interagency map prepared in 1992 that has been controlling for 16 years.
2. The NPS unexplained map showing a sudden and unprecedented expansion of seal haulout areas in Drakes Estero, prepared in 2005.
3. The NPS undated and further expanded map submitted to the Marin County Board of Supervisors.
4. The CCC map prepared in December 2007 based solely on the NPS April 26, 2007 trip report. This is the first map that imposed a restricted area.
5. The NPS map, prepared in April 2008, and based on the CCC map showing the same restricted area that the CCC included in their map.
6. A map prepared by DBOC showing where seals haul out in Drakes Estero during low tides.

Please address these very important issues that still exist in the public record and are still doing harm to our business and our family. We anticipate seeing a full analysis of each of these points in your report.

Sincerely,

Kevin Lunny Nancy Lunny

(T)

STATE OF CALIFORNIA—THE RESOURCES AGENCY PETE WILSON, Governor

DEPARTMENT OF FISH AND GAME
P.O. BOX 944209
SACRAMENTO, CA 94244-2090
(916) 653-6194

May 15, 1992

Mr. John L. Sansing, Superintendent
Point Reyes National Seashore
Point Reyes, California 94956

Dear Mr. Sansing:

Thank you for following up on the meeting we had with you, Johnson Oyster Company (JOC), and National Marine Fisheries Service (NMFS). I am pleased to hear that operations appear to be occurring without incident. I am optimistic that the agreement reached at our meeting will provide the protection necessary for continued well-being of the harbor seals in Drakes Estero and, at the same time, provide guidelines for JOC that will allow them to continue their operations without undue hardship.

I have reviewed your synopsis of the issues and discussed it with Frank Henry and Tom Moore of our Department. During discussion at the meeting, Frank Henry took notes on the boating practices and mariculture procedures to be included in the agreement. As you may recall, at meeting's end, Frank read the proposed guidelines from his notes to those present and, after some discussion, all agreed to the language and content. His notes and the recollections of the three Department staff agree, in general, with your synopsis.

One significant difference we noted, was regarding operations in the western channel. Our notes do not reflect any agreement by JOC to not use that channel, even during the pupping season. The three of us all recollect that operation in this western channel was required for the minimal servicing of oyster beds 1, 2, and 3. We remember agreement from JOC not to use the lateral channel but to use the western channel, and then to travel by foot, if necessary to reach the beds. Our recollection is that this was acceptable to you, since operation in the western channel is a good distance from potential haul out areas at the east ends of the islands.

Another difference in our notes and recollections regards the timing of planting on these beds. You are correct that those present at the meeting, including JOC, agreed that, if possible, planting should be put off until after June 1. However, your language that seeding "may begin on June 1. Earlier commencement dates may be permitted ...", we think, overstates the authority of the agreement.

Our recollections are that JOC agreed to plan on, and make every effort to, beginning seeding after June 1. JOC noted, however, that they do not have absolute control over seed

availability, and no control over weather and tides. The spirit of the agreement, we recall, was that JOC would plan on seeding after June 1, and would work with Gary Fellers to minimize the impacts of any earlier seeding. We do not believe there is existing authority to "permit" or to deny a "permit" for earlier seeding.

Also, in the spirit of positive agreement, and without changing any substance, we would strike "and restrictions" from the first santence of the introductory paragraph. I have attached a copy of the complete Record of Agreement, with the three amendments. If these amendments are not acceptable to you, please let me know so that we may come to full agreement.

Thank you again John, for the cooperation and efforts of you and your staff on this issue. I believe they have made possible this resolution in the interest of the harbor seals.

Bob Hulbrock
Aquaculture Coordinator

cc: Johnson Oyster Co.

Tom Johnson
Bob Studdert
Manuel Solorzano

Point Reyes National Seashore

Russ Case
Gary Fellers
LeeRoy Brock

Department of Fish and Game

Frank Henry
Tom Moore

National Marine Fisheries Service

Diane Windham
Charles Clark

Department of Health Services

Gregg Langlois

May 15, 1992

Record of Agreement
Regarding
Drake's Estero Oyster Farming
and
Harbor Seal Protection

As a result of a meeting held January 15, 1992, between the National Park Service (NPS), National Marine Fisheries Service (NMFS, the California Department of Fish and Game (DFG) and Johnson's Oyster Company (JOC), a series of operating procedures was agreed upon to minimize the disturbance to harbor seals resulting from JOC oystering operations. The following items were mutually agreed to by all parties:

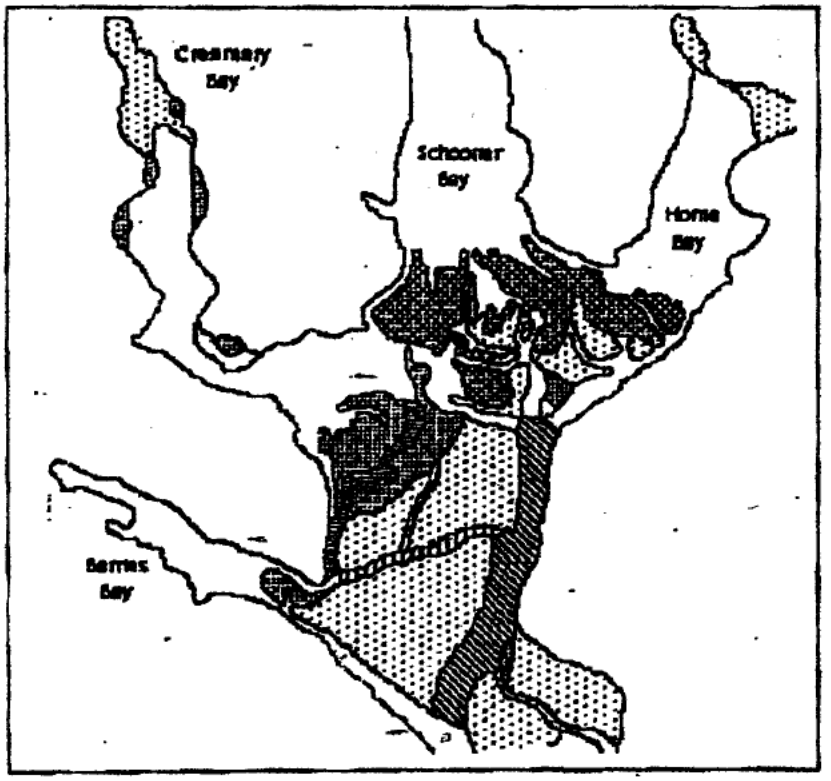
- During the pupping season, March 15 through June 30, the main channel (Figure 1) of Drake's Estero will be closed to boat traffic.

- The "lateral channel" between beds #2 and #3 and bed #1 (figure 1) are closed to boat traffic from March 15 through June 1.

- Oyster seeding operations in beds #1, #2, and #3, located between Creamery Bay and Barries Bay, be deferred until June 1, if possible. Earlier commencement dates, if any, should be coordinated between JOC and NPS.

- The "lateral channel" should be used as little as possible between June 1 and June 30. Oyster beds #2 and #3 should be approached from the north at low speed, and the beds themselves planted from north to south so that disturbance near the "lateral channel" will occur toward the end of the pupping season.

Drakes Estero Harbor Seal Pupping Season Closures



Mud Flat

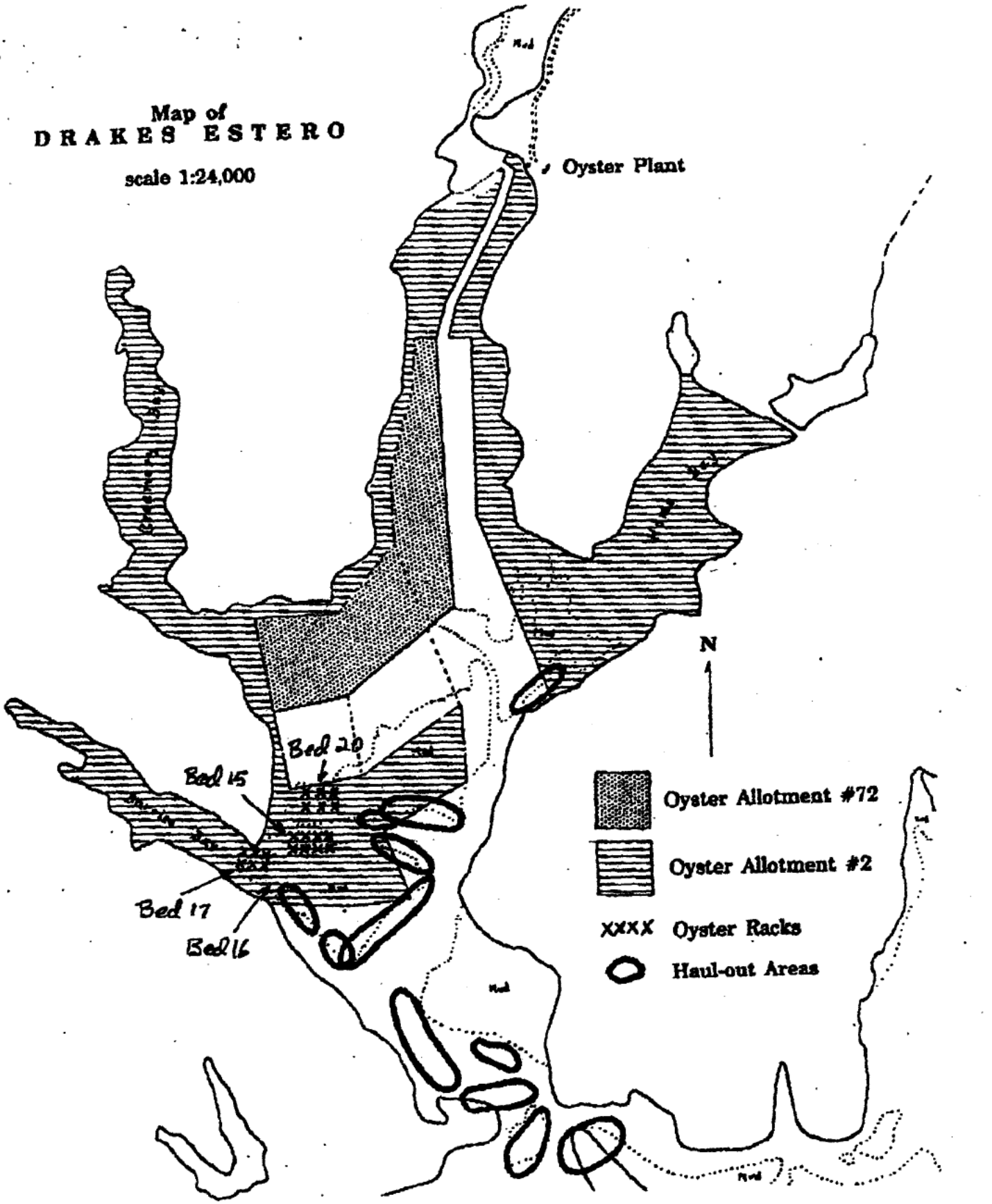
Eelgrass

Main Channel - Closed March 15 through June 30

Lateral Channel - Closed March 15 through June 1

West Channel - Closed March 15 through June 1

Figure 1


Map of
DRAKES ESTERO
scale 1:24,000
Oyster Plant
N
Bed 20
Bed 15
Bed 17
Bed 16
Oyster Allotment #72
Oyster Allotment #2
XXXX Oyster Racks
Haul-out Areas

Drake's Estero Oysters

Aquaculture Lease & Seal Haulout Areas

(4)

State Aquaculture Lease

Wilderness Waters

Harbor Seal Haulout

Astragalus pycnostachys

SUP Area - 1.08 Acres

RUP Area 1.5 Acres

Map Location

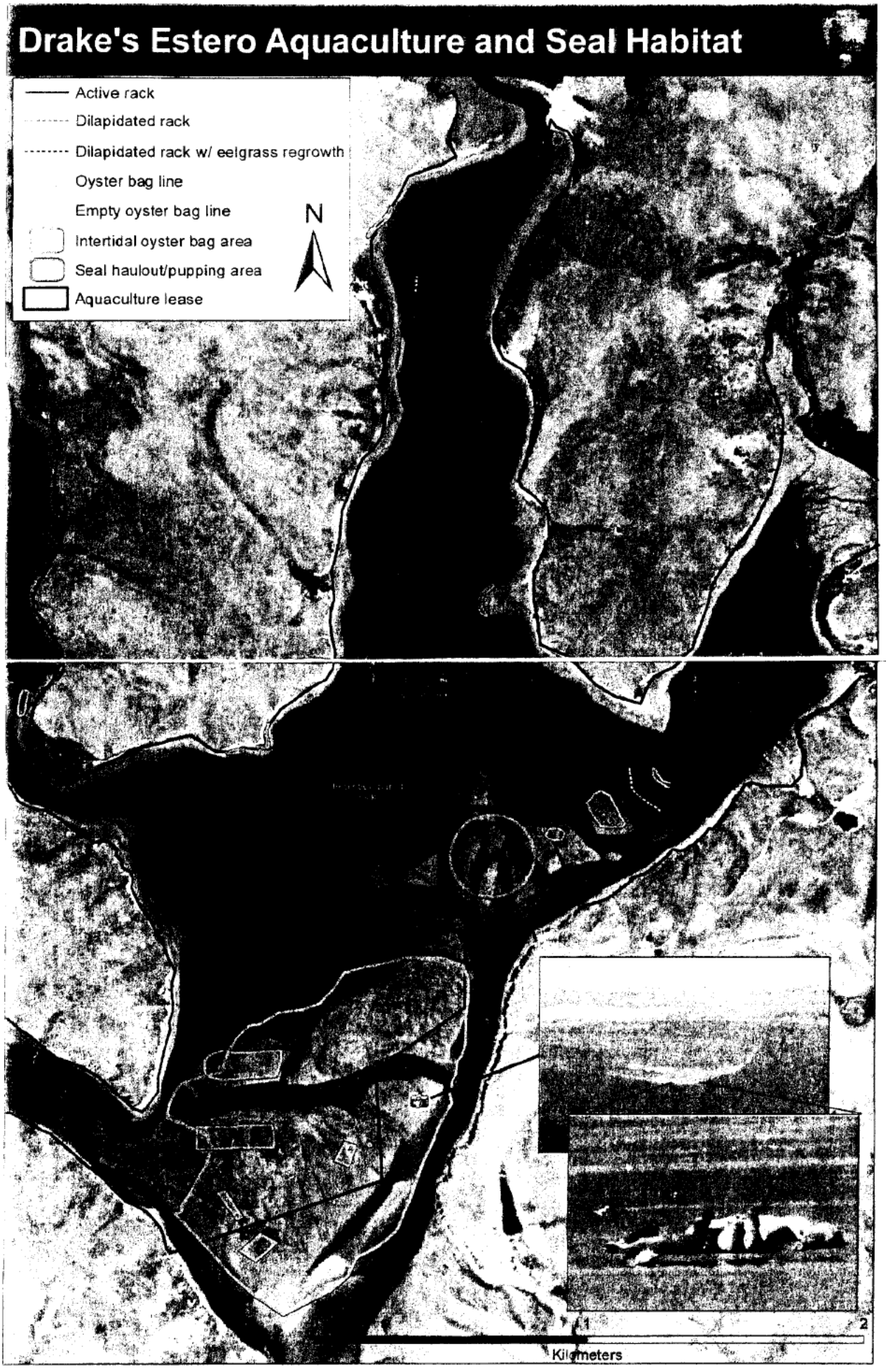
National Park Service
Point Reyes National Seashore
GIS Team

N
W E
S

0 0.5 1 Miles

Plot date: May 17, 2005 s:/gis/projects1/Neubad/Johnsons/Drakes Estero Oyster lease & Drakes Estero.mxd

Drake's Estero Aquaculture and Seal Habitat



(V)

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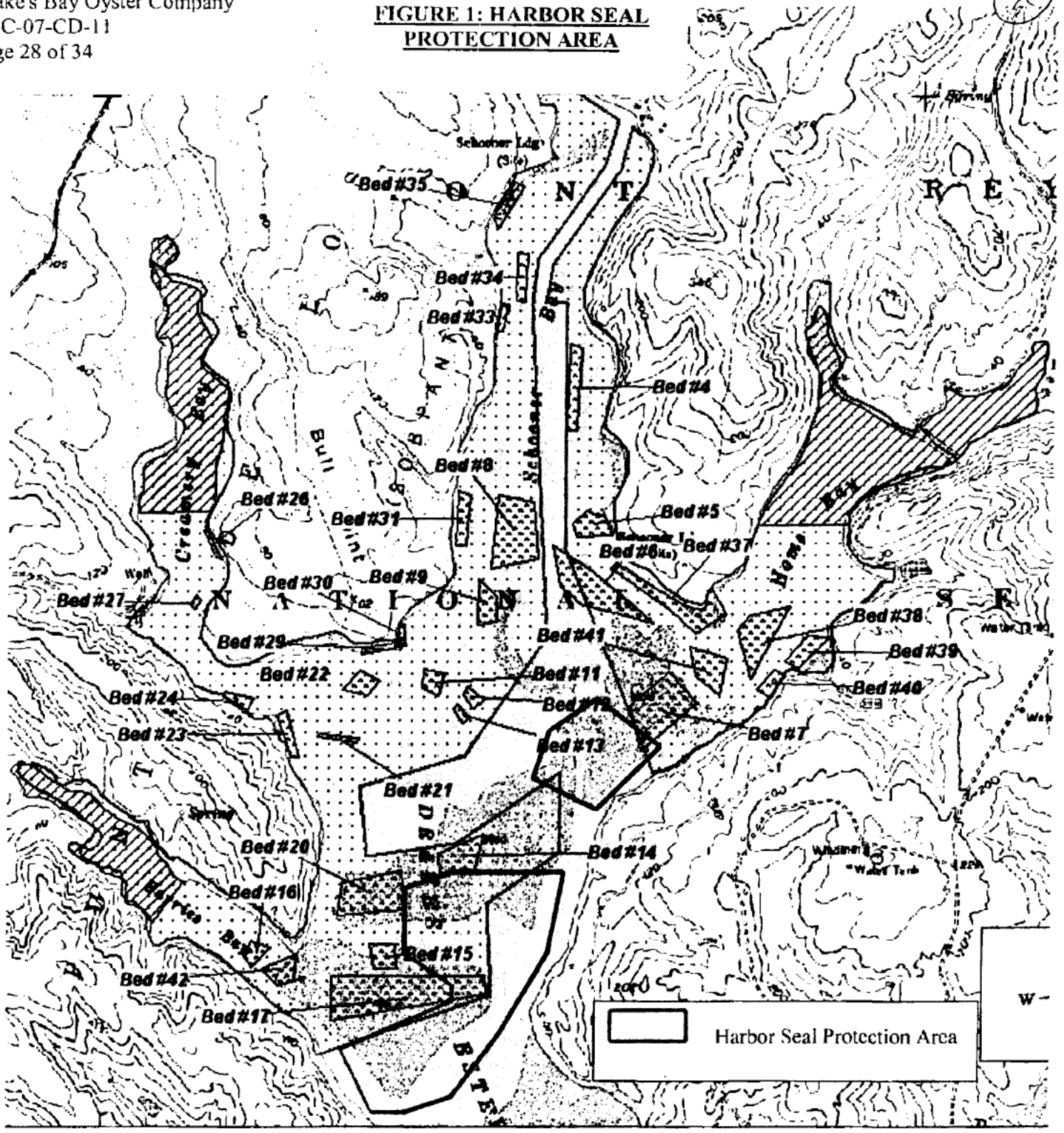
FIGURE 2:HARBOR SEAL PROTECTION AREA

FIGURE 1: HARBOR SEAL PROTECTION AREA



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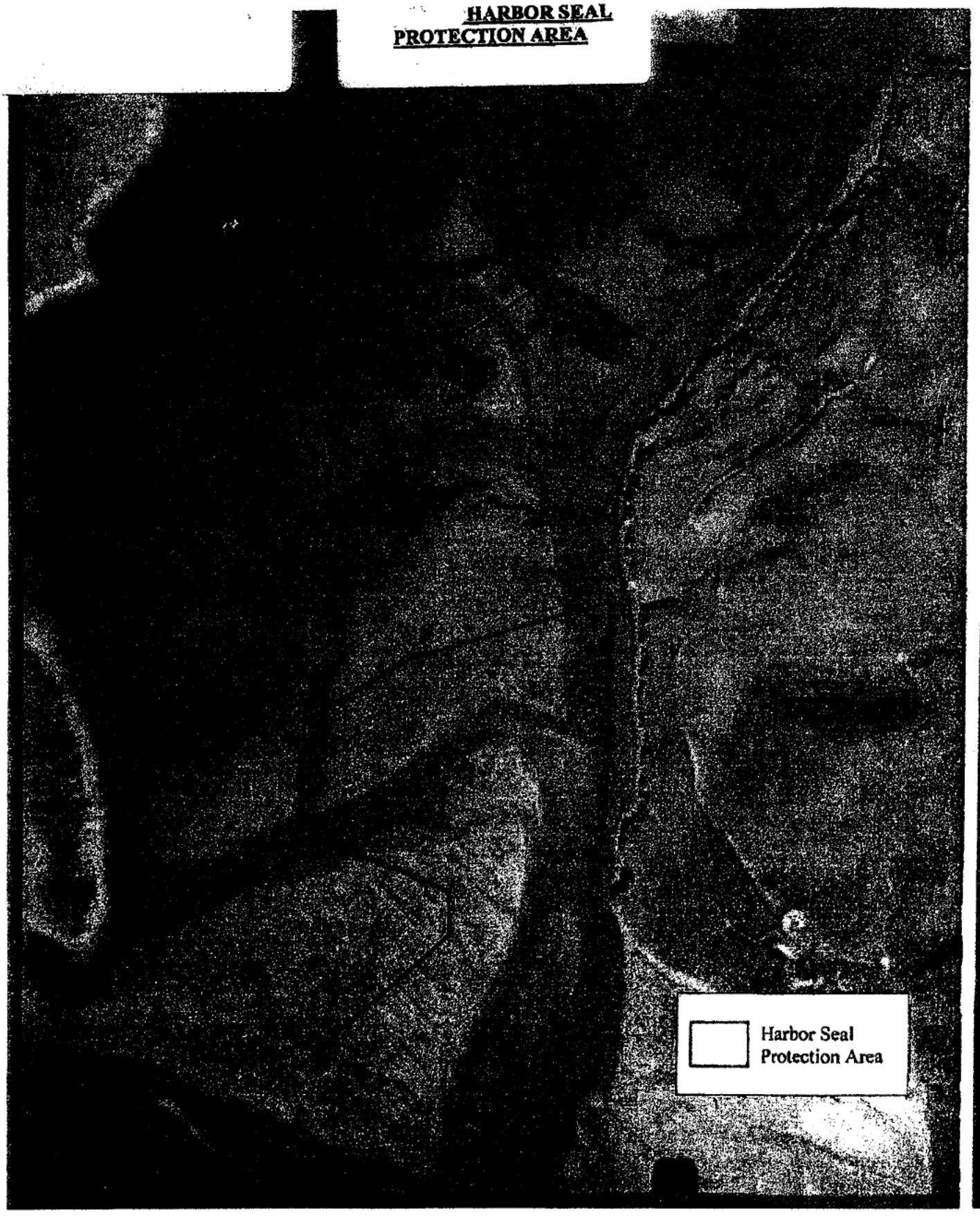
HARBOR SEAL PROTECTION AREA



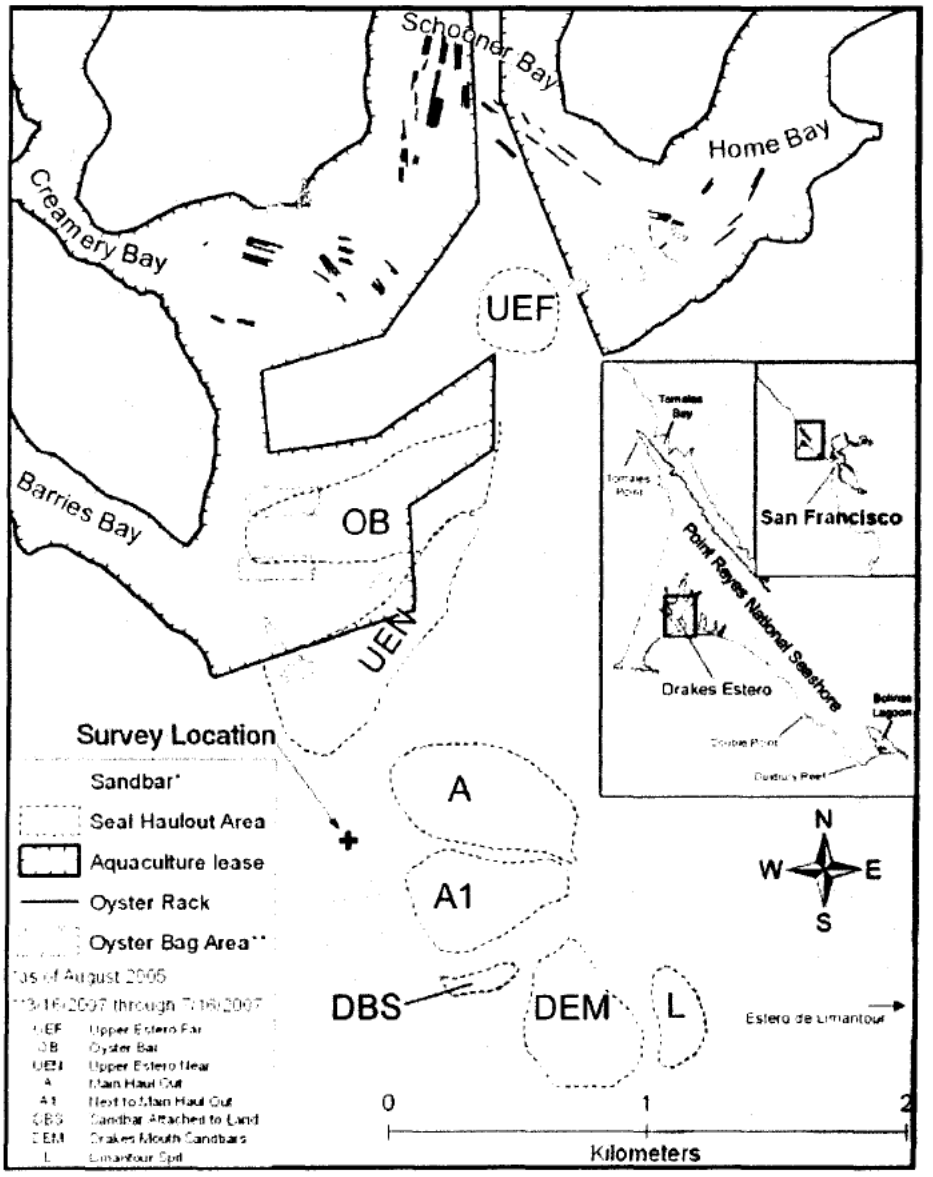


Figure 1. Oyster bag areas (mapped in spring of 2007), oyster racks, and the eight seal haul out subsites (*e.g.*, OB) in Drakes Estero. UEF, OB, and UEN are considered upper estero. Subsites A, A1, DBS, DEM, and L are in the middle-lower estero and not subject to disturbance from mariculture. All surveys were completed from the bluffs indicated by the "survey location" marker.

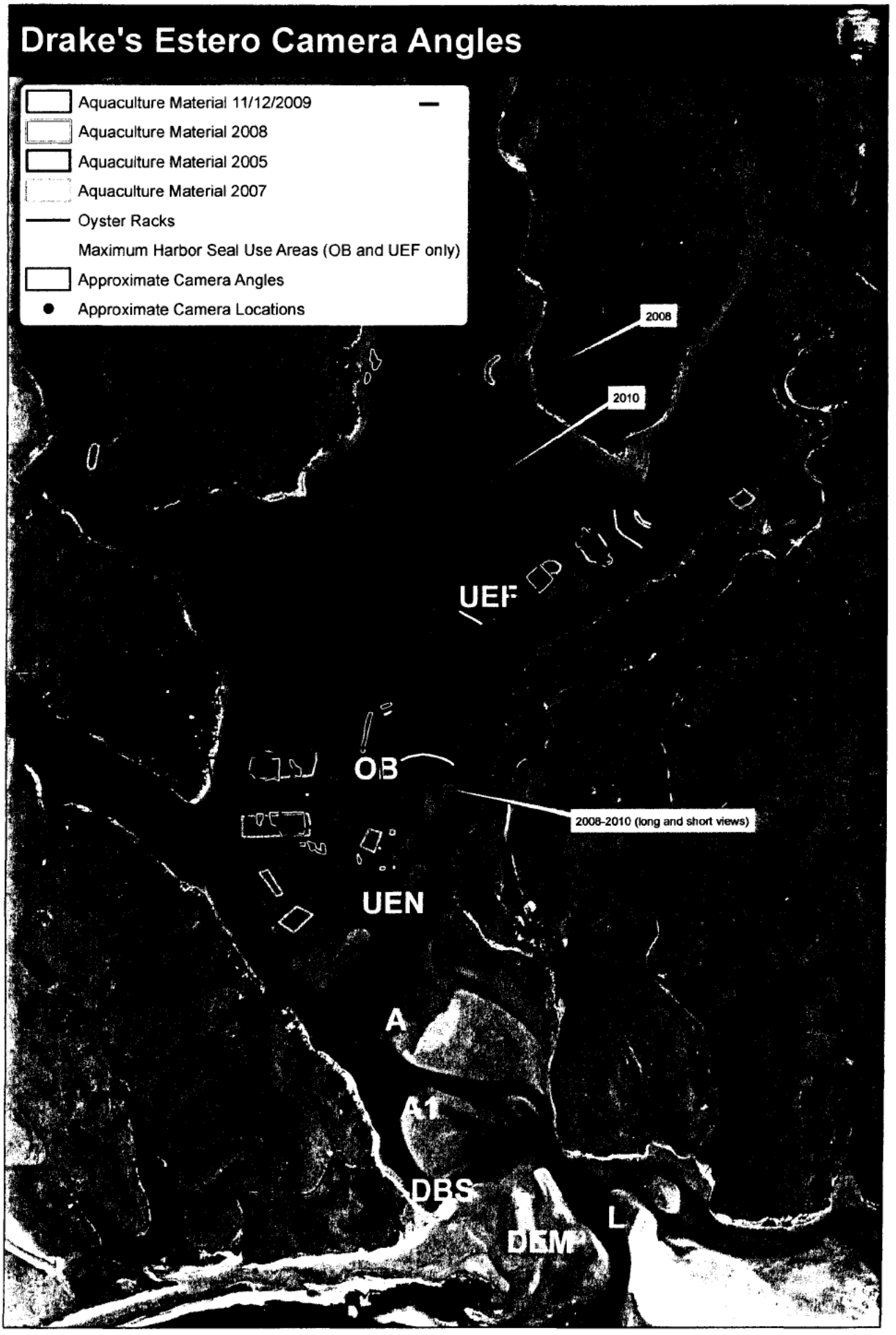
and 2005 (annual production <2 million oysters per year). Production then increased to about 3.5 million (~136,000 kg) oysters in 2006, and ~211,000 kg oysters for 2007 (Fig. 2A, B).[3,4]

[3]California Department of Fish and Game. 2007. Unpublished report on oyster landings in Drakes Estero from 1950 to 2006. Available from Tom Moore, CDFG Biologist, Bodega Bay, CA.

[4]Tom Moore, Biologist, California Department of Fish and Game, Presentation to the National Research Council Panel on Mariculture in Drakes Estero, 4 September 2008.

(AA)

Drake's Estero Camera Angles



AB

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February 3, 2009

Dr. Susan Roberts
Executive Director
Ocean Studies Board
National Academy of Sciences
500 Fifth Street, NW
Washington, DC 20001

Re: Drakes Estero, Becker Report II

Dear Dr. Roberts,

We sent you a letter dated 10/31/08 regarding Becker II (see attached). This letter was prepared following the meeting at the PRNS Red Barn where Ben Becker, Sarah Allen and David Press orally presented this revised report and answered questions posed by Dr Paul Thompson about the report. At the time that this letter was written, we had not yet been provided a copy of Becker II. Most of this meeting was dedicated to Allen, Becker and Press' (all co-authors of Becker II) presentation and Q&A regarding Becker II.

It appears that the authors of Becker (version II) intentionally misrepresented factual scientific information. Their report's statements about Drakes Estero harbor seal protocols are simply wrong, and have mislead your panel.

In Becker II, Becker, Allen and Press wrote:

The 2008 pupping season presented an opportunity to investigate the immediate effect of a change in oyster operations. In 2008, the California Coastal Commission (CCC) imposed a seal protection zone which restricted some use of the lateral channel adjacent to OB by oyster boats during the pupping season. Thus, boat use in the lateral channel in 2008 was curtailed from use levels during 2005--2007, and concurrently, mean counts at OB increased from about 61 ± 10 (SE) in 2007 to 81 ± 12 in 2008 despite a nominal increase in oyster harvest, from 466,000 lbs in 2007 to a projected 493,000 lbs in 2008. The restriction of oyster operations also coincided with only one mariculture related disturbance detected in the upper estero in 2008 (versus six in 2007) (Fig. 2B), suggesting that conditions that previously reduced pupping season seal counts may have partially abated due to CCC restrictions.

We therefore suggest that an adaptive management approach for oyster operations be investigated since reducing activity in the area close to seals may have had immediate positive effects. This also suggests that while oyster harvest was a good proxy for impacts on seal counts in the upper estero for 1997--2007, changes in operations such as those experienced in 2008 may make the oyster harvest proxy less useful in the future. For this reason, it is not appropriate to include the 2008 data in the models because of this large change in management.

The authors of NPS Becker II would have the panel believe that CCC imposed upon the oyster farm a "large change in management" which led to a reduction in oyster-related disturbance in 2008. The fact is that the conditions required by the CCC imposed NO change in management or the use of the lateral channel during pupping season whatsoever.

The interagency agreement reached between NPS, NMFS, CDFG and Johnson Oyster Company in 1992 created protocols (attached) for the oyster operation regarding harbor seals – which include a pupping season lateral channel closure. DBOC has always

known about these protocols and has always followed these protocols, including the lateral channel closure. These protocols were provided to us and explained in detail by CDFG when we were assigned the shellfish leases in 2005. The authors were wrong and, as a result, the Becker II report and its analyses are severely flawed.

This incorrect statement by the authors leads to a very serious question. Did Becker, Allen and Press know about the Drakes Estero seal protection protocols that have been in force since 1992? Because they are the NPS officials in charge of the seals in Drakes Estero, they certainly should. However, by the above statement made in Becker II, one must assume that they were not aware of the NPS et al protocols.

The Department of Interior's Inspector General investigated the Point Reyes National Seashore and published its report on 07/22/08. The IG found PRNS scientists were engaged in scientific misconduct and exposed part of their misconduct. Proof that Dr. Sarah Allen and the NPS actually did know about the protocols is contained in the following section of that report. Sarah Allen was quoted:

> Allen explained that the pre-existing seal site from the 2005 map that was extended on the 2007 map was a "lateral channel" that Lunny knew he was not supposed to use. She referred to a 1992 agreement between the Johnson Oyster Company and NPS that indicated as much. A review of the 1992 Record of Agreement between NPS, the National Marine Fisheries Service, the California Department of Fish and Game, and the Johnson Oyster Company reflected that the lateral channel was closed to boat traffic from March 15 through June 1 and that during the entire month of June, the channel "should be used as little as possible." Allen further explained that the new area circled on the 2007 map was not circled on the 2005 map because it was not a primary pupping area, which she was focused on showing Lunny in 2005. It illustrated a place where seals hauled out of the water.

Sarah Allen explained, in detail, to the DOI IG, that the lateral channel has been closed during pupping season since 1992. A few months later, Sarah Allen told the NAS that these very protocols did not exist – that a new restriction set forth by the CCC first closed the lateral channel during pupping season. This represents additional scientific misconduct presented to your panel.

Becker II claims that the CCC first imposed the lateral channel restriction during pupping season. This is FALSE. The NPS scientists obviously knew about the current interagency protocols. This information, withheld from your panel but provided as an attachment here, contradicts Becker II. The statistical analysis made in Becker II is, therefore, inaccurate and must be corrected.

The final comment in Becker II states:

> to population loss. Finally, our results suggest that an important part of managing for protection of pinnipeds may be to provide a higher level of protection around breeding habitat which is not currently protected under the U.S. Marine Mammal Protection Act (www.nmfs.noaa.gov/pr/laws/mmpa).

With this statement, the NPS authors again mislead the NRC panel – any anyone else who reads the Becker report. There is no reference to the current interagency protocols that already provide a much higher level of protection than is required by the Marine Mammal Protection Act. That sentence also appears to be an effort to use incorrect information to impact decision making at PRNS.

The assertions found in Becker II are inaccurate and therefore cannot be relied upon when considering how best to protect the harbor seals of Drakes Estero.

Your panel is charged to answer this question: *What conclusions can be drawn from the body of scientific studies, and how do they compare with what the NPS presented to the public?* We ask that your panel fulfill your charge by also addressing the NPS science presented before you, which has been shown to be false but has still become part of the public record against us and our family and our farm. Please address the following NPS science and conclusions presented before your panel and entered into the public record by NPS:

1. NPS publicly presented, in Becker II, that the California Coastal Commission was responsible for creating an "immediate"... "large change in management" by closing the lateral channel during the 2008 pupping season in Drakes Estero.
2. NPS publicly presented, in Becker II, statistical analysis that was based on the claim that the lateral channel was first closed during the 2008 pupping season.
3. NPS publicly presented, in Becker II that because of the new restrictions imposed by the CCC, their results suggest that increased restrictions on the oyster farm, to provide a higher level of protection, are necessary.

In July of 2007, Senator Feinstein demanded that the NPS have its scientific claims independently reviewed. In a September 26, 2007 letter to Congresswoman Woolsey, NPS Regional Director Jarvis acknowledged that agreement by writing, "At the July 21 meeting, we agreed to a review of the park news report [Drakes Estero Report] by an independent science review..." The NPS chose to have the NAS Ocean Studies Board undertake that review. It is the responsibility of your panel to identify each instance of NPS scientific misconduct---both those instances that occurred before the NAS' involvement, as well as those presented to your panel directly.

Sincerely,

Kevin Lunny Nancy Lunny

AC

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LRH: MARINE MAMMAL SCIENCE, VOL. 00, NO. 0, 2009

RRH: BECKER *ET AL.*: MODELING HARBOR SEAL DISTURBANCE

Modeling the effects of El Niño, density-dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997--2007

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ABSTRACT

Harbor seal (*Phoca vitulina*) haul-out site use may be affected by natural or anthropogenic factors. Here, we use an 11-yr (1997--2007) study of a seal colony located near a mariculture operation in Drakes Estero, California, to test for natural (El Niño-Southern Oscillation (ENSO), density-dependence, long-term trends) and anthropogenic (disturbance or displacement related to oyster production activities) factors that may influence the use of haul out subsites. Annual mariculture related seal disturbance rates increased significantly with increases in oyster harvest (r_s = 0.55). Using generalized linear models ranked by best fit and Akaike's Information Criteria, ENSO and oyster production (as a proxy for disturbance/displacement) best explained the patterns of seal use at all three subsites near the mariculture operations, with effects being stronger at the two subsites closest to operations. Conversely, density-dependence and linear trend effects poorly explained the counts at these subsites. We conclude that a combination of ENSO and mariculture activities best explain the patterns of seal haul-out use during the

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breeding/pupping season at the seal haul-out sites closest to oyster activities.

Key words: information-theoretic, AIC, *Phoca vitulina*, harbor seal, disturbance, Point Reyes, Drakes Estero, El Niño, density-dependence, mariculture.

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The Pacific harbor seal (*Phoca vitulina richardii*) ranges along the eastern Pacific from Baja California to Alaska, and in north-central coastal California, they are the dominant and only year-round resident pinniped (Sydeman and Allen 1999, Burns 2002). The population at Point Reyes, California represents the second largest concentration of harbor seals in the State of California, accounting for about 20% of the mainland breeding population, and the most seals per haul out site in the state occur between 37.5° and 38.0°N.[1] Much of the Point Reyes coastal zone remains relatively pristine within a national park, and provides diverse marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal, in contrast to urbanized locations nearby such as San Francisco Bay (Sydeman and Allen 1999, Grigg *et al.* 2004).

Harbor seals are unusual for a large marine predator because they occur almost exclusively in nearshore habitats, and as a pinniped, they come onshore at traditional terrestrial sites to breed and rest (Burns 2002). Typically, seals attend haul out sites year round and spend about 33%--55% of their time onshore (Yochem *et al.* 1987, Allen Miller 1988). The number of seals present at any given haul-out site is influenced by several factors including time of day, tide level, current

direction, weather, season, year, disease outbreaks, disturbances from other wildlife, and human activities (Allen *et al.* 1984, Hayward *et al.* 2005, Yochem *et al.* 1987, Suryan and Harvey 1999, Thompson *et al.* 2001, Grigg *et al.* 2004, Seuront and Prinzivalli 2005). During the pupping and molting seasons, attendance is usually higher than at other times of the year (Yochem *et al.* 1987, Grigg *et al.* 2004), but females and pups may also react more strongly to disturbances, depending on the source (Perry *et al.* 2002). Environmental factors such as El Niño Southern Oscillation (ENSO) events can affect attendance and reproduction (Allen *et al.* 1989, Trillmich and Ono 1991, Sydeman and Allen 1999), as can density-dependent factors (Brown *et al.* 2005, Jeffries *et al.* 2005), interspecific competition (Bowen *et al.* 2003), predation (Lucas and Stobo 2000), and epizootic outbreaks (Thompson *et al.* 2001). Human activities can disturb seals at haul out sites, causing changes in seal abundance, distribution and behavior, and can even cause abandonment (Allen *et al.* 1984, Suryan and Harvey 1999, Grigg *et al.* 2002, Seuront and Prinzivalli 2005, Johnson and Acevedo-Gutierrez 2007). Given all of these potential factors, it can be difficult to determine which are the most important ones affecting seal attendance at haul-out sites. This pitfall was

aptly noted by Richardson *et al.* (1995) by the statement: "it is uncommon to have a series of reliable counts long enough to quantify the numerical change, let alone determine the cause."

To explore how environmental and anthropogenic factors affect seal use of colonies, we examined a long-term study of harbor seals at Drakes Estero, Point Reyes, California. The purpose of the study was to determine changes in population size, reproductive success, and anthropogenic or environmental factors that may affect trends in counts (Sydeman and Allen 1999, Allen *et al.* 2004[2]). Here, we present an analysis of the seal population at three of eight subsites in Drakes Estero that were exposed to varying levels of human related disturbances associated with a mariculture operation. We tested four *a priori* hypotheses that could explain trends in seal counts: (1) year as a linear trend, (2) number of seals at subsites in the middle-lower Estero (to search for a density-dependent effect), (3) years since the last ENSO event, and (4) the level of mariculture operations in the estuary as measured by the magnitude of annual oyster harvesting.

METHODS

Study Area

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The Point Reyes peninsula, along the north-central California Coast, extends from Tomales Bay (38°30'N) south to Bolinas Lagoon (37°30'N). The peninsula is located within the Point Reyes National Seashore and adjacent to the Gulf of the Farallones National Marine Sanctuary. The topographic diversity of this coastal zone provides a broad range of substrates for harbor seals to haul out of the water. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. A "haul-out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987). A colony site may be a collection of haul-out sites within a limited geographic area. Drakes Estero and Estero de Limantour encompass a complex of eight subsites where seals haul out (Fig. 1), which are referred to collectively as the Drakes Estero/Limantour colony. Seals use the subsites at various times of the year depending upon their reproductive status, molting condition, and the level of disturbance encountered (Allen Miller 1988). All subsites are used during the breeding and molt seasons, and some are used regularly year-round. Females with pups have disproportionately used the sand bars exposed at low tide in the upper and middle portions of the Estero that are isolated from the mainland, and

consequently from humans and predators. Limantour Spit was mostly used by non-breeding seals during the breeding season (Allen Miller 1988). Subsites in the middle-lower estero, which are generally closer or attached to the mainland, have historically suffered higher human disturbance rates when compared to the isolated island sandbars of the upper estero.

Human access to the seal haul-out sites within Drakes Estero was limited because it is part of a national park and a congressionally designated wilderness area. During the breeding season (1 March--1 July), no boats were allowed within the Estero except for the non-conforming (to congressionally designated wilderness) uses by a commercial oyster operation. Three of the subsites where seals haul out are proximate to this commercial oyster operation (UEF, OB, and UEN). Subsite OB is within the oyster lease but was not used much for oyster culture in the recent past (1999--2004), portions of subsite UEN were within or adjacent to the lease, and subsite UEF was in a navigational channel that bisects a gap in the oyster lease where oyster boats traversed Drakes Estero (Fig. 1).

Oyster production and oyster culture methods used within the estuary have varied over the past 50 yr. However, the primary methods included oyster racks (measuring approximately 3

x 30 m each), stakes, and bags (each measuring 0.5 x 1 m). In 2007 most of the racks were distributed in the upper portion of the estuary and >1,000 oyster bags (estimated) were distributed along the margins of the estuary, on intertidal sandbars in the center of the bay and in Home and Creamery Bays (Fig. 1).[3] Oyster production levels were high between 1981 and 1998 (annual production ranged from 3 to 9 million oysters per year) and reduced between 1999 and 2005 (annual production <2 million oysters per year). Production then increased to about 3.5 million (~136,000 kg) oysters in 2006, and ~211,000 kg oysters for 2007 (Fig. 2A, B).[4, 5]

Surveys

The National Park Service (NPS) conducted surveys of harbor seals throughout the year from 1996 to 2007, but surveys were more frequent during breeding (1 March--30 May) and molting (1 June to 1 August) seasons (2--4 times per week, depending on weather). Trained volunteers and NPS staff conducted surveys at medium to low tides (below 2.5 ft [0.76 m]) during the day. Surveys were not conducted in heavy fog or rain because of poor visibility. NPS data collection began in 1996 but we were not able to completely discern all subsite count data in that first year since a few subsites were grouped on some surveys. We

therefore analyzed disturbance data from 1996--2008, and count data from 1997--2007.

Surveys were designed to capture the seasonal peak numbers at several of the Point Reyes seal colonies, including the Drakes Estero/Limantour colony, and to detect disturbances that might affect seasonal peak numbers at each colony. Survey periods lasted at least two hours, with counts occurring every half-hour. Each subsite was surveyed separately, and added to other subsites to obtain a total count for the entire colony. All subsites were visible from one survey location. For each subsite, the observer recorded the total number of adult/immature seals, pups, and dead pups present. Because of the difficulty in distinguishing adult from immature seals, these two groups were combined. Pups were the young of the year and, after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only from 1 March to 1 June. Surveys were conducted with binoculars and a 40--50× monocular spotting scope from a bluff on the western edge of Drakes Estero (Fig. 1).

Disturbances of the seals were recorded during each survey, and within a survey, multiple disturbances could occur. We defined disturbance as any activity that elicited a reaction by

the seals; which was either a head alert, a flush towards water, or flush into water. Disturbance rate (# disturbance events / # surveys during March--July of each year) was analyzed from 1996--2008 for the upper estero subsites and we tested for a correlation in mariculture related disturbance rate in relation to annual oyster harvest using a 1-tailed Spearman ranks test. We also used a non-parametric Wilcoxon rank test to see if oyster harvest differed in years with or without mariculture related disturbances. To be conservative, if two or more activities (*e.g.*, oyster boat and a kayak) appeared to cause a seal disturbance, the event was categorized as "non-oyster" related.

Data Preparation

We selected count data from Drakes Estero within the historical peak of the pupping season (15 April--15 May) during 1997--2007. These data were then filtered to remove: (1) data from observers with less than one year of survey experience, (2) observations at tide levels above +2 ft (+0.61 m) (MLW) when fewer seals would be present because some subsites might be submerged (Allen Miller 1988, Grigg *et al.* 2004), and (3) observation dates where weather reduced visibility. Tide level and tide time were standardized to the Golden Gate Bridge, San

Francisco (PST). To ensure that variation in tide levels ≤2 ft (0.61 m) did not affect counts, we tested for correlations between tide level and counts at all of the eight subsites and found no relationships (Spearman ranks test, all $r_s < |0.24|$, $n = 104$). Temporal autocorrelation plots of means by year indicated no significant autocorrelations at any time lag (all $r < 0.5$). The data from all 104 surveys used in this analysis were checked for accuracy against the raw data forms and by comparing subsite data with the sum of counts from the full Estero. Between 6 and 15 surveys (mean = 9.5 ± 2.9) were completed in each year during this period. We also graphically compared pupping season counts with the five other primary local harbor seal colonies within 30 km of Drakes Estero from 2000 to 2007 to provide a regional context.

Analyses

We hypothesized that there could be four potential effects on counts at two of the subsites closest to the mariculture operation in the upper estero (OB and UEN): (1) year as a linear trend through time, (2) density-dependence, defined as total seal counts in the middle-lower Estero away from mariculture operations (L, A, A1, DEM, DBS), (3) years since the last ENSO event (1991--1992 and 1997--1998;

http://www.pmel.noaa.gov/tao/elnino/), and (4) mariculture activity measured as the weight of oysters harvested (x 10^5 lbs) during the same year. We assumed that the oyster harvest variable represented the combined effects from boat traffic, human activity, and oyster bag placement that may displace or disturb seals. Candidate models included between one and three of the above factors; year and ENSO were not used in the same models since both represent time and they were correlated. Density-dependence data was limited to the middle-lower estero counts since the upper estero subsites were being modeled as dependent variables and including them would lead to lack of independence between independent and dependent variables. For example, if oyster harvest was impacting any of the upper estero subsite counts, then using those counts as independent variables in the model would lead to a lack of independence. This could result in using overlapping data in both the independent and dependent variables.

To investigate the robustness of the models to how density-dependence was calculated, we also investigated density-dependence effects on an annual (mean) basis (in addition to daily, as described above). Similarly, we also investigated modeling oyster harvest with a 1-yr time lag. Since time from

oyster planting to harvest is about 18 mo, any effects due to harvest levels could potentially begin to be expressed sometime during the 18 mo prior to harvest.[5, 6] However, in Drakes Estero, most oyster related activity occurs near seal haul-out sites OB and UEN for only 3--4 mo prior to harvest.[7] Consequently, we focus on *same* year oyster harvest effects in the analyses and results. Lastly, we considered lowest tide height during the survey as an additional covariate. Linear mixed-effects models were also tested using ENSO as a random effect.

For analyses of total counts at subsites OB and UEN, we built generalized linear models (GLM). Daily counts were overdispersed (*i.e.*, variance greater than the mean and increasing with the mean), and we therefore used a negative binomial distribution to model the data (Venables and Ripley 2002, Insightful Corp. 2003, Crawley 2005) and ranked each model using Akaike's Information Criterion corrected for small sample sizes (AIC_c) (Burnham and Anderson 2002). Lower AIC_c values indicate a more parsimonious model that better explains the pattern in the data while penalizing the addition of trivial parameters. For the negative binomial distribution, we used a maximum likelihood estimation of θ (shape parameter for the negative binomial distribution) for both UEN and OB using the

glm.nb function in S-Plus (GLM with negative binomial distribution) (Venables and Ripley 2002). These values (1.0 for OB and 1.6 for UEN) were subsequently used in all GLM models because θ must be kept constant to compare maximum likelihood (and hence AIC_c) between models using the same dataset (Venables and Ripley 2002). We report the ΔAIC_c value, Akaike weights (w_i), and pseudo r^2 (Maddalla 1983) to present the level of confidence in each model.

To validate the best model at OB, we used the best fitting GLM model parameters to predict counts at UEF using a scaling parameter that divided the mean counts at UEF from 1997--2007 (26.4) by the mean counts at OB (83.6) for the same period (ratio = 0.32). We then compared the predicted and actual counts at UEF for each year using a Pearson correlation. Lastly, we constructed a regression tree with the software program R to illustrate and test the interactions between independent variables (year, ENSO, density-dependence, and oyster harvest in the same year) on combined OB and UEF harbor seal counts. Statistical analyses were done with S-Plus 6.2 (Insightful Corp. 2003) or R 2.7.2 (R Development Core Team 2008) using the MASS library (Venables and Ripley 2002).

RESULTS

Seal attendance varied at all three upper Drakes Estero subsites from 1997--2007; however, the amount of change varied amongst the subsites. At subsite OB, both the maximum and mean counts for seals and pups were lower from 1998--2001, higher from 2002--2004, and then lower for 2004--2007. Oyster harvesting showed a U-shaped pattern, declining in the early part of the study period and increasing in 2005 (Fig. 2A).

Disturbance rates in the upper estero (subsites OB, UEF, UEN) significantly increased with oyster harvest (r_s = 0.55, P < 0.03). This correlation is highly robust to sample size. For example, there was still a significant positive correlation (r_s = 0.53, P < 0.04) of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis. Similarly, oyster harvest levels in years with oyster related disturbances were significantly higher (U = 43, n = 13, $P_{1\text{-tail}}$ < 0.04). Only one mariculture related disturbance was recorded in the middle-lower estero during the study. This was at subsite A in 2003 and was likely due to a state mandated water quality testing trip.

The best GLM model to explain seal counts at OB (w_I = 0.65) included years since ENSO and oyster harvest (Table 1). The coefficients indicated that seal counts had a positive relationship with years since ENSO and a negative relationship with oyster harvest (Table 2). The second ranked model (oyster + ENSO + Density-dependence) was similar to the first model with the inclusion of density-dependence as a non-significant variable (w_I = 0.32). Thus, the top two models had a total w_I of 0.97 and consisted primarily of years since ENSO and oyster harvest. Pseudo r^2 was moderate (0.37-0.38) for these two best models and declined rapidly thereafter to <0.29 for the remaining models.

Predicted counts at UEF using the scaled best fit/lowest AIC_c model from OB fit well (r = 0.66, P < 0.04), strongly suggesting that similar processes (ENSO and oyster harvest) were driving the counts at both OB and UEF (Fig. 3A). In fact, all years except the highest oyster harvest years (1997, 2006, 2007) fit extremely well. The only significantly correlated (P < 0.05) variables were year and ENSO (r_s = 0.89), and ENSO and subsite OB counts (r_s = 0.64). Daily density-dependence was not correlated with counts at OB (r_s = -0.12), but mean annual density-

dependence was using ranks tests (r_s = 0.65) but not Pearson tests (r_p = 0.43, P > 0.18).

Using density-dependence as an annual mean rather than a daily value and/or oyster harvest with a 1-year lag effect still resulted in oyster harvest (with a significant negative coefficient) being included in all of the best (lowest AIC_c / highest r^2) models at OB. For example, if considering density-dependence on an *annual* mean basis, (not shown in tables), the best model included density-dependence, ENSO and oyster harvest (same year) all as significant (P < 0.004) variables and oyster harvest still had a negative coefficient similar to that in Table 2. However, removing oyster harvest from the model increased AIC by ~6.7, indicating that failing to consider oyster harvest results in a model with much lower confidence (Burnham and Anderson 2002). Tide height effects were not important in any models and did not appear in the highest ranking models. Linear mixed-effects models (termed non-nested or crossed random effects) (Faraway 2006) using ENSO as a random factor also resulted in a significant negative oyster harvest coefficient. Model results were also not affected by including components for temporal autocorrelation. Residual plots for the

GLMs showed no issues with homoscedasticity or increasing variance.

Models for subsite UEN, which is farther from the oyster operations, all had poorer fit than OB (all pseudo $r^2 < 0.17$), but oyster harvest and ENSO were once again in the best (lowest AIC_c) model with an Akaike weight of 0.41 (Fig. 3B, Table 1). However, the model containing only year as an explanatory variable ranked second and had an Akaike weight of 0.20, which partially reduces our confidence in the top model.

The regression tree for counts at OB and UEF combined also confirmed the patterns found by the GLMs. ENSO explained much of the variation, and an increase in oyster harvest explained the significantly lower counts (from 255 ± 62 seals down to 118 ± 62) once ENSO effects had subsided (Fig. 4). The tree was grown until additional nodes had a negligible (<5%) additional reduction in model deviance. Residual plots of the regression tree model indicated that the model was sound.

Five other colonies in the region showed a different pattern than Drakes Estero subsites UEF, UEN, and OB, as well as Drakes Estero as a whole (Fig. 5). Bolinas Lagoon, Tomales Bay, and Duxbury Reef showed stable populations during the time series. The Double Point haul-out site suffered from an

aggressive male elephant seal (*Mirounga augustirostrus*) in 2003 that killed approximately 40 (mostly female) and chronically harassed 100s of harbor seals throughout the breeding season. Coincidentally, the Drakes Estero colony had an abrupt peak in 2003, possibly due to movement of some of the seals from Double Point. The Tomales Point colony showed a small increase over time. Finally, middle-lower Drakes Estero counts (used to analyze density-dependence in this paper: subsites A, A1, DEM, DBS, and L) were relatively stable from 2000 to 2006, and similar to the entire estero, had a one-year peak in 2003 that may have been related to the displaced seals from nearby Double Point, and then a small decline in 2007.

Discussion

Pinnipeds, and harbor seals in particular, are vulnerable to human disturbance at haul-out sites where they rest, molt and raise their young (Seuront and Prinzivalli 2005, Grigg *et al.* 2002, Perry *et al.* 2002, Suryan and Harvey 1999, Allen *et al.* 1984, Kenyon 1972). Determining the level of effect from human activities, though, is difficult because of confounding factors such as environmental variables and multiple disturbance sources. Additionally, many studies are of short duration, focusing on short-term issues and do not account for factors

such as density-dependence on long-term trends of populations (Johnson and Acevedo-Gutierrez 2007, Perry *et al.* 2002, Grigg *et al.* 2002).

This study illustrates the utility of concurrently modeling anthropogenic and environmental factors using *a priori* hypotheses and information-theoretic (i.e., AIC) model selection to explain observed patterns in wildlife counts. Here, we provide evidence that from 1997 to 2007 seal counts at Drakes Estero subsites OB and UEF increased after the last ENSO and then declined with an increase in mariculture activities around 2005. The strong ENSO in 1998 had widespread ramifications for many upper trophic level predators in the California current, and in harbor seals, who may forego breeding and pupping in years of low available forage while spending more time foraging (Lee *et al.* 2007, Grigg *et al.* 2004, Benson *et al.* 2002, Sydeman and Allen 1999, Trillmich and Ono 1991). The upper estero subsites were used mainly for pupping and molting because they are islands, and therefore generally have lower human and natural disturbance rates.

Mariculture operations likely began increasing by 2005 to generate the increases in harvesting seen in 2006 and 2007, as time from oyster planting to harvest is typically around 18 mo

in Drakes Estero, with the latter 3--4 months being in areas closer to seal haul out sites OB and UEF. This is consistent with observations that there was little or no oyster equipment (*e.g.*, bags) near the OB sandbars from the summer of 2002 to the summer of 2004 (DTP, unpublished data). Also, aerial imagery from August of 2005 shows oyster bags on the west end of sandbar OB. After April 2007, there were extensive oyster equipment arrays and bags in this area (Fig. 1). The disturbance data and oyster landings (Fig. 2B, Table 1) suggest that increasing mariculture activities resulted in some combination of increased disturbance from boat traffic, human presence on sand bars, and/or physical displacement of seals from the sandbars by oyster growing equipment. While disturbance would likely occur primarily at low tides when seals were hauled out, surveys that count seals and record disturbance events were only completed during a small fraction of the year (typically <50 d per year, each survey 2--4 h), so all types of disturbance were likely underestimated here. Studies from Washington found that disturbance events that flush seals into the water only resulted in a return to previous numbers 39% of the time (Suryan and Harvey 1999), and results from nearby Bolinas Lagoon were similar (Allen *et al.* 1984). Other studies have indicated that

females with pups may be more vigilant and sensitive to disturbance, and this also may have contributed to the sharp decline of seals at the subsite (OB) in Drakes Estero where mostly females and pups occurred (Lucas and Stobo 2000, Suryan and Harvey 1999, Stein 1989). Such disturbance events in Drakes Estero at OB and UEF appear to have produced effects that were detectable during the entire pupping season via reduced seal counts. However, simple displacement due to mariculture activities or equipment without actual disturbance events may equally be driving the patterns observed at OB and UEF.

The similar count pattern and good model fit observed at subsite UEF (Fig. 3A) suggests that the same factors were driving counts at both OB and UEF. However, the predictive model also showed that the subsites appeared to decouple when oyster harvest was high (1997, 2006, 2007, and perhaps 2008). This suggests that UEF and OB covary strongly in the absence of high oyster harvest levels. Conversely, it appears that when oyster harvest was high, the subsites (OB and UEF) fell out of sync due to mariculture related disturbance or displacement events. Curiously, there is no consistent directionality in this decoupling pattern (Fig. 3A). Alternatively, this decoupling could be related to poorer model fit at the beginning and end of

the time series, but since time (year) was not a variable selected or used in the model, this seems unlikely.

Counts at subsite UEN, which is slightly further away from mariculture operations, nonetheless showed a significant, but muted response to ENSO and oyster harvesting. While several other subsites in the estero vary with changes in sandbar morphology, disturbance, predators, and other environmental factors, subsites OB and UEF (and UEN) suffered no such physical changes other than an increase in nearby mariculture use. The generally poor fit for all of the UEN models suggests that other unmodeled factors (including interactions among subsites) may affect counts there more than ENSO, density-dependence, or oyster harvest. Additional processes that might influence the seal counts at UEN include 1) seals are typically farther from oyster operations than those at OB and UEF and thus less susceptible to disturbance, and/or 2) some seals may have moved from OB or UEF to UEN upon being displaced by oyster operations. Distance from a disturbance source has often been documented as contributing to whether seals respond to a human activity (Johnson and Acevedo-Gutierrez 2007, Suryan and Harvey 1999, Allen *et al.* 1984). Furthermore, changes in sandbar morphology in the middle-lower Estero, might also have affected counts in

the upper estero because of redistribution of seals. For example, counts at subsite A in the middle estero (Fig. 1) declined dramatically from 2004--2007, due to a naturally shifting sandbar that allowed predator (coyote, *Canis latrans*) access to the site. The displaced seals appeared to move to other subsites in the estero (for example, subsite A1 increased dramatically as A declined), and this process may have also had a confounding impact on the counts at UEN. Clearly, the variation at UEN is not very well explained by our candidate models and unknown processes such as interactions among subsites in the Estero may be partially driving counts at UEN. Additionally, variation in tidal height should not affect the counts since all surveys were conducted at low tides, and multiple counts were conducted during each survey, with only the highest count recorded and analyzed here.

Modeling density-dependence should also control for larger scale regional impacts such as the poorly understood oceanographic anomalies in the California Current reported in 2005 and 2006 that depressed food for many seabirds (Barth *et al.* 2007). For example, if ocean conditions depressed seal density in Drakes Estero and this in turn caused less use of OB or UEF due to density-dependent effects, then density-dependence

should have presented a better (more parsimonious) explanation of the data than "ENSO" and "Oyster" (Table 1). This would similarly address any covariation of counts in Drakes Estero compared to other harbor seal haul-out sites in north-central California due to unexplained interannual variation (Fig. 5). While mean total harbor seal counts in all of Drakes Estero increased from 2000 to 2003 (from ~700 to 1,200 individuals), and then declined from 2003 to 2007 (back down to ~750 individuals), ENSO and oyster harvesting still explained the data much better than density-dependence (Tables 1 and 2). This is likely because the middle-lower estero counts were somewhat more stable (Fig. 5). The one year spike in 2003 was likely due to displaced seals from Double Point moving to Drakes Estero. There was also a small unexplained decline in 2007.

The significant decline in adults and pups at OB after 2004 suggests that oyster harvesting influenced these numbers; however, the GLM models were fit to actual data, so it would be inappropriate to predict if seals at OB would have continued to increase or asymptote after 2004 in the absence of increasing oyster harvesting. In fact, a square-root (diminishing effects) transformation for ENSO may have also been a reasonable *a priori* test. Nonetheless, while long-term studies in Washington and

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Oregon noted density-dependence effects at harbor seal colonies (Brown *et al.* 2005, Jeffries *et al.* 2005), the data for subsite OB in Drakes Estero were most consistent with the hypothesis that a significant portion of the reduced seal count during 2005--2007 was related to the increase in oyster harvesting.

Further evidence for the negative effect of oyster harvest levels on counts at subsites OB and UEF comes from the limited data available for 1996. These counts were not used in the GLM or tree models due to incomplete data, however, five surveys during the peak pupping season showed a mean count for OB of only 47 ± 39 (similar to 1997, 2005, and 2007) during the highest oyster harvest year (587,000 lbs) and the highest disturbance rate during the study (Fig. 2B).

The 2008 pupping season presented an opportunity to investigate the immediate effect of a change in oyster operations. In 2008, the California Coastal Commission (CCC) imposed a seal protection zone which restricted some use of the lateral channel adjacent to OB by oyster boats during the pupping season. Thus, boat use in the lateral channel in 2008 was curtailed from use levels during 2005--2007, and concurrently, mean counts at OB increased from about 61 ± 10 (SE) in 2007 to 81 ± 12 in 2008 despite a nominal increase in

oyster harvest, from 466,000 lbs in 2007 to a projected 493,000 lbs in 2008. The restriction of oyster operations also coincided with only one mariculture related disturbance detected in the upper estero in 2008 (versus six in 2007) (Fig. 2B), suggesting that conditions that previously reduced pupping season seal counts may have partially abated due to CCC restrictions.

We therefore suggest that an adaptive management approach for oyster operations be investigated since reducing activity in the area close to seals may have had immediate positive effects. This also suggests that while oyster harvest was a good proxy for impacts on seal counts in the upper estero for 1997--2007, changes in operations such as those experienced in 2008 may make the oyster harvest proxy less useful in the future. For this reason, it is not appropriate to include the 2008 data in the models because of this large change in management.

In conclusion, patterns observed in Drakes Estero at upper estero subsites OB and UEF (and potentially UEN) are best explained by ENSO and increased disturbance from oyster harvest activities. The ability of the OB model to predict counts at subsite UEF suggests that similar processes are occurring at both subsites and that the modeling techniques are robust. The results of this study also contribute to a limited body of

literature on the potential negative effects of mariculture on marine mammals. Watson-Capps and Mann (2005) found that oyster farming in coastal waters off Australia reduced use by bottlenose dolphins (*Tursiops* sp.) even though the facility had open areas that presumably would allow dolphins to pass. Such conflicts may increase in the future if mariculture replaces wild ocean harvesting due to the worldwide decline in wild fish stocks (Worm *et al.* 2006).

This study illustrates the benefits of long-term studies for understanding multiple anthropogenic and environmental factors that can affect pinniped populations and productivity (Thompson *et al.* 2001, Richardson *et al.* 1995). It also demonstrates how chronic disturbance activities, in this case associated with a mariculture operation, can lead to displacement of seals at haul-out sites, resulting in animals either shifting to alternate subsites or leaving the area. Kenyon (1972) noted for the monk seal (*Monachus schauinslandi*) that such losses likely led to net population losses because of the lack of suitable breeding habitat. If harbor seals in the region are at environmental carrying capacity, then loss of pupping sites within Drakes Estero also might conceivably lead to population loss. Finally, our results suggest that an

important part of managing for protection of pinnipeds may be to provide a higher level of protection around breeding habitat which is not currently protected under the U.S. Marine Mammal Protection Act (www.nmfs.noaa.gov/pr/laws/mmpa).

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FIGURE LEGENDS

Figure 1. Oyster bag areas (mapped in spring of 2007), oyster racks, and the eight seal haul out subsites (*e.g.*, OB) in Drakes Estero. UEF, OB, and UEN are considered upper Estero. Subsites A, A1, DBS, DEM, and L are in the middle-lower Estero and not subject to disturbance from mariculture. All surveys were completed from the bluffs indicated by the "survey location" marker.

Figure 2. (A) Mean (±1 SE) counts of harbor seals at Drakes Estero subsite OB and oysters harvested from Drakes Estero during 1997--2007. 1998 was an El Niño year. (B) Relationship between annual oyster harvest and mariculture related disturbance rate from 1996--2008. Text adjacent to points indicates the year, the number of disturbances in that year, and the number of surveys. Between 37 and 50 surveys were conducted each year from 1997--2005. During 1997--1998, oyster harvest rate was rapidly declining which may have diminished some of the factors that lead to disturbance.

Figure 3. (A) Predicted and actual (from the best fitting generalized linear model at OB) mean counts of pups and adults from 1997--2007 at subsite UEF. The 2008 data point is not derived from the model (it is actual data) or used the

correlation test. It is only shown to illustrate that seals in 2008 appear to be returning to more normal covariation between OB and UEF. (B) Mean seal counts from 1997--2007 at subsite UEN during the 15 April--15 May pupping season. Error bars represent the standard error for the total count.

Figure 4. Regression tree illustrating how ENSO and oyster harvest interact to best explain seal counts at subsites UEF and OB. The number of seals for each survey is represented by a dot histogram along the x-axis in each box, with points at the origin indicating a zero count and points to the right of the box indicating larger counts. This model agrees closely with the GLM results in Table 1.

Figure 5. Mean (±1 SE) counts of pups and adults during the pupping season (15 April--15 May) from 2000 to 2007 at Drakes Estero and five regional sites within 30 km. Dark bars on the Drakes Estero panel represent only the middle-lower estero counts used for calculating density-dependence in the GLM and regression tree models.

FOOTNOTES

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Table 1. Ranking of candidate models at subsites OB and UEN by AIC_c and Akaike weights (w_i). The dependent variable is the count of total seals at subsite OB and independent variables are year as linear trend (Year), Density-dependence (DenDep: daily sum of seals in the middle-lower estero), years since last El Niño event (ENSO), and lbs of oysters harvested in the same year (Oyst). Column headings are: small sample AIC (AIC_c), distance from best model (Δ_i), and Akaike weight (w_i); n = 104 for all models.

Model	AIC_c	Δ_i	w_i	r^2
Subsite OB				
Oyst + ENSO	332.96	0.00	0.65	0.37
Oyst + ENSO + DenDep	334.38	1.42	0.32	0.38
ENSO	340.36	7.40	0.02	0.25
ENSO + DenDep	340.70	7.74	0.01	0.28
Year	344.90	16.53	0.00	0.19
DenDep	353.16	20.20	0.00	0.07
Oyst	353.22	20.26	0.00	0.05
Oyst + DenDep	353.42	20.47	0.00	0.11
Null	353.68	20.72	0.00	0.05
Subsite UEN				
Oyst + ENSO	320.19	0.00	0.41	0.16
Year	321.68	1.49	0.20	0.10

Oyst + ENSO + DenDep	322.34	2.15	0.14	0.16
ENSO + DenDep	322.66	2.47	0.12	0.12
ENSO	323.20	3.01	0.09	0.11
Null	326.10	5.90	0.02	0.00
DenDep	327.66	7.47	0.01	0.01
Oyst	328.22	8.02	0.01	0.00
Oyst + DenDep	329.81	9.61	0.00	0.01

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Table 2. Coefficients of the best two AIC_c ranked models for OB and UEN from Table 1. w_i is Akaike weight.

Subsite:Model	Coefficient	Standard Error	t	p<0.05
Subsite OB				
Model 1 (w_i = 0.65)				
Constant	3.530	0.185	19.099	*
Oyst	-0.240	0.063	-3.821	*
ENSO	0.261	0.035	7.563	*
Model 2 (w_i = 0.32)				
Constant	3.269	0.366	8.928	*
Oyst	-0.229	0.066	-3.447	*
ENSO	0.251	0.036	6.911	*
Density-dependence	0.001	0.001	0.914	
Subsite UEN				
Model 1 (w_i = 0.41)				
Constant	4.720	0.117	40.292	*
Oyst	-0.105	0.040	-2.631	*
ENSO	0.119	0.022	5.436	*
Model 2 (w_i = 0.20)				
Constant	-140.463	36.041	-3.897	*
Year	0.073	0.018	4.038	*

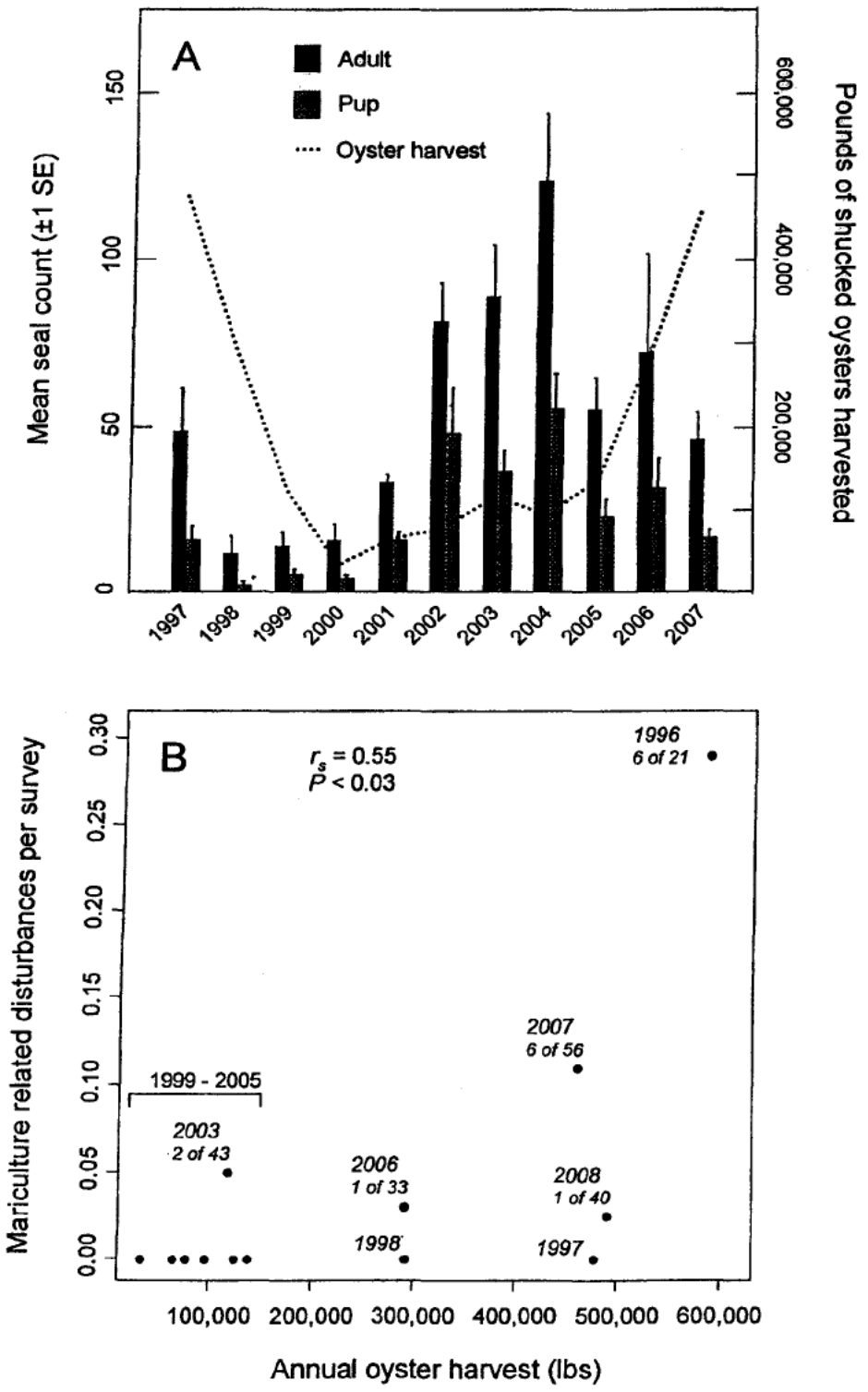

A
Adult
Pup
Oyster harvest
Mean seal count (±1 SE)
Pounds of shucked oysters harvested
0
50
100
150
200,000
400,000
600,000
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
B
r_s = 0.55
P < 0.03
1996
6 of 21
2007
6 of 56
1999 - 2005
2003
2 of 43
2006
1 of 33
2008
1 of 40
1998
1997
Mariculture related disturbances per survey
0.00
0.05
0.10
0.15
0.20
0.25
0.30
100,000
200,000
300,000
400,000
500,000
600,000
Annual oyster harvest (lbs)

Fig. 2

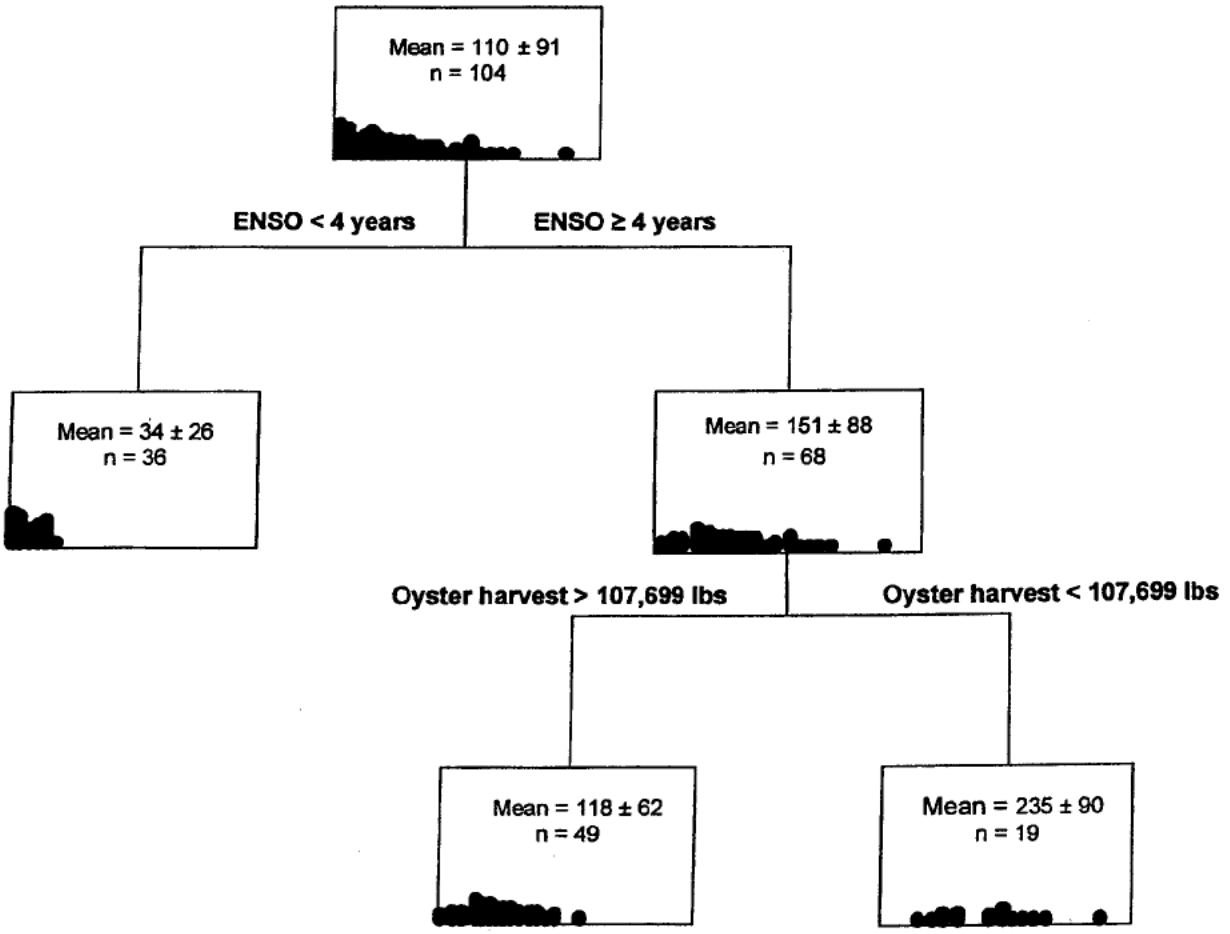
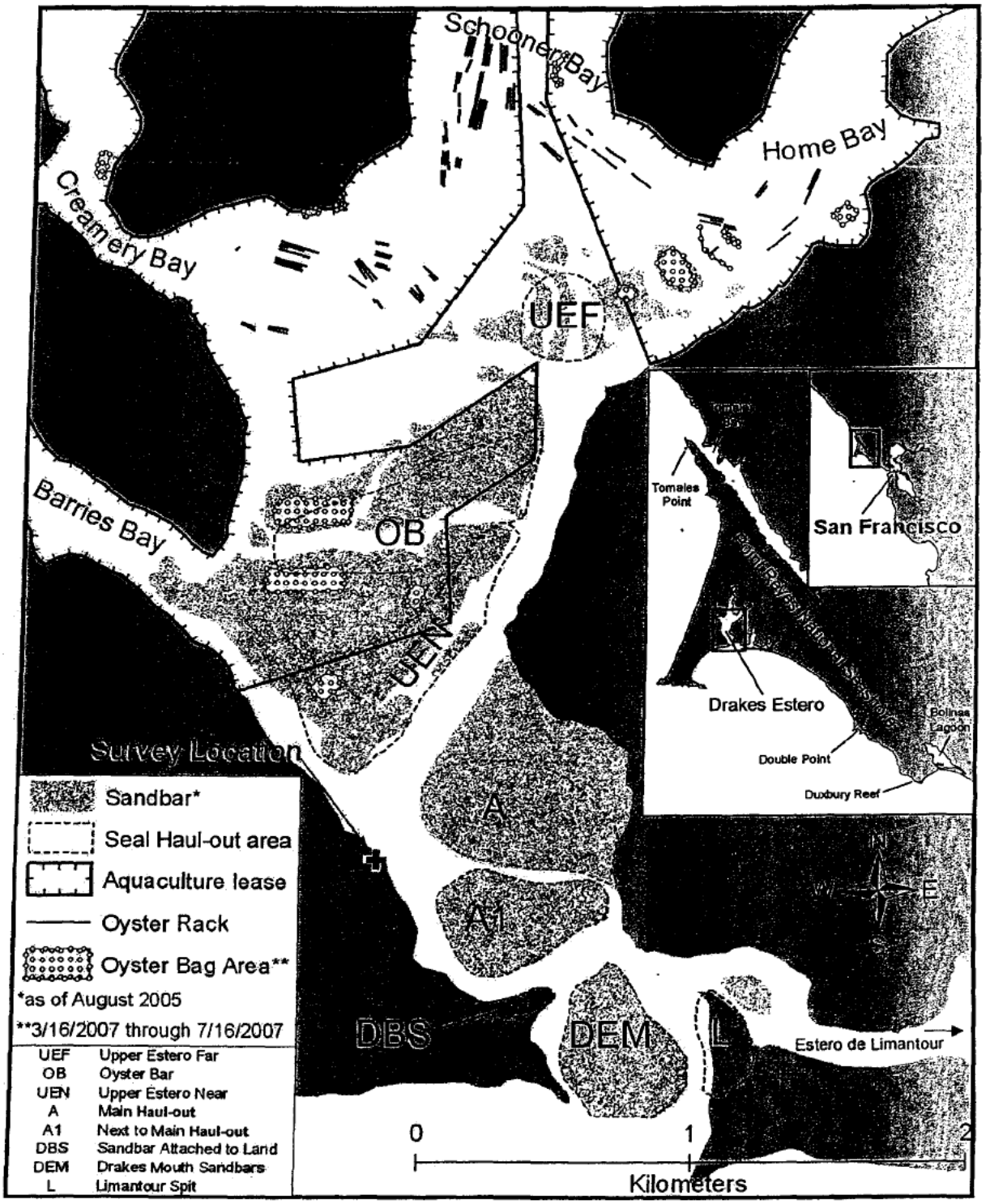

Mean = 110 ± 91
n = 104
ENSO < 4 years
ENSO ≥ 4 years
Mean = 34 ± 26
n = 36
Mean = 151 ± 88
n = 68
Oyster harvest > 107,699 lbs
Oyster harvest < 107,699 lbs
Mean = 118 ± 62
n = 49
Mean = 235 ± 90
n = 19

Fig. 4


Schooner Bay
Home Bay
Creamery Bay
UEF
Barries Bay
OB
UEN
Survey Location
A
A1
DBS
DEM
L
Estero de Limantour
Tomales Point
San Francisco
Drakes Estero
Bolinas Lagoon
Double Point
Duxbury Reef
N
W
E
Sandbar*
Seal Haul-out area
Aquaculture lease
Oyster Rack
Oyster Bag Area**
*as of August 2005
**3/16/2007 through 7/16/2007
UEF Upper Estero Far
OB Oyster Bar
UEN Upper Estero Near
A Main Haul-out
A1 Next to Main Haul-out
DBS Sandbar Attached to Land
DEM Drakes Mouth Sandbars
L Limantour Spit
0
1
2
Kilometers

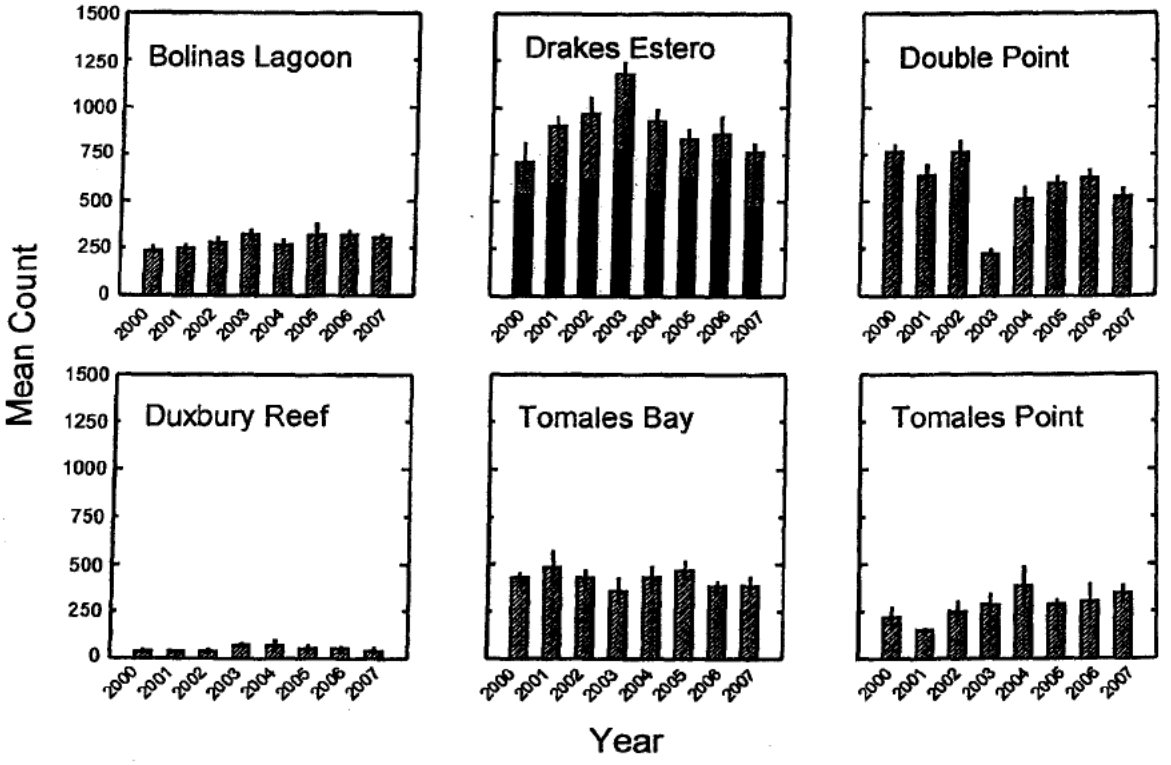

Bolinas Lagoon
Drakes Estero
Double Point
Duxbury Reef
Tomales Bay
Tomales Point
Mean Count
Year
1500
1250
1000
750
500
250
0
2000
2001
2002
2003
2004
2005
2006
2007

Fig. 5

AE

POINT REYES LIGHT

Tomales Bay Publishing Company 1949-2008

Updated: Friday December 12, 2008

The Pulitzer Prize-Winning Weekly Newspaper

Park service to close historic oyster farm

Peter Jamison
2007-06-15

Commercial oyster farming began in Drakes Estero in the last quarter of the nineteenth century, but by some accounts the history of shellfish cultivation on Point Reyes began long before that. Ancient mounds of shells discovered on surrounding beaches have led archaeologists to speculate that for thousands of years the Miwok Indians harvested oysters from tremendous clusters that stretched throughout the estuary.

Over the millennia Drakes Estero, now part of the Point Reyes National Seashore, hasn't changed much. Its shallow water — some six feet deep throughout — is still cold and clear, and, seen from the shore on a sunny day, astonishingly blue. Humans are still pulling oysters out of the estuary's narrow, finger-shaped bays.

In coming years that could change. Kevin Lunny owns Drakes Bay Oyster Company, formerly known as Johnson's Oyster Company, the cannery that has operated on Drakes Estero since the 1940s. He says that he was told by National Seashore Superintendent Don Neubacher more than a year ago — before he bought the cannery — that the park plans to end oyster farming in the estuary. In a telephone interview this week, park administrators confirmed that when the company's current lease expires, six years from now, it will not be renewed.

But few outside of the agricultural and environmental communities are aware that Drakes Bay Oyster is to be shut down. The expected closure will mark the end both of a living piece of West Marin's history and of one of the state's most significant shellfish producers.

According to Lunny, thousands of visitors flock to the cannery, located on the shore of Schooner Bay, every week. Drakes Bay Oyster Company holds more than half of the area leased out for shellfish farming by the state Department of Fish and Game, and by itself accounts for 85 percent of Marin County's aquaculture.

"I'd hate to see it go," said Tom Moore, a marine biologist for Fish and Game. "It's got the best water quality of any of the leases in the state. It's a green business. It's been in operation a long time. As far as Marin goes, it could be a lot to the economy." In 2004, Moore said, Fish and Game renewed the company's leases on harvest areas for another 25 years, the maximum term. But Drakes Bay Oyster can't stay open without continued use of the small plot of shore it leases from the National Park Service.

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Lunny, who grew up on the neighboring historic "G" ranch, is known in West Marin as a luminary of the organic farming movement. His beef ranch, which he also leases from the National Seashore, was the first in the county to have its pastures certified organic, and to date still has the county's only certified organic cattle. A soft-spoken, broad-shouldered man with salt-and-pepper hair and an easy smile, Lunny this week explained the place of shellfish in sustainable agriculture as he looked out over the shore of Schooner Bay, where visitors to the farm were spread out, shucking and eating raw oysters.

"What this oyster farm represents is our best example of a sustainable food system," he said. "It's the poster child. We can produce 10 times the amount of protein per acre in water that we can on land. We don't use fertilizers, we don't till our land, we don't have to feed these animals. Sustainably as we can grow beef, we still have to use fossil fuels to prepare feeds for winter, to do the feeding and moving of the animals, and for processing. I think the biggest environmental tragedy that could happen here is to lose this production."

Lunny bought the farm last year from owner Tom Johnson, whose father founded Johnson's Oyster Company in 1957. Before that, the operation was run by the Coast Oyster Company, based in Washington State. Johnson's thrived for decades, and at one point was the largest oyster producer in California, turning out more than 700,000 pounds of shucked oyster meat a year. The land on Schooner Bay occupied by the farm's processing center and retail outlet was sold to the park in 1965, then leased back to the Johnsons for a 40-year term.

In later years, production fell off, as the Johnsons poured money into improvements intended to reduce the farm's impact on the estuary. County, state, and federal agencies demanded that problems with the company's septic system and overcrowded worker housing be fixed.

As a child, Lunny says, he would often watch the Johnsons' oystermen at work from the pastures of his family's neighboring ranch, and was eager to buy the cannery when it came up for sale. Although he was told up front by Park Supt. Neubacher that the lease would not be renewed in 2012, he has so far poured $300,000 into various environmental cleanups.

"Kevin has done a fantastic job of cleaning up," National Seashore spokesman John Dell'Osso said. "Everything that we've asked him to do, he's done."

Neubacher said this week that in not renewing the lease the park will be following the intent of Congress, which designated Drakes Estero as a potential wilderness area in 1976. The park administration essentially has no choice in keeping the farm open, he said, since congressional legislation directs the park to remove commercial activities from potential wilderness tracts — changing them to full wilderness — as soon as possible.

"From our perspective, Congress told us what to do, and we're following that," Neubacher said. Attorneys from the Department of the Interior have confirmed that the area should go to full wilderness in 2012, he said. At this point, he added, only an act of Congress would make it possible for Drakes Bay Oyster to remain open longer.

Marin County Agricultural Commissioner Stacy Carlsen, who supports continued oyster farming in Drakes Estero, challenges the assertion that the National Seashore has no choice in preserving the historic operation.

"That's too easy," he said, "to fall back and say we have this guidance document and just to ignore the historical significance of farming out on the point." He said that he considers aquaculture an integral part of the county's agricultural makeup, particularly since it lends diversity to food production. "To me this is not just a decision made in a vacuum. This deals with people's lives and the integrity of our farming community."

Some local environmental activists support the end of oyster farming in Drakes Estero. Both the Sierra Club's Marin chapter and the Environmental Action Committee of West Marin sent letters to the Park Service supporting the transformation of the area to wilderness at the end of the current lease; the Sierra Club's letter also proposes various ways to limit oyster cultivation in the company's six remaining years.

Intent of Congress aside, the extent of oyster farming's impact on the estuary and its wildlife is questionable. In theory, shellfish cultivation can have several harmful effects: imported oyster seed can carry non-native diseases, and harvest boats on the estuary can leak gasoline into the water or disturb harbor seals from the sandbars where they sun themselves.

But park officials and environmentalists agree that Lunny has done much to reduce those threats. Drakes Bay Oyster cultivates its own seed, eliminating the risk of imported pathogens; avoids harbor seal haulout sites, as identified by the Park Service; and plans to install quieter, cleaner boat engines. At a recent meeting, Lunny said, local environmental leaders agreed that he had successfully minimized all impacts except one — the "visual impact" of oyster racks protruding above the water's surface.

Some in the environmental movement question whether uprooting the oyster operation is necessary to preserve the estuary's health.

"You can have an estuary that's got wilderness protection on it and also have sustainable food production," said Bolinas organic farmer Peter Martinelli, who sits on the Environmental Action Committee's board of directors. "I don't think one should come at the expense of the other."

Helge Hellberg, executive director of nonprofit Marin Organic, said it's shortsighted to give up a local source of food production with minimal impact on the environment.

"To rip out an operation that has been in place for 40 years that uses no inputs, no chemicals, no fertilizers, no feeds — it is very, very questionable to me if that's a good approach," Hellberg said. "To eliminate [Drakes Bay Oyster] and ship in oysters from Washington, from an environmental point of view, makes no sense whatsoever."

The fate of Drake's Bay Oyster Company also worries some ranchers in the National Seashore. In the legislation that created the park, special provisions were made for the dairy and beef ranches that existed on Point Reyes, many of them dating back to the nineteenth century. Those ranches could continue operating indefinitely, Congress said, leasing their land back from the Park Service.

While no such exception was made specifically for aquaculture, fear has taken root in the ranching community that the closure of the oyster farm might signal a new view towards agriculture in the park.

"If the park ends the lease of Drakes Bay Oyster Company, what is that saying to the rest of the leasees?" Asked David Evans, a fourth-generation rancher on Point Reyes. "Are the rest of the ranches next?"

Lunny said that those who want agriculture eliminated from the National Seashore will see the oyster farm's closure as a milestone. "Everybody's saying, okay, if this happens, who's next. Whether they're rational concerns or not, those are the concerns," he said.

Park Supt. Neubacher said that the situation at Drakes Bay Oyster has no bearing on the leases of other ranchers, since aquaculture, unlike ranching, is not protected under the laws that created the park.

"That's a resounding no," he said. "The legislation was pretty clear that we could do dairy and beef

ranching, and there's no wilderness on ranchlands."

Lunny's business plan for the oyster company will allow his family to recoup their expenses within six years — "we'll get out with our skin, barely," he said — but he says that the preservation of Drakes Bay Oyster is about more than money.

"As I got to understand what this was, I just really got excited," he said. "This was California's largest commercial production of shellfish for decades and decades, and it still had wilderness quality." He paused for a moment, looking out over the electric blue water of Schooner Bay. "That's what we want in our food production. That's exactly what our goal should be.

"The park administration has told us they're not going to renew our lease in 2012, because they need to actively make this a full wilderness," he continued. "Well, if that's what the people of the United States want, that's what they're going to get. But I'd like to make sure that people know what they're losing. They have to know the cost of making this a wilderness. When the people know and the people decide, I think we'll be fine with that."

On an afternoon this week at Drakes Estero, few customers appeared to be aware that the farm is slated for closure in just six years. "No way," said San Bruno resident Sun Hwang, who was crouched over a bag of fresh oysters, still in their shells, with his wife and small daughter. Shaking his head in dismay, Hwang said this is the only place he could get seafood as fresh as that in his native Korea.

Mill Valley resident Joel Kimmel said that he comes to Drakes Bay Oyster every time he's in West Marin. For his daughter's high school graduation party, he said, his family bought hundreds of oysters harvested out of Drakes Estero.

"They should keep this open," he said. "Why close it? Where's our history? There's too many of these things disappearing." After handing his money across the counter in Drakes Bay's small storefront, he hoisted his bag of oysters and walked out to his car. "The story will be, 'oh, that's where the oyster farm used to be,'" he said, "rather than, 'let's go in and get some.'"

Note: This article was originally published on February 23, 2006 and is republished today after it received a California Newspaper Publishers Association award for financial reporting.

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Administration | Website by Web Monopoly

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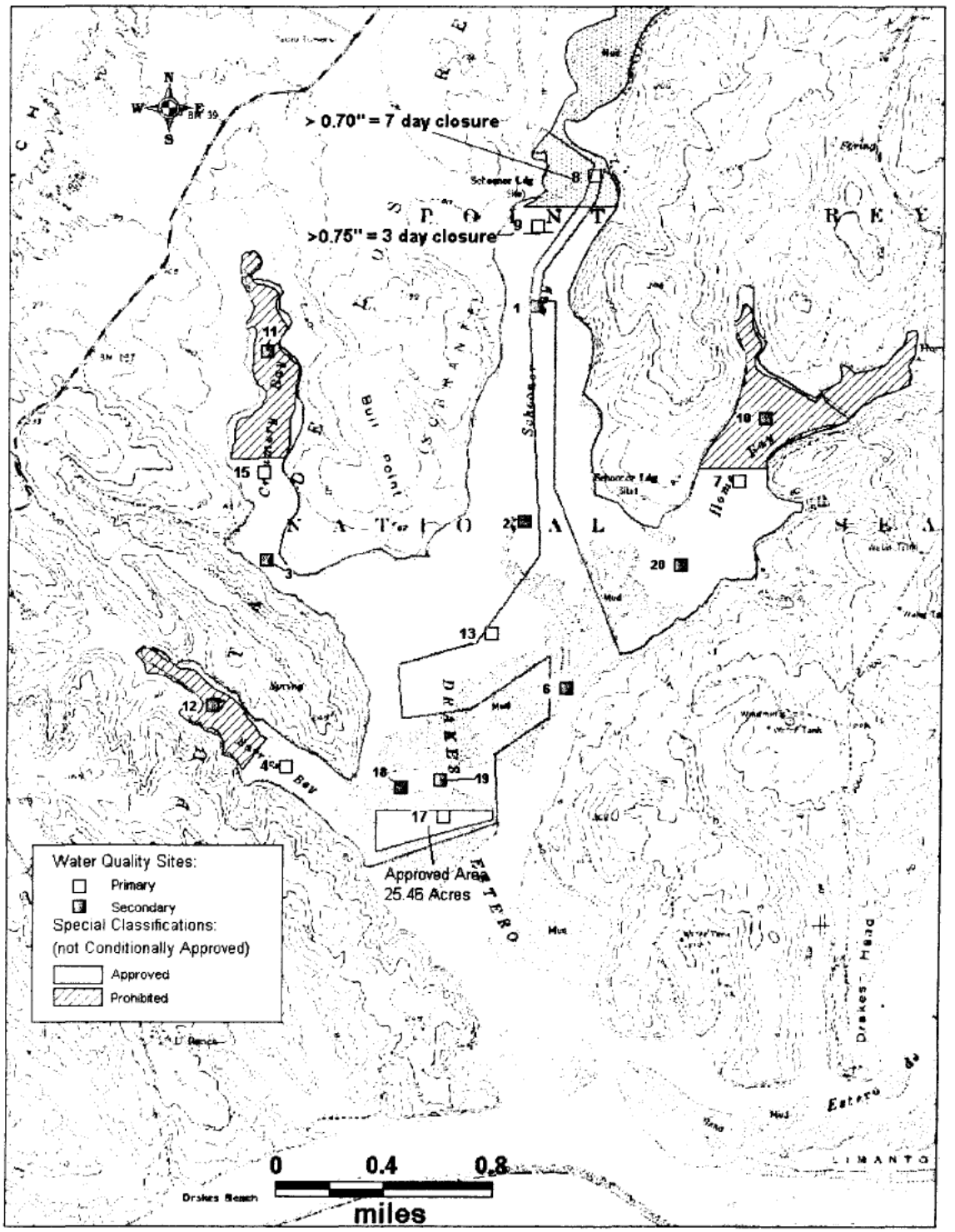
Figure 1. Primary and Secondary Water Quality Stations in Drakes Estero.



Frost, Gavin

From: Neal Desai [ndesai@npca.org]
Sent: Tuesday, December 28, 2010 11:52 AM
To: Frost, Gavin
Cc: Rick Johnson[redacted] Amy E. Trainer (amy@eacmarin.org)
Subject: [WARNING : MESSAGE ENCRYPTED] info for fact finding
Attachments: notes for Gavin Frost.pdf; map_oyster_activity_1109.pdf; 2007-05-08 01-11-15 PM T.JPG; Frances Gulland email.pdf

Dear Gavin,
Please respond to confirm receipt. As requested, here is information for your fact-finding efforts. Three documents (2 powerpoints and 1 letter from NPCA to MMC) can be downloaded at this site – I zipped/compressed the files due to their size: https://rcpt.yousendit.com/1015640317/c93b7b90e3a07c1f9e6031a718d325bf

1) NPCA's letter to the Marine Mammal Commission on various topics which include:
   a. photo analysis regarding three disputed disturbance dates (3/14/08, 5/8/07, and 4/29/07) pgs 4-63
   b. best available science on harbor seal disturbance, including the NPS' work on measuring disturbance (statistical analysis rather than using volunteer disturbance surveys per NAS recommendations), and information on the relationship between photos and Becker 2010 including limitations on using photos for measuring disturbance pgs 1-4
   c. the letter can be downloaded at the yousendit link.
2) Notes regarding Goodman's reliance on photos as the "full picture", wildlife biology of seals vis-à-vis disturbance and photos, and detailed analysis of one particular date (5/8/07). Please read this first and use as a reference before viewing the following two powerpoint slideshows. Document attached.
3) Powerpoint slideshow of 5.8.07 using wildlife camera images that are zoomed in to the area where visible seals are. (FYI on how it was done: Rick used GIMP, an open source Photoshop type package. He cropped the images at a uniform position and scaled them up using a default GIMP interpolation using a "Cubic" routine). Download at yousendit link. When you run the slideshow, it will automatically advance slides for you
4) Powerpoint slideshow of 5.8.07 using images in original size, with the seal area in view. Download at yousendit link. When you run the slideshow, it will automatically advance slides for you
5) Photo from 5.8.07 which shows seals spilling into the right edge of the camera photo, indicating that seals can be out of the field of view of the camera at site OB. This is for the purposes of showing that Goodman's assertion that all seals are within the photo is flawed. See attached.
6) Email from The Marine Mammal Center's Frances Gulland confirming disturbance on 5.8.07. See attached.

7) Attached map which shows mariculture activity near and within (within, fyi, is a violation of the permit) harbor seal protection areas, starting around 2007. The 2007 mariculture footprint and the ramp up trend in the footprint after 2004 constitute a key part of the overwhelming evidence of harm that was available to Don Neubacher in April 2007. DBOC was boxing the seal birthing area into a smaller space. These remote inner flats are a key birthing resource for the central California population. Sydeman[redacted] (1999) report on the state of the harbor seal population in Farallones region and state: "We are unclear as to the limiting factors now affecting harbor seals in central California, but we suspect undisturbed habitat may be limiting breeding populations on the mainland." Sydeman, W[redacted] 1999. Pinnipeds in the Gulf of the Farallones; 25 years of monitoring. Marine Mammal Science. 15:446-461

Please let us know if you have any difficulties opening or reviewing the documents sent. We look forward to continuing the conversation and providing you with information to defend NPS employees from these unsubstantiated accusations that continue to vilify good public servants.

Thanks,
Neal

==========

Neal Desai
Associate Director, Pacific Region

National Parks Conservation Association
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October 4, 2010

Dr. Tim Ragen, Executive Director
U.S. Marine Mammal Commission
4340 East-West Highway, Room 700
Bethesda, MD 20814

Dear Dr. Ragen,

As you work to develop a draft final report (DFR) on harbor seal disturbance at Drakes Estero, we wish to provide the Marine Mammal Commission (MMC) with information that may be of use in your process. Thank you for the time and effort you have put in thus far in working with the many viewpoints associated with this project.

In related news, the National Park Service (NPS) has commenced an environmental review process via NEPA to determine future land use at Drakes Estero once the mariculture operating rights expire in November of 2012. As you may recall, an important reason we asked the MMC to engage in this process was that the public and press, and subsequently policymakers, misinterpreted several pertinent points of the National Research Council's (NRC) study on Drakes Estero, including those discussing marine mammals. Consequently, this led to unfortunate policy decisions.

Through your work on this project, we believe the MMC can reinforce NPS goals of providing maximum protection for natural systems and native species, including marine mammals. Additionally, the MMC's work will inform continued efforts to implement marine reserve and wilderness designations, both of which are consistent with this national park's goals of protecting marine mammals and high priority on restoring natural processes and protecting all native species.

The following letter discusses:

1) What we know from best available science and what prudent concerns are supported by science;
2) Harbor seal disturbance data points and disputed data points;
3) The relationship between policies, scientific research, and land-use management while mariculture is authorized (currently) and land-use decision-making for post-November 2012 (above referenced NEPA process);
4) Pertinent National Park Service (NPS) management policies.

Once you have had an opportunity to review this, we would appreciate an opportunity for discussion (likely phone given our locations).

What do we know from best available science and what prudent concerns are supported by science (in contrast to characterization in local papers)

Best available science

It is our view that best available science shows there is a strong negative correlation between oyster production and harbor seal pup counts in Drakes Estero. NRC (2009, p. 44) states "the NPS seal monitoring program at Point Reyes provides robust data on seal abundance trends." Based on NRC recommendations for further research [redacted] et al. (2010) conducted statistical analysis of the seal abundance data and included data on oyster production, regional seal population, environmental conditions, and visitor disturbance observations. This peer-reviewed study shows that high oyster production in Drakes Estero is strongly correlated with lower pupping at the sites closest to mariculture bags and operations.

[redacted] et al. (2010) states "After accounting for the ENSO effect and not including non-significant anthropogenic disturbance terms, the best GEE models estimated 14 ± 4 fewer pups, and 59 ± 15 fewer total seals in the three near mariculture subsites during the high mariculture production years." This result indicates a "take" involved in the operation of the DBOC oyster production at high levels. There is no data on seal counts with no mariculture operations, but it is likely that pup counts would be even higher if oyster cultivation ceases because disturbances can occur at variable distances and in water as well as during haul out periods (a statement also supported by the NRC).

In [redacted] et al. (2010), visitor disturbance counts are not a statistically significant variable. This result is consistent with the NRC conclusion that even though the NPS monitoring program provides robust data on seal abundance trends, the disturbance data from the seal monitoring program have more limited utility in estimating changes in the level of disturbance within the estero or in the relative importance of different disturbance sources (NRC, 2009, p. 44). Disturbance data from the NPS seal monitoring program "serve mainly as an indicator of a new source of disturbance or a large change in a known source of disturbance." As Professor Paul Thompson stated in his February 2010 MMC presentation in Point Reyes, most seal disturbances are unobserved.

The [redacted] et al. (2010) statistical analysis is consistent with other image data on oyster operations in the Estero. There were no mariculture bags on flats adjacent to seal haul outs in 2004 which is in a period of low level oyster production. From 2005 to 2007 bags and oyster operations moved progressively closer to the seal birthing sites. In 2008 the California Coastal Commission gained agreement from DBOC to move back at least 91 meters by establishing an exclusion zone around the seal haul out and pupping sites. But, the 91 meter limit still results in oyster bags and operations on the flats adjacent to haul outs, and high production levels which will probably continue to suppress seal counts. Also, since Drakes Estero is a designated wilderness area, it is important to consider that the 91 meter limit is particularly inadequate. NRC (2009) states "empirical studies have been used to underpin zonation of marine protected areas, for example where a 1.5-km buffer exists around harbor seal haul-out sites in the Dutch Wadden Sea to exclude recreational disturbance (Brasseur and Fedak, 2003) and where a 500-m

exclusion zone around breeding and molting haul-out sites has been included in the mariculture industry's best practice guidelines in Shetland, United Kingdom." (P. 48)

In summary, we believe that the best available science indicates that oyster production has reduced harbor seal population and births at Drakes Estero, a key birth site for California harbor seals. And, the 91 meter exclusion zone in Drakes Estero is unlikely to protect the seals from disturbance by oyster operations.

Harbor seal disturbance data points and relationship to Becker 2010
Much attention has been given to harbor seal disturbance data points by the various stakeholders in the MMC study process, as well as in the past. For example, these data points have been used by NPS to convey concerns about oyster farming, by DBOC to refute such concerns, and by other stakeholders to reinforce either of those positions.

The NRC said clearly that the Seal Monitoring disturbance data is an inadequate and incomplete measure of disturbance levels (see below). NRC recommended further analysis and that is the essence of the [redacted] 2010 Report.

There has also been a great deal of misinterpretation assigned to the harbor seal monitoring data points and [redacted] 2010. Our perspective, which we ask you to consider when developing the DFR, is as follows:

a) We do not believe the disputed survey data points are related to the statistical analysis that is the basis for Becker 2010.

b) If the NPS were to dismiss all the disputed disturbance surveys, the strong statistical correlation between increased oyster production and decreased seal use would still exist.

c) The Harbor Seal Monitoring Database (HSMD) was designed primarily for monitoring and counting harbor seals, and secondarily for the purposes of providing early warnings about harbor seal disturbances. The disturbance data collected did indeed provide this early warning to the NPS of the potential oyster farming impacts on harbor seals while there remained uncertainty regarding the source and level of impacts (including, as the NRC stated, not accounting for a variety of oyster company related disturbances).

d) The NPS has been criticized for not having data and systems that "definitively proves" or shows "cause-and-effect" that disturbances are caused by oyster operations and that disturbances reports by NPS seal monitors are unreliable. For example, DBOC has asserted that its own data "proves" that its boats and employees were not in areas where NPS seal monitors attributed a disturbance to oyster operations. Yet photographic evidence exists that supports the NPS seal monitors and undercuts the accuracy of the DBOC data. Should the NPS refrain from raising concern and implementing its management policies short of definitive cause-and-effect proof? No. The NPS should not have to implement impractical and likely expensive laboratory procedures in attempts to secure 100% "cause-and-effect" for the purposes of wildlife management, especially when the best available science and history of violations provide valid grounds for

concern regarding the mandate to protect natural resources. This view is supported by the NPS Management Policies, listed in detail further down, and notably the statement: *"In cases of uncertainty as to the impacts of activities on park natural resources, the protection of natural resources will predominate."*

e) HSMD surveys may provide early warnings of potential impacts and wildlife camera photos may inform the conflict between the survey data and DBOC records, but neither proves cause-and-effect for numerous reasons, including those noted by the NRC:
   - *Surveys consider disturbance only of groups of seals that are hauled out, rather than seals that are foraging or mating locally...*
   - *Surveys...capture the peak counts...disturbances may occur more frequently...at other times...*
   - *Surveys will miss disturbance...before seals come ashore. These disturbances will not result in flushing but could depress the numbers of seals that haul out...* [**In 2009 more than 700 clam bags were placed on a nursery site that we understand seals avoided for 3+ months, but this did not count as a "disturbance."**]
   - *Responses of seals to different types of disturbance may differ. For example, if seals are flushed into the water by a hiker on the beach, it is possible that any perceived risk is reduced or absent once the seals are in the water. In contrast, if seals are flushed into the water by a motorboat, underwater engine noise may result in a continued perception of risk and a stronger response by the seal.* [Wildlife cameras do not record sound…and do not even photograph all nursery sites.]

Disputed Data Points

As stated above, the HSMD surveys and wildlife camera photos provide insight into resolving disputed data points, but it is unclear to us if these data points can be resolved definitively if the goal is to conclude 100% certainty on items such as the specific source of disturbance, the identifications of humans in photos, the specific number of animals in the photos and/or surveys, and the make/model/ownership of boats. We applaud the MMC for their work to help resolve disputed data points and also to move forward to more relevant information (b) (6), (b) (7)(C) 2010). Because MMC has had recent discussions with NPS and DBOC on disputed data points, we wish to provide commentary on this topic. Given the large number of photos in the following pages, I have highlighted text in yellow so it is more easily seen.

March 14, 2008 Disputed Data Point

According to (b) (6) survey, at 12:33pm, an oysterboat disturbed seals (head alerts and flush) and a person took bags from subsite UEN to the boat; the other two people stayed in the boat.

According to the 6/10/10 Point Reyes Light report "Van Der Wal reported that oyster workers, along with a mother and children, were picking up oyster bags and flushing seals into the lateral channel at 12:22 p.m. **Company records indicate that the only boat trips that day were in the morning between 8 and 10 a.m., and traveled to a completely different region of the estero.** The NPS released a photograph this week taken by a hidden camera on that day. **The photograph shows a boat in an area that Lunny says his workers do not place oyster bags.** He hopes that further examination of photographs from that day will show that the vessel did not belong to him. The NPS has not discounted this data." [emphasis added]

In support of [redacted] survey and in contrast to the Point Reyes Light reporting and DBOC's records, we note that the photos included below reveal the following sequence of events:

12:37-12:38: a motorboat heads southbound from the region of the oyster company

12:41: motorboat enters the lateral channel

12:42: motorboat lands on seal sandbar UEN at a spot that appears to provide closest access by foot at the then-existing low tide conditions to oyster bags visible ~100+ feet south from the landing site (see attached map for mariculture site)

12:43. person shown ~100+ feet south of the landing site where oyster bags are visible.

12:45 person shown about 30 feet from the boat

12:46: person shown again at oyster bags ~100+ feet from the landing site

12:47: person back in boat

12:48: boat just offshore, motor starts

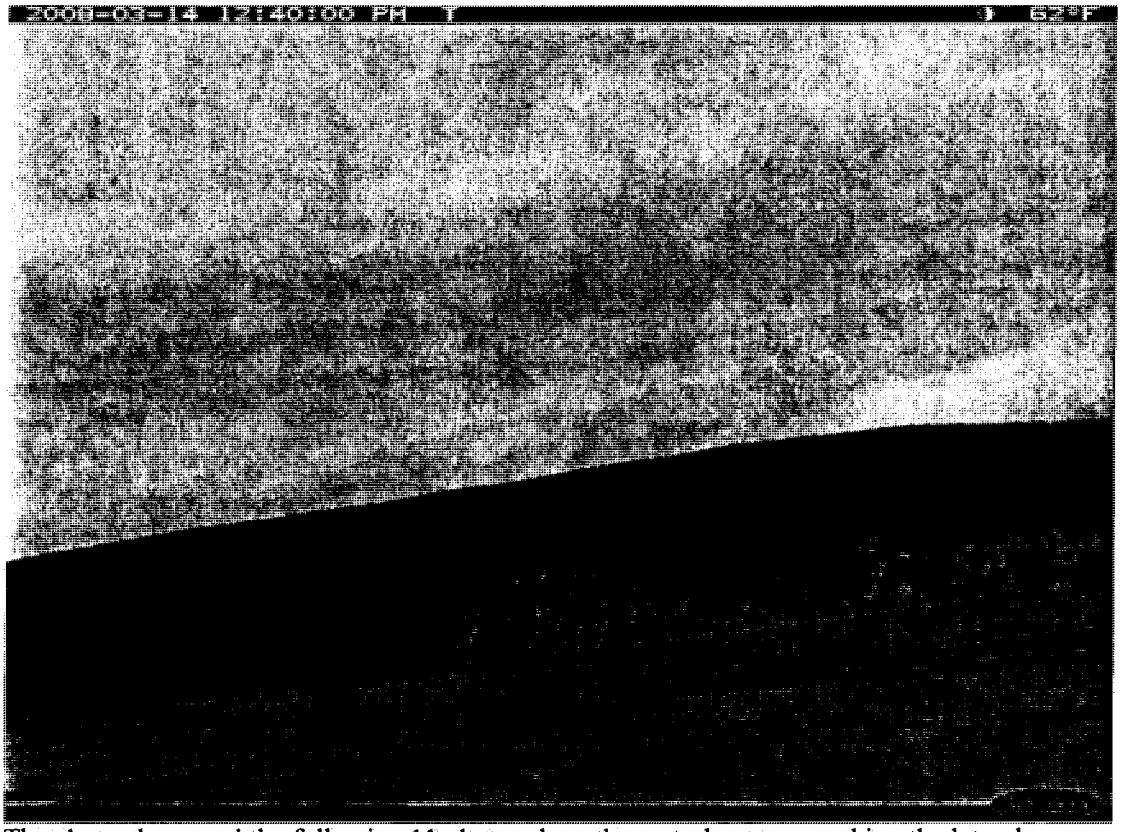
12:49: the motorboat then departs the lateral channel.

12:57-12:59: a motorboat heads northbound to the region of the oyster company

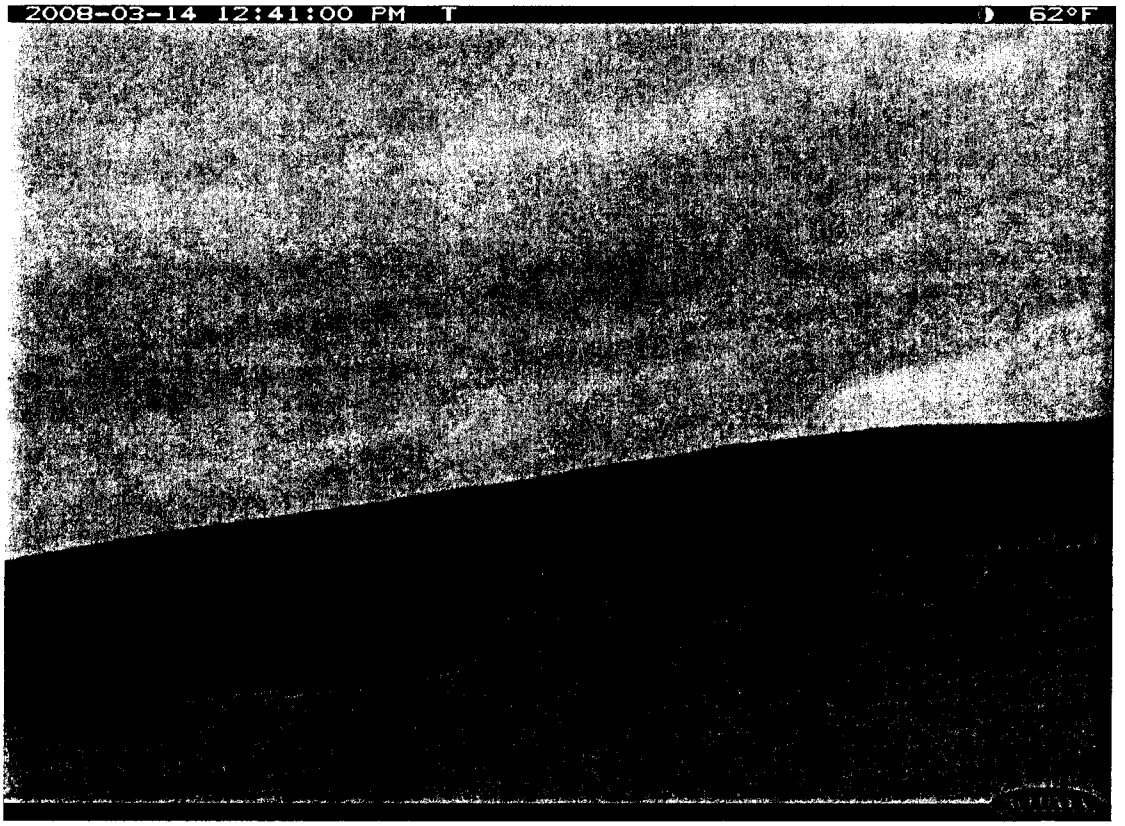
A map showing locations of oyster bags is attached.

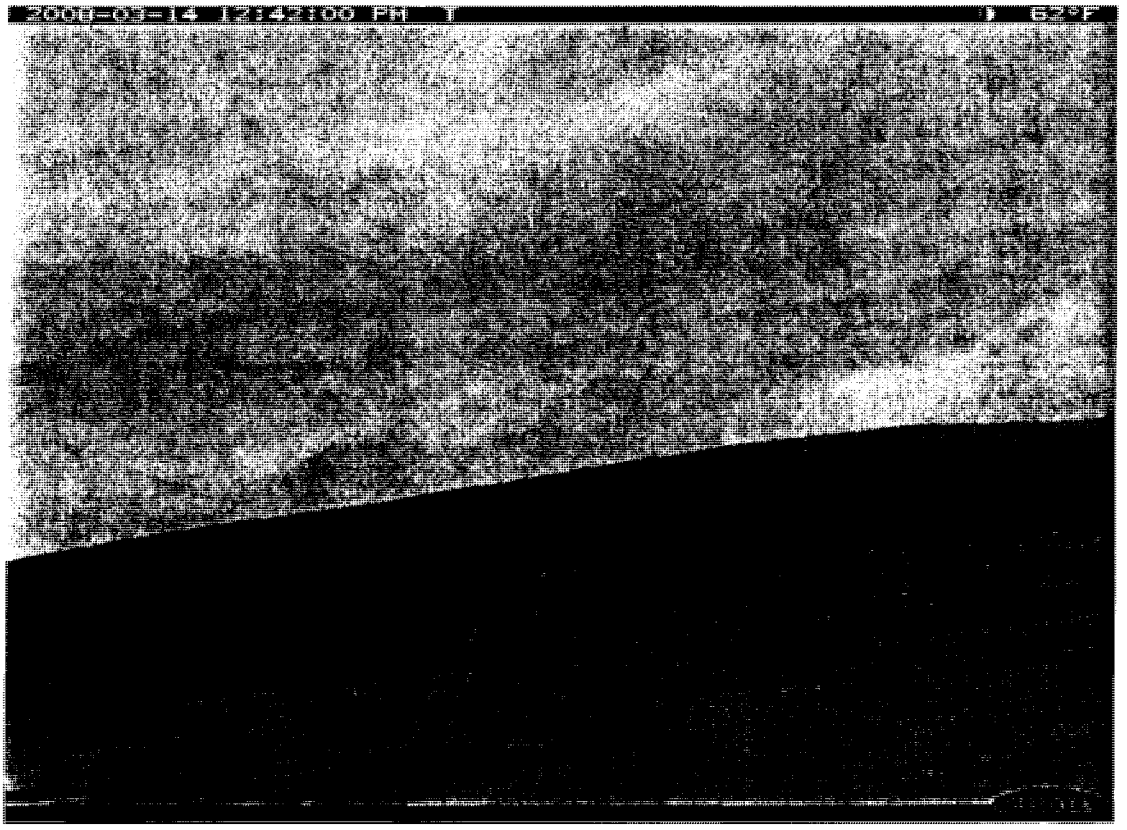
Photo above and below shows a motorboat arriving from the north, heading southbound (12:37pm-12:38pm 3/14/08).

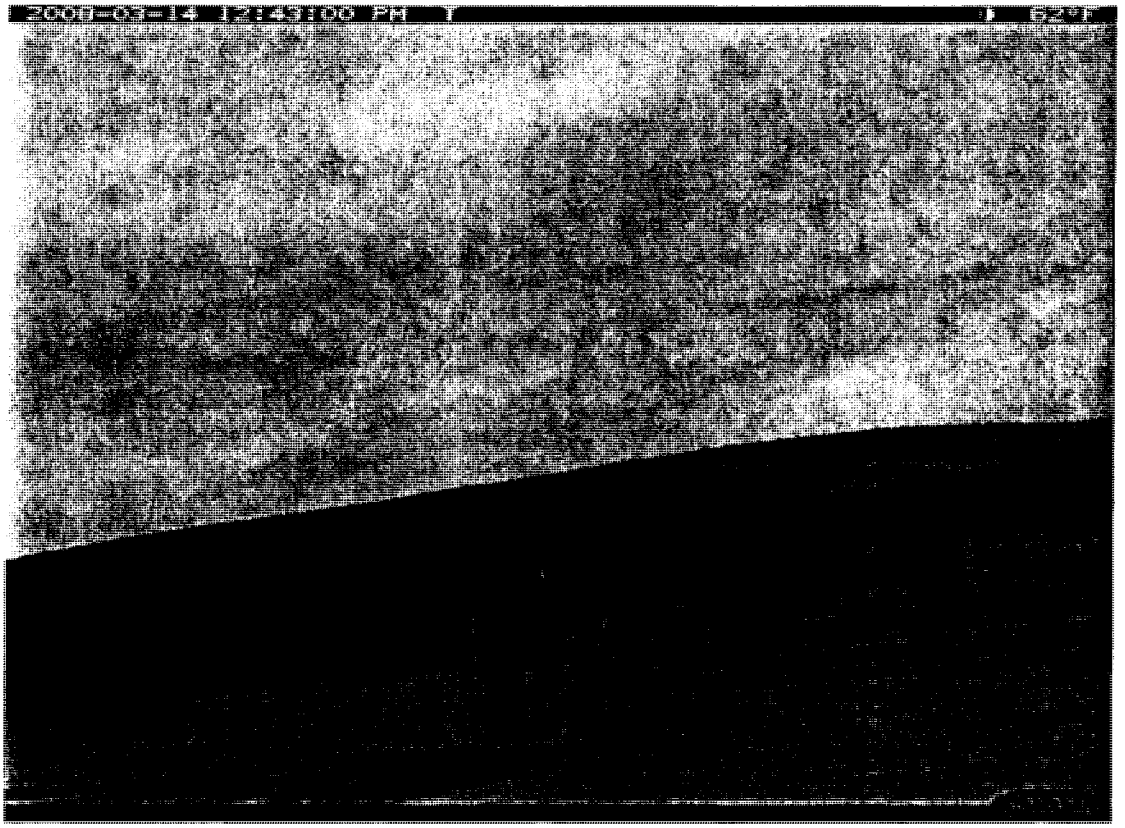
2004-04-14 12:30:10 PM
67°F
WWW.RECONYX.COM

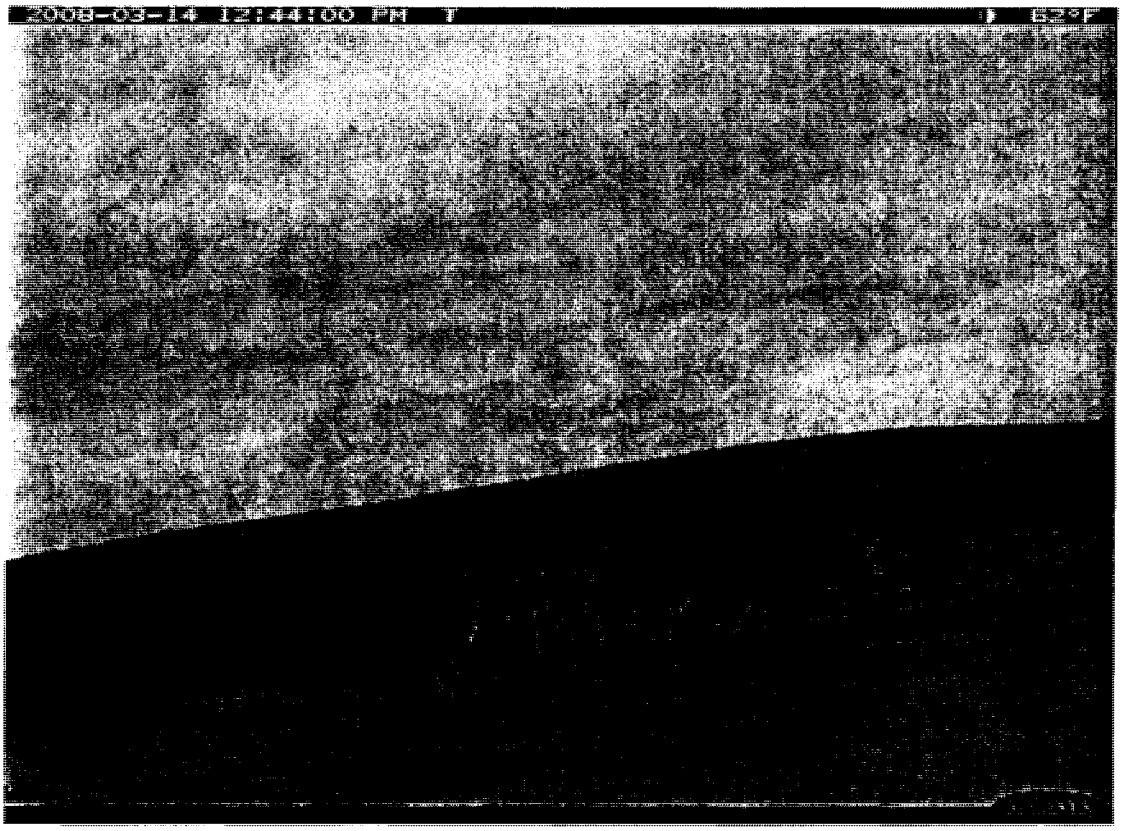


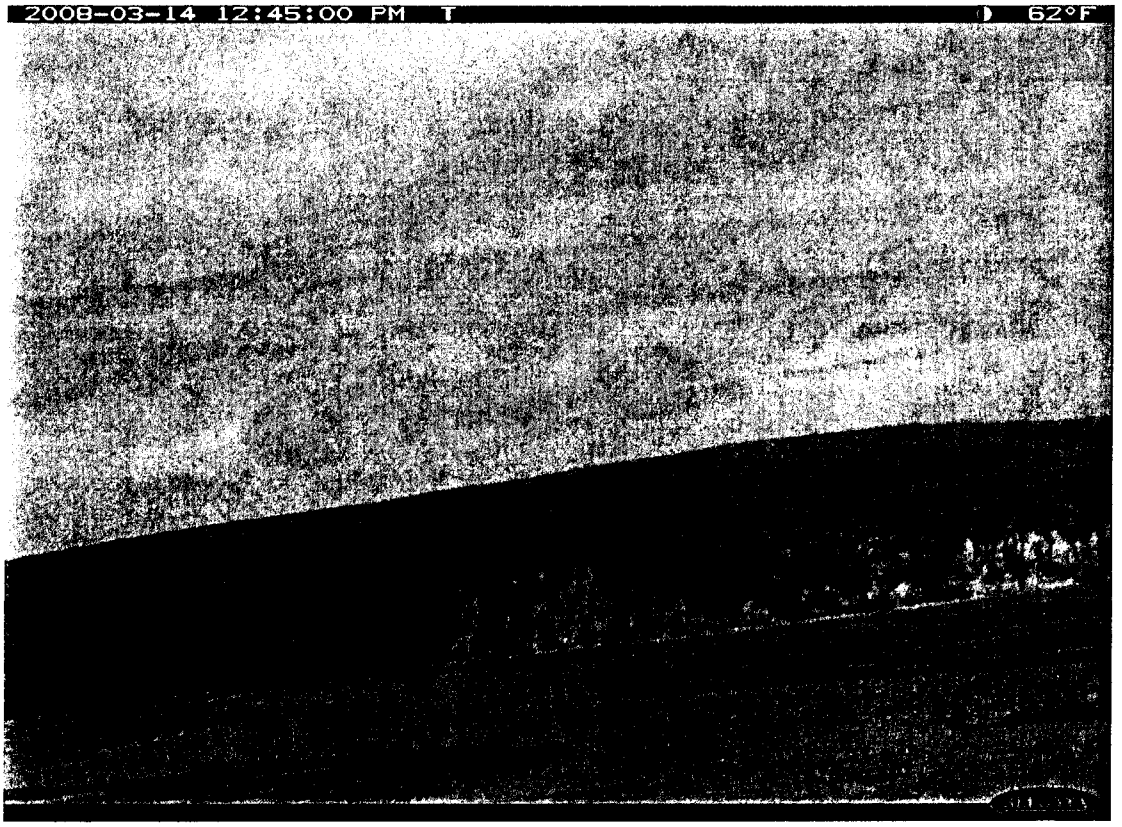
The photo above and the following 11 photos show the motorboat approaching the lateral channel, stopping where oyster bags are known to be placed (see below estero map), and then departing. (12:40pm-12:51pm 3/14/08)

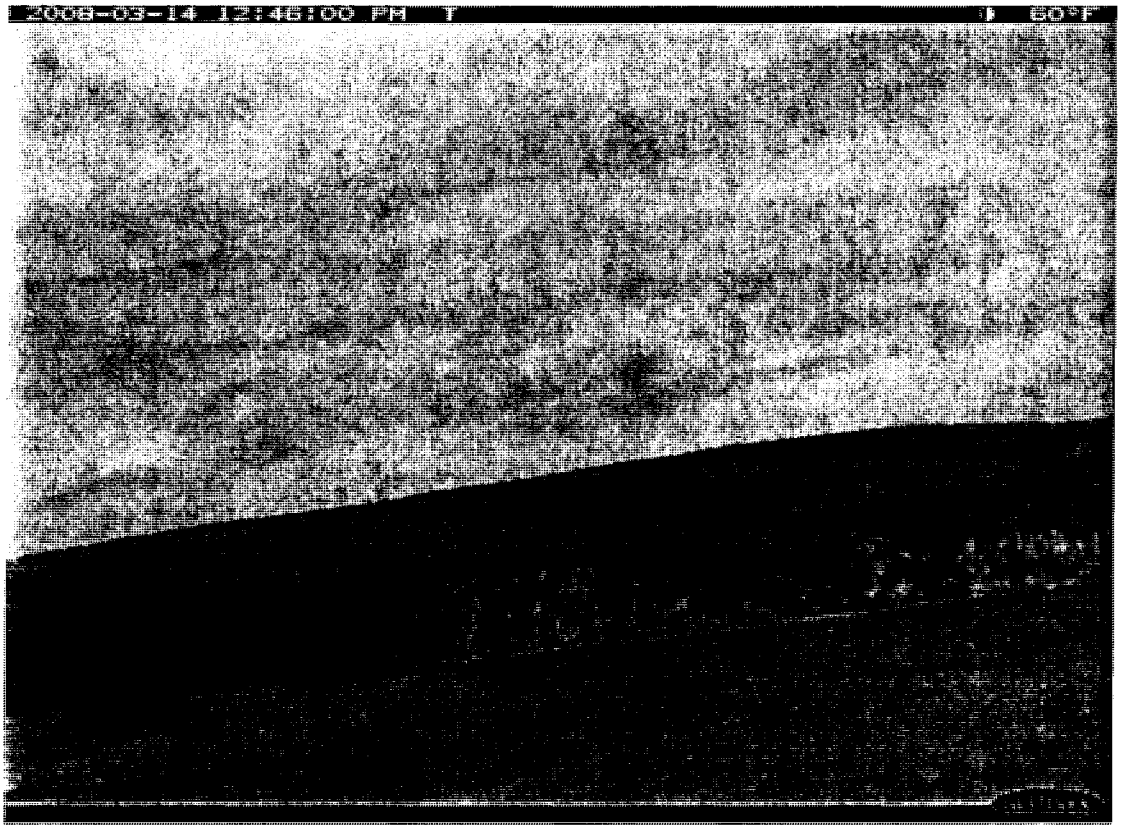

2008-03-14 12:41:00 PM T
62°F

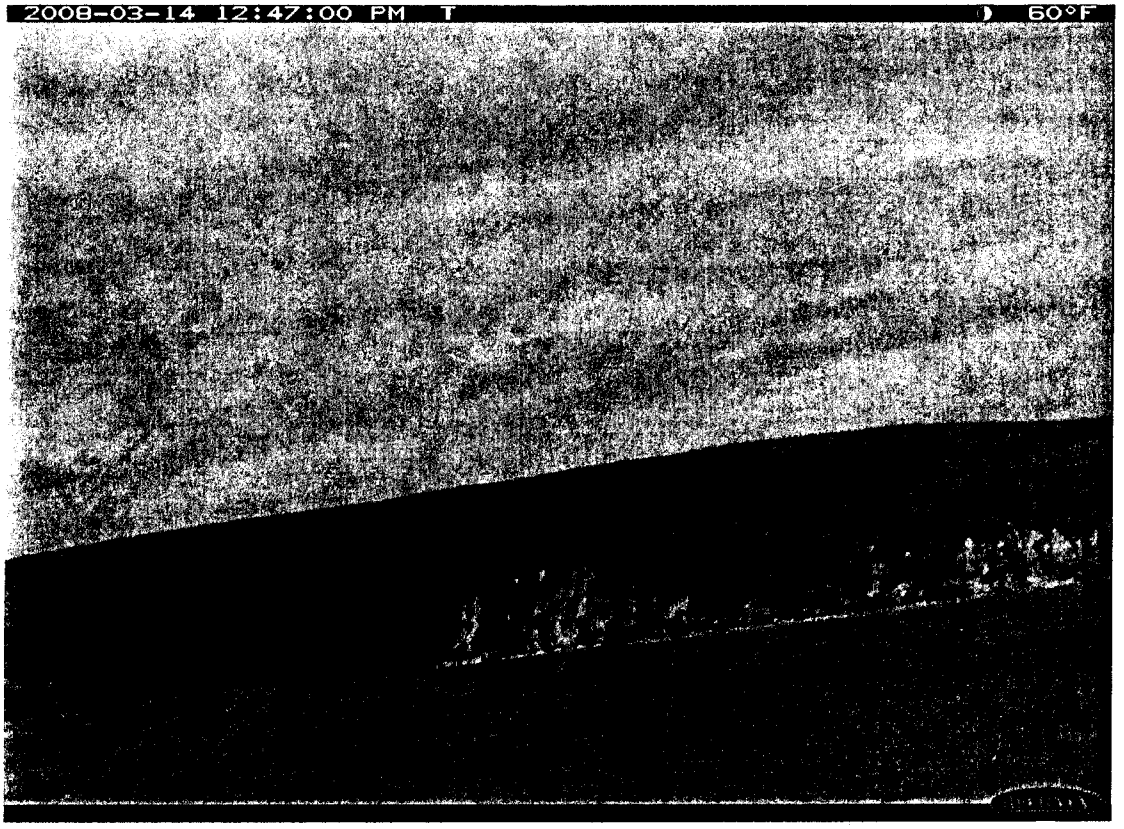

2001-07-14 12:41:00 PM
62.3F

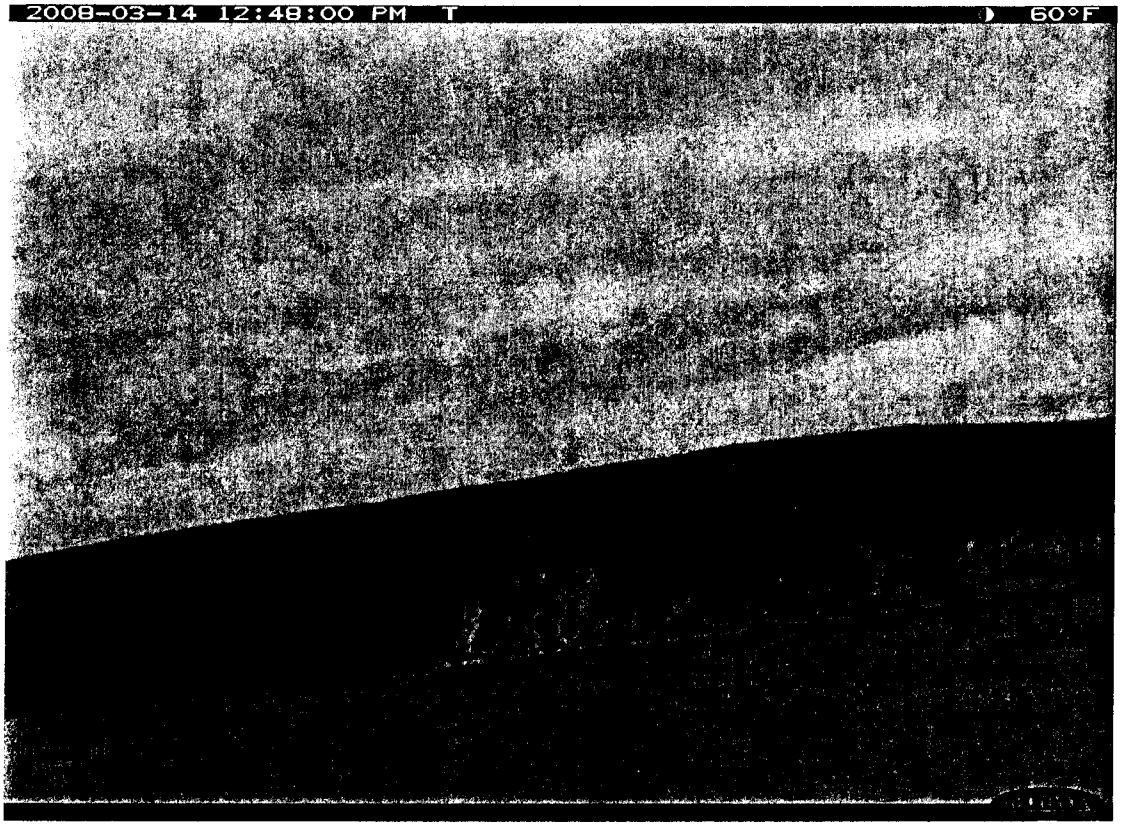


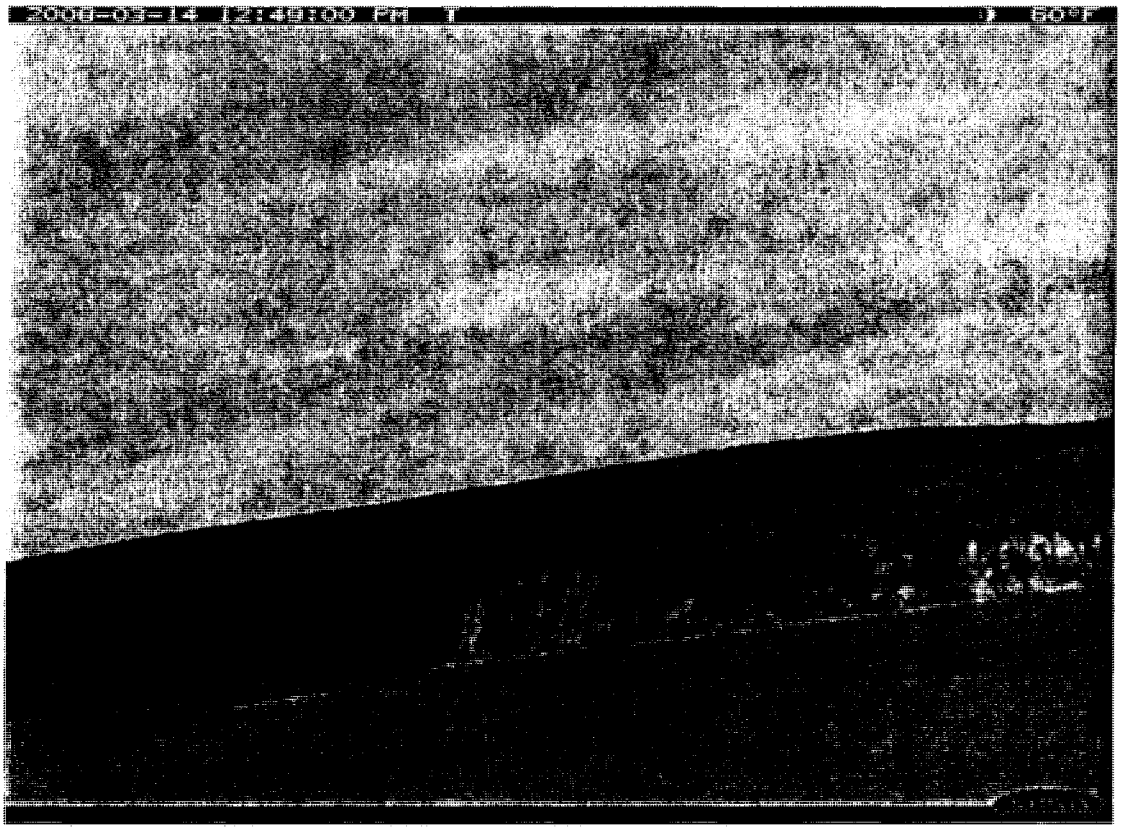

2008-03-14 12:44:00 PM T
52°F

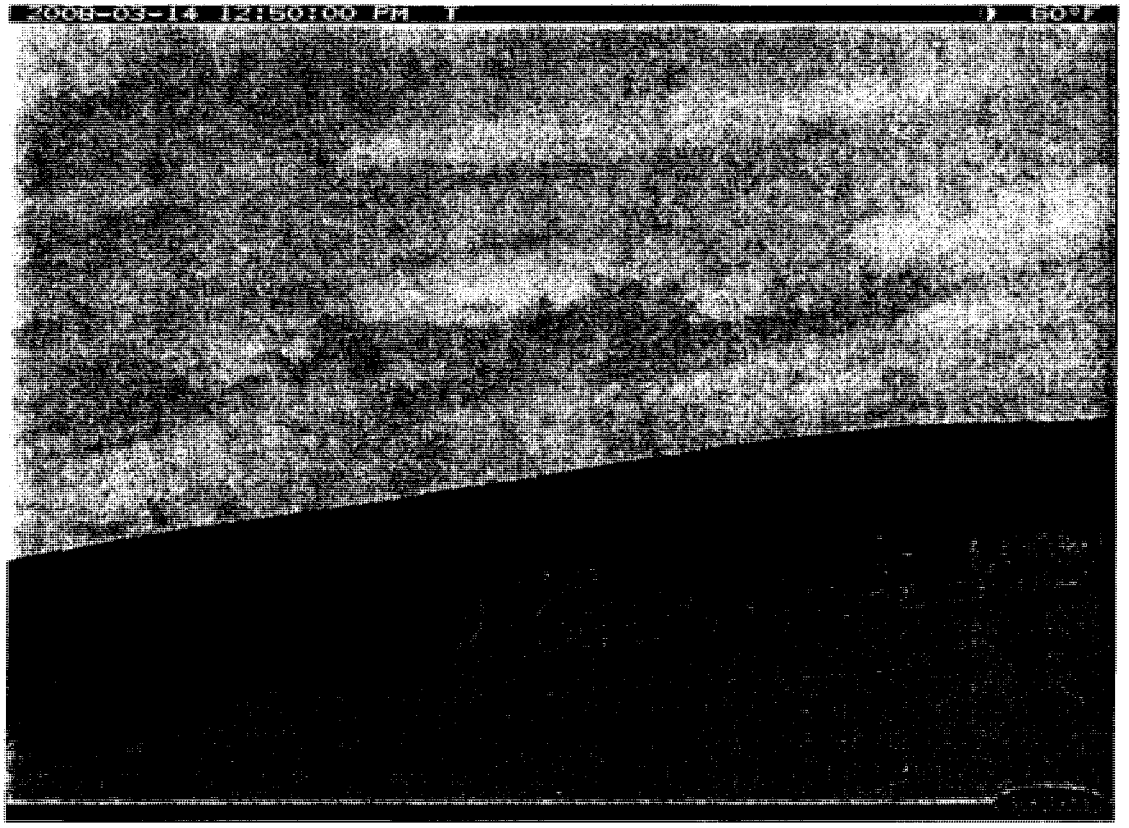

2008-03-14 12:45:00 PM T
62°F

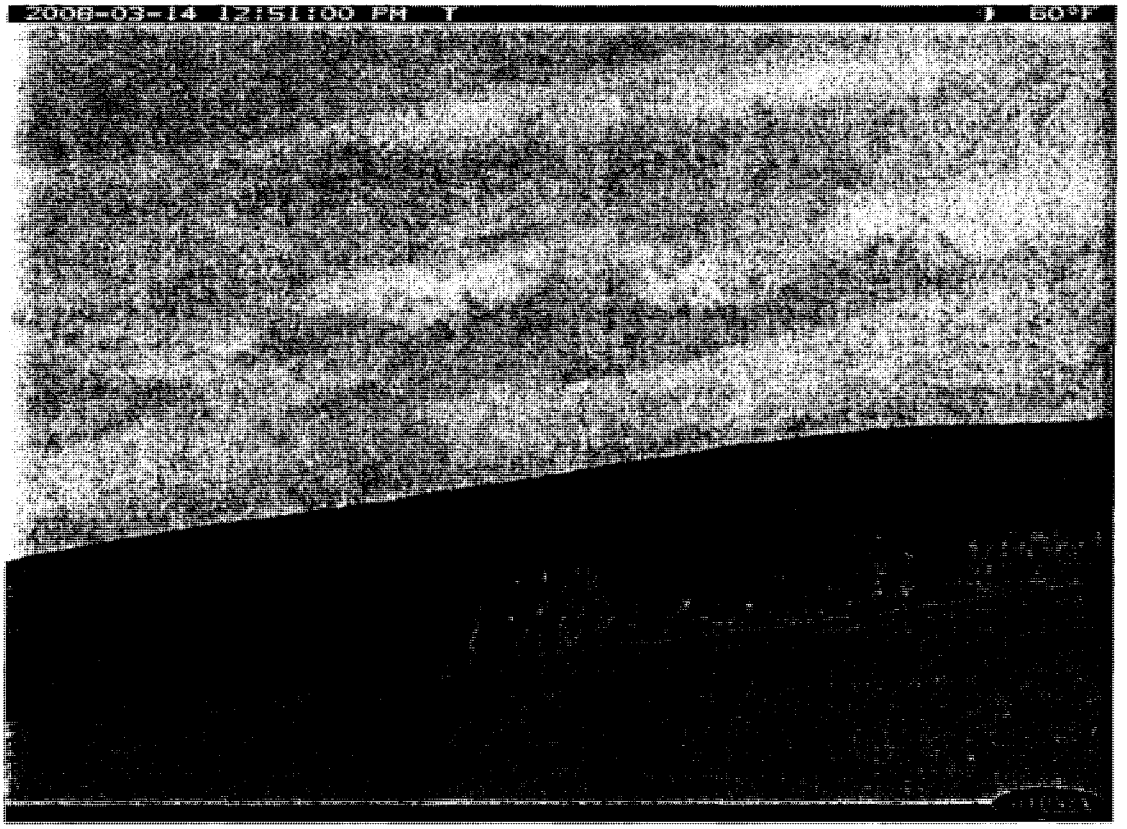

2008-03-14 12:45:00 PM T
60°F


2008-03-14 12:47:00 PM T
60°F


2008-03-14 12:48:00 PM T
60°F




2008-05-16 12:50:00 PM


2006-03-14 12:51:00 PM T
60°F

The above and below photos show the motorboat arriving from the south heading northbound, to the area where the oyster company exists. (12:57-12:59pm 3/14/08)

2008-03-14 12:50:18 PM T
67°F
WWW.RECONYX.COM

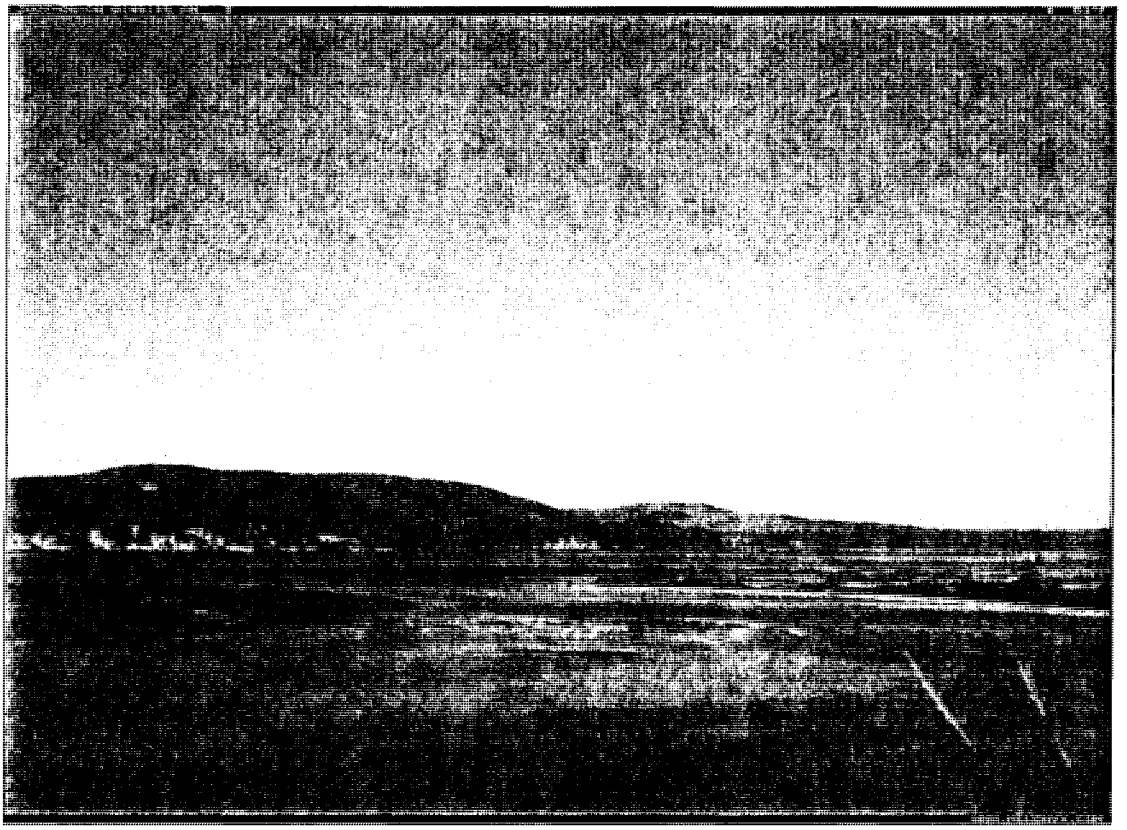
May 8, 2007 Disputed Data Point

The following six photos show wakes from a motorboat, consistent with the survey report filled out, including the drawing on the map included in the survey report. As already previously stated above, the camera does not cover the full area where seal disturbance was noted. As a point of detail and to highlight local newspaper misunderstanding/inaccurate reporting, volunteer (b) (6), (b) (7)(C) did not document "employee Jorge Mata driving a boat recklessly down the main channel" as reported in the 6/10/10 article in the Point Reyes Light (b) (6), (b) (7)(C) stated, per her own notes in the survey report: "it traveled slowly + hugged land"

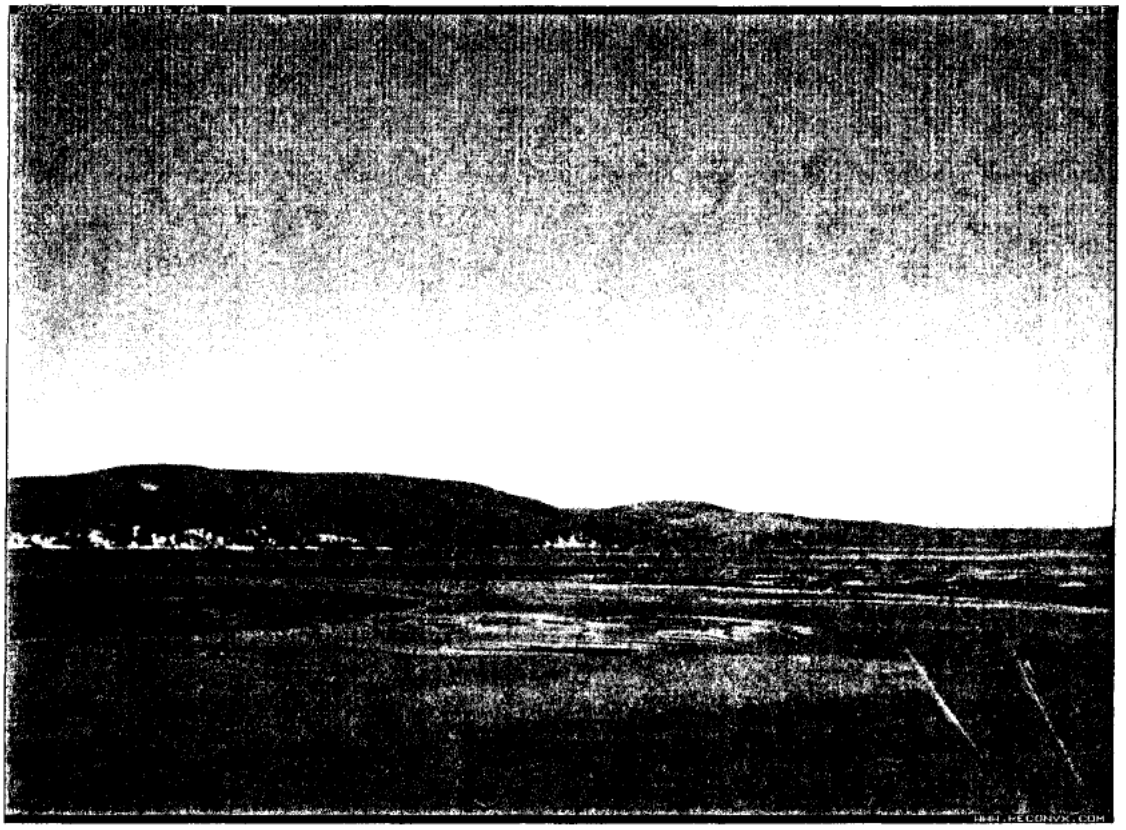
2007-05-04 01:43:15 AM
WWW.RECONYX.COM

2007-05-08 01:41:15 AM
WWW.RECONYX.COM

2007-05-00 8:45:15 AM
61°F
WWW.MECONYX.COM

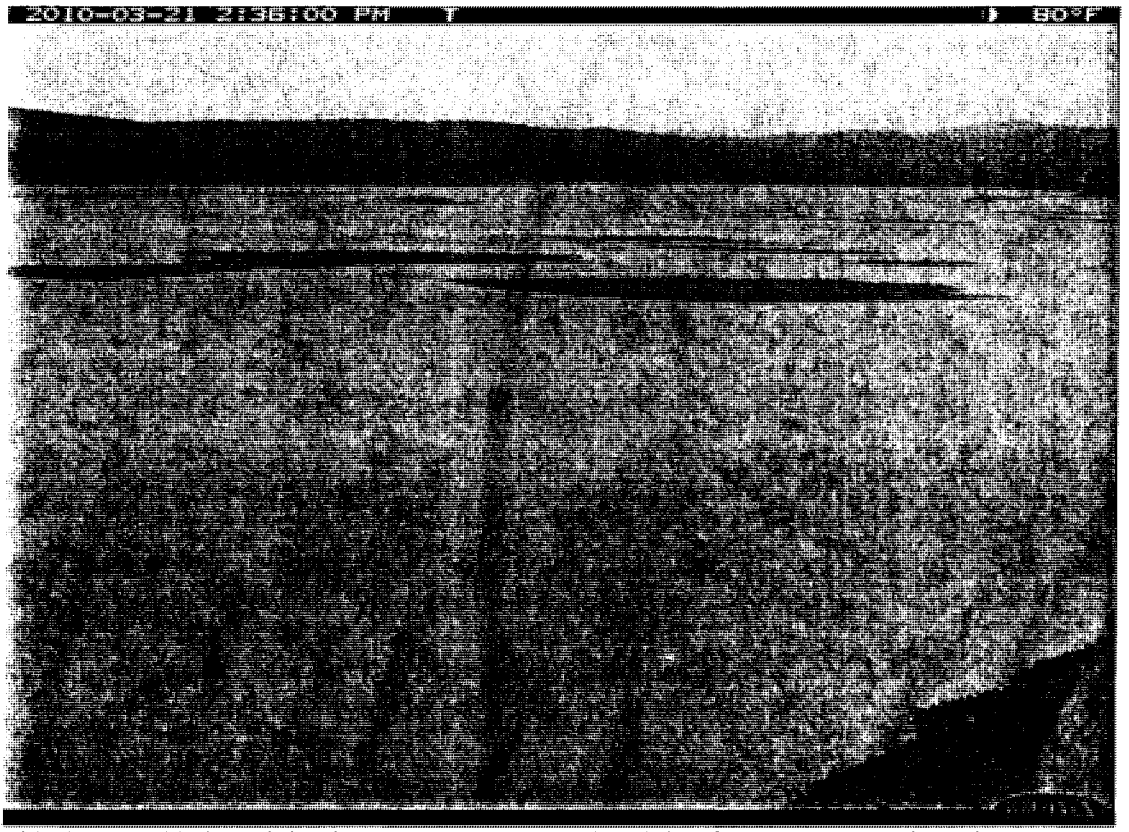


2007-05-08 8:47:15 AM
61°F
WWW.RECONYX.COM



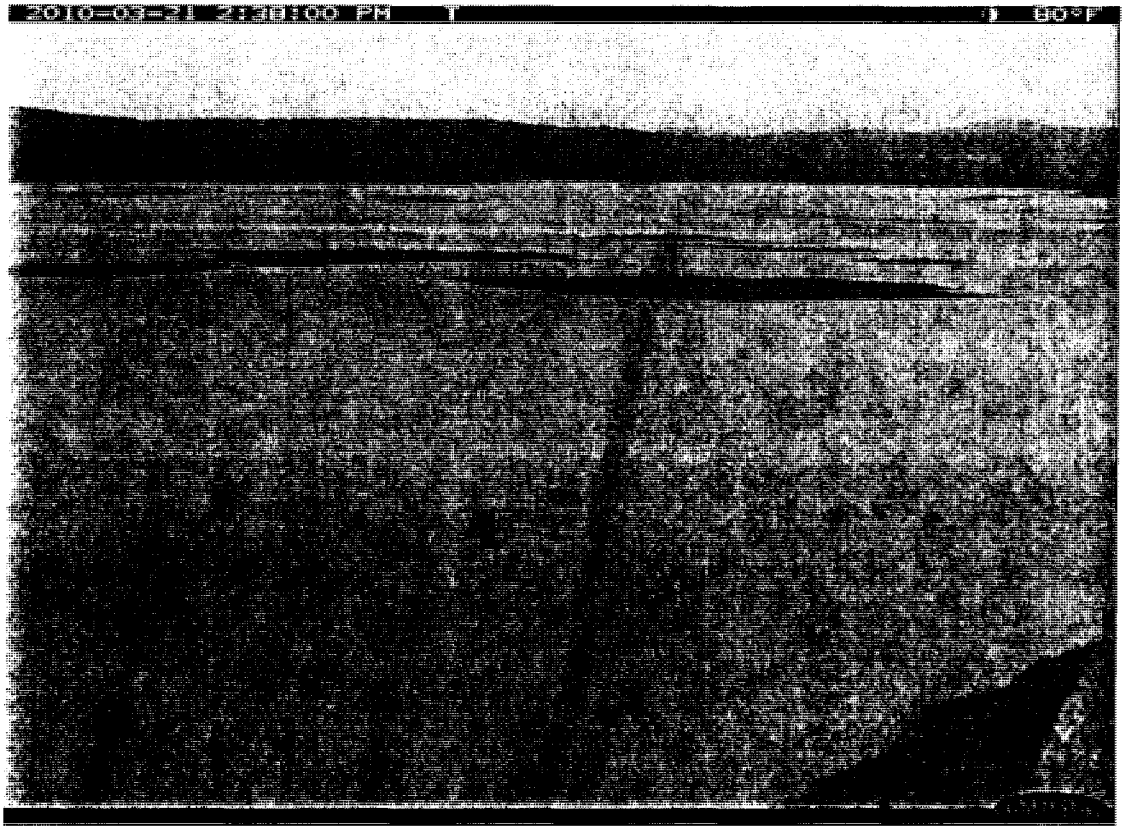
April 29, 2007 Disputed Data Point

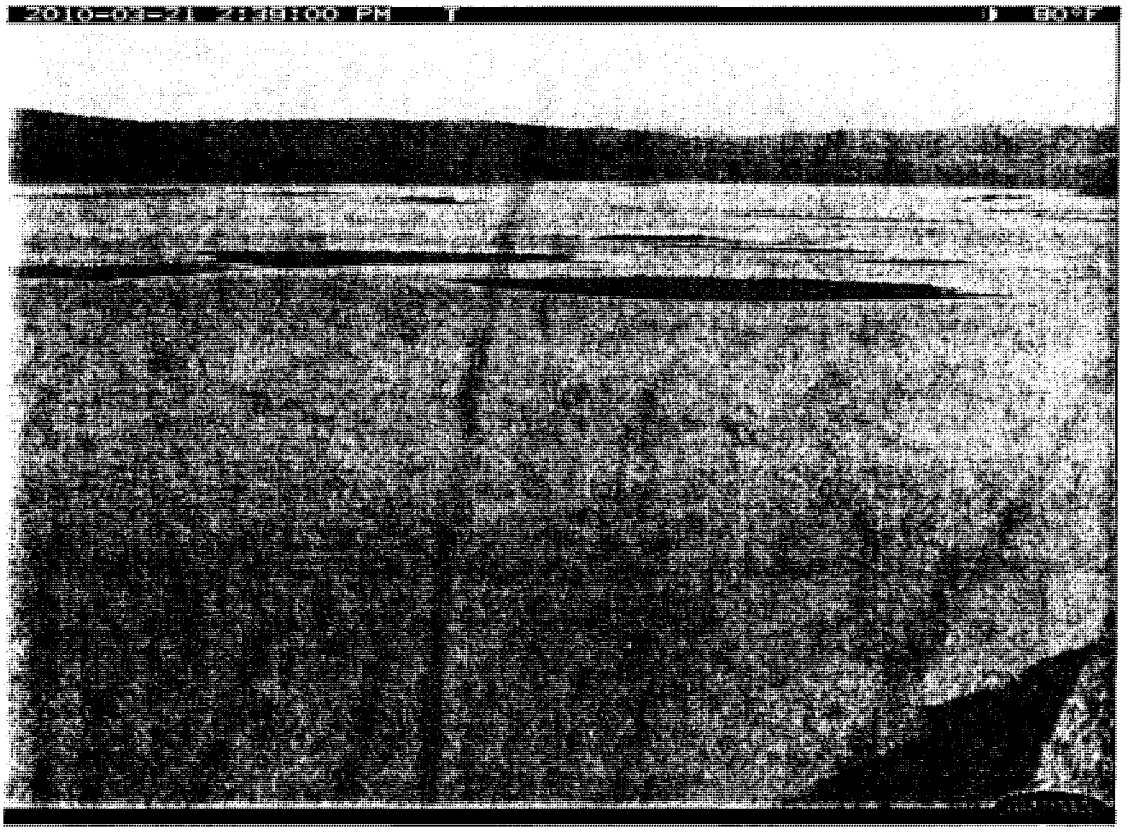
The cameras were set up on or about May 5, 2007, so there are no photographs to inform the April 29, 2007 dispute. However the 6/10/10 Point Ryes Light article states regarding this dispute that DBOC records show that its workers does not handle oyster bags on Sundays and that anyway, the job requires six workers. In contrast, we note that the previous photos from March 3, 2008 show one person handling oyster bags and the following photos from Sunday 3/21/10 and Sunday 2/28/10 show a motor boar departing from and returning to and area where the oyster workers handle bags.

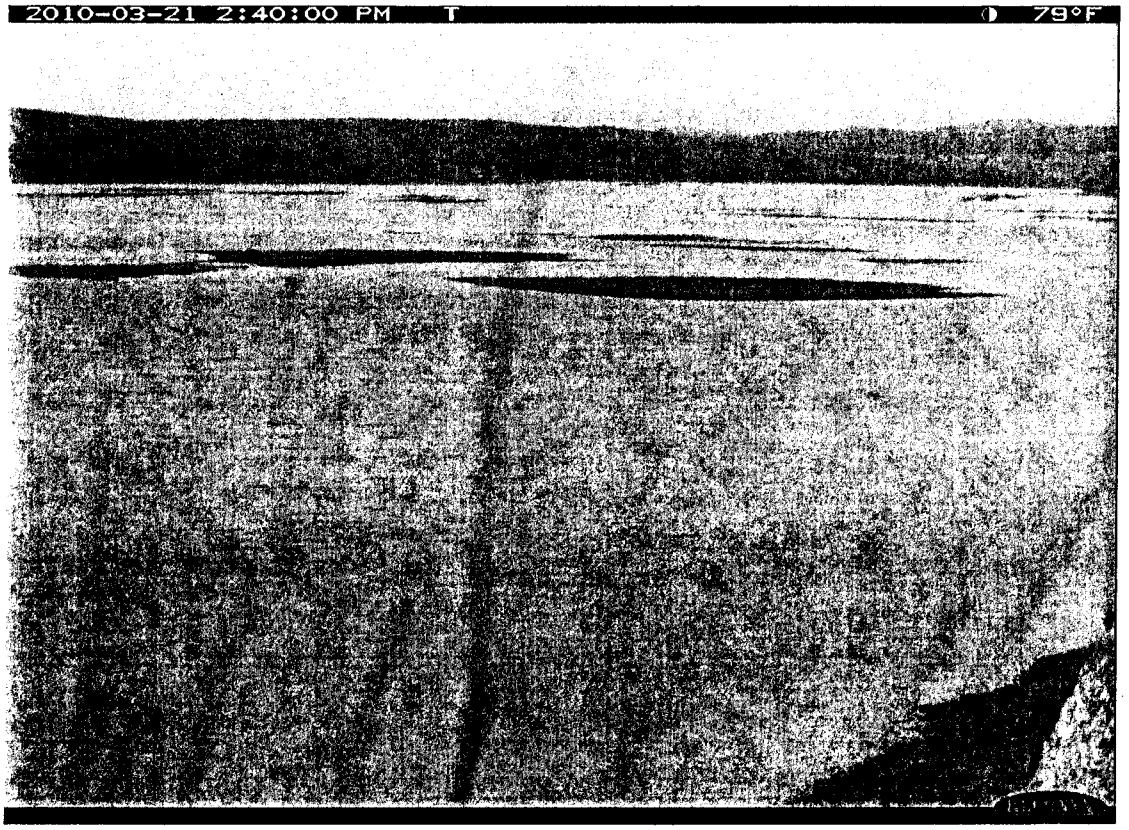


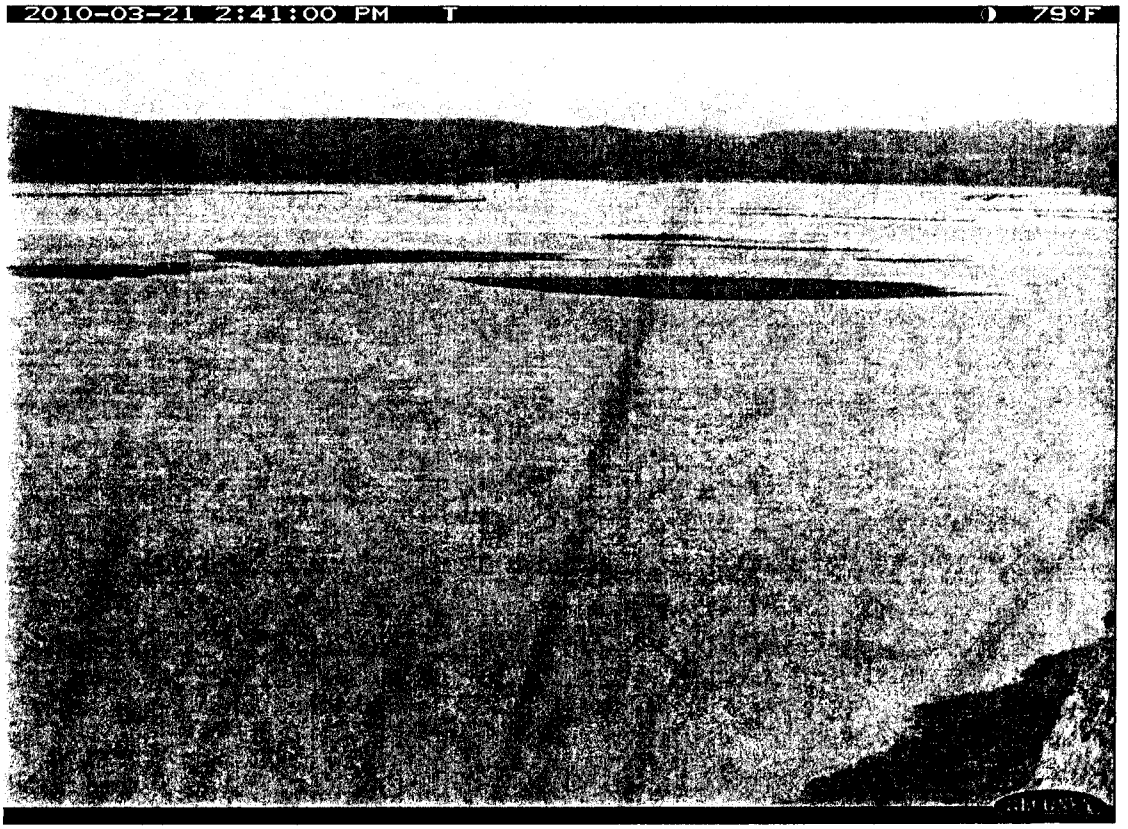
The above and below eight photos show a motorboat arriving from the north, where the oyster company exists, heading southbound. (2:36pm-2:44pm 3/21/10)

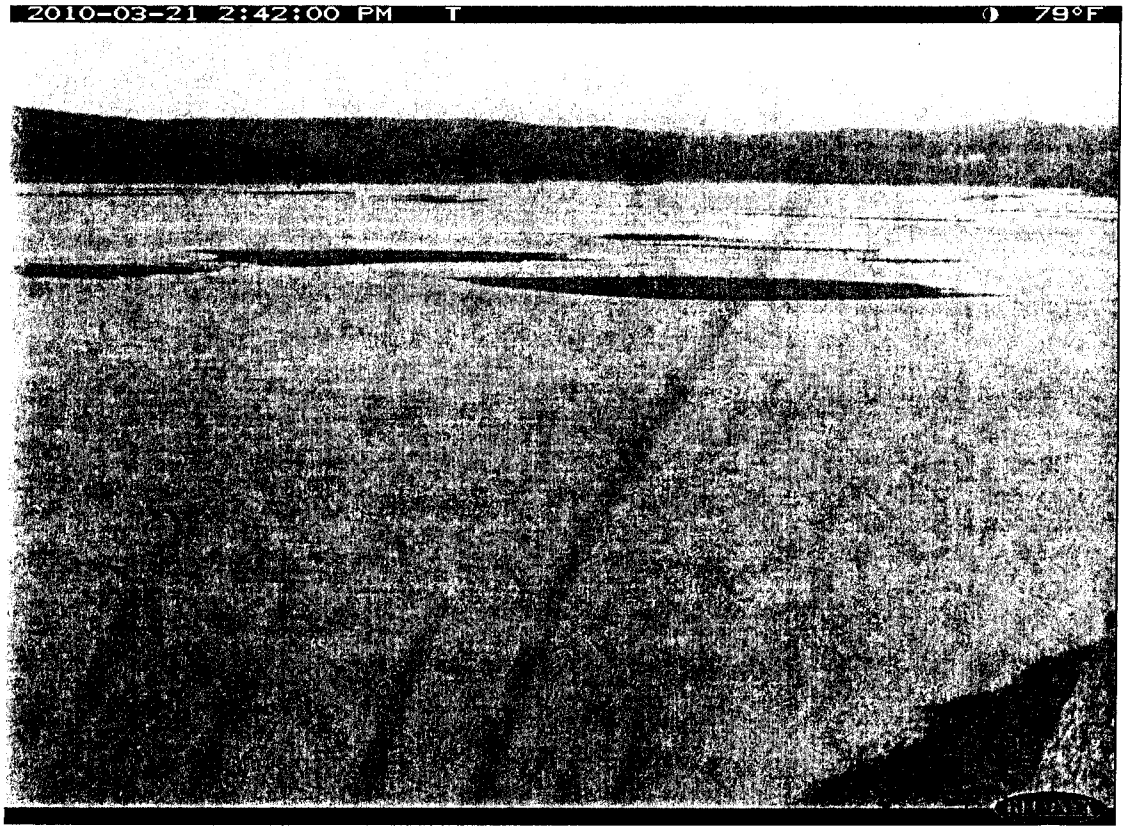
2010-03-21 2:37:00 PM T
80°F

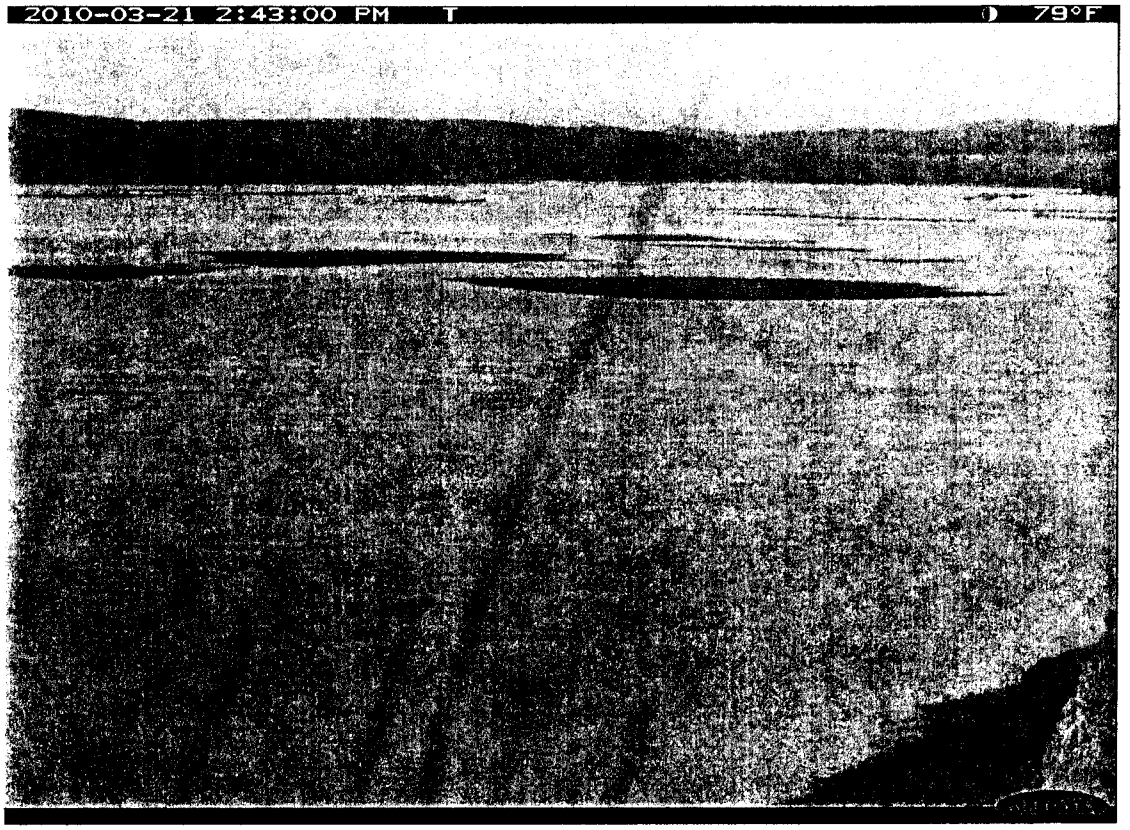

2010-05-21 2:18:00 PM
80°F

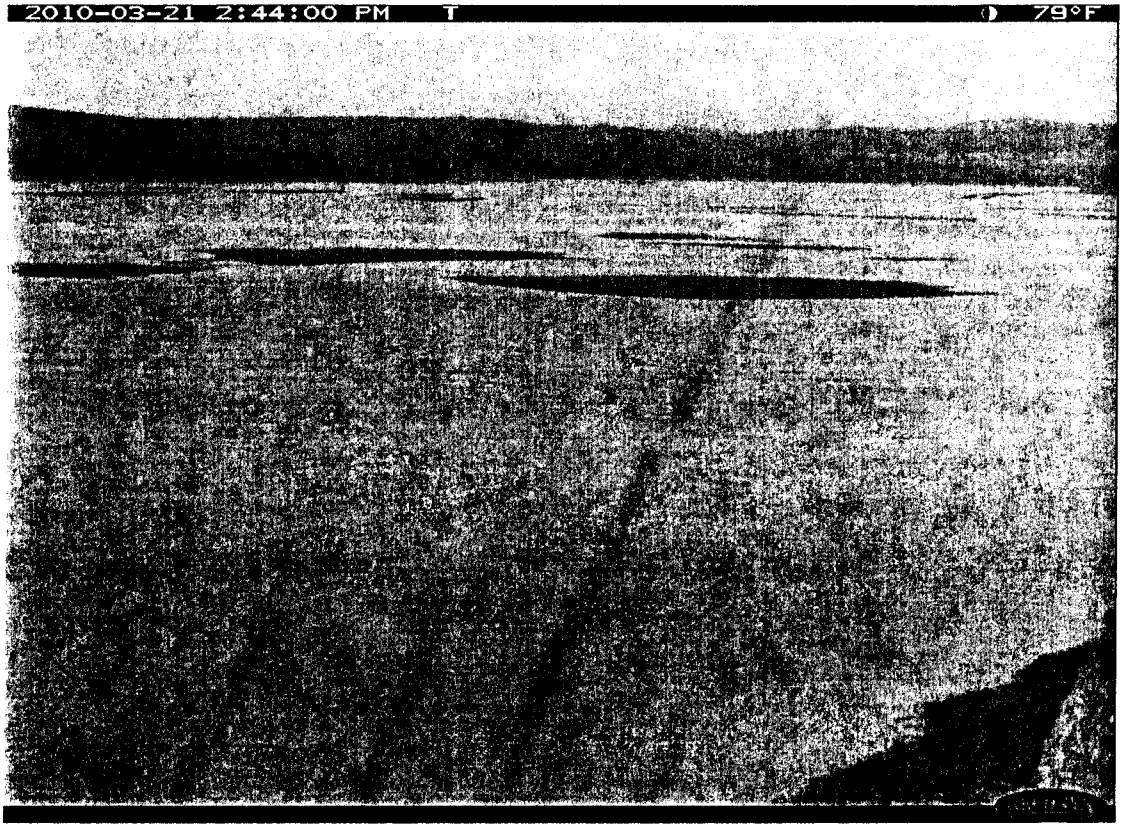


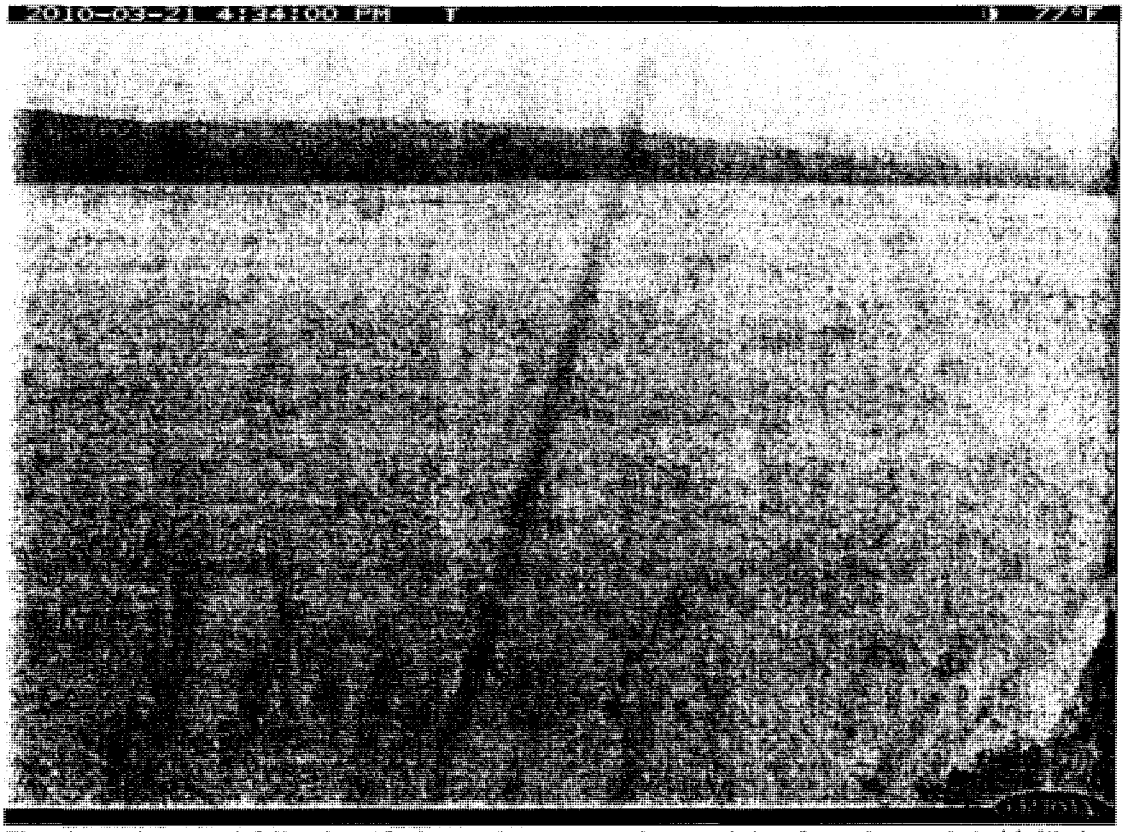

2010-03-21 2:40:00 PM T
79°F


2010-03-21 2:41:00 PM T
79°F

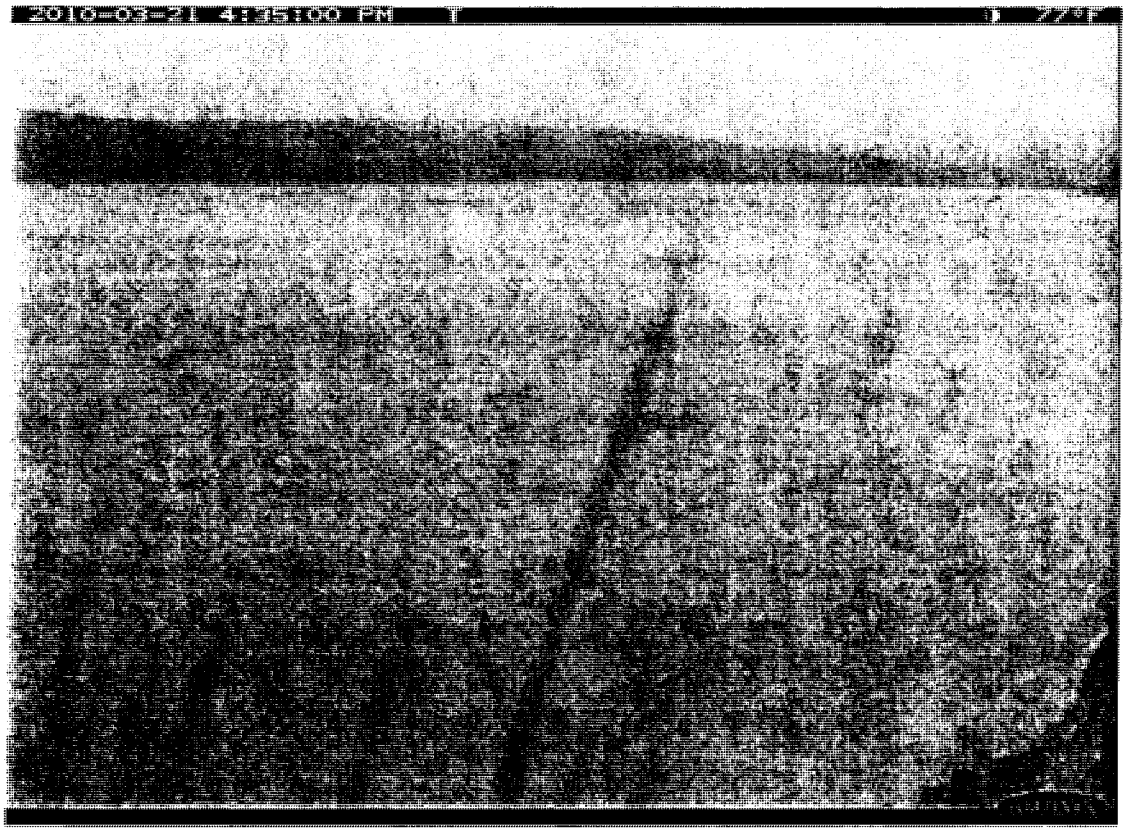

2010-03-21 2:42:00 PM T
79°F

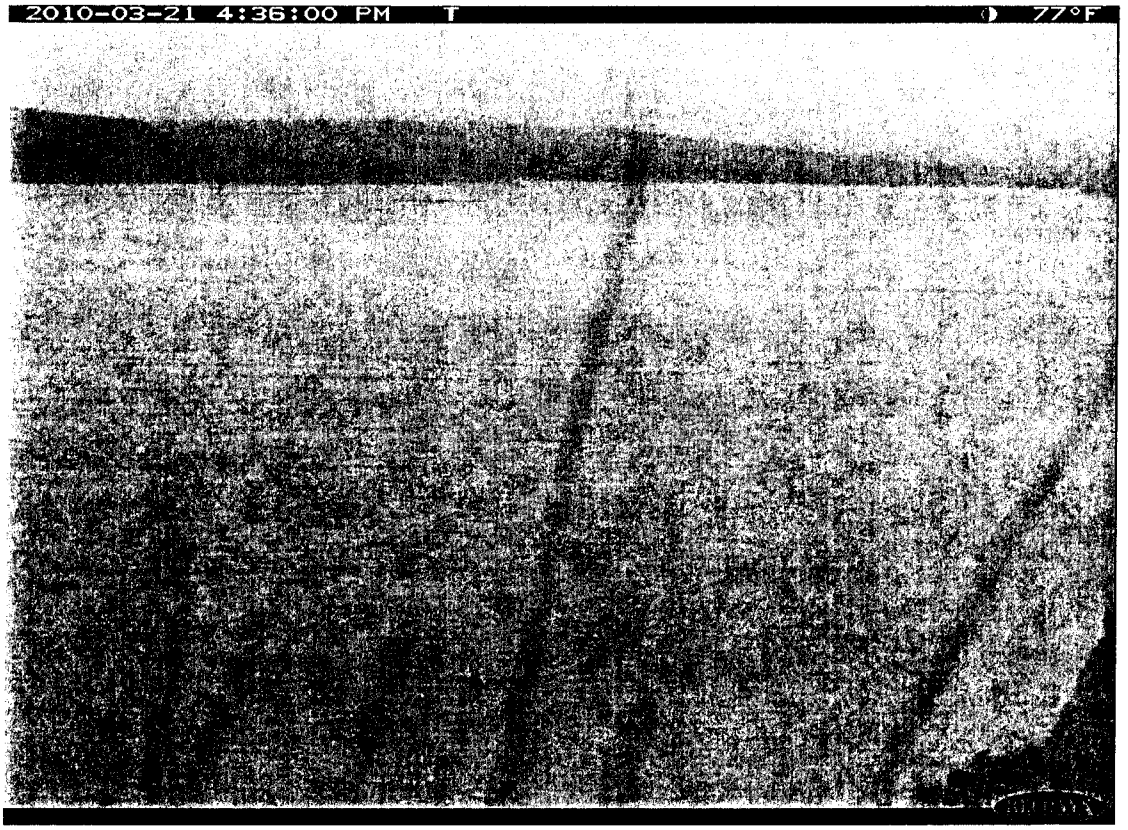

2010-03-21 2:43:00 PM T
79°F

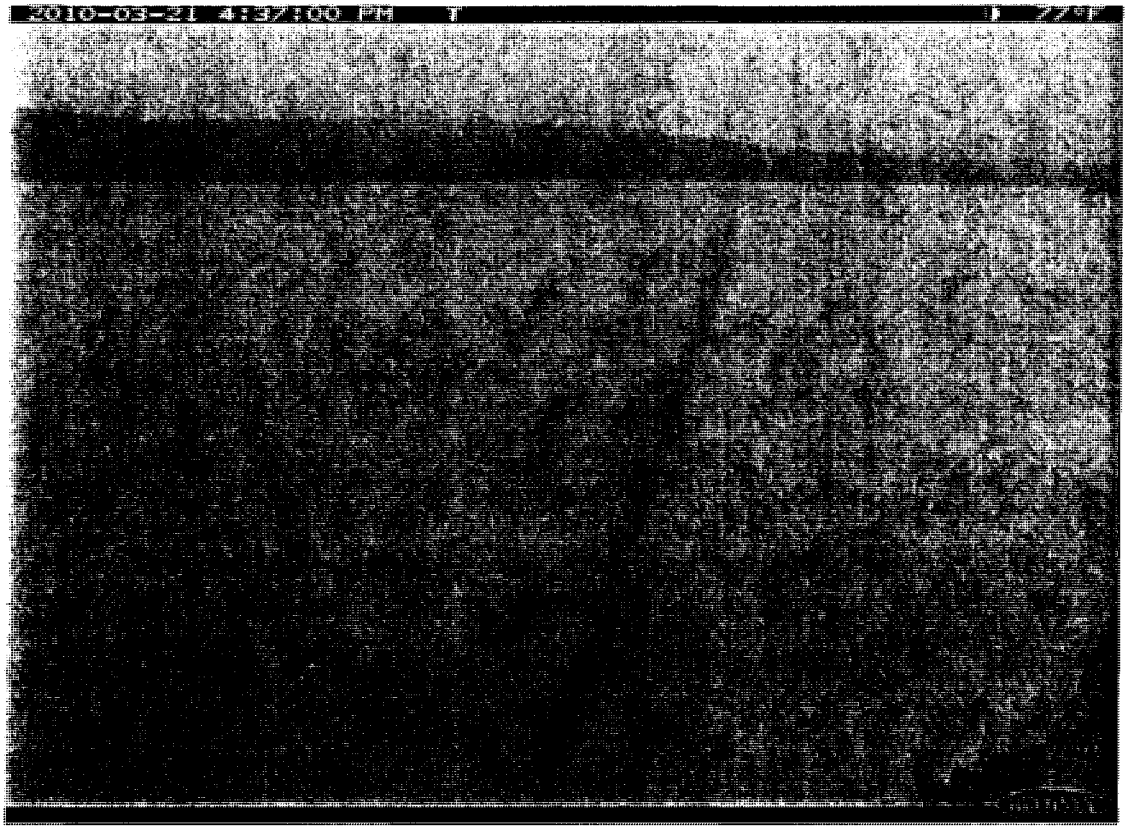

2010-03-21 2:44:00 PM T
79°F



The photo above and following 13 photos show a motorboat arriving from the south (with likely oyster barge in tow) heading northbound to the area where the oyster company exists. (4:34pm-4:47pm 3/21/10)

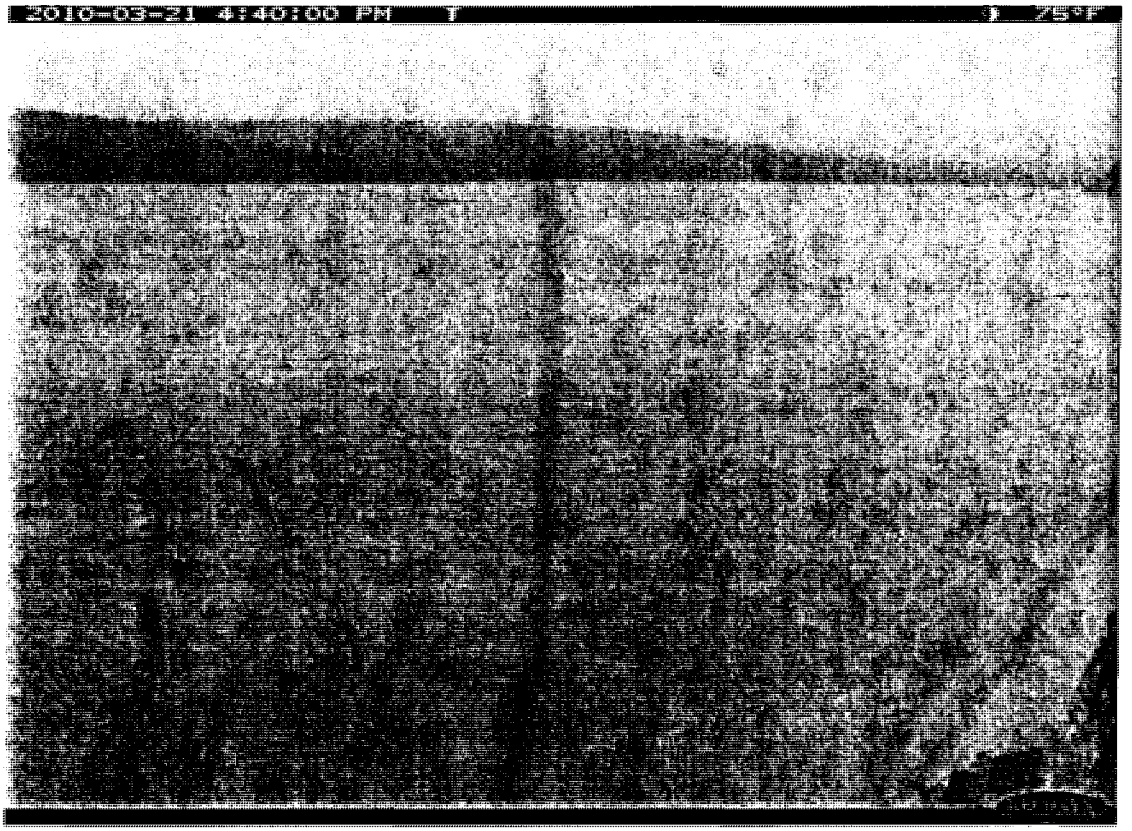

2010-05-21 41:35:00 PM

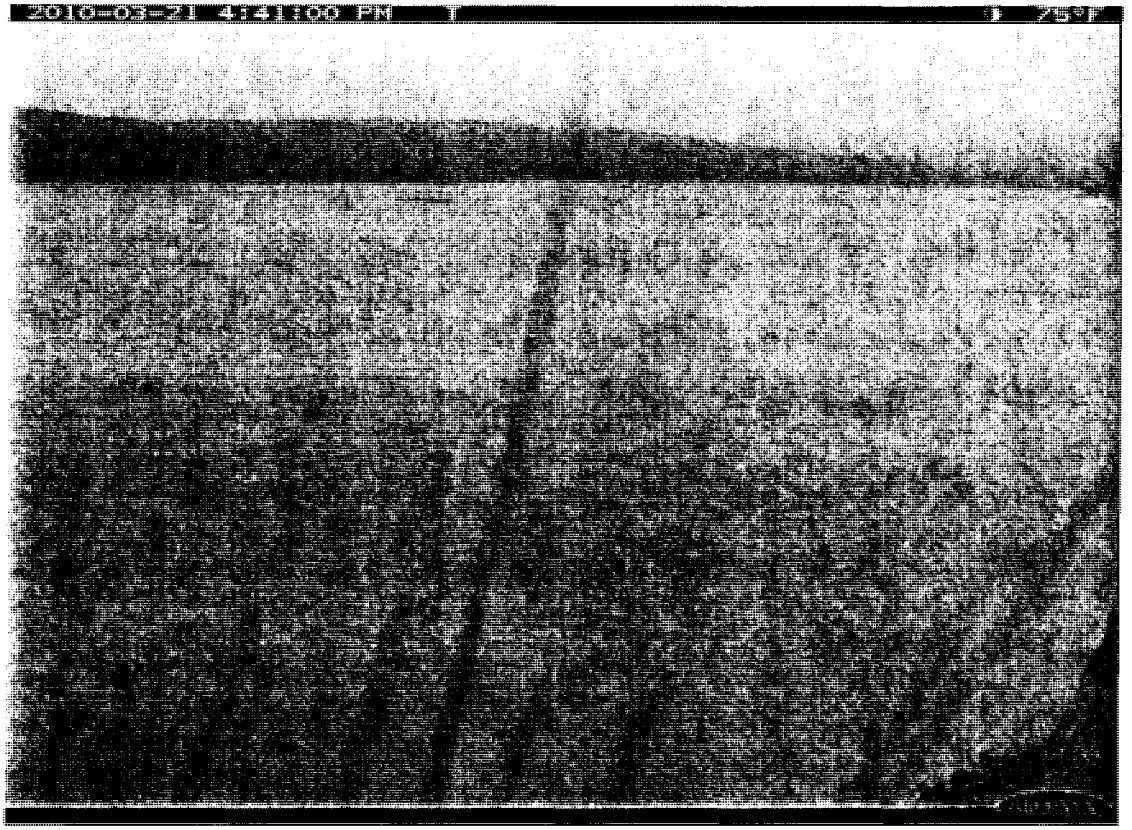

2010-03-21 4:36:00 PM T
77°F

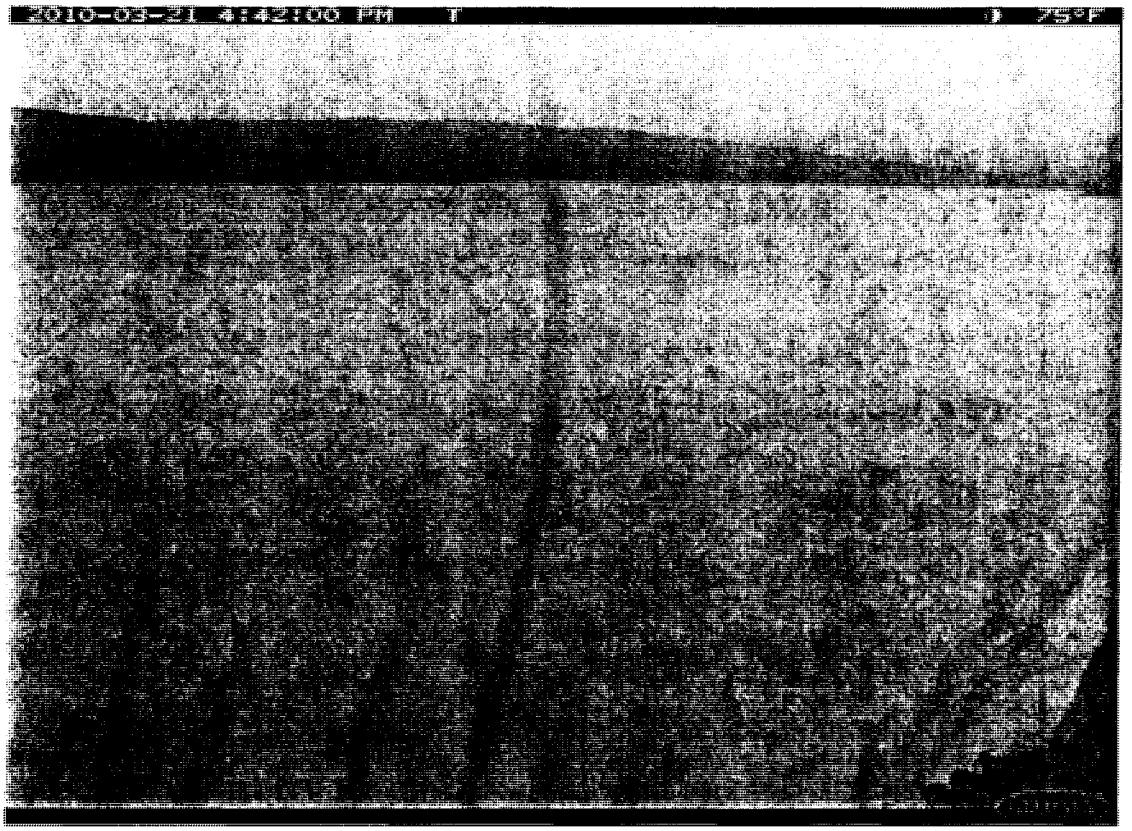

2010-03-21 4:37:00 PM

2010-03-21 4:38:00 PM
79°F

2010-03-21 4:39:00 PM T
75°F


2010-03-21 4:40:00 PM
75°F

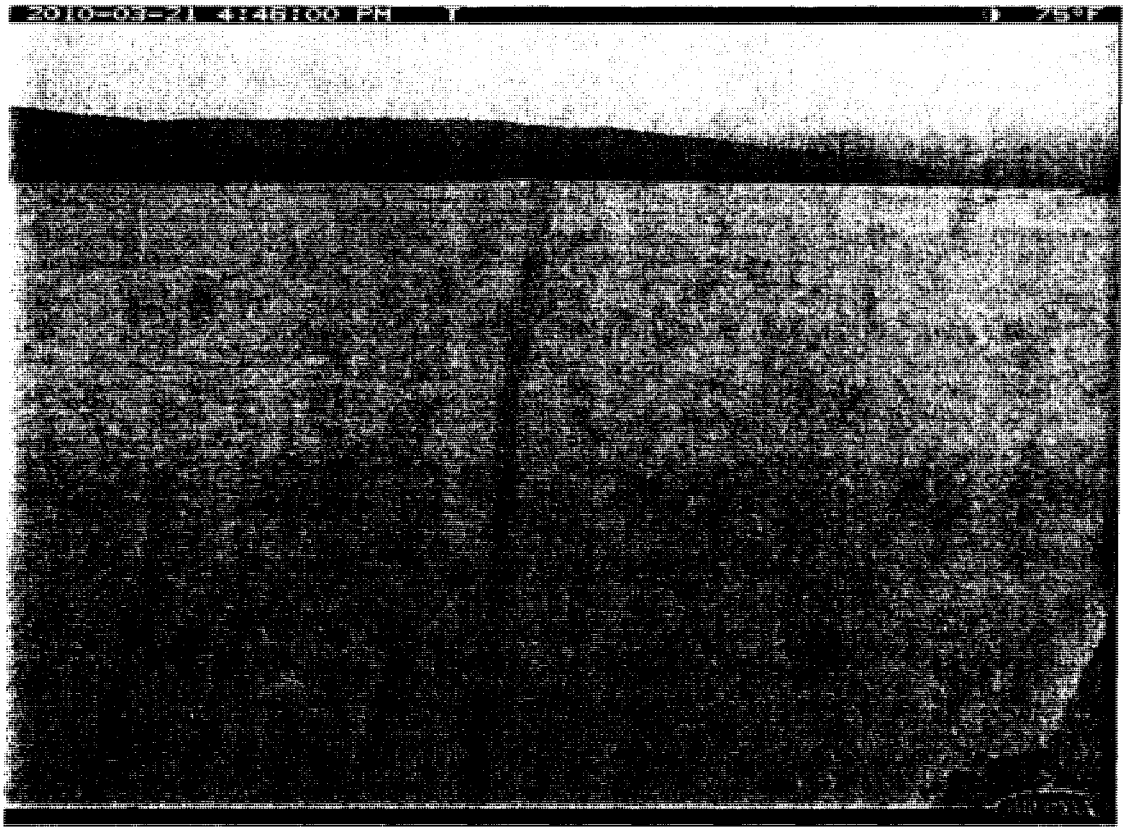

2016-05-21 4:43:00 PM

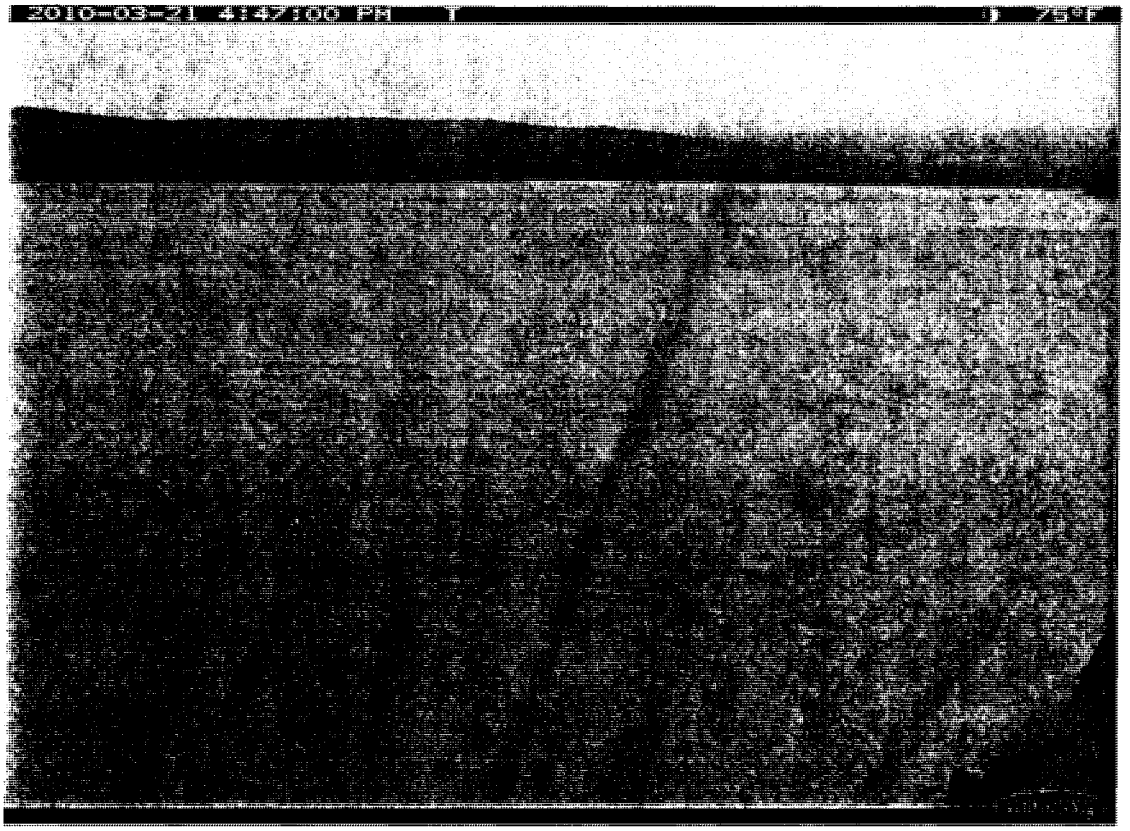

2010-03-21 4:42:00 PM T
75°F

2010-03-21 4:43:00 PM T
75°F

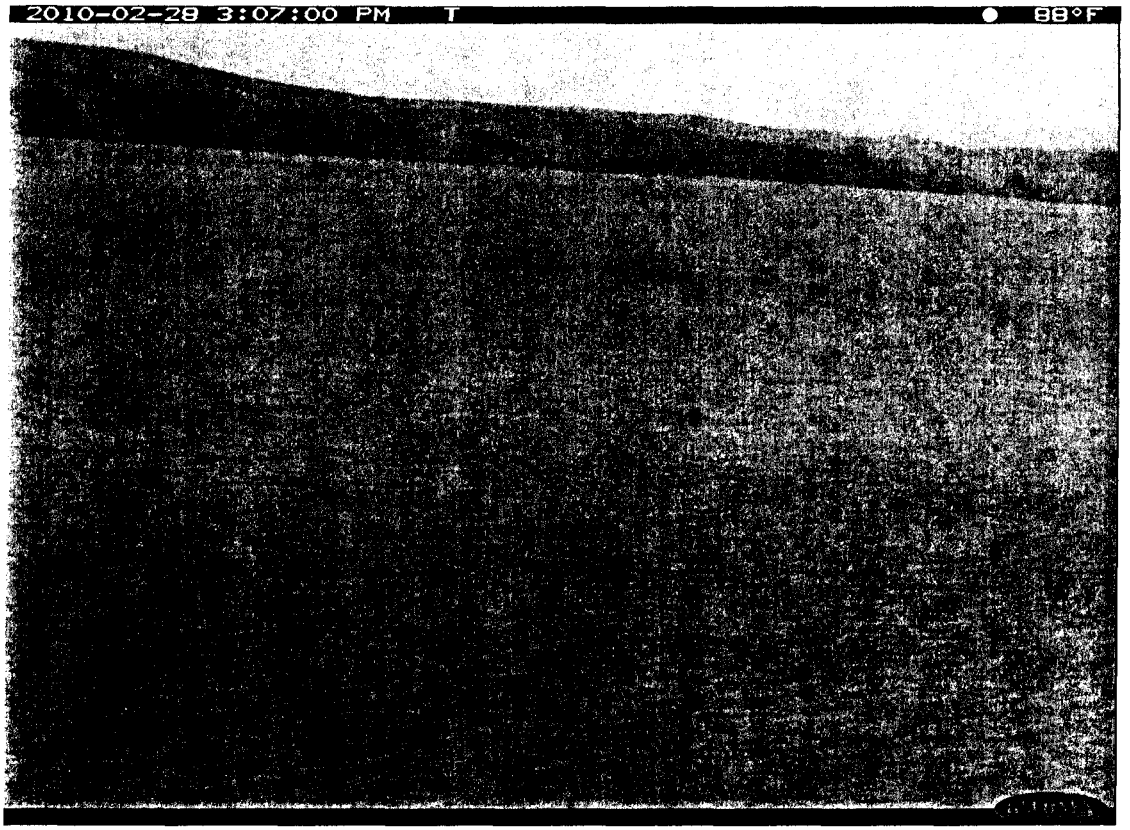
2010-05-21 4:44:00 PM

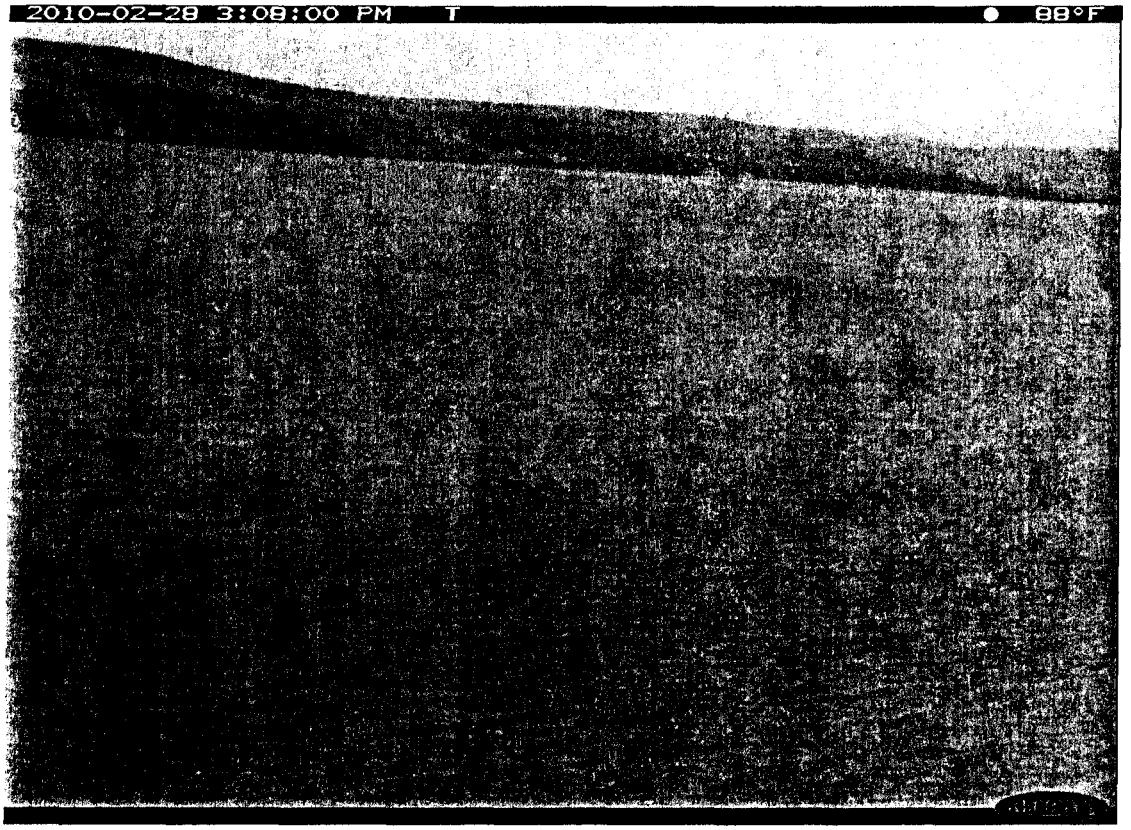
2010-03-21 4:45:00 PM T
75°F

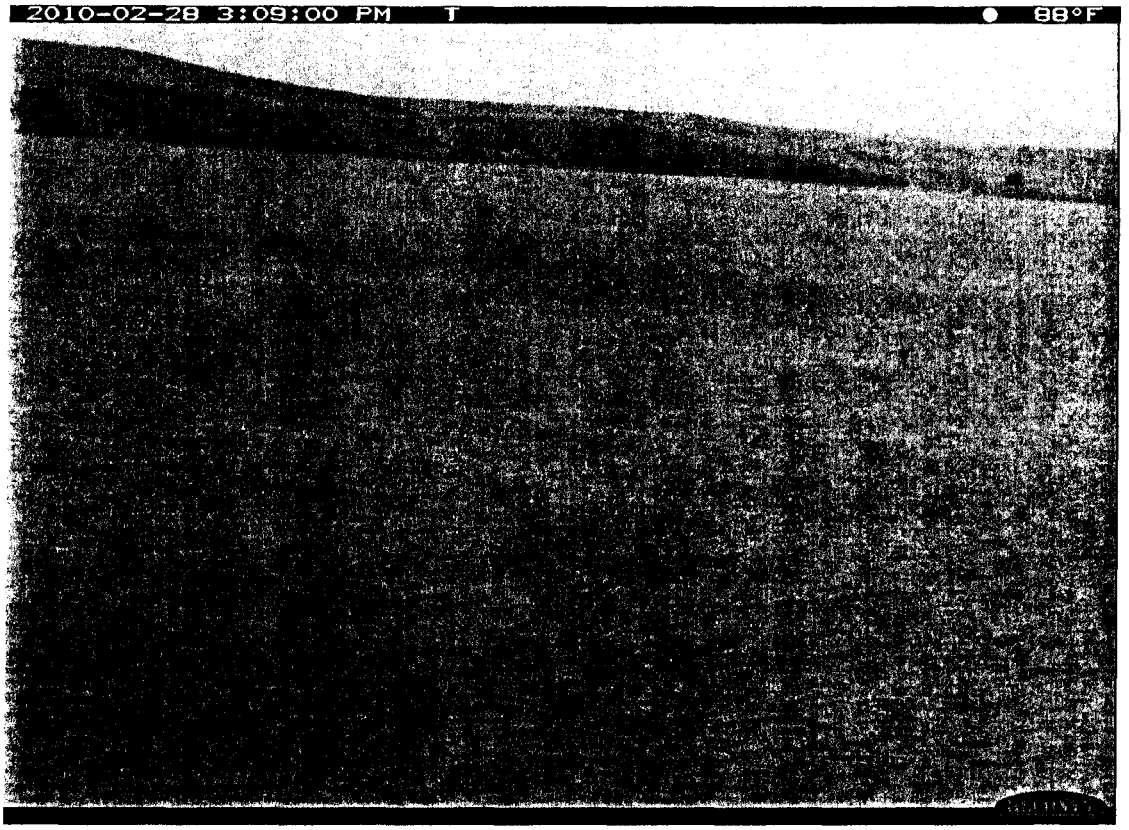

2010-03-21 4:24:00 PM

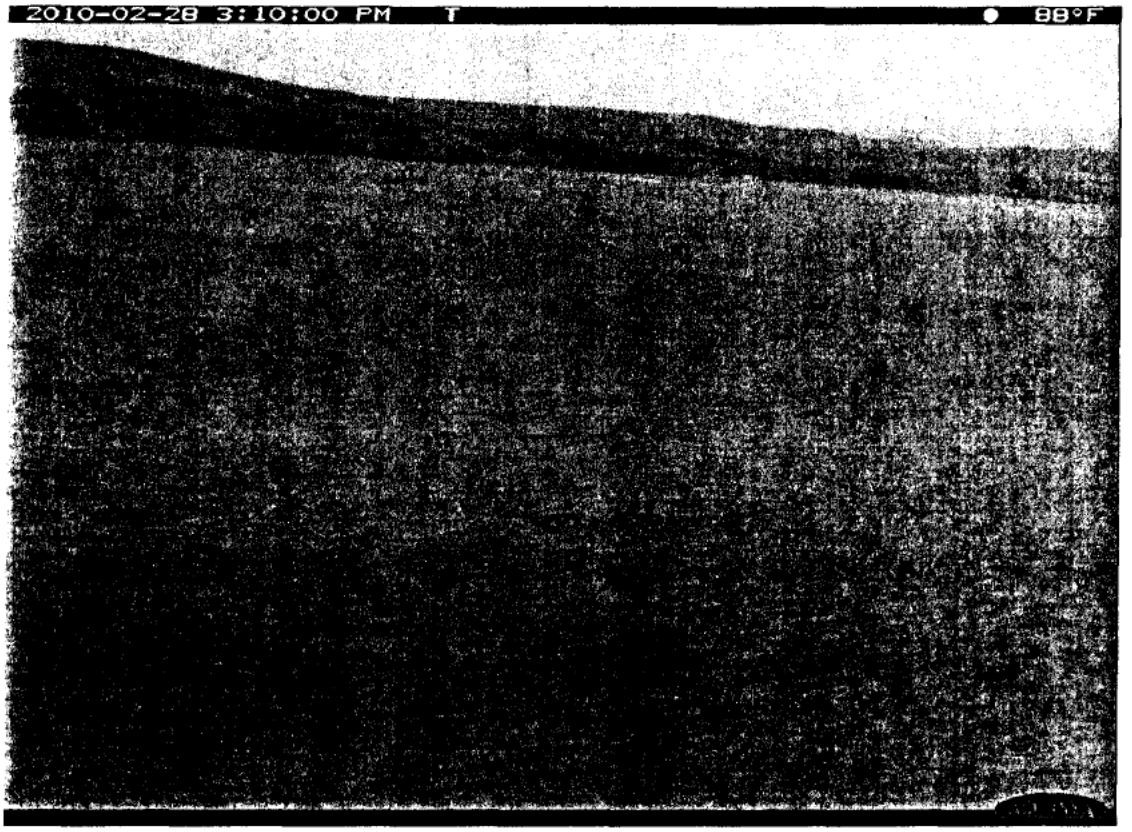


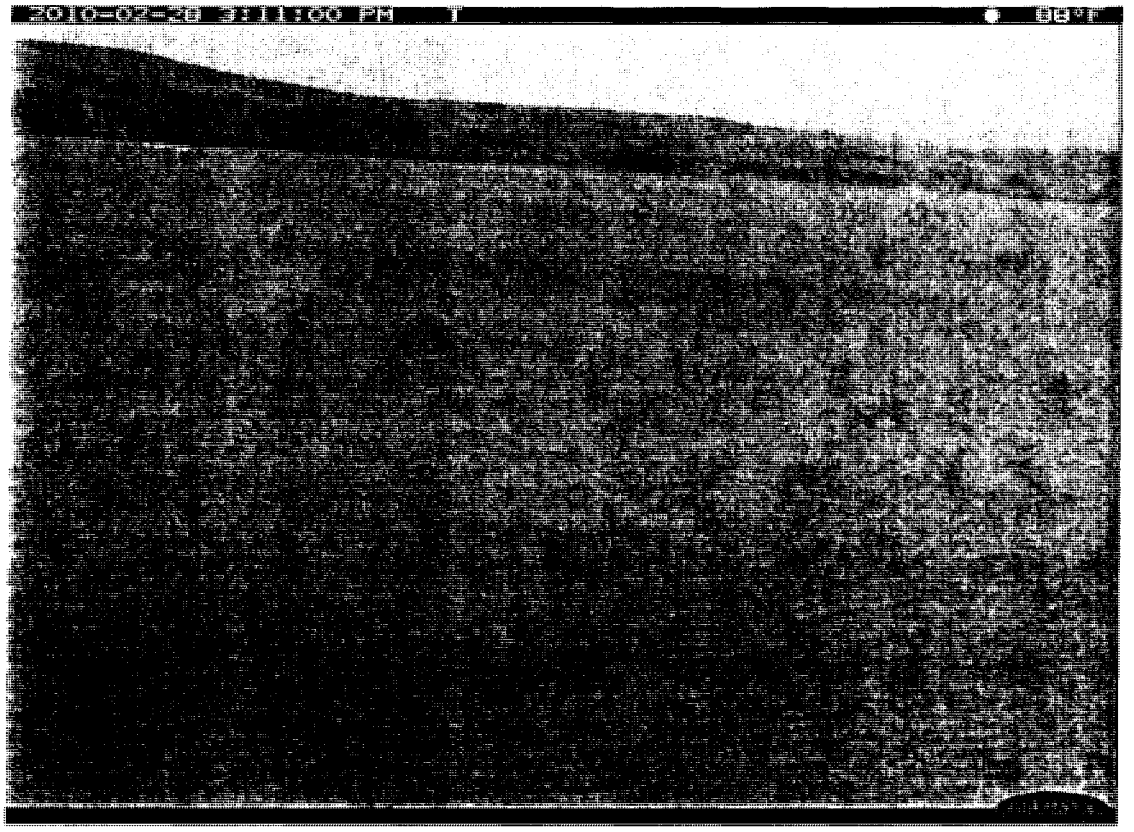
The following photos are from Sunday 2/28/10 between 3:07pm-3:22pm and show a motorboat arriving from the north heading southbound and then returning from the south heading northbound, towards the area where the oyster company exists.


2010-02-28 3:07:00 PM T
88°F

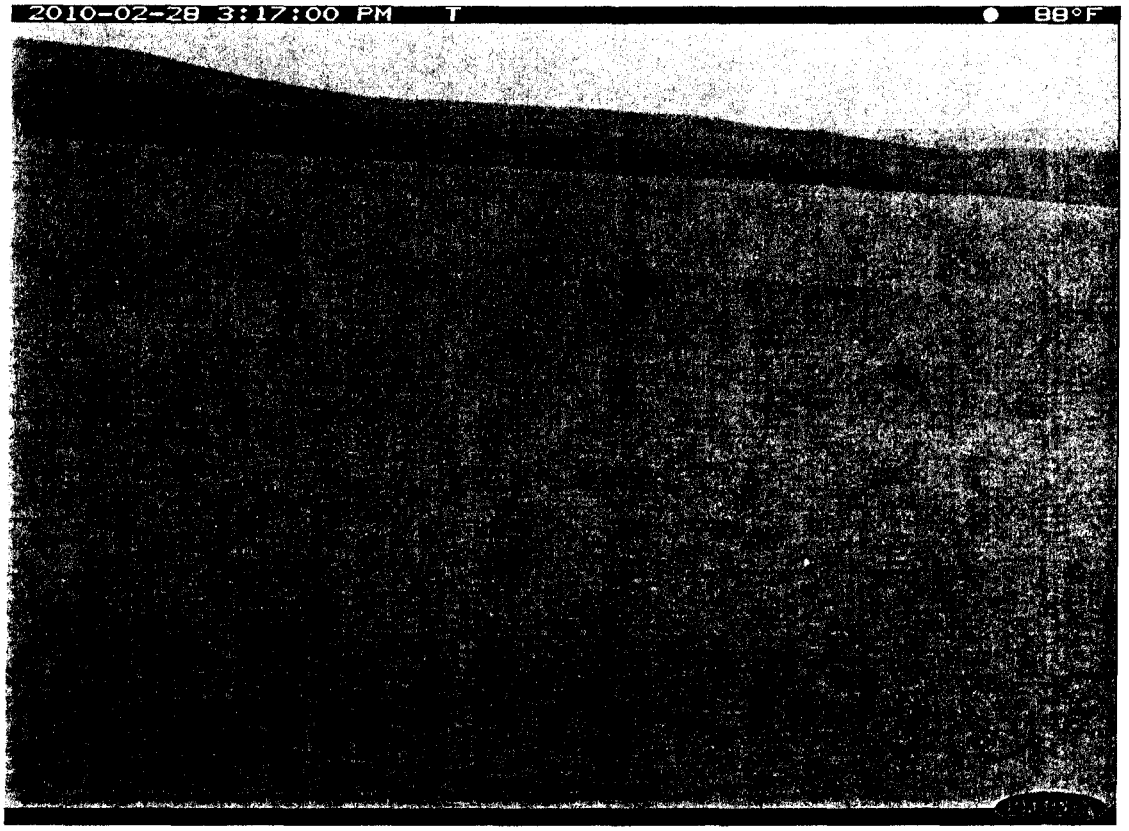

2010-02-28 3:09:00 PM T
88°F

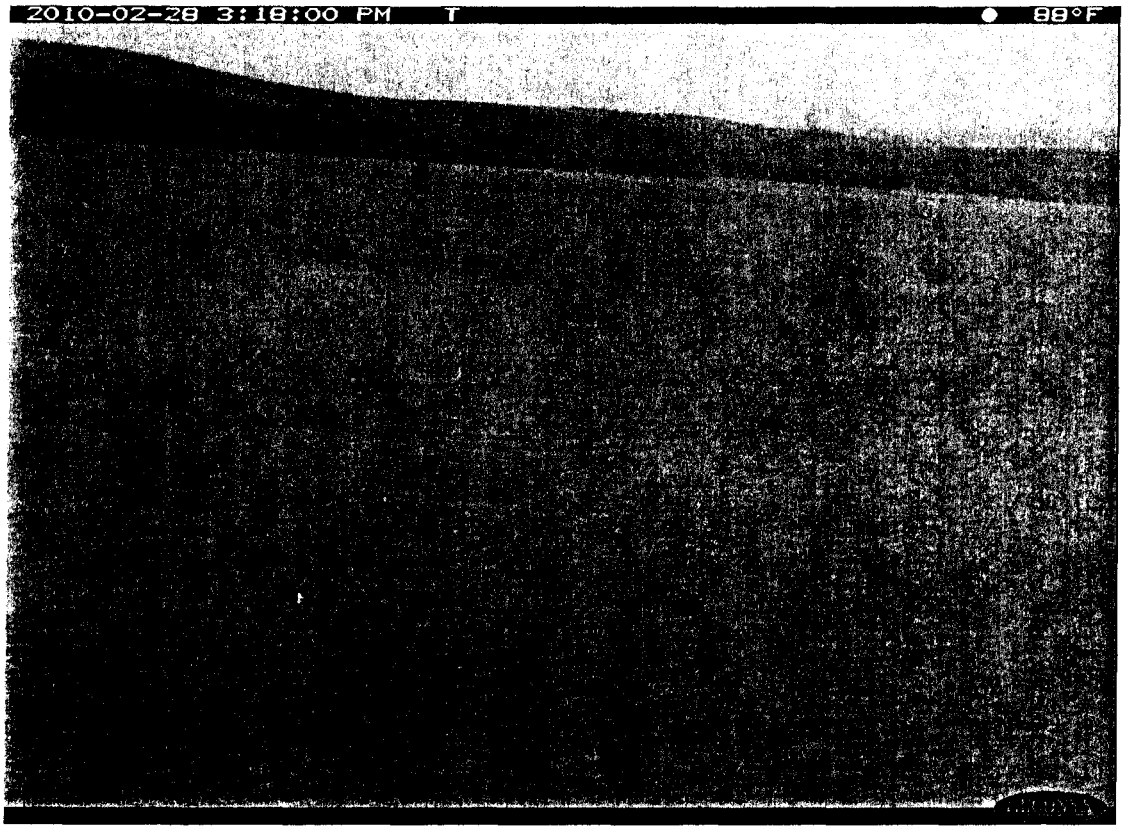

2010-02-28 3:09:00 PM T
88°F

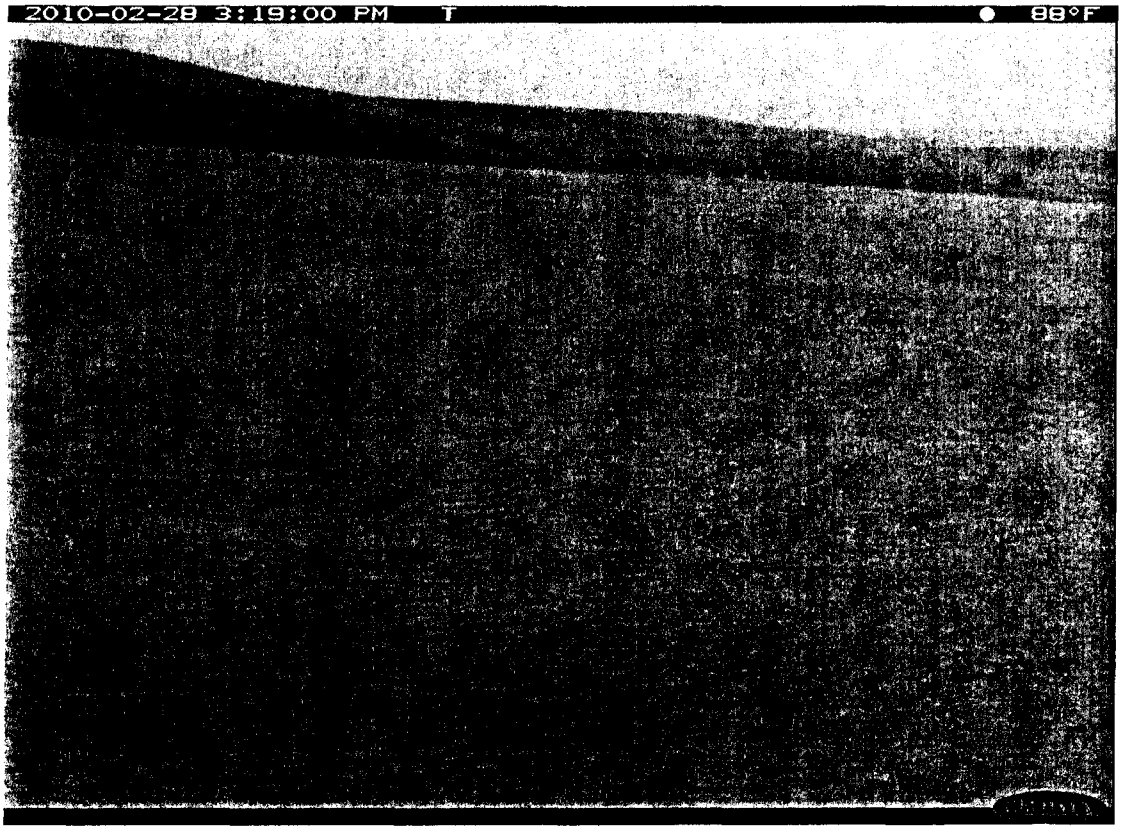

2010-02-28 3:10:00 PM T
88°F

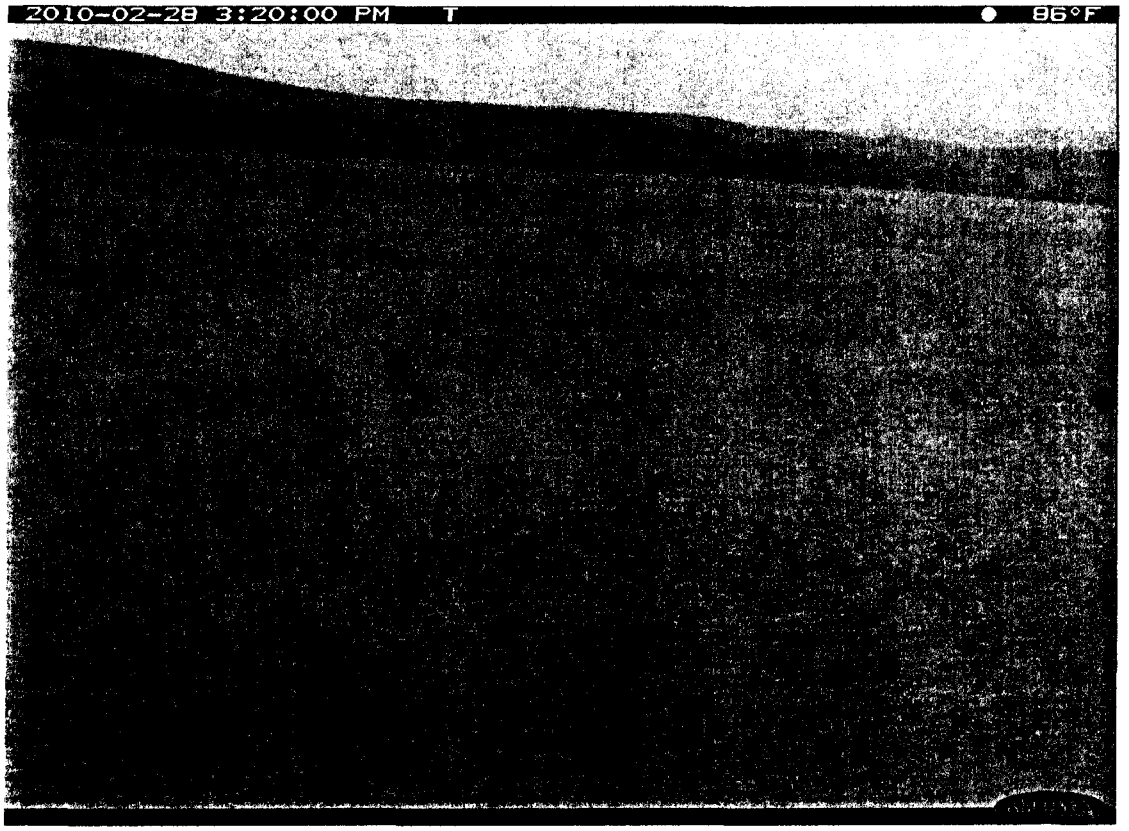

2010-07-28 3:11:00 PM
88°F

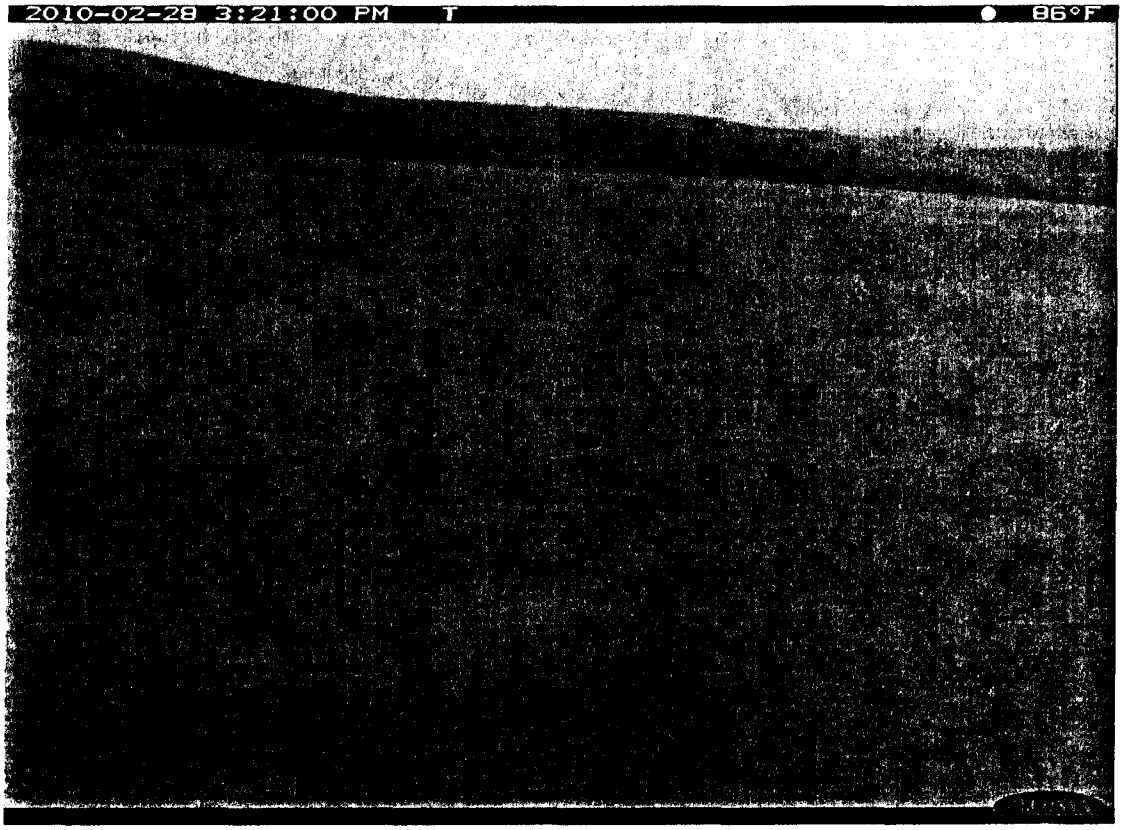
2010-02-28 3:12:00 PM T
88°F

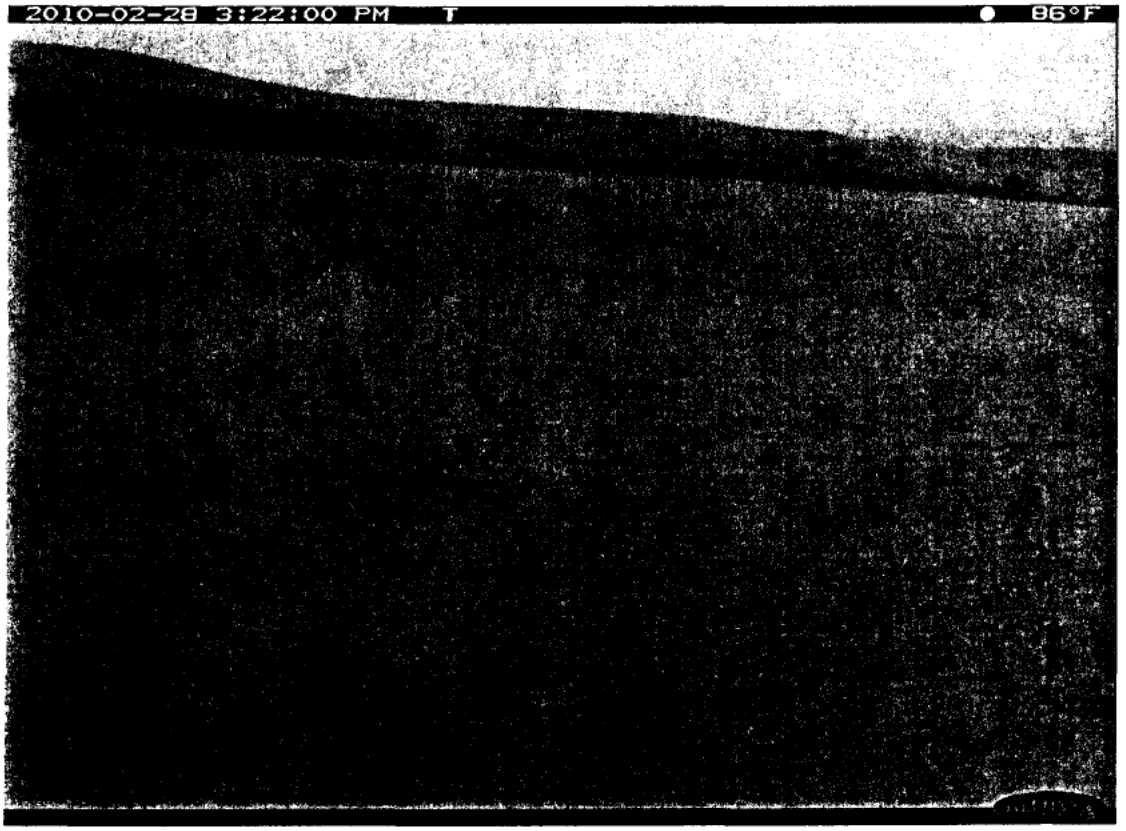

2010-02-28 3:17:00 PM T
88°F


2010-02-28 3:18:00 PM T
88°F


2010-02-28 3:19:00 PM
88°F


2010-02-28 3:20:00 PM T
86°F


2010-02-28 3:21:00 PM T
86°F



Recommendation for DFR: We note that while the above photographic evidence is still inadequate to prove cause-and-effect regarding seal disturbances, we believe it clearly calls into question the accuracy of DBOC explanations and asserted contradicting "records." We understand that the timings noted on the surveys are not the exact same as those from the photos, likely because personal watches and cameras are not synchronized, but we see they are close and the photos lend support to surveys. Thus, we wish to register our objection in advance to any credence that the DFR may be considering giving to DBOC's records and explanations about its operations absent independent third-party verification. Absent this verification, we strongly urge that DBOC "records" of where and when their boats and employees are at any given moment not be used for any future analysis of reported seal disturbances.

The relationship between policies, scientific research, and land-use management while mariculture is authorized (currently)

Currently, and up until November 2012, the DBOC has authorization to operate within Drakes Estero. During this time, existing scientific research and policies apply in management actions taken by NPS. The existing research and policies allow the NPS to appropriately manage a use with known real and potential impacts on the natural resources.

The NRC concurred, stating: "With regard to addressing the risk of ecological effects, NPS's Management Policies prioritize the protection of natural resources, including circumstances where the available scientific information contains substantial uncertainty: **"In cases of uncertainty as to the impacts of activities on park natural resources, the protection of natural resources will predominate" (NPS, 2006c). This policy could be applied to permitting decisions before 2012 as well as providing an environmental rationale for not extending the 40-year term of the RUO that was granted upon the Johnson's sale of the property to NPS in 1972.**" (pg 86 NRC report) [emphasis added]

We believe that the best available science (previously noted above) and a recent past of violations to regulations (e.g. placement of more than 700 mariculture bags within harbor seal protection area, 2009) should provide NPS with concern on the real and potential impacts mariculture operations on the natural resources. Should NPS be willing to act on those concerns, the applicable policies provide guidance for managing, regulating, and possibly partially or fully restricting and regulating a use that is inconsistent with such policies. It is important for the MMC to understand and support the implementation of the Management Policies of the NPS and ensure the DFR does not inadvertently preclude or hinder NPS stewardship of the estero.

The relationship between policies, scientific research, and land-use management for land-use decision-making for post-November 2012 (i.e. NPS NEPA process)

This topic was one of several that NPCA asked MMC to address as part of its engagement, clearly acknowledging it is not appropriate for the MMC to take a position on the issue. Our view is that the Department of Interior must make the decision of land-use vis-à-vis continued oyster farming post November 2012 based on pertinent NPS policies and laws, which is also consistent with the NRC statement that there is no scientific answer (though significant real and potential concerns exist and would be included in the NEPA assessment). Therefore, ensuring a particular land-use meets the law and policy threshold is the fundamental assessment that must be made by NPS. Whether a particular land-use meets the acceptable environmental impacts threshold is an important assessment, yet it is secondary to first determining if the use is consistent with applicable policies and laws, including those that discuss private commercial use of a publicly owned resource. The National Research Council's (NRC) report on Drakes Estero concurs with this view, as follows:

- **Consequently, our committee concludes that this decision on extension of the RUO hinges on the legal interpretation of the legislative mandate rather than a scientific analysis of the impacts of DBOC on the Drakes Estero ecosystem.** As such, more scientific study of DBOC operations and Drakes Estero would not necessarily affect National Park Service decisions about the future of oyster farming in the estero. (pg 82 NRC report) [emphasis added]

- With regard to addressing the risk of ecological effects, NPS's Management Policies prioritize the protection of natural resources, including circumstances where the available scientific information contains substantial uncertainty: **"In cases of uncertainty as to the impacts of activities on park natural resources, the protection of natural resources will predominate" (NPS, 2006c). This policy could be applied to permitting decisions before 2012 as well as providing an environmental rationale for not extending the**

40-year term of the RUO that was granted upon the Johnson's sale of the property to NPS in 1972. (pg 86 NRC report) [emphasis added]

- The ultimate decision to permit or prohibit a particular activity, such as shellfish farming, in a particular location, such as Drakes Estero, necessarily requires value judgments and tradeoffs that can be informed, but not resolved, by science. Science describes the effects (differences in outcomes) that can be expected with and without shellfish farming in Drakes Estero, the level of uncertainty given current knowledge about these effects, and approaches to assess and balance potential risks and benefits. **Because stakeholders may reasonably assign different levels of priority or importance to these effects and outcomes, there is no scientific answer to the question of whether to extend the RUO for shellfish farming.** Like other zoning and land use questions, this issue will be resolved by policymakers charged with weighing the conflicting views and priorities of society as part of the decision-making process. (pg 87 NRC report) [emphasis added]

Recommendation for DFR: We believe that it is appropriate (and consistent with the NRC) for the DFR to reinforce this view clearly, upfront and as a primary, substantive point. Unfortunately, this key explanation was not adequately and appropriately communicated by the NRC and therefore, was misinterpreted by the public, press, and policy makers. We recommend the DFR lead with a clear, concise statement such as: "Land-use decisions regarding Drakes Estero post November 2012 should be determined by applicable policies and laws governing the area; it is not one that has a scientific answer. This report does not take a position on this decision."

Applicable NPS Management Policies

Below are some of the key applicable NPS Management Policies that impact NPS decision-making pre and post November 2012. Additional policies, NPS Director's Orders, and laws applicable to Point Reyes National Seashore, the National Park Service, and Drakes Estero also influence current management of the estero as well as future land-use decision-making. Additionally, policies regarding commercial use will be applied for post November 2012 decision-making. Please consider stating these policies and referencing them in the DFR, as they best convey the priority of natural systems management at Drakes Estero. The DFR should fully support this priority. This would also support potential future efforts of NPS to better protect the natural resources consistent with their policies (we continue to be concerned that public and political pressure and various stakeholders' need for "absolute certainty" in decision-making has constrained the NPS's ability to provide adequate and appropriate protections for natural resources).

NPS Management Policies (excerpts from noted chapters). Emphasis added represented by *italics*.

4.1.5 Restoration of Natural Systems

The Service will reestablish natural functions and processes in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes, and fires, will be allowed to recover naturally unless manipulation

is necessary to protect other park resources, developments, or employee and public safety. *Impacts on natural systems resulting from human disturbances include the introduction of exotic species; the contamination of air, water, and soil; changes to hydrologic patterns and sediment transport; the acceleration of erosion and sedimentation; and the disruption of natural processes. The Service will seek to return such disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological community structure and function.*

6.3.7 Natural Resources Management

"The National Park Service recognizes that wilderness is a composite resource with interrelated parts. Without natural resources, especially indigenous and endemic species, a wilderness experience would not be possible. Natural resources are critical, defining elements of the wilderness resource, but they need to be managed within the context of the whole ecosystem. Natural resource management plans will be integrated with and cross-reference wilderness management plans. Pursuing a series of independent component projects in wilderness, such as single-species management, will not necessarily accomplish the over-arching goal of wilderness management. Natural resources management in wilderness will include and be guided by a coordinated program of scientific inventory, monitoring, and research.

The principle of nondegradation will be applied to wilderness management, and each wilderness area's condition will be measured and assessed against its own unimpaired standard. Natural processes will be allowed, insofar as possible, to shape and control wilderness ecosystems. Management should seek to sustain the natural distribution, numbers, population composition, and interaction of indigenous species. Management intervention should only be undertaken to the extent necessary to correct past mistakes, the impacts of human use, and influences originating outside of wilderness boundaries."

6.3.4.3 Environmental Compliance

"Proposals having the potential to impact wilderness resources will be evaluated in accordance with NPS procedures for implementing the National Environmental Policy Act. Those procedures include the use of categorical exclusions, environmental assessments (EAs), or environmental impact statements (EISs). Administrative actions impacting wilderness must be addressed in either the environmental assessment or environmental impact statement accompanying the approved wilderness management plan or as a separate environmental compliance document.

Managers contemplating the use of aircraft or other motorized equipment or mechanical transportation within wilderness must consider impacts to the character, esthetics, and traditions of wilderness before considering the costs and efficiency of the equipment.

In evaluating environmental impacts, the National Park Service will take into account (1) wilderness characteristics and values, including the primeval character and influence of the wilderness; (2) the preservation of natural conditions (including the lack of man-made noise); and (3) assurances that there will be outstanding opportunities for solitude, that the public will

be provided with a primitive and unconfined type of recreational experience, and that wilderness will be preserved and used in an unimpaired condition. Managers will be expected to appropriately address cultural resources management considerations in the development and review of environmental compliance documents impacting wilderness resources."

6.3.1 General Policy

"The National Park Service will take no action that would diminish the wilderness eligibility of an area possessing wilderness characteristics until the legislative process of wilderness designation has been completed. Until that time, management decisions will be made in expectation of eventual wilderness designation. *This policy also applies to potential wilderness, requiring it to be managed as wilderness to the extent that existing nonconforming conditions allow."*

"All management decisions affecting wilderness will further apply the concept of "minimum requirement" for the administration of the area regardless of wilderness category. The only exception is for areas that have been found eligible, but for which, after completion of a wilderness study, the Service has not proposed wilderness designation. However, those lands will still be managed to preserve their eligibility for designation."

...except as necessary to meet the minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area) *there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.*

6.3.5 Minimum Requirement

All management decisions affecting wilderness must be consistent with a minimum requirement concept.... *When determining minimum requirement, the potential disruption of wilderness character and resources will be considered before, and given significantly more weight than, economic efficiency and convenience. If a compromise of wilderness resource or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts will be acceptable.*

6.4 Wilderness Use Management

"The National Park Service will encourage and facilitate those uses of wilderness that are in keeping with the definitions and purposes of wilderness and do not degrade wilderness resources and character. Appropriate restrictions may be imposed on any authorized activity in the interest of preserving wilderness character and resources or to ensure public safety."

6.3.11.3 Waters in Wilderness

"In keeping with established jurisdictions and authorities, the Service will manage as wilderness all waters included within wilderness boundaries, and the lands beneath these waters (if owned by the United States)."

6.4.3.3 Use of Motorized Equipment

"Public use of motorized equipment or any form of mechanical transport will be prohibited in wilderness except as provided for in specific legislation. Operating a motor vehicle or possessing a bicycle in designated wilderness outside Alaska is prohibited (see NPS regulations in 36 CFR 4.30(d)(1)).

However, section 4(d)(1) of the Wilderness Act (16 USC 1133(d)(1)) authorizes the Secretary-where legislation designating the wilderness specifically makes this provision applicable-to allow the continuation of motorboat and aircraft use under certain circumstances in which those activities were established prior to wilderness designation. *Section 4(d)(1) gives the Secretary the discretion to manage and regulate the activity in accordance with the Wilderness Act, the NPS Organic Act, and individual park enabling legislation. As authorized, the National Park Service will administer this use to be compatible with the purpose, character, and resource values of the particular wilderness area involved.* The use of motorized equipment by the public in wilderness areas in Alaska is governed by applicable provisions of the Alaska National Interest Lands Conservation Act, NPS regulations in 36 CFR Part 13, and Department of the Interior regulations in 43 CFR Part 36. The specific conditions under which motorized equipment may be used by the public will be outlined in each park's wilderness management plan."

In conclusion, we wish to thank the MMC for considering our views in its preparation of a DFR, and for allowing key stakeholders to review it once prepared. The DFR is an important opportunity for us to ensure that NPS goals of providing maximum protection for natural systems and native species, including marine mammals, are supported and that NPS management procedures are better understood. We look forward to meeting with you soon regarding our perspectives and comments.

Sincerely,

Neal Desai

Neal Desai
Associate Director, Pacific Region
National Parks Conservation Association

Attached:
Map of mariculture activity

Cc:
Superintende(b) (6), (b) (7)(C) on, Point Reyes National Seashore
(b) (6), (b) (7)(C) ker, Point Reyes National Seashore

Documents responsive to the October 20, 2011, request from Chairman Issa for documents regarding Drakes Bay Oyster Company

Volume: 00033002_Issa_005

	Document Name	Pages	Document Type	Document Title
1	NPS-PWR-B06-00001-000001	4	COR	FOIA-2010-0302 Response
2	NPS-PWR-B06-00002-000001	1	COR	FOIA-2010-0377 Response
3	NPS-PWR-B06-00003-000001	57	COR	FOIA-2010-0427 Response
4	NPS-PWR-B06-00004-000001	34	COR	FOIA-2010-0440 Response
5	NPS-PWR-B06-00006-000001	290	COR	FOIA-2010-0755 Response Enclosure 1
6	NPS-PWR-B06-00006-000003	153	COR	FOIA-2010-0755 Response Enclosure 2
7	NPS-PWR-B06-00006-000005	534	COR	FOIA-2010-0755 Response 2
8	NPS-PWR-B06-00007-000001	220	COR	FOIA-2010-0761 Response
9	NPS-PWR-B06-00008-000001	20	COR	FOIA-2010-0847 Response
10	NPS-PWR-B06-00009-000001	2	COR	FOIA-2010-0982 Response
11	NPS-PWR-B06-00010-000001	73	COR	FOIA-2010-1000 Response
12	NPS-PWR-B06-00011-000001	13	COR	FOIA-2010-1045 Response
13	NPS-PWR-B06-00012-000001	54	COR	FOIA-2010-1048 Response

Total Pages: 1,455

· Facilitating the use of parks for scientific inquiry
· Supporting science-informed decision making
· Communicating relevance and providing access to research knowledge
· Promoting resource stewardship through partnerships

----- Forwarded by Ben Becker/PORE/NPS on 11/30/2009 01:38 PM -----

"Tom Moore"
<tmoore@dfg.ca.gov>
11/30/2009 01:19 PM

To <Ben_Becker@nps.gov>
cc <Gregg.Langlois@cdph.ca.gov>, "Cassidy Teufel" <cteufel@coastal.ca.gov>, "Kirsten Ramey" <KRAMEY@dfg.ca.gov>
Subject Fwd: M-438-02 and lat longs for corners from ArcGIS

Hi Ben,

As per our phone conversation, I am forwarding my email to Kevin Lunny regarding locating (lat-long) the corners of lease M-438-02. These coordinates should not be considered as a legal description of the corners of lease M-438-02 and are a rough approximation only.

This lease was a deep-water lease for scallop culture using lantern nets, it was never intended for clam culture which takes place on the bottom in intertidal mudflats. Clam culture was mistakenly authorized for this lease, not M-438-01 as requested by JOC and the Department, through clerical error on part of the Fish and Game Commission back in the 1990s.

The mapped location of lease M-438-02 (DPH management plan Fig 2.) is consistent with the conditionally approved harvest guidelines for lease M-438-02. Further information on DPH management of shellfish harvest from Drakes Estero can be obtained from Gregg Langlios at DPH (CC'd here).

I will be retiring on Dec. 16, 2009, my replacement and point-of -contact after that date will be Kirsten Ramey. Her contact inforamtion is as follows:

Email Addresse
KRAMEY@dfg.ca.gov

Phone Numbers
Office: (707) 445-5365
Mobile: (707) 761-1755
Fax: (707) 445-7883

If you have any questions or need clarification on this topic, please let me know.

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator,
P.O. Box 1560
Bodega Bay, CA 94923

(707) 875-4261
(707) 688-3192 cell
(707) 875-4269 FAX
tmoore@dfg.ca.gov
Due to the Governor's Executive Order, I will be off on Furlough the 1st, 2nd & 3rd Friday of each month

You will never find time for anything. If you want time you must make it. C. Buxton

>>> TMOORE 10/19/2009 11:33 AM >>>
Kevin,

I used Fig 2. DPH Management Plan for DE 2006 location for M-438-02 (see attached) and created a polygon of one-acre area. This is my best approximation of: 1) the location and, 2) the lat long coordinates for the corners (see attached print-out).

I used DPH location for the lease since they control harvest and have water quality info based on this mapped location. Robert Reese should be able to provide the most accurate location, based on the lease description, however we may wish to use the DPH location and provide an accurate description and amend the lease description.

Take a look and let me know your thoughts.

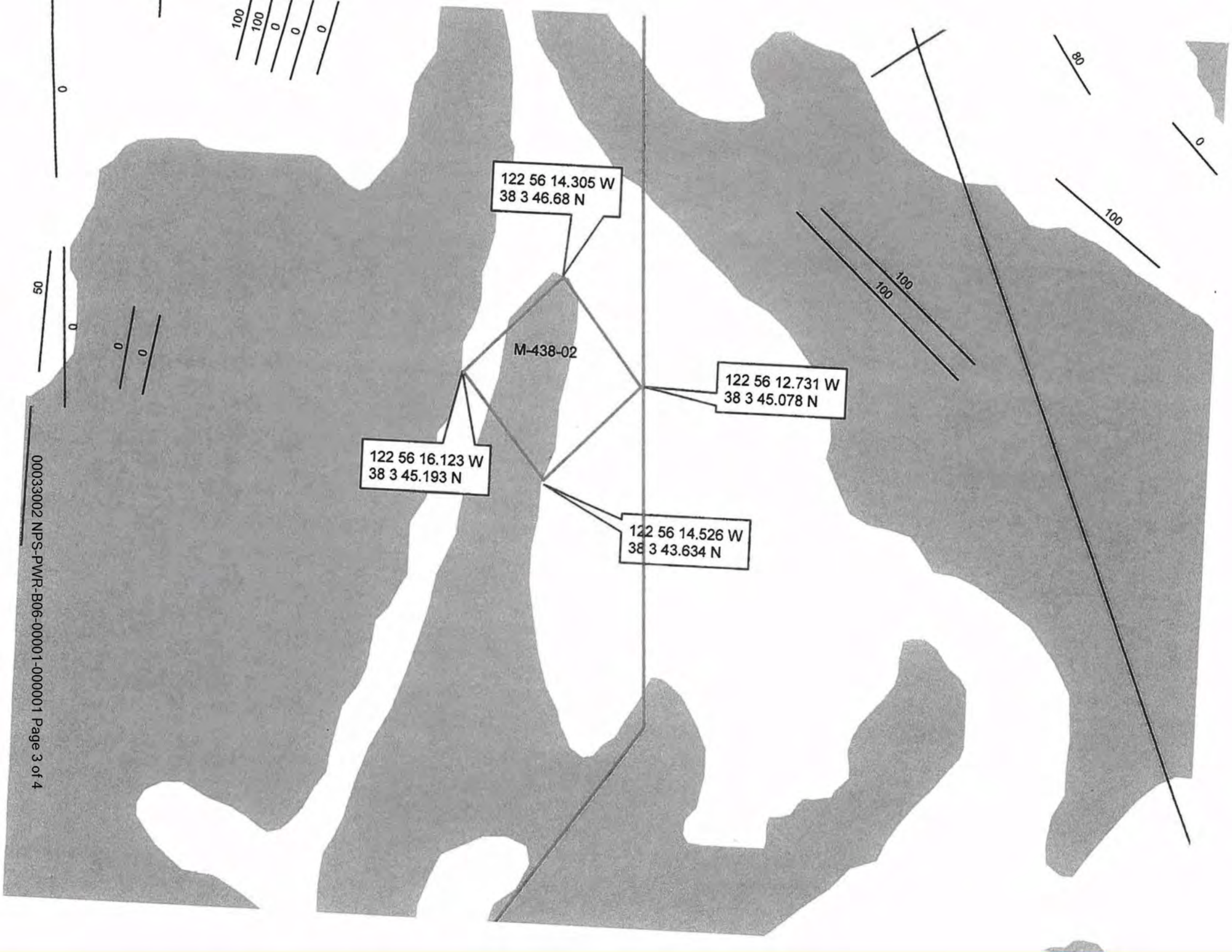
Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator,
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 688-3192 cell
(707) 875-4269 FAX
tmoore@dfg.ca.gov
Due to the Governor's Executive Order, I will be off on Furlough the 1st, 2nd & 3rd Friday of each month

You will never find time for anything. If you want time you must make it. C. Buxton

M-438-02 with lat long .pdf

DE_ManPlan_2006_final.pdf


122 56 14.305 W
38 3 46.68 N
M-438-02
122 56 12.731 W
38 3 45.078 N
122 56 16.123 W
38 3 45.193 N
122 56 14.526 W
38 3 43.634 N
100
100
100
100
80
0
0
0
0
0
0
0
50

The following coordinates were obtained Ranger Daniel Habig during site visit on 11/29/09 between 1330 and 1530 hours.

Coordinates for Clam bag area located within a seal protection zone.
TOPO! GPS Data Format UTM NAD83

CLMBGE: 10S,505660,4212160

CLMBGS: 10S,505645,4212147

CLMBGN: 10S,505648,4212217

CLMBGW: 10S,505623,4212189

Coordinates for unidentified squares on aerial photos:
SQUARS: 10S,506125,4212426

Don Neubacher/PORE/NPS
02/10/2010 09:40 AM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject the video

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

—— Forwarded by Don Neubacher/PORE/NPS on 02/10/2010 09:40 AM ——

Phyllis Faber
[redacted]
02/09/2010 10:39 AM

To don_neubacher@nps.gov
cc
Subject the video

Don I can't tell you how horrified I am, we all are, over the video. I never saw it and it was released without anyone's OK. It is appalling and I a know everyone involved is upset and sorry. You and I have disagreed about agriculture and mariculture in the Park but his was uncalled for. I am so very sorry. I am enraged they brought Sarah into the film, all so unfair and unnecessary.

I, in this unhappy email, want to congratulate you however on your promotion to Yosemite. That will be a huge challenge but so different from Pt Reyes. Jim Shevock was here last night and we talked about all the good resource management you have accomplished here. You would have been pleased to hear him. I so regret not starting out earlier trying to win your heart to celebrating the agricultural aspects of the Seashore. Anyway my deepest apology for my miniscule role in the video, for the video at all, and my best wishes for your time at Yosemite. P

Attachment 8

Dated

12/12/2007

4 pages

List of NPS reference materials

Referred back to National Park Service for their review and direct response to the requestor

MEMORANDUM

December 13, 2007

To: Dr. Susan Roberts

From: Dr. Sarah Allen

Reference: List of NPS reference materials

1. National Park Service (NPS) documents (see list below)
2. Articles referenced in NPS documents (see list below)
2. Other articles used as background information by NPS (see list below)
3. Website for information provided by the California Department of Fish and Game
http://www.dfg.ca.gov/marine/
Additional websites are referenced in the NPS documents

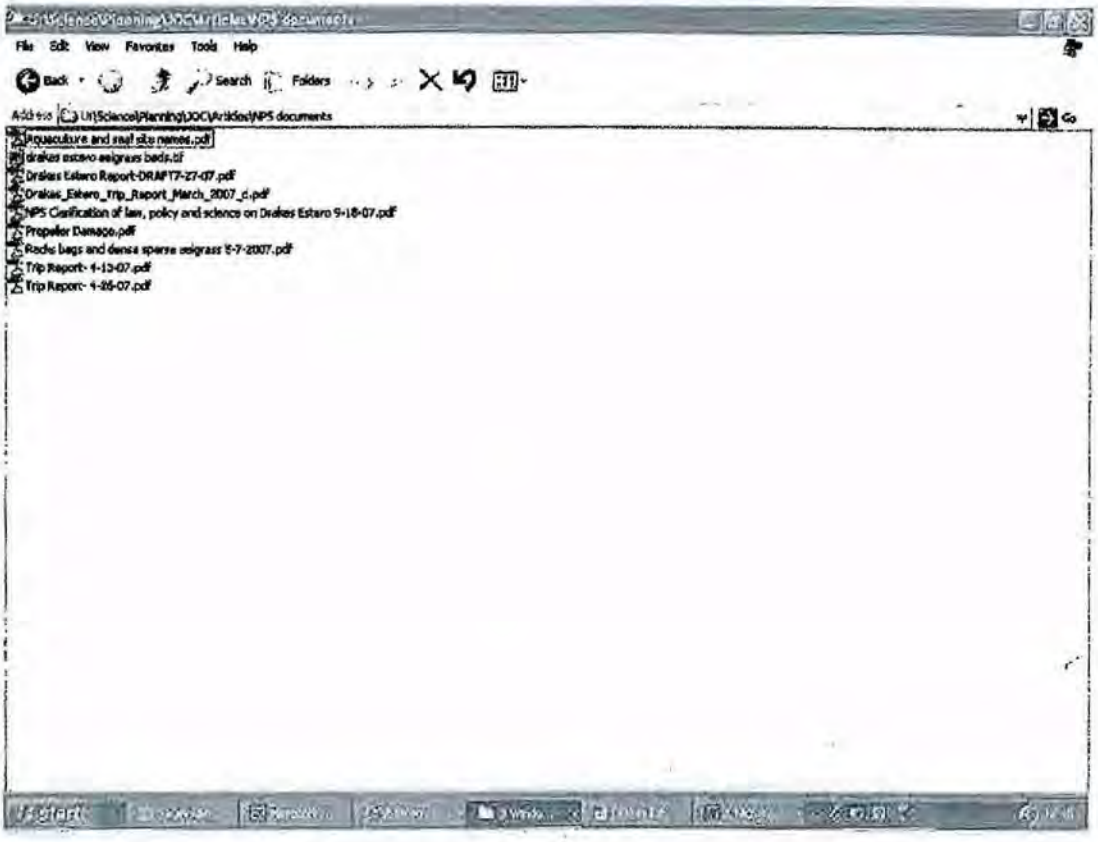
4. Other reference materials not sent to you include books which we could mail to you if you wish copies:
    Galloway 1977
    Miller and Lea 1972

5. There are also a few documents that we are getting in digital form and will send to you shortly.

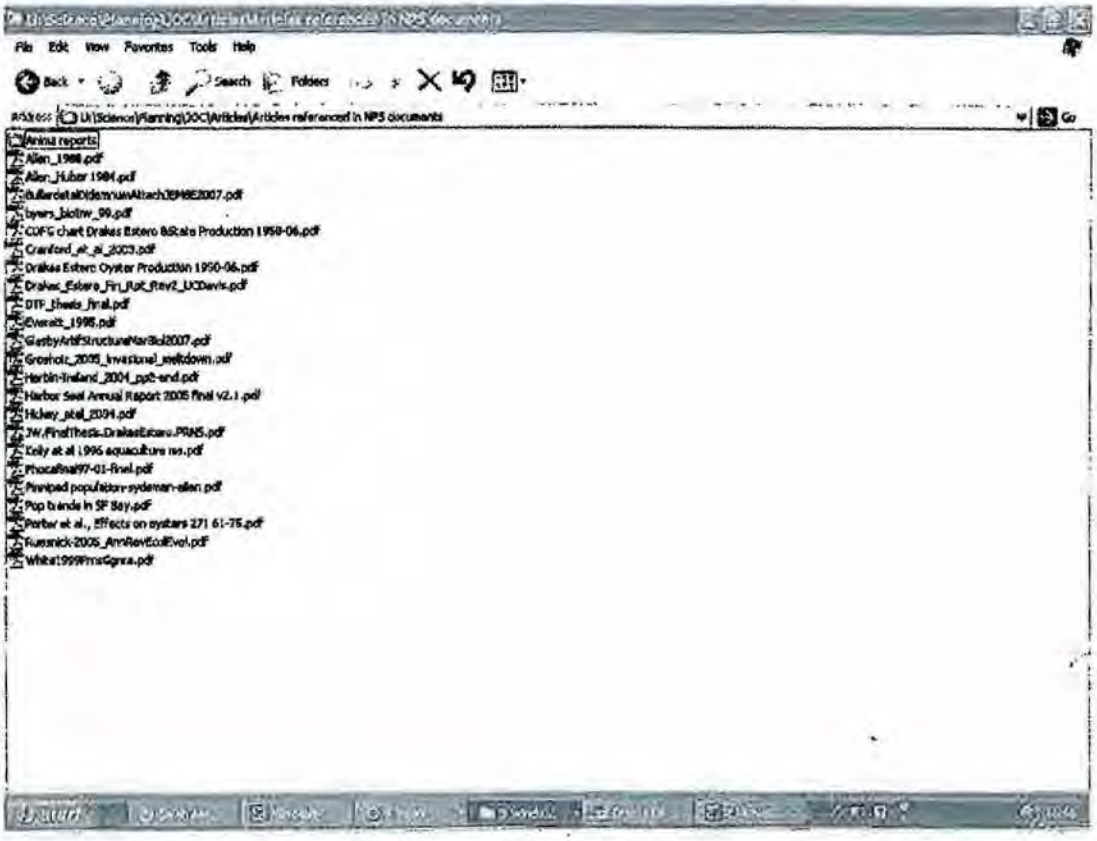
My contact information is:

Point Reyes National Seashore
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

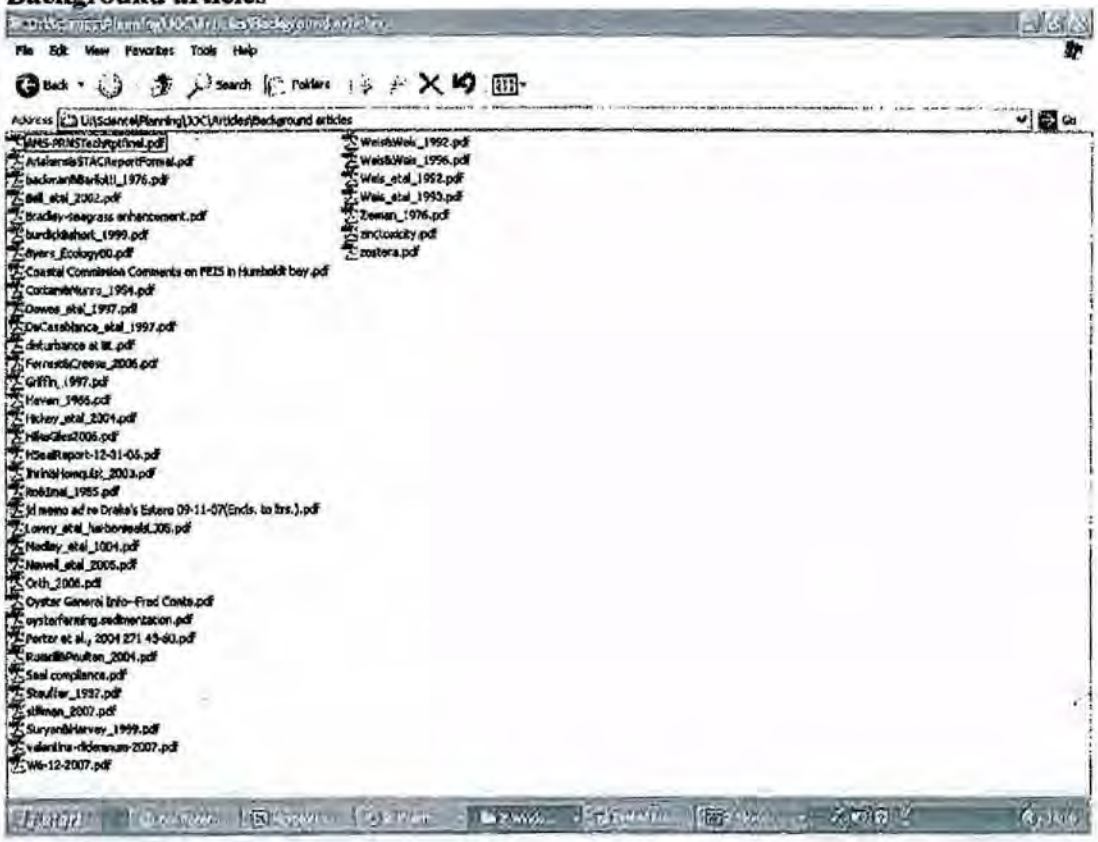
NPS documents



Articles referenced in NPS documents



Background articles



Attachment 9

Email

Dated

11/20/2007

1 page

With attachment

22 pages

NPS report

Referred back to National Park Service for their review and direct response to the requestor

Roberts, Susan

From: David_Graber@nps.gov
Sent: Tuesday, November 20, 2007 3:47 PM
To: Roberts, Susan
Subject: NPS documents

Attachments: Drake's Estero - Sheltered Wilderness 070511.pdf; NPS Clarification of law, policy and science on Drakes Estero 9-18-07.pdf

Drake's Estero - Sheltered Wil...

NPS Clarification of law, poli...

Hello Susan --

You asked me last week about the sentence in our proposal: "Did the NPS draw the correct conclusions from the body of scientific studies, and did they present them correctly to the public?

NPS has intended to use available studies in preparation of an Environmental Assessment for the "Reservation of Occupancy and Use" that permits Drakes Bay Oyster Co. (DBOC) to operate in Drake's Estero. The prior operator had been grandfathered, but when Mr. Lunny purchased the company in 2004, NPS recognized its obligation under NEPA to conduct an EA. Pursuant to this effort, NPS also published on its web site a document entitled "Drake's Estero, A Sheltered Wilderness Estuary," that reported some initial findings regarding the effects of the oyster operation. After objections from Mr. Lunny and Dr. Goodman that some claims made in that document were not supported by the cited research, the report was modified.
Upon further challenge, NPS produced a document entitled "NPS Clarification of law, policy, and science on Drakes Estero." Both of these documents are attached.

To be candid, the various statements made by DBOC and by Dr. Goodman, and the various responses made by NPS, make it nearly impossible for me to provide you with a comprehensive picture of the issue and its assorted filaments. Should NRC agree to undertake the proposed study, all of those communications can be made available to NRC, of course. I believe I explained previously that an investigation by the DOI Inspector General's office is presently underway and is expected to be concluded soon. I believe the IG's report, presuming it is not confidential, likewise can be made available.

Sincerely,
Dave Graber

(See attached file: Drake's Estero - Sheltered Wilderness 070511.pdf)(See attached file: NPS Clarification of law, policy and science on Drakes Estero 9-18-07.pdf)

David M. Graber, Ph.D.
Chief Scientist, Pacific West Region, National Park Service Sequoia & Kings Canyon National Parks 47050 Generals Highway Three Rivers, CA 93271-9651
559.565.3173 voice 559.679.5999 cell 559.565.4283 fax david_graber@nps.gov

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Point Reyes National Seashore

Drakes Estero

Photo © Robert Campbell

A Sheltered Wilderness Estuary

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. This is the only federal marine coastal wilderness from Washington State to the Mexican Border. Only 11 marine wilderness areas exist in the US.

Drakes Estero

A Sheltered Wilderness Estuary

Background

Drakes Estero is within Point Reyes National Seashore, established in 1962. The estuary is the only coastal bay with special congressional designation as wilderness in the western United States, south of Alaska. The estuary was recently designated a Western Hemisphere Shorebird Reserve Network (WHSRN), a site of Regional Importance in the U.S. Shorebird Conservation Plan because it is important to a great diversity and abundance of shorebirds. A portion of the estero is currently managed as Wilderness and the remainder is potential wilderness that will be fully managed as Wilderness when a mariculture lease expires in 2012. Drakes Estero is adjacent to Estero de Limantour, a State Ecological Marine Reserve, established in 1974 by the California Department of Fish and Game. Coastal scrub and grassland habitat surrounds the estuary; and the only current human activities on, or adjacent, to the estuary include recreation, cattle/dairy grazing and oyster farming.

At the time of purchase in 1972, the National Seashore provided a 40 year Reservation of Use and Occupancy Agreement to Johnson's Oyster Company (JOC). The agreement allows for use of a park site for oyster processing, but requires compliance with local, state, and federal laws and regulations. The agreement expires in 2012. In 2005, the JOC sold the leasehold interest to the Drakes Bay Oyster Company (DBO). At the time of the sale, the NPS notified DBO that the lease would expire in 2012.

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. The legislative history (House Report 94-1680) indicates Congressional intent: "it is the intention that those lands and waters designated as potential wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these land and waters to wilderness status." This is the only federal marine coastal wilderness along the Pacific coast from Washington to the Mexican Border. Only 11 marine wilderness areas exist in the US.

> *The need for wilderness and the refuge it offers to Americans will only increase with the passage of time. Our generation of Americans has an obligation to preserve for future generations more areas that qualify for wilderness designation."*
>
> *--Theodore Roosevelt IV*

The General Management Plan (GMP, 1980) designates the estuary as wilderness, where no mechanized equipment or development may occur.

The estuary area of approximately 1,000 acres is used by DBO for oyster cultivation under a lease by the California Department of Fish and Game (CDFG). The ocean floor was ceded by the State of California to the National Park Service, except for the "right to fish." The estuary floor is thus owned by Point Reyes National Seashore.

The 2001 NPS Management Policies direct staff to actively seek to remove from potential wilderness the temporary, non-conforming conditions that preclude wilderness designation (6.3.1 Wilderness Resource Management). Moving from Congressionally authorized potential to full wilderness status is an administrative action only requiring publishing a notice in the Federal Register.

Point Reyes legislation also stipulates that "No freehold, leasehold, or lesser interest in any lands hereafter acquired within the boundaries of Point Reyes National Seashore shall be conveyed for residential or commercial purposes except for public accommodations, facilities, and services provided pursuant to the Act of October 9, 1953."

"Wilderness is a resource which can shrink but not grow. Invasions can be arrested or modified in a manner to keep an area usable either for recreation, or for science or for wildlife, but the creation of new wilderness in the full sense of the word is impossible."

–Aldo Leopold, Sand County Almanac

The activities of Johnson's Oyster Company (JOC) produced many adjudicated environmental problems. As a condition of a stipulated agreement (Marin County Superior Court No. 165361, March 1997), JOC was ordered to complete several actions, including obtaining building permits and upgrading facilities and septic systems to meet state and county code requirements. DBO is in the process of upgrading the facilities but is still under a Cease and Desist Order from the California Coastal Commission.

Oyster bags that cover the shoreline at Bull Point.

Under this order, DBO is required to obtain a permit from the California Coastal Commission for the facilities, but has not yet acquired a Coastal Development Permit for its activities.

DBO wishes to extend the lease past 2012; NPS has instructed DBO that the issuance of a new lease cannot be extended beyond 2012 because of the GMP, NPS Management Policies, and the enacted Wilderness legislation.

Point Reyes enabling legislation indicates that natural environment will be the park's first priority.

"the property acquired by the Secretary under such sections shall be administered by the Secretary without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area . . . . (16 USC Sec. 459c; Enabling Legislation for Point Reyes National Seashore)

Ecology of the Estuary

An ecosystem consists of interactions of plants, animals, and microorganisms with their physical (e.g., soil conditions and processes) and climatic conditions. The primary natural processes that drive the ecological function of any estuary, including Drakes Estero, are the terrestrial hydrology (the timing and amounts of freshwater inputs), sedimentation from land and sea, terrestrial nutrient loading, and coastal shoreline change from tides, storms and sea level rise. The presence and abundance of plants and animals are based on their ability to adapt to these processes and eek out a living in microhabitats within the larger estuary.

Drakes Estero complex is a large, convoluted coastal estuary with one narrow, unobstructed opening to Drakes Bay. Shaped like a hand, the estuary consists of five fingers that feed into a 1,300 acre central bay; the estuary reaches a total area of 2,270 acres at the highest tides. Geologically, the estuary is recognized as a system of drowned river valleys invaded by the sea. Sea level rise following the Late Pleistocene glacial period formed the contemporary estuary 6,000 years ago. The depth is mostly shallow, less than 6 feet deep, with a deeper channel (about 25 ft) that traverses the main bay. Intertidal sand and mud flats exposed at low tide make up approximately 1,200 acres of the estuary (Anima 1990). The estuary is surrounded by low bluffs composed of the Drakes Bay Formations which includes fine-grained siltstone embedded with mudstone (Galloway 1977). The bay is protected from ocean wave action by the sand spits of Drakes and Limantour Beaches (Mudie and Byrne 1980).

The sediments of the outer estuary near the mouth consist mostly of sand, which is the long shore transport of sand in Drakes Bay and the overtopping by tides and storms of the sandspits near the mouth. Rocky bottom is limited to the deep channels at the seaward part of the estuary near the mouth; no boulders were found in cores taken within the estero (Anima 1990 and Harbin-Ireland 2004). Pebble and cobble stones

are limited to a few places along the shoreline in parts of Estero de Limantour, along bluffs in the main part of the bay and along the east shoreline in Home Bay.

Wilderness areas only comprise about 2.5 percent of all the land in the lower forty-eight states.

Tidal exchanges occur through a narrow inlet that is 21 feet deep. Tidal exchanges are cycled completely with a tidal bore that travels the length of the estero to Bull Point; however, exchanges are less complete in the fingers of the estero. The deepest point is 25 feet at the first bend along the major channel from the entrance. The tidal range is twelve feet from -6.0 to 6.6 feet with currents ranging between 32 cm/sec to 46 cm/sec (Anima 1990). Because the estuary is mostly shallow, the water column is well mixed from wind and tides, resulting in a mostly homogenous saline level. Salinity ranges measured in 1987-88 varied little between the upper and lower reaches of the estuary (33.67-34.356 ppt; Anima 1990).

Drakes Estero from the air looking towards Point Reyes headlands showing extensive eel grass beds. Photo © Robert Campbell

In Drakes Estero, natural sediment and nutrient loading is relatively moderate and attributed to shifting sand bars and decomposed granite from streams. Freshwater

feeds into the estero from six perennial streams and four ephemeral streams/springs that drain the small watersheds surrounding the 7,847 acre estuary. The water quality throughout the estuary, as measured by the presence of coliform, is well within the safe established limits measured by the California Department of Public Health (NPS report 2006). Home Bay had a spike of elevated coliform counts when a septic system failed. This septic system, though, is being replaced by the Seashore in 2006. Ranching in the watershed is limited to grazing around 1000 cattle managed by five separate ranches. None of Point Reyes' dairy ranches are within the Drakes Estero watershed.

Within Drakes Estero, there are several distinct, natural habitats. Along the shoreline, the dominant habitats are sandstone flats (as occur at Bull Point), mudflats along the inner finger bays and sand flats near the mouth. Pickleweed (*Salicornia virginica*), arrow-grass (*Triglochin maritima*) and saltgrass (*Distichlis spicata*) are the dominant shoreline native vegetation; however, the size and number of marshes are limited. Within the estuarine waters, dominant habitats include mudflats and sand flats exposed at low tides, eelgrass beds, and soft-bottom substrate. Cobble and hard substrate is limited towards the mouth of the estuary. Each habitat supports distinct communities. The dominant plants and animals of the estuary that are major drivers of the estuarine ecosystem include eel grass beds, invertebrates in the soft-bottom sediment, estuarine fish such as herring, migratory waterbirds and shorebirds, and harbor seals.

Eelgrass beds are highly significant to the ecological function of the estuary because they provide cover, feed and a nursery for fish and invertebrates. The eelgrass beds of Drakes Estero include around 642 acres, or 36% of the estuary. Several marine species spend their larval and juvenile stages in eelgrass beds such as lingcod, English sole, speckled sanddab, several species of nearshore rockfish, and Dungeness crab (see Larson and Mello – www.dfg.ca.gov/local). Large, eelgrass beds are found in only a few estuaries in California and many species are entirely dependent on them for a part of their life cycle. For example, within Drakes Estero many species such as Pacific herring, bay pipefish, gammarid and caprellid amphipods, the sea slug (*Phyllaplysia taylori*), and several shrimp species are directly dependent on eelgrass beds.

The native invertebrates of Drakes Estero are primarily species adapted to soft-bottom sediment and eelgrass beds, and rarely include the common species found in rocky intertidal habitats around Point Reyes, such as limpets, chitons, mussels, and native oysters. In Drakes Estero, the dominant species that filter feed phytoplankton from the water column are bivalves such as *Nutricola* sp., Washington clams (*Saxidomus nuttalli*), gaper clams (*Tresus capax*), and rock-boring piddock clams at Bull Point and the mouth of the Estero. In addition, predominantly deposit-feeding *Macoma* clams, which filter-feed, are found in densities up to 250 per square meter in the outer, sandy tidal flats of Drakes Estero. Additional dominant benthic invertebrates include tanaid crustaceans (*Leptochelia dubia*), cumaceans (*Cumella vulgaris*), phoronids (*Phoronopsis viridis*), shore crabs (*Hemigrapsus oregonensis*), gammarid amphipods, polychaete worms, and ostsracods (Harbin-Ireland 2004, Press 2005). Native limpets, oysters, mussels and chitons have never been abundant in the esteros due to the lack of rocky substrate, except towards the mouth of the estero. Currently, there is a modest number of invasive invertebrate species in Drakes Estero relative to a highly urbanized estuary such as San Francisco Bay, such as green crabs (*Carcinus maenas*).

Approximately 60 fish species have been documented in the area (Miller 1972, Wechsler 2004, D. Jacobs, unpubl. data). A recent study identified 35 species from 20 families. Five species were dominant and represented 89% of the fish assemblage, including topsmelt, three-spined stickleback, staghorn sculpin, bay pipefish, and kelp surfperch (Elliott-Fisk et al. 2005, Wechsler 2004). Steelhead trout, a federally protected species, were documented in a tributary to Schooner Bay in the late 1990s.

The bird life in Drakes Estero and Estero de Limantour is highly diverse and abundant, and the esteros are recognized as significant sites for bird conservation. The Fish and Wildlife Service recognized Drakes Estero as a Western Hemisphere Shorebird Reserve and as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan. The maximum population of all shorebirds combined was estimated at between 10,000 and 100,000, and the estero regularly holds thousands of shorebirds in winter (Hickey et al. 2003; http://www.waterbirdconservation.org/). A similar designation is pending for waterbirds.

Brown pelican and marbled godwits. Photos © Rich Stallcup.

PRBO identified over 100 species of waterbirds and shorebirds during winter surveys in the 1980s and 1997-99 (White 1999), and 86 species of birds at Drake's Cove during 2004, with counts of Buffleheads, Ruddy Ducks, Western Sandpipers, Least Sandpipers, and Dunlin numbering over 1000 individuals. PRBO and NPS biologists identified several federal threatened, endangered, or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, Western Snowy Plover and Marbled Murrelet. During the late summer and fall, shorebirds and waterbirds arrive and stay in the estero throughout the winter months to feed and rest.

The bird life in Drakes Estero is highly diverse and abundant, and as a consequence, the estero is recognized as a significant site for conservation.

The estero is one of only a few locations where thousands of Black Brant over-winter where they rest and feed on eelgrass (Shuford et al. 1989). "Brant is a holarctic species (it has populations in boreal regions all around the world) that nests on tundra near saltwater environments" (http://www.prbo.org/obs_cms). They are on the Audubon species Watch List because of their sensitivity to habitat loss. From the summer through December, hundreds to thousands of Brown Pelicans, a federally protected species, congregate at the esteros, feeding on large schooling fish such as anchovies, herring and smelt, and resting on tidal mudflats. Other species that occur in large numbers are Caspian Terns, Gadwall, Ruddy Duck, American Widgeon, Bufflehead, and Green-winged Teal, Western and Least Sandpiper, Dunlin and Black-bellied Plover. In the past 15 years, an egret colony formed near the mouth of the estero where Snowy Egrets, Great Egrets, and Great Blue Herons nest. In the past, Snowy Plovers nested at the mouth of the estero, but have not since the late 1990s due to predation, changes in habitat and disturbance.

A flock of marbled godwits and willets. The waters and shoreline of the estuary provide a home to over a 100 species of birds. Photo © Rich Stallcup.

Harbor seals are the only year-round, resident marine mammal in the estero. Other marine mammals that occur intermittently include California sea lions and northern elephant seals. The narrow mouth of the estero is restrictive to larger marine mammals; although, several dead whales have washed into and deposited at the mouth of the estero including an adult male sperm whale. The harbor seal population within the estero is one of the largest concentrations in California, annually producing between 300 and 500 pups, and reaching a maximum of nearly 2,000 seals during the breeding and molt seasons (Allen et al. 2004). Drakes Estero is largest seal colony in Marin County and one of only five major seal colonies at Point Reyes. All together, the Marin County colonies represents around 20% of the state mainland population of harbor seals, and are the highest concentration of seals in California (Allen et al. 2004). Seals that breed in the estero range nearly 500 km north as far as the Smith River in the winter months but return to Drakes Estero to breed (Allen 1988). The colony at Drakes Estero has grown significantly over the past 10 years, in part because

the park implemented a seasonal closure to kayaks during the pupping season and because JOC was operating at a reduced level in the mid-1990s (Vanderhoof and Allen 2005). The pup count in 1986 was 255 compared with 464 in 2004, an 82% increase.

Harbor seals resting on mudflats. Photo by Jamie Hall.

Overlooking the harbor seal haul out sites in Drakes Estero.

Drakes Estero is one of only 5 major seal colonies in Point Reyes and together represent around 20% of the state mainland population of harbor seals, the highest concentration in the state (Allen et al. 2004).

Human Activities and Changes to Ecological Function

Ocean health globally is in dire condition according to a recent publication in the Journal Science (Worm et al. 2006), and if the long-term trend continues, all fish species are projected to collapse within the next 50 years. Already, the researchers found that 90 percent of all the fish and seafood species in the world's oceans have been depleted within the past century. Seven percent of the fish in several studies already have become extinct. Significantly, less than 1 percent of the global ocean is effectively protected right now. Despite inclusion in this 1%, most ocean parks are experiencing degradation, deterioration and extirpation of species.

Ocean parks have been degraded by habitat alterations that have had a cascading effect on ecosystem function. Coastal waters have been degraded by water diversion, chemical and biological pollution, oil spills, and noise. Invasive non-native species have been introduced through bilge water, mariculture and recreational activities that further degrade ecosystems and water quality.

Specifically in Drakes Estero, ecological function has been degraded and altered over the past several decades due to activities associated with oyster farming and ranching. Other than the oyster operation, there is no development along the shores of the estuary.

Sedimentation rates and types of material have changed because of a combination of factors over the past 150 years. The primary water arteries into the estuary were dammed by ranchers to create stock ponds for cattle. These impoundments reduce the flushing action of winter rains and the size of marshes at the stream mouths flowing into the esteros. The commercial oyster operation has also changed the type and rate of sedimentation where oyster equipment is located. The oyster operation included 1) stakes with plastic tubing that were embedded into intertidal mudflats, 2) bags that were placed on top of the intertidal mudflats, and 3) racks that were located on mudflats and open water channels. Oyster bags and racks have been documented in Drakes Estero and elsewhere to trap fine particulate sediment resulting in an alteration of hydrologic function and the type of substrate, and have integrated feces into the sediment below and around the structures (Anima 1990, Cranford et al. 2003, Porter et al. 2004). The reduced freshwater flushing from the watershed enables fine-grained sediments to build up within the estero around the oyster racks. USGS (Anima 1990) collected sediment cores from the estero and identified pseudo feces of oysters as the primary source for sediment fill, as has been seen in studies elsewhere. An estimate of 0.6 to 1.0 metric tons of fecal matter can be produced per year by a 60 meter square oyster raft. This sediment material is resistant to erosion because oyster racks are located in upper reaches of the estero where tidal action is lowest and the arrangement of the oyster racks acts as a "baffle to tidal currents where rack density is highest ...silt material accumulates on the leeward side of stacked oyster beds (Anima 1990)."

Affiliated debris found with oyster operations.

Metal and plastic bags from oyster operations.

The ecology of the estero is altered by changes in hydrology and sedimentation, which in turn change habitats and their associated species. Eelgrass beds, for example, in Estero de Limantour where there is no oyster farming, had higher densities of standing stock, as measured by the number of turions and blades, compared to Drakes Estero (AMS 2002). Eel grass is very sensitive to light, nutrients, pollution and sedimentation, and is thus an excellent indicator of estuarine health. Oyster farming reduces the amount of light available to eelgrass beds because of shading by racks, increases the amount of sedimentation due to deposition of oyster pseudo-feces and trapping sediment, and contributes pollution from treated construction materials and from general operations (trash). Researchers from Oregon State University found through experimental tests that both stake and rack culture (as practiced in Drakes

Estero) reduced submerged aquatic vegetation by 25% after one year. This was attributed to increased sedimentation and disturbance during placement and harvest of stakes, and increased shading and erosion under racks (Everett et al. 1995). They conclude that there is the potential for significant loss of submerged aquatic vegetation due to oyster culture. UC Davis researchers working in co-operation with the NPS have qualitatively noted that eelgrass growth is severely restricted under active oyster racks in Drake's Estero (Elliott-Fisk et al. 2005).

In 2003, Wechsler noted that 38 oyster racks were in operation, which would affect 5,700 square meters (nearly 1.5 acres) of affected eelgrass cover. A resurvey of the racks by NPS scientists in 2007 found that the number of active racks had increased by 66%, to a total of 63 active racks. There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There are 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero. However, recent aerial images indicate the impact is much larger approaching 50 acres. Hundreds of channels cut into the eelgrass by boat propellers affect a much larger area. Frequent disturbance by boat traffic may significantly alter eelgrass coverage.

Extensive outboard motor cuts in the eelgrass. Image taken 5/6/2007. (photo by Robert Campbell).

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

Didemnum infestation at Buil Point, May 2007.

Extensive outboard motor cuts in the eelgrass. Image taken 5/6/2007 (photo by Robert Campbell).

Dense assemblages of oysters may reduce recruitment of other species with a planktonic larval stage and reduce plankton in the water column by filter-feeding. This feeding limits the amount of food available to native bivalves and ostracods. Clam abundance is reduced under oyster racks, possibly due to changes in bottom sediment grain-size, particulate organics that contribute to higher sulfide levels, or increased predation by fish and decapod crustaceans attracted to the oyster racks. In other parts of Drakes Estero, clams can be found in extremely high densities - up to 250 per square meter.

A recent California Department of Fish and Game Report (March 2007) indicated that the estuary now holds approximately 9,000,000 individual non-native oysters and 1,000,000 non-native Manila clams. Oysters generally filter ~ 50g/day, thus 450,000,000 gallons of water may be filtered by the non-native oysters in the bay, depriving native species of these plankton resources. This is about 10 times the volume of a large oil tanker filtered every day. "The result of culturing bivalves in systems such as Drakes Estero is that there is a shift in the carbon from the pelagic food web to the benthic food web ..... we would also expect a shift in organic matter and nutrients to the bed. The pelagic to benthic shift can result in quite dramatic losses in the pelagic communities (zooplankton and fish) as have been seen with some exotic bivalve introductions (Zebra Mussel, Asian clam)" (Dr. Janet Thompson, a USGS benthic scientist, letter dated May 7, 2007).

Oyster racks create habitat in the estero by acting as a hard surface substrate in an ecosystem composed of predominantly soft-bottom substrate. This direct change in habitat substrate significantly alters the native species composition and abundance, and provides habitat for non-native species.

Wechsler (2004) detected few Pacific herring; even though this species was historically found in high numbers and spawns in eelgrass beds (Blunt 1984). D. Jacobs surveyed for tidewater goby, another federally listed species, throughout the seashore in the mid-1990s and did not find them in Drakes Estero, speculating that they may have been extirpated by the presence of predatory, non-native fish (D. Jacobs, pers. com.).

Disturbance and displacment of wildlife by oyster farming activities have been documented at Drakes Estero and elsewhere. Kelly et al. (1996) documented how oyster racks influenced shorebird use of tidal flats in Tomales Bay by enhancing feeding opportunities and food for some species, such as gulls and willets, while decreasing them for others, such as the dunlin. Additionally, the bags create an anoxic dead zone underneath by smothering native infauna and trapping sediment; consequently, there is less food available in the mud for birds to feed on. Currently, there are thousands of oyster bags on mudflats in Drakes Estero throughout the estero, and the number of shorebird species and their distributuion may be affected.

Dilapidated oyster racks within Drakes Estero.

Harbor seals have been directly affected by oyster operations in the 1970s-1990s because of disturbance to seals resting onshore; and seals have been affected by placement of racks on tidal sandbars where they rest and pup (Allen, pers. com.). Seal haul out sites in the upper estero are more important to pupping seals than those near the mouth, so mothers with pups were disproportionately disturbed when disturbance was caused by the oyster operation (Allen 1988; pers. obs.). During the early 1980s, seals at Drakes Estero were disturbed on 29% of the days surveyed; primary sources for disturbance were fishermen (38%) and boats (28%) (Allen and Huber 1984). Kayaks were restricted during the breeding season (March-June) in 1995 and the oyster activity declined significantly in the 1990s. Consequently, the number of disturbances declined within the estero from both the oyster operation and kayaks (Allen et al. 2004). During the breeding season, researchers observed seals disturbed by motor boats associated with the oyster operation six times in 1997 and once between 1998 and 2001. Disturbances to resting and breeding seals increased dramatically in 2007. Since March, park biologists documented oyster boats disturbing mothers with pups, and they noted that oyster bags were located on sandbars where seals would normally give birth and nurse their pups. One area where

250 seals nursed more than 100 pups two years ago, have around 50 total seals including around 25 pups in 2007, an 80% decline.

Non-native species can have profound effects on ecosystems by changing ecosystem structure, function, species abundance, and community composition. The introduction of non-native, invasive species by oyster operations has been documented for decades in Marin County (Bonnot 1935, Carlton 1992, Cohen and Carlton 1998) and is a major concern (California Department of Fish and Game 2001). Carlton (1992) summarized the introduction of 28 non-native species of mollusk into estuaries in the Pacific by oyster operations. Hard structures used to cultivate oysters provide habitat that would not otherwise exist, supporting non-native invertebrates and fish. Examples of non-native species introduced into Drakes Estero include gem clam, green crab, slipper snail, Japanese oyster drill, Atlantic oyster drill and *Batillaria.attramentaria* The non-native *Batillaria*, a gastropod, was introduced with Japanese oysters to California and was documented to displace the native confamillial species in northern California (Byers 1999). This invasive gastropod was found in Drakes Estero (Byers, pers. com.; Press, pers. com.). Elliott-Fisk et al. (2005) noted that "the marine invertebrate fouling community of sessile organisms could be properly characterized as "introduced" and "invasive" due to lack of hard, shallow water substrate in Drakes Estero. This community is present and associated with the oyster farming operation in Schooner Bay, but nearly non-existent in Estero de Limantour."

One, invasive, non-native species found on oyster farming structures in Drakes Estero was the colonial tunicate (*Didemnum spp.*), a highly aggressive, invasive species that could alter Drakes Estero ecology. "In the Northwest Atlantic, a closely related species has covered 50-90% of the George's Bank. Such coverage can smother organisms living on the bottom and in the sediment, and block the settlement of larvae (http://www.sfei.org/). A small infestation of the species was also found on natural sandstone habitat at Bull Point in May of 2007. Removal of oyster racks in Drakes Estero would eliminate habitat for this invasive species.

Harbor seals resting on sand bar. Photo by Jamie Hall.

Synopsis of Drakes Estero

Natural Resource Significance

- Only congressionally designated coastal bay wilderness area in the western United States, south of Alaska.
- Adjacent Estero de Limantour is a recognized as a Marine Reserve by the state of California.
- One of only a few sites with significant eelgrass beds which are specially protected by California and critical for many species, including spawning fish, over wintering Black Brandt, and invertebrates.
- A Western Hemisphere Shorebird Reserve Network, identified as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan.
- PRBO identified over 100 species of birds during winter surveys in 1999 and 2000, including several listed species or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, and Marbled Murrelet.
- The estuary is very important to over-wintering Black Brant that only migrate to a few places along the Pacific Flyway.
- The estero is important to resident and spawning fish where they are associated with eelgrass beds and benthic sediment. The federally listed steelhead trout spawns in the Schooner Bay tributary.
- Harbor seal population is one of the largest in the state of California and the largest in Marin County, with as many as 2,000 breeding/molting individuals and 300-500 pups, annually.

Oyster farming impacts on the ecological communities of Drakes Estero

- A USGS researcher stated that a source for sediment fill in the estero was from oyster feces and from structures trapping sediment.
- Eelgrass beds are found in all suitable habitats within Drakes Estero, except between active oyster racks, where they do not exist due to shading and possibly other effects. In 2003, with 38 active oyster racks, this amounted to at least 1.5 acres of lost eelgrass cover
- Oyster racks and bags provide structural habitat that does not naturally occur in the estero except in limited areas. The equipment and structures change the community composition and abundance of species and provide habitat for invasive, non-native species.
    - Invasive organisms were found on the hard substrates provided by the oyster racks in Schooner Bay. These organisms were limited in Estero de Limantour where no oyster facilities exist.
    - The invasive non-native species, *Didemnum spp.*, is commonly present on oyster racks and is a highly aggressive, invasive species that could alter Drakes Estero ecology.
    - Schooner Bay, where there are many oyster racks, supported a different fish community than Estero de Limantour where no mariculture occurs.
- Clam abundance is reduced under oyster racks, possibly due to changes in bottom sediment composition or increased predation by fish and decapod crustaceans attracted to the oyster racks. In parts of Drakes Estero, clams are found in extremely high densities away from oyster racks - up to 250 per meter squared.
- The oyster operation is a potential source for many invasive species because non-native species hitchhike on oysters and equipment that are brought to the estero.
- Placement of oyster bags and racks in intertidal mudflats and sand bars displace wildlife such as shorebirds and harbor seals because of spatial coverage of racks and disturbance by oyster operations. In 2007, oyster bags and disturbance have reduced one sub colony by 80%

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Douglas iris near the mouth of Drakes Estero. © Susan Van Der Wal.

"...without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area."

P.L. 94-544 and 94-567 establishing the Point Reyes Wilderness

***Aerial view of the** mouth of Drakes Estero. © Alexandra Kruse.*

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so that all may experience our heritage.

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National Park Service
Point Reyes National Seashore
Point Reyes Station, CA 94956
www.nps.gov/pore

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Attachment 10

Email

Dated

12/13/2007

4 pages

With attachments

22 pages

NPS report

Referred back to National Park Service for their review and direct response to the requestor

Roberts, Susan

From: Sarah_Allen@nps.gov
Sent: Thursday, December 13, 2007 8:07 PM
To: Roberts, Susan
Cc: David_Graber@nps.gov; Don_Neubacher@nps.gov; Ben_Becker@nps.gov
Subject: Fw: Roberts contact info

Importance: High

Attachments: List of documents 12-07.doc

List of
ments 12-07.doc

Dear Dr. Roberts:

Dave Graber, PWR Chief Scientist, has asked me to provide you with information. I have put together the reference materials on both a ftp site and a CD which I will mail by the end of the week. If you do not receive it by early next week, please notify me and I will resend it.

Access to the National Park Service ftp site is as follows:

ftp://63.220.43.40/

user name: npsftpwin
passworkd: [redacted]

Once you access this site, navigate to the PORE folder and to then the folder with you name - Susan Roberts-NAS

/PORE/Susan Roberts-NAS

Within this folder are several subfolders containing the reference material. There is also a word document with a list of all references which I attach here. Forgive the small print, but I copied the list as a screen in the interests of saving time. I will have a couple more articles to follow by next week.

If you have any questions, I can be reached at the work phone number below but also by cellphone [redacted]. I am not in the office this friday but will be back next monday, December 17th.

Sincerely,

Sarah

(See attached file: List of documents 12-07.doc)

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----- Forwarded by Sarah Allen/PORE/NPS on 12/12/2007 15:15 -----

David Graber

12/11/2007 14:53
EST

To: Sarah Allen/PORE/NPS
cc:
Subject: Roberts contact info

Dr. Susan Roberts
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MEMORANDUM

December 13, 2007

To: Dr. Susan Roberts

From: Dr. Sarah Allen

Reference: List of NPS reference materials

1. National Park Service (NPS) documents (see list below)
2. Articles referenced in NPS documents (see list below)
2. Other articles used as background information by NPS (see list below)
3. Website for information provided by the California Department of Fish and Game
http://www.dfg.ca.gov/marine/
Additional websites are referenced in the NPS documents

4. Other reference materials not sent to you include books which we could mail to you if you wish copies:
   Galloway 1977
   Miller and Lea 1972

5. There are also a few documents that we are getting in digital form and will send to you shortly.

My contact information is:

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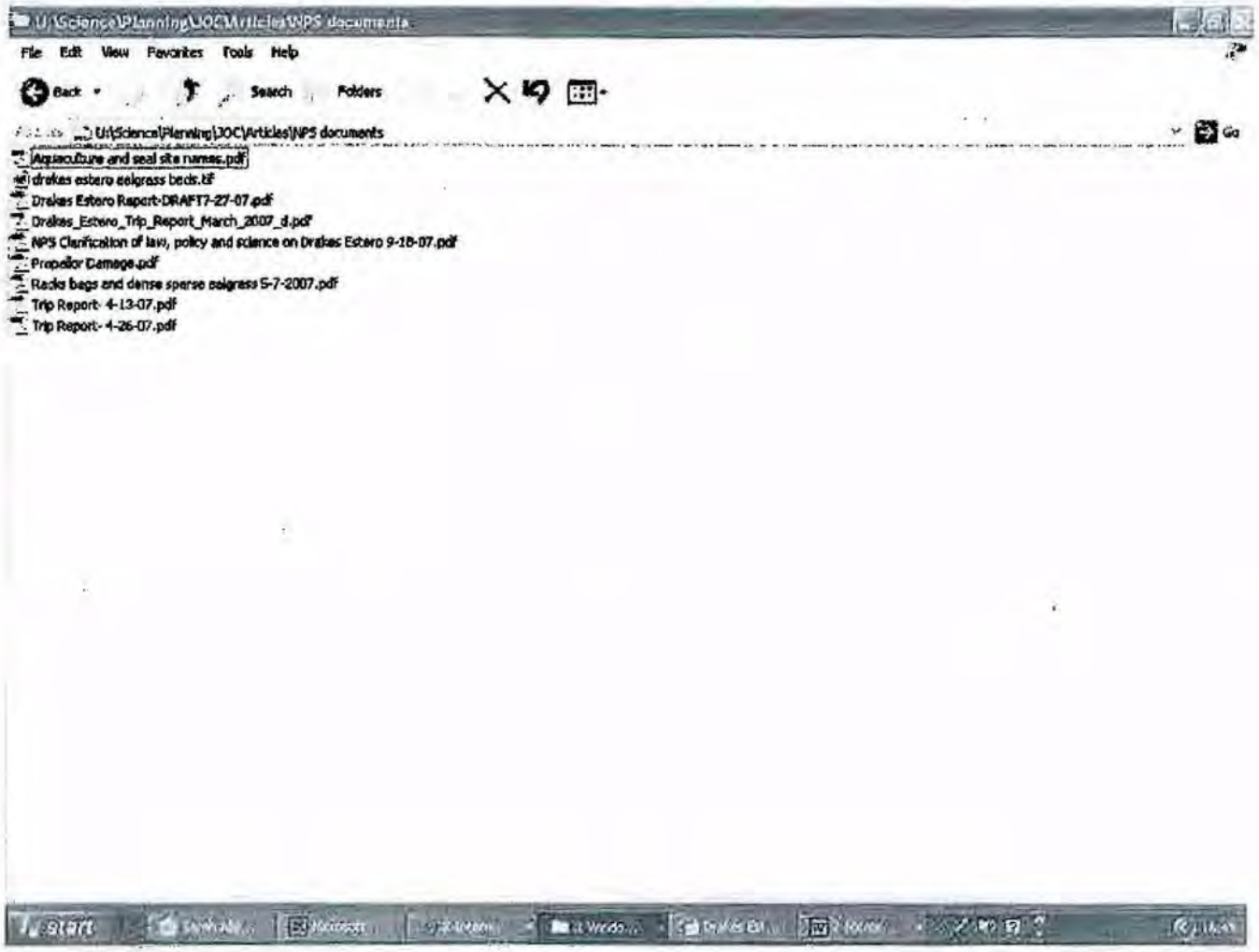
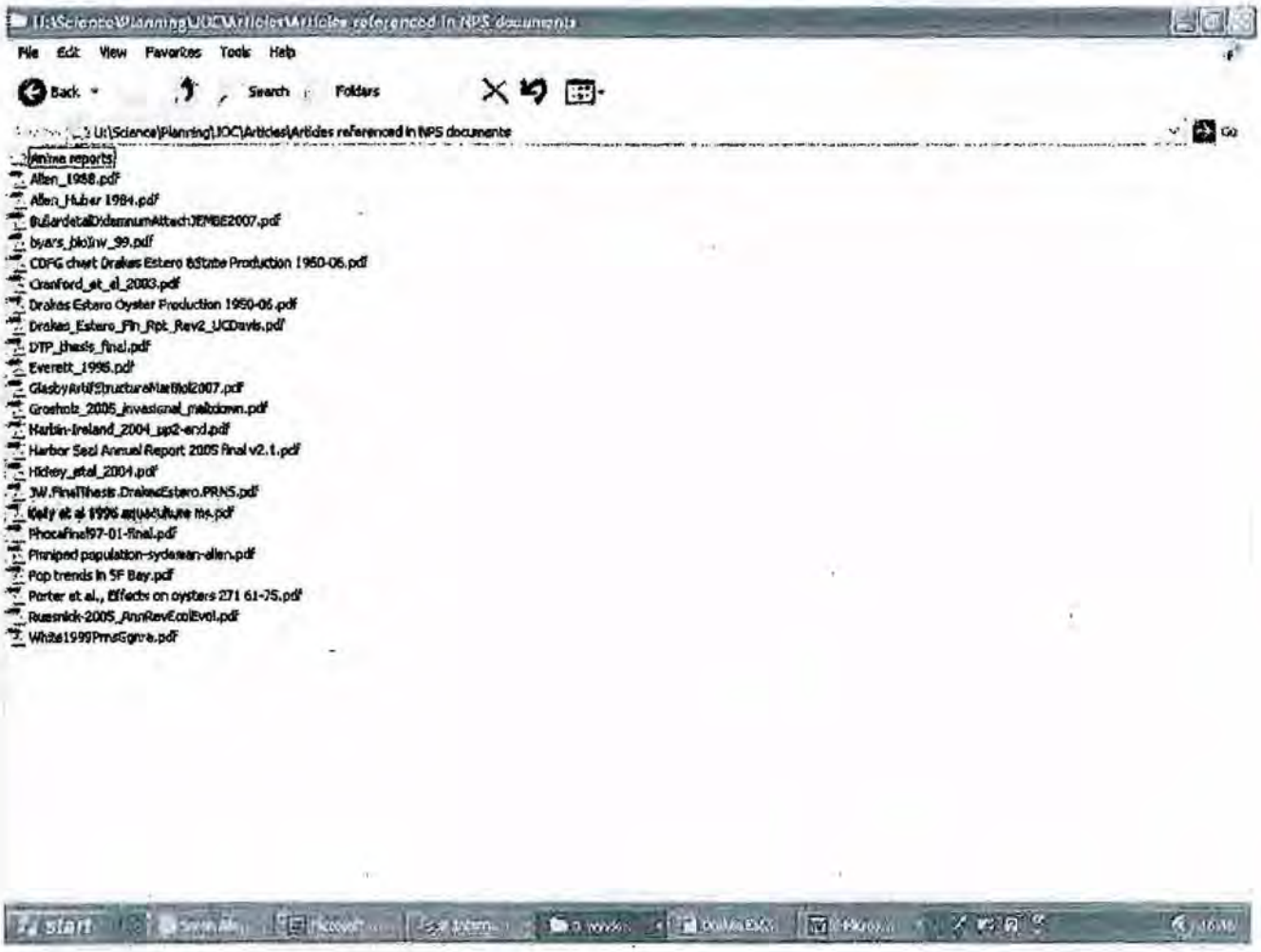
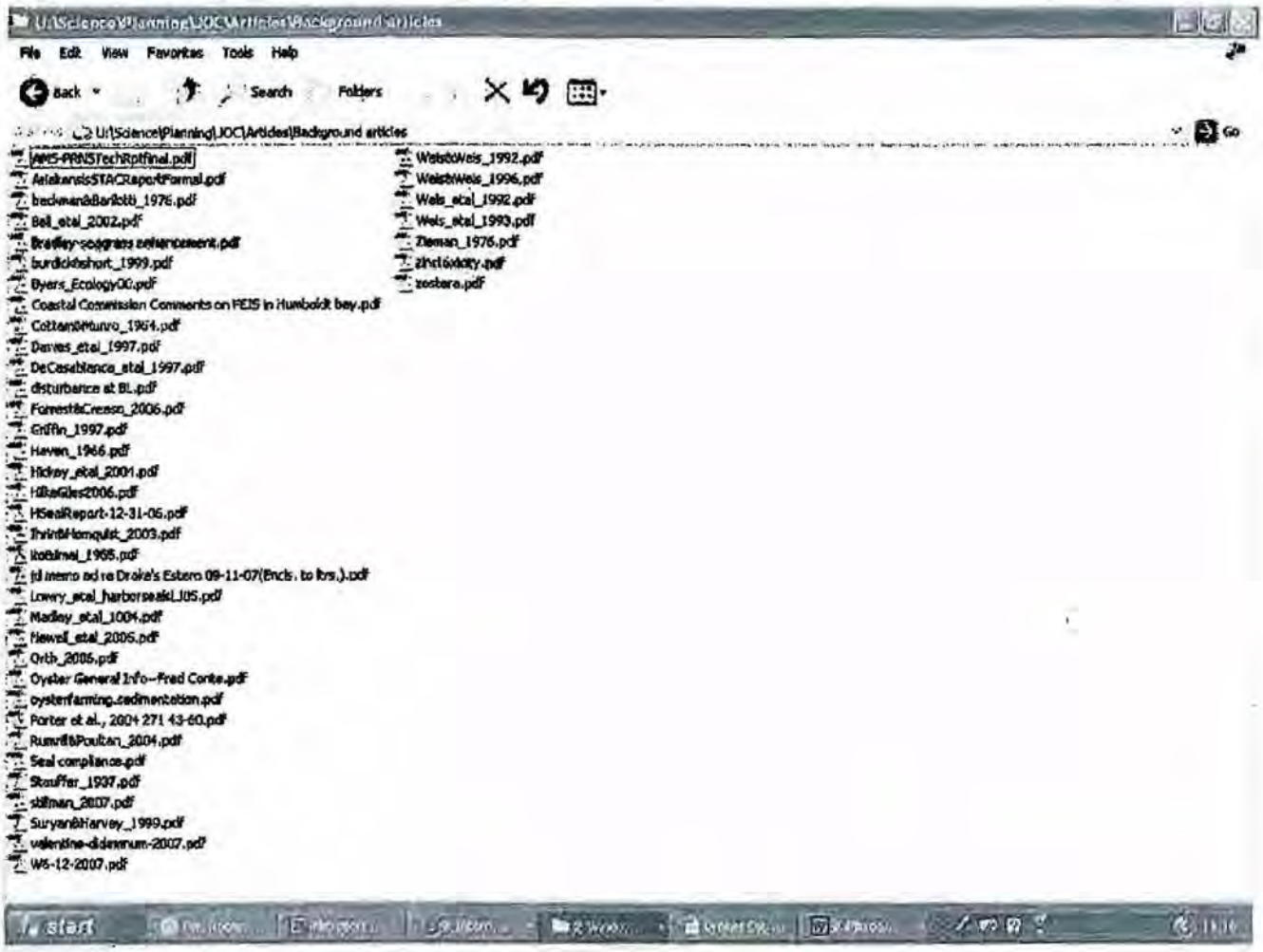
NPS documents



Articles referenced in NPS documents



Background articles



DRAFT – NOT FOR DISTRIBUTION OR PUBLIC REVIEW

Point Reyes National Seashore

Drakes Estero

Photo © Robert Campbell

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. This is the only federal marine coastal wilderness from Washington State to the Mexican Border. Only 11 marine wilderness areas exist in the US.

July 27, 2007; Version 3

Drakes Estero

A Sheltered Wilderness Estuary

Background

Drakes Estero is a two thousand acre estuary within Point Reyes National Seashore, established in 1962. The estuary is the only coastal estuary with special congressional designation as wilderness in the western United States, south of Alaska. The estuary was recently designated a Western Hemisphere Shorebird Reserve Network (WHSRN), a site of Regional Importance in the U.S. Shorebird Conservation Plan because it is important to a great diversity and abundance of shorebirds. A portion of the estero is currently managed as Wilderness and the remainder is potential wilderness, all of which Congress mandated to be fully managed in accordance with the provisions of the (Public Law 94-544). Drakes Estero is adjacent to Estero de Limantour, a State Ecological Marine Reserve, established in 1974 by the California Department of Fish and Game. Coastal scrub and grassland habitat surrounds the estuary, and the only current human activities on, or adjacent, to the estuary include recreation, cattle/dairy grazing and oyster farming.

At the time of purchase in 1972, the National Seashore provided a 40 year Reservation of Use and Occupancy Agreement to Johnson's Oyster Company (JOC). The agreement allows for use of a park site for oyster processing, but requires compliance with local, state, and federal laws and regulations. The agreement expires in 2012. In 2005, the JOC sold the reservation of use interest to the Drakes Bay Oyster Company (DBOC). At the time of the sale, the NPS notified DBOC that the reservation of use would expire in 2012.

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. The legislative history (House Report 94-1680) indicates Congressional intent: "it is the intention that those lands and waters designated as potential wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these land and waters to wilderness status." This is the only federal marine coastal wilderness along the Pacific coast from Washington to the Mexican Border. Only 11 marine wilderness areas exist in the US. The General Management Plan (GMP, 1980) designates the estuary as wilderness, where no mechanized equipment or development may occur.

The need for wilderness and the refuge it offers to Americans will only increase with the passage of time. Our generation of Americans has an obligation to preserve for future generations more areas that qualify for wilderness designation."

–Theodore Roosevelt IV

Approximately 1,000 acres of the estuary is used by DBOC for oyster cultivation under a lease by the California Department of Fish and Game (CDFG). The ocean floor was ceded by the State of California to the National Park Service, except for the "right to fish", which does not include mariculture. The estuary floor is thus owned by Point Reyes National Seashore which is the primary management authority within the estuary. This primary authority was reaffirmed in a May 2007 letter from CDFG to NPS.

The 2001 NPS Management Policies direct staff to actively seek to remove from potential wilderness the temporary, non-conforming conditions that preclude wilderness designation (6.3.1 Wilderness Resource Management). Moving from Congressionally authorized potential to full wilderness status is an administrative action that only requires publishing a notice in the Federal Register.

Point Reyes legislation also stipulates that "No freehold, leasehold, or lesser interest in any lands hereafter acquired within the boundaries of Point Reyes National Seashore shall be conveyed for residential or commercial purposes except for public accommodations, facilities, and services provided pursuant to the Act of October 9, 1953."

The activities of Johnson's Oyster Company (JOC) produced many adjudicated environmental problems. As a condition of a stipulated agreement (Marin County Superior Court No. 165361, March 1997), JOC was ordered to complete several actions, including obtaining building permits and upgrading facilities and septic systems to meet state and county code requirements. DBOC is in the process of upgrading the facilities but is still under a Cease and Desist Order from the California Coastal Commission. Under this order, DBOC is required to obtain a permit from the California Coastal Commission for the facilities, and is currently undergoing this process.

Oyster bags that cover the shoreline at Bull Point

"Wilderness is a resource which can shrink but not grow. Invasions can be arrested or modified in a manner to keep an area usable either for recreation, or for science or for wildlife, but the creation of new wilderness in the full sense of the word is impossible."

--Aldo Leopold, Sand County Almanac

Point Reyes enabling legislation indicates that natural environment will be the park's first priority.

"the property acquired by the Secretary under such sections shall be administered by the Secretary without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area . . . . (16 USC Sec. 459c; Enabling Legislation for Point Reyes National Seashore)

Ecology of the Estuary

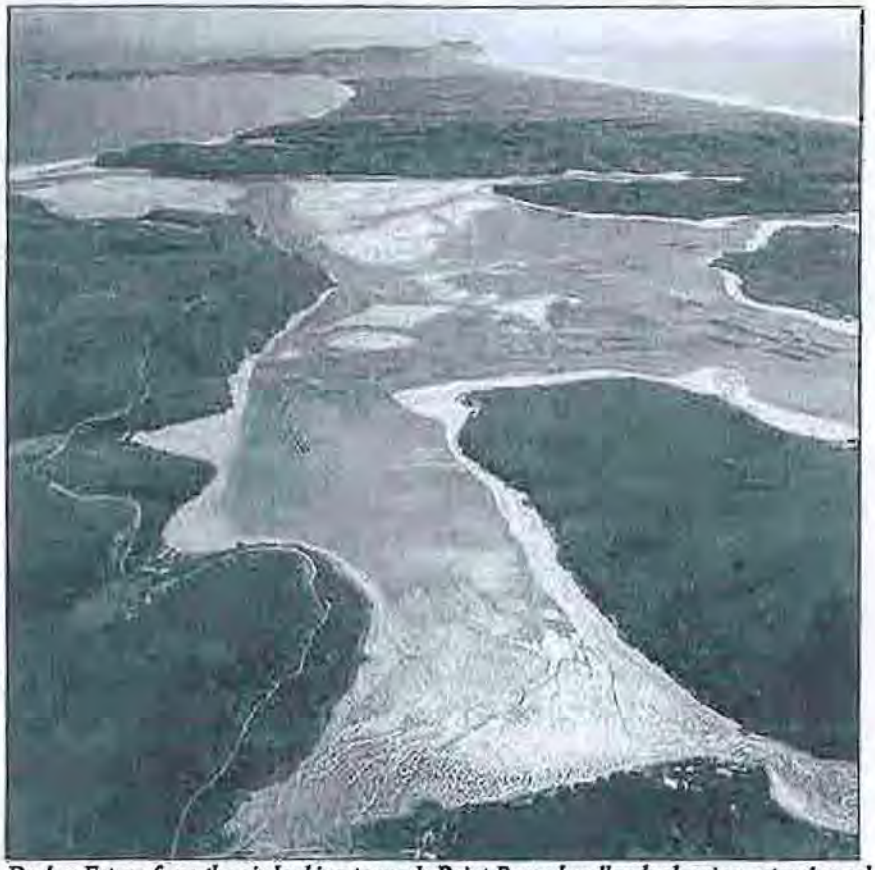
An ecosystem consists of interactions of plants, animals, and microorganisms with their physical (e.g., soil conditions and processes) and climatic conditions. The primary natural processes that drive the ecological function of any estuary, including Drakes Estero, are the terrestrial hydrology (the timing and amounts of freshwater inputs), sedimentation from land and sea, terrestrial nutrient loading, and coastal shoreline change from tides, storms and sea level rise. The presence and abundance of plants and animals are based on their ability to adapt to these processes and persist in microhabitats within the larger estuary.

Drakes Estero complex (including Estero de Limantour) is a large, convoluted coastal estuary with one narrow, unobstructed opening to the open ocean on Drakes Bay. Shaped like a hand, the estuary consists of five fingers that feed into a 1,300 acre central bay; the estuary reaches a total area of 2,270 acres at the highest tides. Geologically, the estuary is recognized as a system of drowned river valleys invaded by the sea. Sea level rise following the Late Pleistocene glacial period formed the contemporary estuary by 6,000 years ago. The depth is mostly shallow, less than 6 feet deep, with a deeper channel (about 25 ft) that traverses the main bay. Intertidal sand and mud flats exposed at low tide make up approximately 1,200 acres of the estuary (Anima 1991). The estuary is surrounded by low bluffs composed of the Drakes Bay Formation which includes fine-grained siltstone embedded with mudstone (Galloway 1977). The bay is protected from ocean wave action by the sand spits of Drakes and Limantour Beaches (Mudie and Byrne 1980).

Tidal exchanges occur through a narrow inlet that is 21 feet deep. Tidal exchanges are cycled completely with a tidal bore that travels the length of the estero to Bull Point; however, exchanges are less complete in the fingers of the estero. The deepest point is 25 feet at the first bend along the major channel from the entrance. The tidal range is around nine feet from -2 to +7 feet with current speeds ranging from 32 cm/sec to 46 cm/sec. Because the estuary is mostly shallow, the water column is well mixed from wind and tides, resulting in a mostly homogenous saline level. Salinity ranges measured in 1987-88 varied little between the upper and lower reaches of the estuary (33.7-34.36 ppt; Anima 1990).

Wilderness areas only comprise about 2.5 percent of all the land in the lower forty-eight states. Drakes Estero is the only bay wilderness on the Pacific coast south of Alaska

The sediments of the outer estuary near the mouth consist mostly of sand from the long shore transport of sand from Drakes Bay, and the overtopping by tides and storms of the sandspits near the mouth. Rocky bottom is limited to the deep channels at the seaward part of the estuary near the mouth; no boulders were found in cores taken within the estero (Anima 1991 and Harbin-Ireland 2004). Pebble and cobble stones are limited to a few places along the shoreline in parts of Estero de Limantour, along bluffs in the main part of the bay and along the east shoreline in Home Bay.



Drakes Estero from the air looking towards Point Reyes headlands showing extensive eel grass beds. Photo © Robert Campbell

Within Drakes Estero, natural sediment and nutrient loading is relatively moderate and attributed to shifting sand bars and decomposed granite from streams. Tides and storm waves are an important source for sediment transport at the mouth of the estero, and streams are an important source in the upper reaches of the estero. Freshwater feeds into the estero from six perennial streams and four ephemeral streams/springs that drain the small watersheds surrounding the 7,847 acre estuary. The water quality throughout the estuary, as measured by the presence of coliform, is well within the safe established limits measured by the California Department of Public Health (NPS report 2006). Home Bay had a spike of elevated coliform counts one year, when a septic system failed, but this septic system was replaced by the Seashore in 2006. Ranching in the watershed is limited to grazing by approximately 1,000 beef cattle

managed by five separate ranches. None of Point Reyes' dairy ranches are within the Drakes Estero watershed.

Within Drakes Estero, there are several distinct, natural habitats. Along the shoreline, the dominant habitats are mudstone and sandstone flats (as occur at Bull Point), mudflats along the inner finger bays and sand flats near the mouth. The size and number of marshes are limited within the estero, but of that limited vegetation, Pickleweed (*Salicornia virginica*), arrow-grass (*Triglochin maritima*) and saltgrass (*Distichlis spicata*) are the dominant native species. Within the estuarine waters, dominant habitats include mudflats and sand flats exposed at low tides, eelgrass beds, and soft-bottom substrate. Cobble and hard substrate is limited towards the mouth of the estuary, and a sandstone shelf at Bull Point. Each habitat supports distinct communities. The dominant plants and animals of the estuary that are major drivers of the estuarine ecosystem include eel grass beds, invertebrates in the soft-bottom sediment, estuarine fish, migratory waterbirds and shorebirds, and harbor seals.

Eelgrass beds are highly significant to the ecological function of the estuary because they provide cover, food and a nursery habitat for fish and invertebrates. The eelgrass beds of Drakes Estero include around 740 acres, 355 acres of dense and 385 acres of patchy eelgrass, representing around 36% of the estuary (NPS GIS data, 2007). There has been an expansion of the eelgrass within the estero since a survey was conducted in 1991, coinciding with but not necessarily related to a reduction in the amount of oysters harvested within the estero between 1997 and 2003 (Tom Moore, CDFG biologist, oyster production data). Several marine species spend their larval and juvenile stages in eelgrass beds such as lingcod, English sole, speckled sanddab, several species of nearshore rockfish, and Dungeness crab. Large, eelgrass beds are found in only a few estuaries in California and many species are entirely dependent on them for a part of their life cycle. For example, many species such as Pacific herring, bay pipefish, gammarid and caprellid amphipods, the sea hare (*Phyllaplysia taylori*), and several shrimp species that occur in Drakes Estero are directly dependent on eelgrass beds. The Coastal Commission provides special protection to eelgrass beds in California and eelgrass beds are described by NOAA as a component of Essential Fish Habitat for steelhead trout and Coho salmon, both protected species under the Endangered Species Act (Magnuson Stevens Fisheries Management Act; http://swr.ucsd.edu/efh.htm).

The native invertebrates of Drakes Estero are primarily species adapted to soft-bottom sediment and eelgrass beds, and rarely include the common species found in rocky intertidal habitats around Point Reyes, such as limpets, chitons, and mussels. In Drakes Estero, the dominant species that filter feed phytoplankton from the water column are bivalves such as *Nutricola* sp., Washington clams (*Saxidomus nuttalli*), gaper clams (*Tresus capax*), and rock-boring piddock clams at Bull Point and the mouth of the Estero. In addition, predominantly deposit-feeding *Macoma* clams are found in densities up to 250 per square meter in the outer, sandy tidal flats of Drakes Estero. Additional dominant benthic invertebrates include tanaid crustaceans (*Leptochelia dubia*), cumaceans (*Cumella vulgaris*), phoronids (*Phoronopsis viridis*), shore crabs (*Hemigrapsus oregonensis*), gammarid amphipods, polychaete worms, and ostracods (Harbin-Ireland 2004, Press 2005). Native limpets, oysters, mussels and chitons have never been abundant in the esteros due to the lack of rocky substrate, except towards the mouth of the estero.

Approximately 60 fish species have been documented in the area (Miller 1972, Wechsler 2004, D. Jacobs, unpubl. data). A recent study identified 35 species from 20 families. Five species were dominant and represented 89% of the fish assemblage, including topsmelt, three-spined stickleback, staghorn sculpin, bay pipefish, and kelp surfperch (Wechsler 2004). Steelhead trout, a federally protected species, were documented in a tributary to Schooner Bay in the late 1990s.

The bird life in Drakes Estero and Estero de Limantour is highly diverse and abundant, and the esteros are recognized as significant sites for bird conservation. The Fish and Wildlife Service recognized Drakes Estero as a Western Hemisphere Shorebird Reserve and as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan. The maximum population of all shorebirds combined was estimated at between 10,000 and 100,000, and the estero regularly holds thousands of shorebirds in winter (Hickey et al. 2003; http://www.waterbirdconservation.org/). A similar designation is pending for waterbirds.

Brown pelican and marbled godwits. Photos © Rich Stallcup.

PRBO Conservation Science identified around 100 species of waterbirds and shorebirds during winter surveys in the 1980s and 1997-99 (White 1999). PRBO Conservation Science and NPS biologists identified several federally threatened, endangered, or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, and Western Snowy Plover. During the late summer and fall, shorebirds and waterbirds arrive and stay in the estero throughout the winter months to feed and rest.

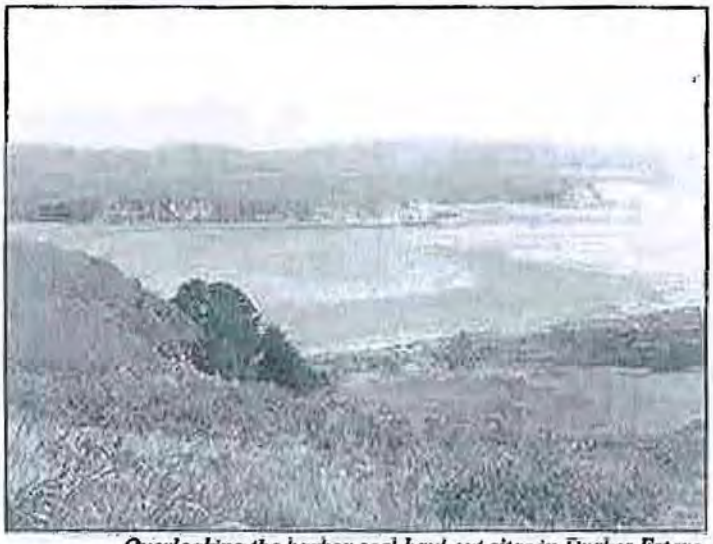
The bird life in Drakes Estero is highly diverse and abundant, and as a consequence, the estero is recognized as a significant site for conservation.

From the summer through December, hundreds to thousands of Brown Pelicans, a federally protected species, congregate at the esteros, feeding on schooling fish such as anchovies, herring and smelt, and resting on tidal mudflats. Other species that occur in large numbers are Caspian Terns, Gadwall, Ruddy Duck, American Widgeon, Bufflehead, and Green-winged Teal, Western and Least Sandpiper, Dunlin and Black-bellied Plover. In the past 15 years, an egret colony formed near the mouth of the estero where Snowy Egrets, Great Egrets, and Great Blue Herons nest. In the past, Snowy Plovers nested at the mouth of the estero, but have not since the late 1990s due to predation, changes in habitat and disturbance.

A flock of marbled godwits and willets. The waters and shoreline of the estuary provide a home to over a 100 species of birds. Photo © Rich Stallcup.

Harbor seals are the only year-round, resident marine mammal in the estero. Other marine mammals that occur intermittently include California sea lions and northern elephant seals. The narrow mouth of the estero is restrictive to larger marine mammals; although, several dead whales have washed into and deposited at the mouth of the estero including an adult male sperm whale in 2004. The harbor seal population within the estero is one of the largest concentrations in California, annually producing between 300 and 500 pups, and reaching a maximum of nearly 2,000 seals during the breeding and molt seasons (Allen et al. 2004). Drakes Estero is the largest seal colony in Marin County and one of only five major seal colonies at Point Reyes. All together, the Marin County colonies represent around 20% of the state mainland population of harbor seals (Allen et al. 2004). Some of the seals that breed in the estero range nearly 500 km north as far as the Smith River in the winter months but return to Drakes Estero to breed (Allen 1988). The colony at Drakes Estero has grown significantly over the past 20 years, in part likely because the park implemented a seasonal closure to all boats during the pupping season and because the oyster company reduced operations in the outer and middle areas of the estero (Vanderhoof and Allen 2005).

Harbor seals resting on sandbars. Photo by Jamie Hall.



Overlooking the harbor seal haul out sites in Drakes Estero.

Drakes Estero is one of only 5 major seal colonies in Point Reyes and together the colonies represent around 20% of the state mainland population of harbor seals, the highest concentration in the state (Allen et al. 2004).

Human Activities and Changes to Ecological Function

Ocean health globally is in dire condition according to a recent publication in the Journal Science (Worm et al. 2006), and if the long-term trend continues, the majority of harvested fish species are projected to collapse within the next 50 years. Already, the researchers found that 90 percent of all the fish and seafood species in the world's oceans have been depleted over the past 60 years as harvesting has steadily increased. Seven percent of the fish in several studies already have become extinct. Significantly, less than 1% of the global ocean is effectively protected from harvesting. Despite inclusion in this 1%, most ocean parks are experiencing degradation, deterioration and extirpation of species. The loss of historic coastal wetlands has been more than 91% in California (Dahl 1990).

Ocean parks have been degraded by habitat alterations that have had a cascading effect on ecosystem function. Coastal waters have been degraded by water diversion, development, chemical and biological pollution, oil spills, and noise. Invasive non-native species have been introduced through bilge water, mariculture and some recreational activities that further degrade ecosystems and water quality.

Specifically in Drakes Estero, the ecology has been altered over the past several decades due to activities associated with human activities including ranching and oyster farming. Other than the oyster operation, there is no development along the shores of the estuary.

Oyster bags on sandbar in the middle of Drakes Estero.

Sedimentation rates and the types of sediment have changed in Drakes Estero because of a combination of factors over the past 150 years. The streams that drain the watershed surrounding the estero were dammed by ranchers to create stock ponds for cattle, which reduced sediment input into the estero during winter rains. Oysters that are grown in Drakes Estero by the commercial oyster operation likely play an

important role in the deposition of fine-grained sediment, and in the trapping of sediment. The oyster operation presently has placed at least one thousand bags of oysters on top of intertidal mudflats and sandflats throughout the estuary, and there are 93 racks located on mudflats and open water channels. In other estuaries, mariculture bags and racks have been documented to trap fine particulate sediment resulting in an alteration of the hydrology and substrate type due to the placement of the cultivated species and related racks. Research in other estuaries has found that the deposition of oyster feces tends to be focused below and around mariculture structures (Cranford et al. 2003; Porter et al. 2004, Everett et al. 1995). Within Drakes Estero, USGS (Anima 1990) noted that oyster racks may act as a "baffle to tidal currents where rack density is highest ...silt material accumulates on the leeward side of stacked oyster beds." Anima (1991) reported that the oyster operation likely played "an important role" in the sedimentation of Drakes Estero with oyster pseudofeces contributing to the amount of fine-grained sediment. Anima (1991) also noted that the sediment material is likely resistant to erosion because oyster racks are located in the upper reaches of the estero where tidal action is lowest. A graduate study in 2001, did not detect effects of oyster cultivation on sediment organic matter, but did indicate that some sediment erosion may be taking place due to the presence of the rack structures (Harbin-Ireland 2004). To determine the past and current effects of oyster operations on sedimentation rates within Drakes Estero requires a more focused and site specific study.

Metal and plastic bags from oyster operations.

Eelgrass is very sensitive to light, nutrients, pollution and sedimentation, and is thus an excellent indicator of estuarine health. Oyster farming reduces the amount of light available to eelgrass beds because of shading by racks, locally increases the amount of sedimentation due to deposition of oyster pseudo-feces and trapping sediment, and contributes pollution from treated construction materials and from general operations. One study in Florida indicated that native mussels may increase seagrass productivity (Peterson and Heck 1999), however, a study by Oregon State University of non-native oysters in Coos Bay, Oregon, a similar estuary to Drakes Estero, found through experimental tests that both stake and rack oyster culture (rack culture is practiced in Drakes Estero) reduced submerged aquatic vegetation by 25% after one year (Everett et al. 1995). Their findings were attributed to increased sedimentation and disturbance during placement and harvest of stakes, and increased shading and erosion

under racks. Everett et al. (1995) concluded that there was the potential for significant loss of submerged aquatic vegetation due to oyster culture. Although this study occurred in Oregon, the study focused on the same species and similar methods used in Drakes Estero. Two studies conducted in Drakes Estero by UC Davis researchers working in co-operation with the NPS, qualitatively noted that eelgrass growth was severely restricted under active oyster racks (Harbin-Ireland 2004, Wechsler 2004).

In 2003, Wechsler noted that 38 oyster racks were in operation, which would affect 5,700 square meters (1.5 acres) of affected eelgrass cover. A resurvey of the racks by NPS scientists in 2007 found that the number of active racks had increased by 66%, to a total of 63 active racks. There are a total of 93 oyster racks in varying states of integrity in Drakes Estero (NPS Trip Report March 13, 2007). A total of 89 of the 93 racks were either surrounded by or in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Several of the dilapidated racks with no mariculture cultivation had some eelgrass regrowth. There were 8 acres of active oyster racks within eelgrass beds that had no eelgrass growth underneath.

In total, all oyster growing activity within the estero covers ~18 acres. However, recent aerial images indicate the impact is much larger, approaching 50 acres. Numerous channels cut into the eelgrass by boat propellers affect a much larger area, and frequent disturbance by boat traffic may significantly alter eelgrass coverage. The long-term effects, if any, from this impact need further study.

Extensive outboard motor cuts in the eelgrass. Image taken 5/6/2007. (photo by Robert Campbell).

Didemnum infestation at Bull Point, May 2007.

Extensive outboard motor cuts in the eelgrass. Image taken 5/6/2007 (photo by Robert Campbell).

Dense assemblages of oysters may reduce recruitment of other species with a planktonic larval stage and reduce plankton in the water column by filter-feeding. This feeding may limit the amount of food available to native bivalves and ostracods. A preliminary study found that clam abundance was reduced under oyster racks, possibly due to changes in bottom sediment grain-size, particulate organics that contribute to higher sulfide levels, or increased predation by fish and decapod crustaceans attracted to the oyster racks (Harbin-Ireland 2004). In one area of Drakes Estero where no oyster farming occurred, clams were found in extremely high densities - up to 250 per square meter; however, there was no evidence that the numbers were higher because of the absence of farmed oysters there (Press 2005).

More recently, Dr. Grosholz of University of California, Davis, provided expert opinion that addressed the potential effects of the oyster bags (Letters to NPS May 6, 2007 and July 15, 2007). He stated that "There is likely to be immediate impacts, mostly negative, on suspension feeders and surface deposit feeders immediately under the bags due to increased sedimentation, physical obstruction, decreased particle size and associated increased hypoxia. There may be positive effects for species requiring hard substrate for attachment." No studies to date have investigated the effects of the oyster bags on the underlying native marine invertebrate community, and more data are necessary to draw meaningful conclusions or to detect trends regarding potential effects of bags and racks on the invertebrate community.

Oyster racks create habitat in the estero by acting as a hard surface substrate in an ecosystem composed of predominantly soft-bottom substrate. This direct change in habitat substrate significantly alters the native species composition and abundance, and provides habitat for non-native species.

A recent California Department of Fish and Game Report (March 2007) indicated that the estuary now holds approximately 9,000,000 individual non-native oysters and 1,000,000 non-native Manila clams. This species of oyster generally filters ~ 50g/day, thus 450,000,000 gallons of water may be filtered by the non-native oysters in the bay, potentially depriving native species of these planktonic resources. While Drakes Estero likely receives much of its plankton with the daily ocean tides, the impact of the numerous non-native bivalves has not been adequately assessed.

Disturbance and displacment of wildlife by oyster farming activities have been documented at Drakes Estero and elsewhere. Kelly et al. (1996) documented how oyster racks influenced shorebird use of tidal flats in Tomales Bay by enhancing feeding opportunities and food for some species, such as gulls and willets, while decreasing them for others, such as dunlin. Additionally, the bags may create an anoxic zone by sedimentation and sequestering of oyster feces into the sediment under the bags, severely stressing the native invertebrate community beneath (Dr. Janet Thompson, USGS, pers. comm.); consequently, there would likely be less food available in the mud for birds to feed on. Currently, there are over a thousand oyster bags on mudflats in Drakes Estero, and the number of shorebird species and their distribution may be affected (Kelly et al. 1996).

Dilapidated oyster racks within Drakes Estero.

Harbor seals have been directly affected by oyster operations in the 1970s-1990s because of disturbance to seals resting onshore; and seals have been affected by placement of oyster bags on tidal sandbars where they rest and pup (Allen, pers. comm.). Seal haul out sites in the upper estero are more important to pupping seals than those at the mouth (Allen 1988), so mothers with pups tended to be disproportionately disturbed when disturbance was caused by the oyster operation. During the early 1980s, seals at Drakes Estero were disturbed on 29% of the days surveyed; primary sources for disturbance were fishermen (38%) and boats (28%) (Allen and Huber 1984). Kayaks were restricted during the breeding season (March-June) in 1995 and the oyster activity declined significantly in the 1990s. Consequently, the number of disturbances declined within the estero from both the oyster operation and kayaks (Allen et al. 2004). During the breeding season, researchers observed seals disturbed by motor boats several times in 1997 and once between 1998 and 2001.

Since March 2007, park biologists have documented oyster boats disturbing mothers with pups, and they noted that hundreds of oyster bags were located on or adjacent to sandbars where seals would normally give birth and nurse their pups. Two oyster bag arrays (approximately 5 acres) were within a regular harbor seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site (NPS Trip Reports April 13 and 26, 2007).

Non-native species can have profound effects on ecosystems by changing ecosystem structure, function, species abundance, and community composition. The introduction of non-native, invasive species by oyster operations has been documented for decades in Marin County (Bonnot 1935, Carlton 1992, Cohen and Carlton 1998) and is a major concern (California Department of Fish and Game 2001). Carlton (1992) summarized the introduction of > 25 non-native species of mollusk into estuaries in the Pacific by oyster operations. Hard structures used to cultivate oysters provide habitat that would not otherwise exist, supporting non-native invertebrates (Tyrrell and Byers 2007). Examples of non-native species introduced into Drakes Estero include gem clam, green crab, slipper snail, Japanese oyster drill, Atlantic oyster drill and *Batillaria attramentaria*. The non-native *Batillaria*, a gastropod, was introduced with Japanese oysters to California and was documented to displace the native confamillial species in northern California (Byers 1999). This invasive gastropod was found in Drakes Estero (Byers 1999). Researchers recently documented that an invasive trematode parasite hitchhiked on the Japanese *Batillaria*, and that this parasite had infected birds and fish in North America (Science Daily December 2006). No studies have been specifically conducted to confirm the presence of the parasite in Drakes Estero.

A recent preliminary study examined the sessile marine invertebrates that grow upon the oysters and oyster racks in Drakes Estero. Elliott-Fisk et al. (2005) noted that "the marine invertebrate fouling community of sessile organisms could be properly characterized as "introduced" and "invasive" due to lack of hard, shallow water substrate in Drakes Estero. This community is present and associated with the oyster farming operation in Schooner Bay, but nearly non-existent in Estero de Limantour."

One, invasive, non-native species found on oyster farming structures in Drakes Estero was the colonial tunicate (*Didemnum* species A.). A recent study described how the species has spread rapidly on both the east and west coasts of North America by larval

settlement and fragmentation (Bullard et al. 2007a). This invasive could affect Drakes Estero's natural ecology and may provide a source of larvae and fragments that would facilitate spread of the species to other areas. This species has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. The San Francisco Estuary Institute noted that "In the Northwest Atlantic, a closely related species has covered 50-90% of the George's Bank. Such coverage can smother organisms living on the bottom and in the sediment, and block the settlement of larvae" (http://www.sfei.org/). In Drakes Estero, surveys in 2007 showed that many of the apparently older and larger oysters on the racks had extensive *Didemnum* growing on them, and a small infestation of the species was found on natural mudstone habitat at Bull Point (NPS Trip Report March 20, 2007). Additionally, current culture methods that involve scraping off the tunicate from culture apparatus may result in the release of large numbers of fragments into the estuary (Dr. Edwin Grosholz, UC Davis, Letter to the California Fish and Game Commission, June 1, 2007). In a laboratory study, Bullard et al. (2007b) demonstrated that damaged and torn fragments of *Didemnum* could survive and reattach to other substrates. Removal of oyster racks in Drakes Estero would greatly reduce habitat for this invasive species.

In conclusion, most scientific articles and experts in the field of marine ecology indicate that oyster farming in Drakes Estero likely would negatively affect the estero ecology, and point to the need for further research. A recent review article by Ruesink et al. (2005) summarized mariculture effects from around the world and reported that "oysters are ecosystem engineers that influence many ecological processes, such as maintenance of biodiversity, population and food web dynamics and nutrient cycling." Some significant effects have been identified already in Drakes Estero and point to the need for further research.

Harbor seals resting on sand bar. Photo by Jamie Hall.

Synopsis of Drakes Estero

Natural Resource Significance

- Only congressionally designated coastal bay wilderness area in the western United States, south of Alaska.
- Adjacent Estero de Limantour is a recognized as a Marine Protected Area by the state of California.
- One of only a few sites with significant eelgrass beds which are specially protected by California and critical for many species, including spawning fish, over-wintering birds and invertebrates.
- A Western Hemisphere Shorebird Reserve Network, identified as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan.
- PRBO identified around 100 species of birds during winter surveys, including several listed species or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, and Black Brant.
- The estuary is very important to over-wintering Black Brant that only migrate to a few places along the Pacific Flyway.
- The estero is important to resident and spawning fish where they are associated with eelgrass beds and benthic sediment. The federally listed steelhead trout spawns in the Schooner Bay tributary. NOAA identified the area as Essential Fish Habitat for federally listed salmonids.
- Harbor seal population is one of the largest in the state of California and the largest in Marin County, with up to 2,000 breeding/molting individuals and 300-500 pups, annually.

Oyster farming impacts on the ecological communities

- Eelgrass beds are found in all suitable habitats within Drakes Estero, except beneath active oyster racks, where they do not exist due to shading and possibly other effects. In 2007, with 63 active oyster racks, this amounted to at least 8 acres of lost eelgrass cover. Approximately 50 additional acres were also affected, likely from boat propeller damage.
- Oysters that are grown in Drakes Estero likely play an important role in the deposition of fine-grained sediment, and in the trapping of sediment.
- Oyster racks and bags provide structural habitat that does not naturally occur in the estero except in limited areas. The equipment and structures may change the community composition and abundance of species and provide habitat for invasive, non-native species.
  - Invasive organisms were found on the hard substrates provided by the oysters and oyster racks in Schooner Bay.
  - The invasive non-native species, *Didemnum* sp. A, is commonly present on oyster racks and was discovered on natural habitat within the estero. Oyster processing methods have the potential to spread *Didemnum* by creating large numbers of fragments that can colonize new areas.
- The oyster operation is a potential source for invasive species because non-native species may hitchhike on oysters and equipment that are brought to the estero.
- Placement of oyster bags and racks in intertidal mudflats and sand bars displace wildlife such as shorebirds, black brant and harbor seals because of spatial coverage of racks and bags, and disturbance by oyster operations.

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Douglas iris near the mouth of Drakes Estero. © Susan Van Der Wal.

"...without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area."

P.L. 94-544 and 94-567 establishing the Point Reyes Wilderness

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Aerial view of the mouth of Drakes Estero. © *Alexandra Kruse*

The National Park Service cares for special places
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so that all may experience our heritage.

United States Department of the Interior
National Park Service
Point Reyes National Seashore
Point Reyes Station, CA 94956

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Official Records of Marin County, Calif.
N. J. Giacomini

POINT REYES NATIONAL SEASH
Tract 02-106

109-130-03

FEE $ 6.00 RECORDER

BOOK 2634 PAGE 641

46827

GRANT DEED

JOHNSON OYSTER COMPANY, a California corporation, GRANTOR, pursuant to a Resolution of the Grantor's Board of Directors September 2, 1972, in consideration of SEVENTY NINE THOUSAND TWO HUNDRED ($79,200.00) DOLLARS, to it in hand paid, receipt of which is hereby acknowledged, does hereby grant and convey to the UNITED STATES OF AMERICA, and its assigns, GRANTEE, the following described property located in the County of Marin, State of California:

EXHIBIT "A" attached hereto and made a part hereof

TOGETHER WITH all buildings and improvements thereon and all water rights appurtenant thereto and all and singular the tenements, hereditaments and appurtenances thereunto belonging, or in any wise appertaining and the reversion and reversions, remainder and remainders, rents, issues and profits thereof.

The land is conveyed subject to existing easements of record for public roads and highways, public utilities, railroads, ditches and canals.

The land hereinabove conveyed contains 5 acres, more or less, and is being acquired by the Department of the Interior, National Park Service.

THE GRANTOR RESERVES only the following rights and interests in the hereinabove described property: a reservation of use and occupancy for a period of forty (40) years in accordance with the terms of the Offer to Sell Real Property, assigned Contract No. CX800032073, signed by the GRANTOR on October 13, 1972, accepted on October 16, 1972, and on file with the National Park Service.

TO HAVE AND TO HOLD the same unto said UNITED STATES OF AMERICA and its assigns, forever.

THE GRANTOR further remises, releases, and forever quitclaims to the UNITED STATES OF AMERICA and its assigns, all right, title, and interest which the GRANTOR may have in the banks, beds, and waters of any streams bordering the land conveyed and also all interest in and to any alleys, roads, streets, ways, strips, gores or railroad rights-of-way abutting or adjoining the land conveyed and in any means of ingress or egress appurtenant thereto.

IN WITNESS WHEREOF, Johnson Oyster Company has caused its corporate name and seal to be hereunto affixed by its duly authorized officer, this 2d day of November, 1972.

JOHNSON OYSTER COMPANY

By Charles W. Johnson
Charles W. Johnson, President

By Milton Simmons
Milton Simmons, Secretary-Treasurer

DOCUMENTARY TRANSFER TAX $ None
___ Computed on full value of property conveyed,
___ OR Computed on full value less liens and encumbrances remaining at time of sale.
Albert Fessler
Signature of Declarant or Agent determining tax.
Firm Name Marin Title Guaranty Co.

ACKNOWLEDGMENT

OFFICIAL SEAL
J. M. POHLMANN
NOTARY PUBLIC
PRINCIPAL OFFICE IN
SAN FRANCISCO COUNTY
My Commission Expires April 18, 1976

STATE OF California }
County of San Francisco } ss.

On this 9 day of November in the year 1972, before me, John M. Pohlmann, a Notary Public of said State, duly commissioned and sworn, personally appeared Charles W. Johnson & Milton T. Simmons and acknowledged to me that such corporation executed the same.
IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

My commission expires:
April 18, 1976

John M. Pohlmann
Notary Public in and for said State

BOOK 2634 PAGE

COPY

EXHIBIT "C"

Reserving to Vendor, its successors and assigns, a terminable right to use and occupy the above-described property, as delineated on Exhibit "D", attached, together with the improvements situated thereon, for a period of 40 years for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items, the interpretation of oyster cultivation to the visiting public, and residential purposes reasonably incidental thereto, subject to the following:

Definitions

The term "Director" as used herein means the Director of the National Park Service, and includes all his duly authorized, delegated representatives.

The term "Vendor" as used herein means the Johnson Oyster Company, a California Corporation, and its successors and assigns.

1. The premises reserved by Vendor hereunder shall at all times be maintained in a safe, sanitary, and sightly condition, open to reasonable inspection by the Director, and meeting all Federal, State, and County health, sanitation, and safety standards applicable to operation of and residence within areas engaged in the processing and retail sale of oysters.

2. Utility services related to the reserved premises, including but not limited to water, electricity, sanitation, and garbage disposal are the sole responsibility of Vendor. Garbage and debris shall be disposed of by Vendor outside the boundary of the Point Reyes National Seashore. Use of the existing trash and garbage dumps on the reserved premises shall be discontinued and the dumps shall be restored to a natural condition by Vendor.

3. Oyster shells may be disposed of within the boundaries of the Point Reyes National Seashore and may be stockpiled for a reasonable period of time on the premises for use as follows:

a) Upon approval and under an agreement with the Fish and Game Department and other State of California regulatory authorities, some shells may be ground up and deposited uniformily on the water bottom allotments.

b) Some shells may be used for surfacing the road southerly from Sir Francis Drake Highway to the premises including the parking area on the reserved premises and the parking area on the adjacent land under special use by the Vendor. Approval of the Superintendent will be required prior to deposition of shells anywhere else within the Seashore for road surfacing purposes.

c) Some shells may be used for seed purpose in oyster propagation.

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d) Some shells will be maintained to offer as gifts to the visiting public.

4. Vendor shall not commit waste upon the reserved premises and shall at all times maintain them in a neat and sightly condition.

5. A permanent residence shall be maintained upon the reserved property, occupied by a responsible employee of Vendor.

6. Vendor shall abide by all rules and regulations pertaining to National Park System areas.

7. No permanent or temporary structure, sign or other improvement of any type whatsoever shall be erected by Vendor in or upon the reserved premises or improvements without the prior written approval of the Director.

8. Vendor and its employees shall take all reasonable precautions to prevent fires in and about the reserved premises, and shall cooperate with the Director in fire extinguishment in the reserved premises and areas immediately adjacent to the reserved premises.

9. During the term of Vendor's reservation, Vendor shall be solely responsible for all claims arising from use of the reserved premises by visitiors, and shall carry extended coverage liability insurance protecting against such claims in an amount and of a type agreed by the Director, to be sufficient for this purpose.

10. During the term of occupancy, the Vendor shall carry fire and extended coverage insurance to the full insurable value of the improvements. The insured under said fire and extended coverage insurance shall be the Vendor and the United States of America as their interests may appear. In case of loss, the Vendor may replace the improvements with equivalent structures. Should the Vendor elect not to rebuild, all insurance proceeds shall be divided between the United States and the Vendor as their interests may appear.

11. Upon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property for the herein described purposes, provided however, that such permit will run concurrently with and will terminate upon the expiration of State water bottom allotments assigned to the Vendor. Any permit for continued use will be issued in accordance with National Park Service regulations in effect at the time the reservation expires.

12. Upon expiration of Vendor's reservation, or the extended use period by permit, it shall remove all structures and improvements placed upon the premises during the period of its reservation. Any such property not removed from the reserved premises within 90 days after expiration of Vendor's reservation shall be presumed to have been abandoned and shall be

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presumed to have been abandoned and shall become the property of the United States of America, but this shall in no way relieve Vendor of liability for the cost of removal of such property from the reserved premises.

13. Disputes concerning performance under the terms of this reservation shall be determined by the Secretary of the Interior or his duly authorized representative in a manner consistent with due process of law.

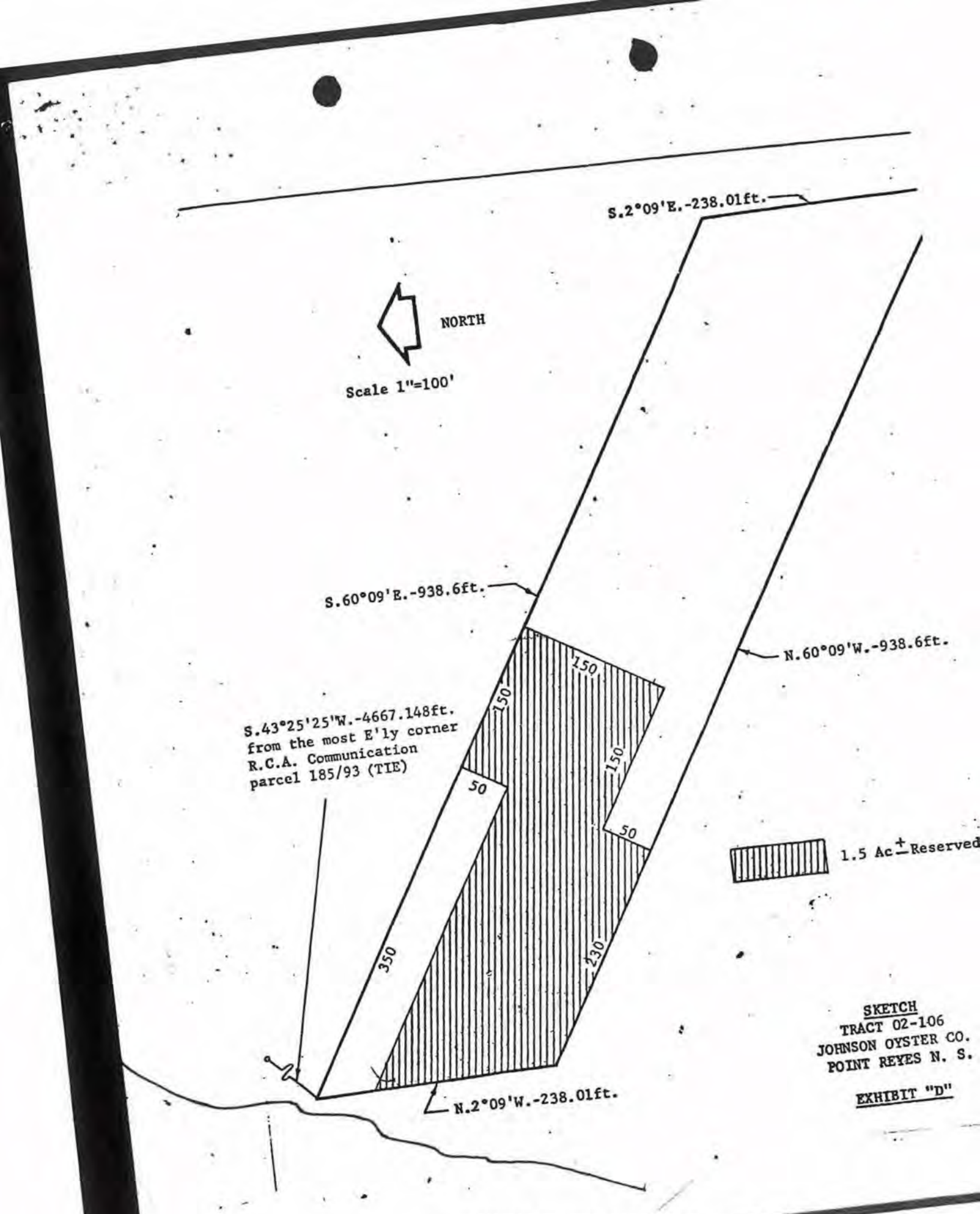
14. Should Vendor elect to dispose of any unused portion of the remainder of its reserved occupancy, the United States of America shall be afforded a right of first refusal to acquire the same.

15. A special use permit will be issued by the Director to Vendor for public interpretation of oyster cultivation by Vendor or adjacent premises, effective concurrently with Vendor's reservation.

16. Vendor shall keep the reserved premises open to the public for the interpretation of oyster cultivation and processing.

17. Vendor, its successors and assigns, shall pay the possessory interest tax during the term of use and occupancy.

18. Vendor cannot conduct a restaurant operation on the premises without prior written approval of the Director.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NORTH
Scale 1"=100'
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N.60°09'W.-938.6ft.
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from the most E'ly corner
R.C.A. Communication
parcel 185/93 (TIE)
150
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1.5 Ac± Reserved
N.2°09'W.-238.01ft.
SKETCH
TRACT 02-106
JOHNSON OYSTER CO.
POINT REYES N. S.
EXHIBIT "D"

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service
Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2008
Reviewed 20
Reviewed 20
Expires November 30, 2012

Long Term X
Short Term

Permit # MISC-8530-6000-8002
Type Park Code No. #
Point Reyes National Seashore

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on April ____, 2008 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP"); the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"); the land designated as the "Well Area" on the map attached hereto as Exhibit D ("Drakes Bay Oyster Company Well Area"); and the land designated as the "Sewage Area" on the map attached hereto as Exhibit E ("Drakes Bay Oyster Company Sewage Area"). Collectively, the areas so designated shall be referred to as the "Premises." The Premises governed by this Permit do not include the area designated as the ROP Area on the map attached hereto as Exhibit B.

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Use of the area designated as the "Well Area" on the map attached hereto as Exhibit D for the purpose of supplying water for the Drakes Bay Oyster Company facilities using Permittee well, pump, and pipelines. Use of the area designated as the "Sewage Area" on the map attached hereto as Exhibit E for the purpose of use and maintenance of existing sewage pipeline and sewage leachfield to service the Drakes Bay Oyster Company facilities. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required	Not Required X	Amount:
LIABILITY INSURANCE:	Required X	Not Required	Amount: As set forth in Article 15 of this Permit.

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year, plus an amount to be determined by appraisal for the use of the Sewage Area and the Well Area including water use.

PERMITTEE: Kristin Drakes Bay Oyster Co. 4/22/08
Signature Organization Date

Authorizing Official: George T. Turnbull George Turnbull 4/22/08
Signature Deputy Regional Director Date

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described In this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Members of the general public visiting the Drakes Bay Oyster Company operation may park in the adjacent NPS parking area and walk over to the SUP or ROP areas.

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, which can include occasional inspections required by Agencies, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area. To comply with this paragraph, Permittee will not encourage barbecuing in the SUP Area. Picnic tables will be provided by the NPS at the adjacent parking area.

k) Unauthorized discharge into the estuary is prohibited. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, Permittee will ensure that Permittee and Permittee's officers, agents, employees, and contractors comply with Applicable Laws regarding pets, including the NPS regulation at 36 C.F.R. § 2.15.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

a) If Permittee and Permitter disagree about an issue related to this Permit, they will first make a good faith effort to resolve such issue at the Park level. If they are unable to resolve the issue at the Park level, Permittee may request a review of the issue by the Regional Director.

b) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) Production of all shellfish species shall be capped at the "current production level" as determined under the California Coastal Commission Consent Order No. CCC-07-CD-04.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed without the prior approval of the Permitter. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) To minimize the chances of introducing invasive species or pathological microorganisms to Drake's Estero, Permittee will only import shellfish in the form of larvae and seed. Within 30 days of the Commencement Date, Permittee shall produce sufficient evidence, for the review and approval of the Permitter, that larvae and seed from outside sources have been certified by the California Department of Fish and Game ("CDFG")

to be free of pathogens. If the Permitter determines that the documentation is insufficient, Permittee shall cease from importing larvae within 30 days of receiving notification of the determination from the Permitter.

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from hauled out seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel is authorized during the pupping harbor seal closure period.

c) Permittee's agreement to the provisions of this Permit does not waive Permittee's ability to take contrary positions with regard to similar provisions with other Agencies.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs, provided that Permittee and Permitter acknowledge that certain repairs are necessary to comply with Applicable Laws. Permittee will make such repairs at its sole cost and expense in compliance with Applicable Laws.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable

Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site, without the presence of an NPS archeological monitor.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) Except as set forth in Section 3(k) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS laws, regulations, and policies.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species, except for the cultivation of the shellfish species authorized by this Permit.

c) On a case by case basis, the Permitter will evaluate incidences of depredation caused by Permittee and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles or for standard household cleaners. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes, except as authorized by Applicable Laws.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past,

ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any final report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e). Notwithstanding the foregoing, neither Permittee nor Permitter shall be required to provide a report under this Section 14(e) if such report is protected by attorney-client privilege.

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's

insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and

expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Except as provided in Paragraph 3(g), Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences shall be maintained in good condition and shall be timely repaired in conformance with Applicable Laws. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) New lighting under Permittee's control of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road from Sir Francis Drake Boulevard to the SUP Area will be maintained by the NPS. The Park will respond in a timely manner to Permittee and/or visitor complaints regarding the condition of the main entrance road. Notwithstanding the foregoing, Permitter may enter into a road maintenance contract with Permittee.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines within the Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall maintain the sewage pipeline and sewage leachfield in the "Sewage Area."

i) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws as required by law. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee relate to the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. Permitter will pay for the preparation of NEPA or NHPA documents. If there is litigation regarding NEPA or NHPA compliance, it will not trigger the indemnification requirements of Article 16.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit..

22) PENALTY

a) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

a) At the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage

resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D: Map – Drakes Bay Oyster Company Well Area

EXHIBIT E: Map – Drakes Bay Oyster Company Sewage Area

EXHIBIT A

Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior

Permit Type

- ROP
- SUP

Oyster Racks

- Active
- Dilapidated

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

Map Location

N
W E
S

0 0.5 Miles

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

Drake's Estero Oysters - SUP & ROP

National Park Service
Point Reyes National Seashore
Marin County, CA

N
W E
S

0 50 100 150 200
Feet

Permit Type

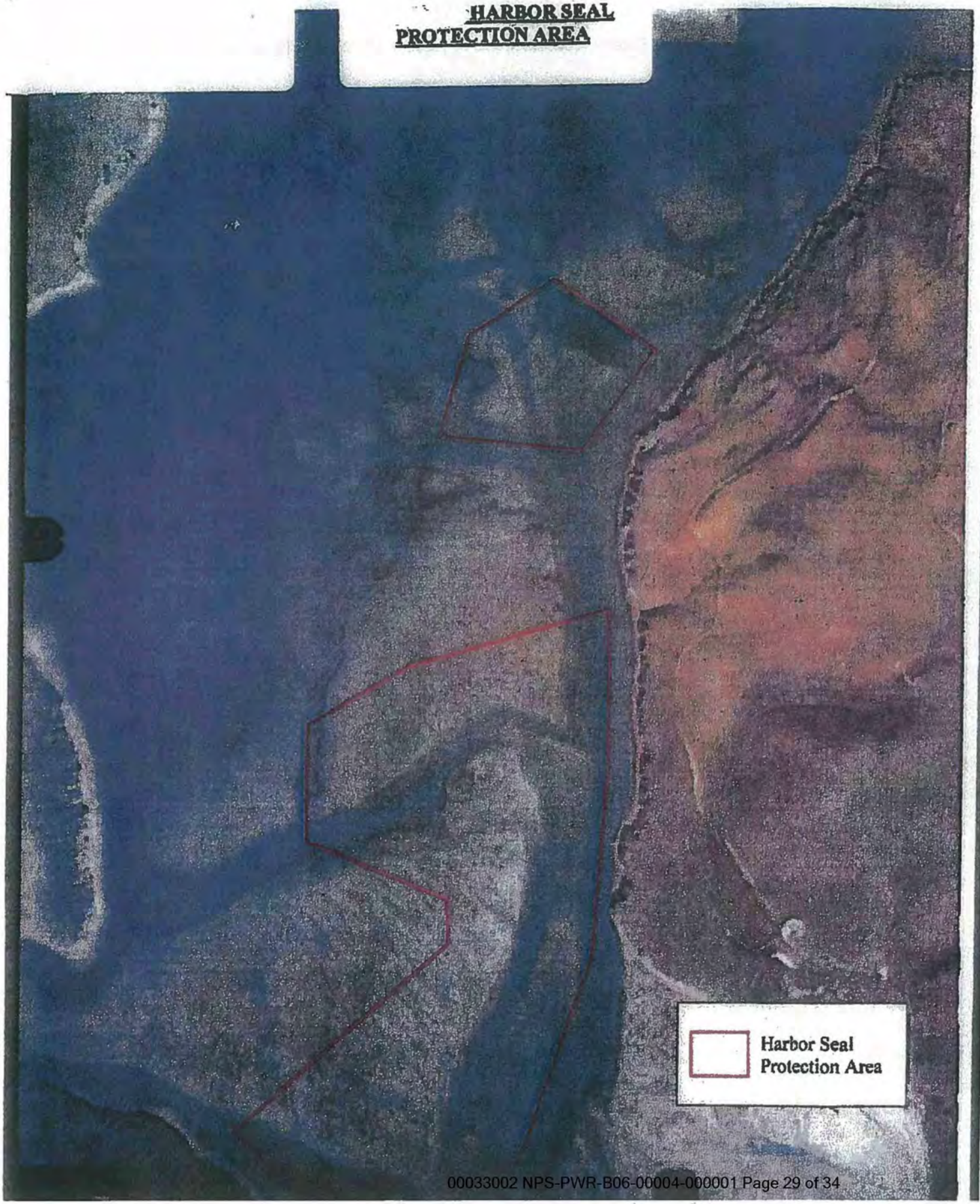
ROP - 1.5 acres

SUP - 1.1 acres

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol

HARBOR SEAL PROTECTION AREA



Drakes Estero Aquaculture and
Harbor Seal Protection Protocol

The following items are mutually agreed to for protection of harbor seals in and adjacent to the Harbor Seal Protection Areas identified in the Map, attached hereto and incorporated herein by reference ("Protocol Map"):

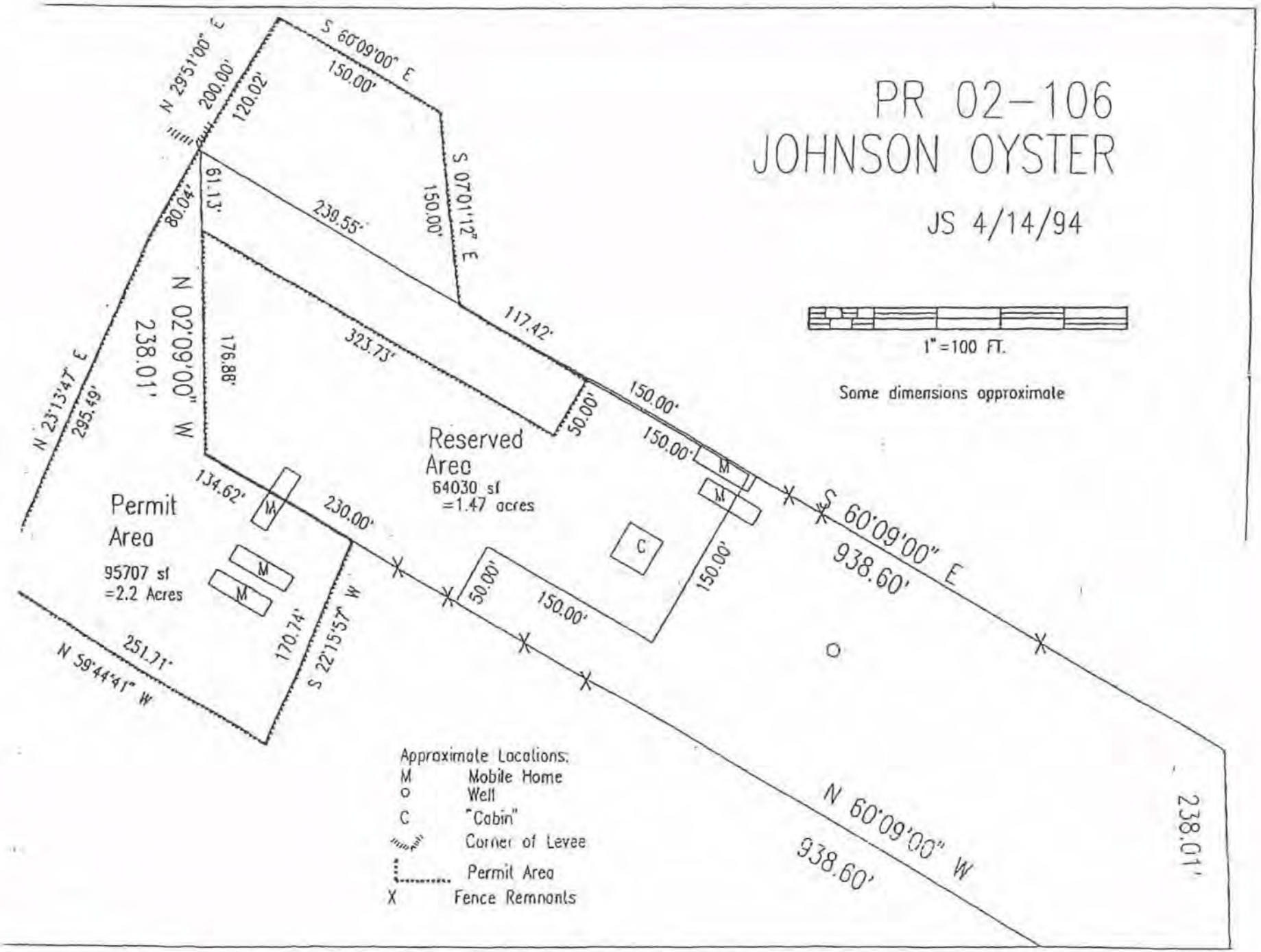
1. During the breeding season, March 1 through June 30, the "Main Channel" and "Lateral Channel" of Drakes Estero will be closed to boat traffic. During the remainder of the year, the Lateral Channel and Main Channel are open to boat traffic outside of the protection zone.

2. During the breeding season, Permittee boats may use the "West Channel" at low speed while maintaining a distance of at least 100 yards from hauled out seals.

3. Throughout the year, all of Permittee's boats, personnel, and any structures and materials owned or used by Permittee shall be prohibited from the harbor seal protection areas identified on the Protocol Map. In addition, all of the Permittee's boats and personnel shall be prohibited from coming within 100 yards of hauled out harbor seals.

EXHIBIT D

Map – Drakes Bay Oyster Company Well Area



00033002 NPS-PWR-B06-00004-000001 Page 32 of 34

EXHIBIT E

Map – Drakes Bay Oyster Company Sewage Area

Plot Date: 1/7/08 S:/GIS/projects1/Range/SpecialParkUses/DBOLeachField.mxd

FOIA 10 755 Miguel & 10 762 Elliott re cameras

07/12/10 Email from Cicely Muldoon to Dave Press

07/12/10 Email from Dave Press to Samantha Simmons

07/12/10 Email from Samantha Simmons to Dave Press, et al

07/09/10 Email from Tim Ragen to Dave Press

07/07/10 Email from EX 6 to Sarah Codde

07/03/10 Email from West Marin Citizen to Dave Press

07/01/10 Email from EX 6 Sarah Codde

06/30/10 Email from Cicely Muldoon to Tim Ragen, David Weiman, Kevin Lunny et al

06/29/10 Email from Dave Press to Cicely Muldoon

06/28/10 Email from Gary Fellers to Cicely Muldoon

06/26/10 Email from David Weiman to Cicely Muldoon

06/25/10 Email from Cicely Muldoon to David Weiman

06/25/10 Email from Cicely Muldoon to Dave Press, Ben Becker, Sarah Allen

06/23/10 Email from Peter Budde/NPS to Dave Press

06/23/10 Email from Cicely Muldoon to Dave Press, Ben Becker et al

06/23/10 Email from Cicely Muldoon to Tim Ragen

06/23/10 Email from Cicely Muldoon to George Turnbull, Alma Ripps

06/23/10 Email from David Weiman to Cicely Muldoon

06/23/10 Email from Cicely Muldoon to George Turnbull, Dave Press, Ben Becker

06/23/10 Email from Corey Goodman to Cicely Muldoon

06/22/10 Email from Tim Ragen to Corey Goodman, Cicely Muldoon

06/22/10 Email from Corey Goodman to Cicely Muldoon

06/22/10 Email from Cicely Muldoon to David Weiman

06/22/10 Email from Dave Press to Cicely Muldoon

06/22/10 Email from Cicely Muldoon to Alma Ripps/NPS

06/21/10 Email from Cicely Muldoon to Sarah Allen, Dave Press, Ben Becker

06/21/10 Email from Dave Press to Cicely Muldoon

06/21/10 Email from David Weiman to Cicely Muldoon

06/21/10 Email from Dave Press to Cicely Muldoon, Sarah Allen, Ben Becker

06/21/10 Email from Cicely Muldoon to Corey Goodman

06/21/10 Email from Corey Goodman to Cicely Muldoon, Dave Press

06/21/10 Email from Cicely Muldoon to David Weiman

06/20/10 Email from David Weiman to Ben Becker, Dave Press, Sarah Allen

06/18/10 Email from David Weiman to Dave Press

06/17/10 Email from Sarah Allen to Cicely Muldoon, Dan Wenk

06/16/10 Email from Cicely Muldoon to Dan Wenk

06/16/10 Email from Dave Press to Cicely Muldoon

06/15/10 Email from Corey Goodman to Cicely Muldoon, Dave Press

06/14/10 Email from Cicely Muldoon to Kevin Lunny

06/14/10 Email from Cicely Muldoon to David Graber

06/14/10 Email from David Graber to Cicely Muldoon

06/14/10 Email from David Graber to Cicely Muldoon, George Turnbull

06/11/10 Email from Sarah Allen to Cicely Muldoon

06/11/10 Email from Cicely Muldoon to Kevin Lunny

06/10/10 Email from Cicely Muldoon to Dave Press, Ben Becker

06/10/10 Email from Cicely Muldoon to Dave Press

06/10/10 Email from Sarah Allen to Dave Press

06/10/10 Email from EX 6 [redacted] to Sarah Allen

06/10/10 Email from Dave Press to Sarah Allen

06/10/10 Email from Cicely Muldoon to Dave Press, Ben Becker

06/09/10 Email from Dave Press to Cicely Muldoon, Sarah Allen

06/09/10 Email from Sarah Codde to Dave Press

06/09/10 Email from EX 6 [redacted] to Sarah Allen

06/09/10 Email from Cicely Muldoon to Sarah Allen

06/09/10 Email from Dave Press to Cicely Muldoon

06/09/10 Email from Corey Goodman to Dave Press

06/09/10 Email from Dave Press to Corey Goodman

06/09/10 Email from EX 6 to Sarah Allen

06/09/10 Email from Cicely Muldoon to Corey Goodman

06/09/10 Email from Corey Goodman to Dave Press

06/09/10 Email from Dave Press to Corey Goodman

06/09/10 Email from Corey Goodman to Dave Press

06/08/10 Email from Corey Goodman to Cicely Muldoon

06/08/10 Email from Mark Bartolini to Cicely Muldoon

06/05/10 Email from EX 6 to Ben Becker

05/20/10 Email from Sarah Codde to EX 6

05/13/10 Email from Sarah Codde to EX 6

05/12/10 Email from Sarah Codde to Dave Press

05/07/10 Email from Sarah Codde to EX 6

05/03/10 Email from Sarah Codde to EX 6

04/30/10 Email from Sarah Codde to EX 6

06/16/10 Email from Sarah Codde to EX 6

04/13/10 Email from Ben Becker to Sarah Allen

03/14/10 Email from EX 6 to Ben Becker

03/04/10 Email from Sarah Codde to EX 6

02/26/10 Email from Sarah Codde to EX 6

02/17/10 Email from Sarah Codde to EX 6

02/10/10 Email from Sarah Codde to EX 6

02/08/10 Email from Sarah Codde to EX 6

02/04/10 Email from EX 6 to Sarah Allen

02/01/10 Email from Sarah Codde to EX 6

01/27/10 Email from Sarah Codde to EX 6

01/04/10 Email from EX 6 Sarah Allen

11/09/09 Email from [redacted] Sarah Allen

09/11/09 Email from Sarah Allen to Don Neubacher

09/10/09 Email from Sarah Allen to John Dell'Osso, Don Neubacher

09/08/09 Email from Sarah Codde to [redacted]

09/01/09 Email from Sarah Allen to Shawn Brown, State Parks

08/21/09 Email from Sarah Codde to [redacted]

06/09/09 Email from Dave Press to Cicely Muldoon, Sarah Allen

06/09/10 Email from [redacted] to Sarah Allen

06/09/10 Email from Dave Press to Cicely Muldoon

03/23/09 Email from Sarah Allen to Don Neubacher

01/27/09 Email from Ben Becker to Sarah Allen

06/20/08 Email from Kan Dhillon to Sarah Allen

06/06/08 Email from [redacted] to Sarah Allen

****

Scientific Research and Collecting Permit, [redacted] SF State University

"Directions to Drakes Estero camera location"

"Harbor seals and their use of Drakes Estero", Sarah Allen, Science Advisor, Point Reyes NS

Cicely Muldoon/PORE/NPS
07/12/2010 01:46 PM

To Dave Press/GOGA/NPS@NPS
cc
bcc
Subject Re: disturbance meeting summary

You here?

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Superintendent
Point Reyes National Seashore
415-464-5101

Dave Press

----- Original Message -----
From: Dave Press
Sent: 07/12/2010 04:46 PM EDT
To: "Samantha Simmons" <ssimmons@mmc.gov>
Cc: Cicely Muldoon; "'Tim Ragen'" <tragen@mmc.gov>
Subject: RE: disturbance meeting summary

Tim and Sam,
Thanks for providing feedback on my draft meeting summary so promptly. If only I could be so efficient .....

Sam raises a really great point about the photos. I went through the 3/14/08 photos and have provided copies to MMC, Kevin, Corey, and Dave W. The photos show a boat arriving to the lateral channel at 12:41, parking on the south side of the channel, and then departing a short time later. The time matches the data on the disturbance data sheet even though DBOC records indicate that there was not a boat on the water at that time on that day. The UEF camera captures the boat leaving from and returning to Schooner Bay (where the DBOC on-shore facility is located), the boat goes directly to the oyster beds, the boat parks at the same spot where the oyster boats typically park for working this lease area, and the boat does not look any different than other photos of the oyster boats. For these reasons, I don't see a basis for making any changes to the 3/14/08 data record and NPS will continue to note this as mariculture related.

In an email from 6/30/10, Cicely provided information to the gourp regarding when the cameras were present at Drakes Estero. Based on the dates that the cameras were in place, the only other mariculture related disturbance record from our monitoring program that can be cross-referenced with the photos is from 5/8/07. The photos don't actually capture the boat passing by the seals and only the boat's wake is visible. The seals at OB don't show up clearly in the image and it is difficult to tell if any responded to the boat passing by. Also - it doesn't appear that the camera captured all of the seals at OB. The camera image shows two distinct groups of seals, but the map that accompanies the datasheet indicates three groups of seals. So I don't think the photos help to resolve the 5/8/07 disturbance record.

Please let me know if you have questions.

Thanks, Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

"Samantha Simmons" <ssimmons@mmc.gov>

"Samantha Simmons"
<ssimmons@mmc.gov>
07/12/2010 12:01 AST

To: <Dave_Press@nps.gov>, "'Tim Ragen'" <tragen@mmc.gov>
cc: <Cicely_Muldoon@nps.gov>
Subject: RE: disturbance meeting summary

Hi Dave,
Sorry not to get back to you at the end of last week. I have had a chance to thoroughly review your meeting summary with the notes that I took and I concur with your summary on all points, except for one. I had an additional note for the disturbance data point on March 14th 2008. I had noted that the disturbance data would remain the same (as you state), UNLESS there was a clear basis for a change based on pictures from the haulout monitoring cameras. (Which were not available for review at the time of the meeting.)

Please let me know if you have any questions or I can provide further assistance.
Thanks,
Sam.

Samantha Simmons, PhD.
Acting Scientific Program Director
Marine Mammal Commission
4340 East-West Highway, Suite 700
Bethesda, MD 20814
(w) 301-504-0087
(f) 301-504-0099
email: ssimmons@mmc.gov
web: www.mmc.gov

-----Original Message-----
From: Dave_Press@nps.gov [mailto:Dave_Press@nps.gov]
Sent: Wednesday, July 07, 2010 1:52 PM
To: Tim Ragen; Samantha Simmons
Cc: Cicely_Muldoon@nps.gov
Subject: disturbance meeting summary

Hi Tim and Sam,
I think it would be very beneficial for a record of where we left things with each of the data records that we discussed back in June. I have drafted this document your review. This has already gone to Ben, Sarah, and Cicely for comment.

I need to send out our harbor seal data again for a FOIA request, so I am hoping for a relatively quick turn around on this. I would like the agreed upon ammendments to the data records be included in the FOIA request, so am seeking your comments and eventual approval.

Thanks a lot, Dave

(See attached file: Meeting_Summary_06072010.doc)

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168

415-331-5530 (FAX)

Dave Press/GOGA/NPS
07/12/2010 01:46 PM

To "Samantha Simmons" <ssimmons@mmc.gov>
cc Cicely_Muldoon@nps.gov, "'Tim Ragen'" <tragen@mmc.gov>
bcc
Subject RE: disturbance meeting summary

History: This message has been replied to.

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David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

"Samantha Simmons"
<ssimmons@mmc.gov>
07/12/2010 09:01 AM

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cc <Cicely_Muldoon@nps.gov>
bcc
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(See attached file: Meeting_Summary_06072010.doc)

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168

"Tim Ragen"
<tragen@mmc.gov>
07/09/2010 10:32 AST

To: <Dave_Press@nps.gov>, "'Samantha Simmons'" <SSimmons@mmc.gov>
cc: <Cicely_Muldoon@nps.gov>
Subject: RE: disturbance meeting summary

Dave,

Thanks for sending this. Your summary seems consistent with my recollection. However, I'll ask Sam to review and confirm with her records. If Sam doesn't seem any inconsistencies, it would be a nice gesture to send this to Kevin and ask if he sees any discrepancies. He will not agree with where we ended up on each data point, but he will recognize this as an accurate record.

Regarding our approval, you don't really need that. We don't have the authority to give such approval - we are just trying to assist you all in getting past this dilemma.

Thanks, again, Dave. Best, Tim

-----Original Message-----
From: Dave_Press@nps.gov [mailto:Dave_Press@nps.gov]
Sent: Wednesday, July 07, 2010 1:52 PM
To: Tim Ragen; Samantha Simmons
Cc: Cicely_Muldoon@nps.gov
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(See attached file: Meeting_Summary_06072010.doc)

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

EX 6
<EX 6
07/07/2010 19:38

To Sarah_Codde@nps.gov
cc
bcc
Subject Re: Camera stuff

History: This message has been replied to.

hey sarah, just wanted to make sure you got the camera stuff ok. let me know. sorry again for calling you early.
EX 6

On Sat, Jul 3, 2010 at 2:04 PM, EX 6 <EX 6 @gEX 6 rote:
hey sarah,

i am off of work at 430 everyday next week and can drop it by your house or wherever is convenient any day.

adios for now!
EX 6

On Fri, Jul 2, 2010 at 4:08 PM, <Sarah_Codde@nps.gov> wrote:
EX 6
Let me know if we can figure out a time next week to meet up. Evenings after work will be good for me.

Thanks,
Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

Editor West Marin Citizen
<editor@westmarincitizen.com>

07/03/2010 13:23 MST

To: David Press <Dave_Press@nps.gov>
cc: Carlos Porrata <porrata@telescience.net>
Subject: Re. briefing statement

Hi David,

Are you able to recall to whom this document was sent?

Obviously it found its way to the Marine Mammal Commission's collection of documents related to Drakes Bay Oyster Company.

But did NPS (or the MMC or Dept. of Interior or anyone else) ever send it directly to John Hulls or Corey Goodman or the Point Reyes Light or Kevin Lunny, and if so, when?

Thank you for any insight.

--
Jim Kravets
Editor
The West Marin Citizen
(415) 246-7998
jim@westmarincitizen.com

Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC May 1, 2009 .pdf

From: EX 6 <EX 6>
To: Sarah Codde <sarah_codde@nps.gov>
cc: EX 6 <EX 6>

Date: Thursday, July 01, 2010 05:13PM
Subject: Reconyx Camera

Hi Sarah,

I just spoke with Sarah Allen and she would like me to return the camera and all the camera stuff. I am going to give my boyfriend, EX 6, the box of camera stuff to give to you. I think this is an easier solution than mailing it. I hear you are out of the country helping out with the oil spill. When you are back, at your earliest convenience, please call/email EX 6 to coordinate a time to exchange the camera. I hope this works ok for you since you guys live pretty close to each other. I will give him the camera this sat (July 3rd).

EX 6 email:
EX 6

cell number: EX 6 EX 6

I am heading back to Canada to get better and be with my family for July but I will be back again in August. Have a great summer and I'll talk to you when I get back. Thank you for all your help and I hope everything in Florida is going well,

EX 6

Turn down-time into play-time with Messenger games Play Now!

Cicely Muldoon/PORE/NPS
06/30/2010 04:59 PM

To Tim Ragen <tragen@mmc.gov>, David Weiman <agresources@erols.com>, Kevin Lunny <kevin@EX 6 EX 6
cc David Press <dave_press@nps.gov>, Ben Becker/PORE/NPS@NPS, "Sarah Allen" <Sarah_Allen@nps.gov>
bcc George Turnbull/OAKLAND/NPS; Maureen Foster/WASO/NPS@NPS; Alma Ripps/WASO/NPS@NPS; John A Dell'Osso/PORE/NPS; Gordon White/PORE/NPS; Ann Nelson/PORE/NPS; Brannon Ketcham/PORE/NPS@NPS; Natalie Gates/PORE/NPS
Subject requested information

Dave, Corey, Kevin, and Tim:

We have pulled together the requested images and are putting them in the mail first thing tomorrow to each of you. The images provided on the DVD include the following:

May 8, 2007. 603 total images. All images from one camera with subsite OB in the foreground.
March 14, 2008. 1440 total images. All images from both cameras, OB and UEF. Images were retrieved from the OB camera on March 14, 2008 and the camera reset. The images for the OB camera on this day are therefore divided into two separate folders.
March 23, 2008. 1440 total images. All images from both cameras, OB and UEF.

The 2007 camera was not installed until May, so there are no images from April 26 or April 29, 2007.

In response to other follow up questions from Dave and Corey --

December 10, 2008 survey
The volunteer who took the pictures referred to on this data sheet is out of town until July 20. We will pursue getting copies of the images requested after she returns. Stay tuned on this one.

June 3, 2009 survey
We have looked to see if there are any other datasheets from June 3, 2009. All of the datasheets have been provided. Because there was only one disturbance recorded that day, as indicated by the count datasheets, we would not expect there to be more than one disturbance datasheet.

March 23 images
The photos on Sunday, March 23, 2008 referenced in the briefing statement were taken from what have been referred to as camera #2. Camera #2 faces north towards subsite UEF with Schooner Bay in the background. The boat is visible in the upper right corner of the photos we sent you, between 5:23 PM and 5:29 PM, traveling from Home Bay to Schooner Bay. These are the photos that were sent to Corey and Tim on June 9 and to Kevin on June 16, 2010. This was presumed to be a DBOC boat because of the extensive boat use in the Estero by DBOC, the rarity of other motor boats in the Estero, the time of year (during the kayak closure, although I understand this is occasionally violated), and the difficulty of seeing a kayak with such limited freeboard from such a great distance.

Harbor seal volunteers
The number of harbor seal volunteers is reported in our recent annual reports. For 2009, 2008, and 2007 there were 49, 38, and 36 volunteers respectively. Please note that our 2009 annual monitoring report was finalized and posted to the website last week. Website:
http://science.nature.nps.gov/im/units/sfan/vital_signs/pinnipeds/HarborSeals.cfm

Drakes Estero camera placement to the best of our knowledge
May 5, 2007 to June 19, 2007. One camera facing the OB seal haul out site. The camera was placed to the southeast of subsite OB. All 2007 photos appear to be taken from this angle.

March 6, 2008 to June 19, 2008. Two cameras. One camera facing OB haul out site along the lateral channel. One camera facing UEF haul out site with part of Schooner Bay in the background.
April 17, 2009 to August 4, 2009. One camera. Camera faces OB haul out site along the lateral channel.
Feb 12, 2010 to late May. One camera facing UEF haul out site with part of Schooner Bay in the background. Exact end date is unknown and may extend into early June.

To our knowledge no cameras are or were positioned to photograph on shore DBOC operations. The cameras were focused on the OB and UEF seal haul out subsites.

Wildlife cameras parkwide
At present, there are two wildlife cameras in use by a USGS scientist, and one camera in use for the snowy plover monitoring program. None of these capture Drakes Estero.

May 1, 2009 Briefing Statement. Since this briefing statement has now become the subject of a FOIA request from the Point Reyes Light, the FOIA process will explore what records exist.

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

Dave Press
06/29/2010 11:11 EDT

To: Cicely Muldoon/OAKLAND/NPS, Natalie Gates/PORE/NPS, Brannon Ketcham/PORE/NPS
cc:
Subject: Fw: Drakes Estero Seal Protection Areas

FYI - here is the April email thread with Kevin regarding changes to the harbor seal protection areas.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

----- Forwarded by Dave Press/GOGA/NPS on 06/29/2010 08:09 AM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
04/02/2010 12:30 PM MST

To: <Dave_Press@nps.gov>
cc: <Sarah_Allen@nps.gov>, <John_A_Dell'Osso@nps.gov>, <Natalie_Gates@nps.gov>, <David_Graber@nps.gov>, <George_Turnbull@nps.gov>, "'Cassidy Teufel'" <cteufel@coastal.ca.gov>
Subject: RE: Drakes Estero Seal Protection Areas

Dave,

Thank you for the reply. I was hoping to work with a NPS GIS person, but we will hire a private GIS consultant to help us with this. We are planning to do some survey work next week. Perhaps the same people can help us with this work.

I certainly understand that you would not want to make any changes at this point. I was really making the point that we still need to have access past these areas. I know that the CCC created them knowing that we would still operate around them - there may be no adjustment required at all. I agree that we should get all of the information together first and then take a look.

I will contact you when we have the GIS work completed.

Thank you,

Kevin

-----Original Message-----
From: Dave_Press@nps.gov [mailto:Dave_Press@nps.gov]
Sent: Friday, April 02, 2010 11:26 AM
To: Kevin Lunny
Cc: Sarah_Allen@nps.gov; John_A_Dell'Osso@nps.gov; Natalie_Gates@nps.gov; David_Graber@nps.gov; George_Turnbull@nps.gov
Subject: Re: Drakes Estero Seal Protection Areas

Hi Kevin,

Thanks for your inquiry. Neither Sarah nor I are able to assist you with any changes to the harbor seal protection areas. Any amendments will have to be discussed with the California Coastal Commission and NPS representatives out of the regional office. Any changes prior to the final report from the Marine Mammal Commission would of course be premature.

As for GIS assistance, I do think it is important for you to have the most accurate information possible. I am not comfortable providing this support. However, I can consult with the regional office to see what help we can provide and when.

Lastly, I strongly encourage you to seek professional assistance from a GIS consultant on these matters. I recognize that the boundaries that you need to be aware of while in the field are not easy to recognize. I think your best option is to use GPS units with all relevant data layers loaded in so that your staff can literally see on the screen where they are in relation to your lease boundary, harbor seal protection zones, etc. A GIS consultant can help you set something like this up, and we would be able to assist with providing some of the data layers.

Best regards, Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

"Kevin Lunny" <kevin@drakesbayoyster.com>
04/01/2010 08:01 MST

To: <Sarah_Allen@nps.gov>, <Dave_Press@nps.gov>
cc:
Subject: Drakes Estero Seal Protection Areas

Good morning Sarah and Dave,

I think we have figured out how to get the prohibited areas to show up on our GPS screens. As we discussed, this would offer another level of security - the boat operators would "know" if they're getting close to a protected area. I have attached a map showing the two prohibited areas. In that map, I have given each angle point a number. Would you please provide us with the coordinates for each of these points? We don't have the capability of determining the coordinates.

I have a couple of questions / observations:

1. Line 2-3 should be placed so that the channel is outside the protection area so that oyster boats may use the channel.
2. Line 8-9-10 should be placed so that the channel is outside the protection area so that oyster boats may use the channel.
3. Line 13-14 should be directly on top of the southernmost aquaculture lease line.
4. Move point 4 north east, towards point 5, enough so that the channel from Bull Point to the main channel can be used by oyster boats.

Is this something you could help us with?

Thank you,

Kevin

[attachment "20100401 Prohibited Area Coordinate Request.pdf" deleted by Dave Press/GOGA/NPS]

"Gary Fellers"
<gary_fellers@usgs.gov>
06/28/2010 01:59 PM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc
bcc
Subject Wildlife training

Cicely - You might be interested in the following from the local chapter of the Wildlife Society. It shows that wildlife cameras are an important wildlife research and management tool. Note that folks are paying about $500 each to attend.

Gary

----- Original Message -----
From: Cynthia Perrine
To: twswsmembers@yahoogroups.com
Sent: Monday, June 21, 2010 2:21 PM
Subject: [TWSWSMembers] Remote Cameras Workshop, July 22-25 at Chimineas Ranch (Registration Open) and Certification Workshop 8/08 in Sacramento

Introduction to Remote Camera Techniques in Wildlife Studies, July 22 - 25, 2010

Remote cameras are an increasingly important tool in wildlife research and management. They have proven useful for studying phenomena that are costly or difficult to observe using traditional methods and have the benefit of being less invasive, less labor intensive, and providing permanent documentation of photo-captured animals. This workshop will examine the use of motion sensitive (passive), infrared-triggered (active) and video cameras in the field and look at the benefits as well as some of the problems associated with them. The goal of this workshop is to provide a comprehensive introduction to camera trapping equipment and methodology so that participants acquire the basic knowledge to plan, outfit, and implement their own surveys.

The workshop is intended for biologists who have never previously worked with remote cameras and who are likely to use them for their work or research. Each participant will have hands-on experience setting up and/or monitoring a passive, active, and video station. Maximum registration: 20. A waiting list will be maintained.

Instructors:
Craig Fiehler, Resource Assessment Program, California Department of Fish and Game
Eveline Larrucea, Independent Consulting Biologist and University of Nevada, Reno
John Perrine, Assistant Professor, Biological Sciences Department, Cal Poly State University
Jerry Roe, Wildlife Biologist and Principal, Nomad Ecological Consulting

Schedule: Start at 5:00 p.m. on Thursday, July 22; conclude by 3:00 p.m. on Sunday, July 25th.

Location: Chimineas Ranch (eastern SLO County); maps provided upon registration.

Catered Meals & Lodging are INCLUDED in the registration fee: Limited indoor, sleeping space (twin beds in shared rooms) will be assigned, upon

request, to participants as available. There is ample lawn space for camping, it is quiet and secluded on the ranch (no generators or noisy neighbors) and indoor bathroom facilities are available for all. We serve healthy, locally-raised meals at our workshops; please list dietary restrictions during registration and we'll accommodate special needs within reason.

Pre-Register: Use the secure online form at joomla.wildlife.org/Western. Instructions for check payments are provided on the registration link. Registration cost includes three nights lodging/camping, nine meals, refreshments, coffee/tea, extensive training materials, and hands-on experience with modern equipment.

Registration payable by check or credit card/received or postmarked:

	Prior to/On 7/08/10	On/After 7/09/10
Member, TWS Western Section	$495	$535
Non-Member	$535	$565
Student/New Professional* (maximum 2 registrants at this level)	$275	$295

* Must show proof of current registration at an accredited university, or graduation within 6 months of workshop date.

Coordinator/Contact: Please direct questions to Rhys Evans, sirsnave@verizon.net

Cynthia Perrine
Program Director
Western Section of The Wildlife Society
http://joomla.wildlife.org/western
http://www.facebook.com/tws.western

"David M Weiman"
<agresources@erols.com>
06/26/2010 11:21 AM

To "Muldoon, Cicely " <Cicely_Muldoon@nps.gov>
cc "Lunny, Kevin" <kevin@drakesbayoyster.com>, "Lunny, Nancy" <nancy@drakesbayoyster.com>, "Ragen, Tim " <tragen@mmc.gov>, "Cichantek, Melissa"
bcc
Subject RE: Our Call

History: This message has been forwarded.

Cicely.

Your statement is not an accurate description of our conversation.

dave w.

From: Cicely_Muldoon@nps.gov [mailto:Cicely_Muldoon@nps.gov]
Sent: Friday, June 25, 2010 6:51 PM
To: David M Weiman
Cc: Lunny, Kevin; Lunny, Nancy; Cichantek, Melissa; Tim Ragen
Subject: Re: Our Call

Dave, a correction-i told you that my understanding was that a camera went up in May 07, not that it lost power in May 07. Be back in touch next week.

Cicely

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

From: "David M Weiman" [agresources@erols.com]
Sent: 06/25/2010 06:08 PM AST
To: Cicely Muldoon
Cc: "Lunny, Kevin" <kevin@drakesbayoyster.com>; "Lunny, Nancy" <nancy@drakesbayoyster.com>; "Cichantek, Melissa" <melissa.cichantek@EX 6
Subject: Our Call

Cicely.

Thank you for the call last evening and please know that I appreciate your willingness to review some of these challenging issues.

From our conversation, here are some of the pending matters to be addressed:

You indicated that the 07 photographic data and other requested information will be available next week. You asked and I confirmed that a written request had already been submitted for specific 07 data. When we discussed the 07 data, you also said that the camera lost power some time in May of that year, so there may be a data gap sometime that month. I shared that information with Kevin and Nancy last evening shortly after we spoke.

On a related matter, one that we did not specifically address, the May 1, 2009 "NPS Briefing Paper" claimed that an oyster boat was seen in the Estero on Sunday March 23, 2008 from the NPS photographic data. Dr. Goodman requested that data, and NPS provided it. However, Dr. Goodman informed us that, upon review, there were no boats in the photo data provided. We are uncertain as to what that means. Was the correct photographic data provided for review, or is the NPS Briefing Paper incorrect? Or, is there an another explanation? We request that this matter be clarified.

From our exchange of emails, earlier this week you asked, *"can you be more specific about your last question related to any other cameras for any other purposes - are you interested in terrestrial wildlife in and around the Estero as well? also, when you refer to prior, how far back are you interested in - prior to Kevin's operation in the Estero?"* Thank you for seeking clarification of this matter. Kevin and Nancy Lunny began operation of DBOC in 2005. At some point, NPS began a program that involved placing remote cameras in the Estero. With respect to 2005 and since, our questions are as follows:

* When did NPS install cameras in Drakes Estero?
* How many cameras were installed (or were the same cameras moved around)?
* If more than two, where were they placed (we acknowledge that you have provided placement information on two cameras already)
* Are, or were, cameras positioned which captured or photographed the on-shore DBOC operation?
* How many cameras are there at Drakes Estero and how many cameras are there throughout the Park?

After reviewing the photographic data and related information, we expect to have additional questions and will submit them at that time.

Thank you,

dave w.

David M. Weiman

Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

Cicely Muldoon/PORE/NPS
06/25/2010 03:50 PM

To "David M Weiman" <agresources@erols.com>
cc "Lunny, Kevin" <kevin@drakesbayoyster.com>, "Lunny, Nancy" <nancy@drakesbayoyster.com>, "Cichantek, Melissa" <melissa.cichantek@[redacted] "Tim Ragen"
bcc "Dave Press" <Dave_Press@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>; George Turnbull/OAKLAND/NPS
Subject Re: Our Call

Dave, a correction-i told you that my understanding was that a camera went up in May 07, not that it lost power in May 07. Be back in touch next week. .

Cicely

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

From: "David M Weiman" [agresources@erols.com]
Sent: 06/25/2010 06:08 PM AST
To: Cicely Muldoon
Cc: "Lunny, Kevin" <kevin@drakesbayoyster.com>; "Lunny, Nancy" <nancy@drakesbayoyster.com>; "Cichantek, Melissa" <melissa.cichantek@gmail.com>
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dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

Cicely Muldoon/PORE/NPS
06/25/2010 03:43 PM

To "Dave Press" <Dave_Press@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>, "Sarah Allen" <Sarah_Allen@nps.gov>, George Turnbull/OAKLAND/NPS,
cc "Gordon White" <Gordon_White@nps.gov>, "John Dell'Osso" <John_A_Dell'Osso@nps.gov>
bcc
Subject Fw: Our Call

Incorrect characterization-told 07 camera went up in may 07 not lost power

---
Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

From: "David M Weiman" [agresources@erols.com]
Sent: 06/25/2010 06:08 PM AST
To: Cicely Muldoon
Cc: "Lunny, Kevin" <kevin@drakesbayoyster.com>; "Lunny, Nancy" <nancy@drakesbayoyster.com>; "Cichantek, Melissa" <melissa.cichantek@EX 6
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dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

Peter Budde
06/23/2010 13:49 MDT

To: Dave Press/GOGA/NPS@NPS
cc:
Subject: Re: Information Request: Cameras in parks for wildlife surveillance?

Thanks for the reply Dave!

Peter

Peter Budde, GIS Team Lead
Inventory & Monitoring Division (IMD)
National Park Service
Natural Resources Program Center
1201 Oakridge Dr, Suite 150
Fort Collins, CO 80525

phone: 970.225.3559
e-mail: peter_budde@nps.gov
Dave Press/GOGA/NPS

Dave Press/GOGA/NPS
06/23/2010 12:55 PM

To Peter Budde/FTCOLLINS/NPS@NPS
cc
Subject Re: Information Request: Cameras in parks for wildlife surveillance?

Hi Peter,

Reporting for the SFAN:

Point Reyes National Seashore
4 active cameras, up to 8 at any one time over the last 2 years

Pinnacles National Monument
3 active cameras, up to 6 at any one time over the last 2 years

Golden Gate National Recreation Area
12 active cameras, up to 16 at any one time over the last 2 years

Presidio of San Francisco
no active cameras, but up to 70 cameras used for a wildlife study in 2003-04

Muir Woods NM, John Muir NHS, Eugene O'Neil NHS, Fort Point NHS
no cameras

Let me know if you have any questions,
Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

Peter Budde

Peter Budde
06/21/2010 11:12 MDT

To: deborah_angell@nps.gov, kristen_beaupre@nps.gov, margaret_beer@nps.gov, john_boetsch@nps.gov, jennifer_burke@nps.gov, kristina_callahan@nps.gov, les_chow@nps.gov, bret_christoe@nps.gov, rob_daley@nps.gov, gordon_dicus@nps.gov, linda_dye@nps.gov, patrick_flaherty@nps.gov, russell_frith@nps.gov, whitney_granger@nps.gov, jennifer_haack@nps.gov, mark_hart@nps.gov, ronald_holmes@nps.gov, bill_johnson@nps.gov, Fagan_Johnson@nps.gov, rebecca_key@nps.gov, kelly_kozar@nps.gov, adam_kozlowski@nps.gov, michael_kunze@nps.gov, lena_lee@nps.gov, mark_lehman@nps.gov, scott_miller@nps.gov, sean_mohren@nps.gov, bill_moore@nps.gov, missy_powell@nps.gov, dave_press@nps.gov, tom_richie@nps.gov, dale_roberts@nps.gov, ann_rodman@nps.gov, gareth_rowell@nps.gov, geoffrey_sanders@nps.gov, Joshua_Schmidt@nps.gov, dennis_skidds@nps.gov, cuyler_smith@nps.gov, allison_snyder@nps.gov, heidi_sosinski@nps.gov, angie_southwould@nps.gov, helen_thomas@nps.gov, bob_truitt@nps.gov, sarah_wakamiya@nps.gov, alan_williams@nps.gov, stephen_k_wilson@nps.gov, brian_witcher@nps.gov, christina_wright@nps.gov

cc:

Subject: Information Request: Cameras in parks for wildlife surveillance?

Greetings.

Bert Frost has asked for a summary of number of parks that may have deployed passive or infrared cameras for wildlife surveillance. If any of you are aware of these activities, can you please send me a list of parks and number of cameras in each respective park?

Thanks!

Peter

Peter Budde, GIS Team Lead
Inventory & Monitoring Division (IMD)
National Park Service
Natural Resources Program Center
1201 Oakridge Dr, Suite 150
Fort Collins, CO 80525

phone: 970.225.3559
e-mail: peter_budde@nps.gov

Cicely Muldoon
06/23/2010 12:11 EDT

To: "Dave Press" <Dave_Press@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>, Ann Nelson/PORE/NPS, "Brannon Ketcham" <Brannon_Ketcham@nps.gov>
cc:
Subject: Fw: info requested

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

----- Original Message -----
From: "David M Weiman" [agresources@erols.com]
Sent: 06/23/2010 10:31 AM AST
To: Cicely Muldoon
Subject: RE: info requested

Cicely.

Thank you for your reply and the additional information.

We did not know a camera was installed at the Estero in 2007.

We ask the following:

(1) Please provide all photographic records for the April 26, 2007 Disturbance Report. Include all of the photographic records beginning at least one hour prior to and after the observation time (3:45 to 5:00 pm). By our rough calculations, that should be approximately 200 time-stamped photographic files based on our understanding of the camera and how it was operated by NPS.

(2) Please provide all photographic records for the April 29, 2007 Survey and Disturbance Report. The Survey Record indicates that the observers were present from 9:30 am until 4:00 PM. Include all of the photographic records one hour prior to and after the observation time. By our rough calculations, that should be approxomately 500 time-stamped photographic files based on our understanding of the camera and how it was operated by NPS.

(3) Please do the same for the May 8, 2007, Survey and Disturbance Report.

Given the circumstances, I would further request that these records be made available immediately -- today if possible.

Dave Press, following the June 7 MMC meeting, demonstrated that the information is readily available. We would urge that it be placed on a disk and made available as quickly as possible.

Lastly, please send a copy of the disk to me, Kevin and Nancy Lunny, Dr. Corey Goodman, and the MMC.

Thank you for your cooperation.

Dave W.

-----Original Message-----
From: Cicely_Muldoon@nps.gov [mailto:Cicely_Muldoon@nps.gov]
Sent: Tuesday, June 22, 2010 4:39 PM
To: David M Weiman
Cc: Kevin Lunny; Tim Ragen
Subject: RE: info requested

Dave, this is my understanding of the timeline for the harbor seal monitoring cameras at Drakes Estero -

2007: one camera
2008: two cameras
2009: one camera
2010: one camera - I believe this camera was non operational as of early June - the grad student who was using this camera injured her knee and hasn't been able to monitor the camera for the last few weeks

the map already sent represents the camera angles and approximate locations

can you be more specific about your last question related to any other cameras for any other purposes - are you interested in terrestrial wildlife in and around the Estero as well? also, when you refer to prior, how far back are you interested in - prior to Kevin's operation in the Estero?

Cicely

(Embedded image moved to file: pic00893.gif)

"David M Weiman" <agresources@erols.com>		To
06/21/2010 12:40 PM	<Cicely_Muldoon@nps.gov>	cc
	RE: info requested	Subject

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Thank you for responding to my email. In the future, any inquires will be coordinated with your office, as requested. If my inquiry caused confusion,

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From: Cicely_Muldoon@nps.gov [mailto:]
Sent: Monday, June 21, 2010 12:10 PM
To: agresources@erols.com
Cc: Ben_Becker@nps.gov; Sarah_Allen@nps.gov; Dave_Press@nps.gov
Subject: info requested

Hi David - a request - would you please add me to any email that you send out to Point Reyes staff requesting information? It will be more efficient, and keep everyone in the loop, if communications are coordinated through my office. We talked about this at the MMC meeting, but possible you weren't part of that conversation? Thanks for your help with this.

To follow up on your point of clarification question - there is one remote camera at present focussed on the Estero (the UEF site, I believe). The grad student who is using the camera on a project through SF State injured her knee, so we are uncertain if it is functioning at present. I sent Kevin a map on 6/14 regarding the approximate location and field of view of the remote cameras that have been used for the OB and EUF sites over the past couple of years. I assume he shared this with you?

Cicely

(Embedded image moved to file: pic05538.gif)

Cicely Muldoon/PORE/NPS
06/23/2010 09:26 AM

To tragen@mmc.gov
cc
bcc George Turnbull/OAKLAND/NPS; dave press; Ben Becker/PORE/NPS@NPS; Brannon Ketcham/PORE/NPS@NPS
Subject Fw: info requested

Tim, I am holding off, per your note of yesterday, on responding to Corey and Dave in anticipation of your calls to each party, as you requested. I am pursuing how we might post all of the photographs on a public website to make them all available to anyone who would like to see them. These individual requests are taking a great deal of staff time, and I'd be happy to make these photographs available to anyone interested if we can work out the IT issues. Look forward to talking to you.

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

----- Forwarded by Cicely Muldoon/PORE/NPS on 06/23/2010 09:20 AM -----

"David M Weiman" <agresources@erols.com>
06/23/2010 07:31 AM

To "Muldoon, Cicely " <Cicely_Muldoon@nps.gov>
cc
Subject RE: info requested

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06/21/2010 12:40 PM

To: <Cicely_Muldoon@nps.gov>
cc:
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Cicely

(Embedded image moved to file: pic05538.gif)

Cicely Muldoon/PORE/NPS
06/23/2010 05:32 AM

To George Turnbull/OAKLAND/NPS, "Dave Press" <Dave_Press@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>
cc
bcc
Subject Fw: Photos

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

----- Original Message -----
From: Corey Goodman [EX 6 m]
Sent: 06/23/2010 01:52 PM ZE2
To: Cicely Muldoon
Cc: David Weiman <agresources@erols.com>; Kevin Lunny <kevin EX 6 >;
Tim Ragen <tragen@mmc.gov>
Subject: Photos

Cicely,
In addition to March 23 2008, and in light of yesterday's announcement
of a camera in 2007, please also send me the complete photos from
April 26, April 29, and May 8 2007.
Thanks very much.
Corey

Sent from my iPhone

Corey Goodman

Ex 6

Corey Goodman
<EX 6 [redacted]
06/23/2010 04:52 AM

To Cicely Muldoon <cicely_muldoon@nps.gov>
cc David Weiman <agresources@erols.com>, Kevin Lunny
EX 6 [redacted] Tim Ragen <tragen@mmc.gov>
bcc
Subject Photos

History: This message has been forwarded.

Cicely,
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Corey Goodman

EX 6 [redacted]

"Tim Ragen"
<tragen@mmc.gov>
06/22/2010 03:41 PM

To "'Corey Goodman'" <EX 6
<cicely_muldoon@nps.gov>
cc "'David Weiman'" <agresources@erols.com>, "'Kevin Lunny'"
EX 6 EX 6 >
bcc

Subject RE: the photos you sent

History: This message has been forwarded.

Hi All,

I am concerned that the exchanges we've had since our data meeting may be undermining much of the progress I thought we had made in the past two meetings. That being said, I continue to believe that there is a way forward. I am wondering if we wouldn't benefit from a pause in this back and forth while we consider the next step. I had hoped that the data meeting would bring closure to many of the remaining issues and that some of us could back away and let Cicely and Kevin develop their working relationship. That may have been naive on my part, and now I am wondering if we might need or benefit from a small meeting to tie up remaining details and complete this transition. From the MMC perspective, a pause that allows everyone a chance to catch their breath would be a good thing. So I am asking everyone to step back and take a minute to let the waters calm a bit. I will try to call each of you separately in the next three days to talk about how to move forward.

Thanks for considering my request. Best, Tim

From: Corey Goodman [mailto:EX 6
Sent: Tuesday, June 22, 2010 4:59 PM
To: cicely_muldoon@nps.gov
Cc: David Weiman; David Press; Kevin Lunny; Tim Ragen
Subject: Re: the photos you sent

Hi Cicely,

I am puzzled by your June 21 reply concerning the digital photos.

We have all committed to improving communications, but I fear the past several weeks foreshadow more of the same. I fear I am still experiencing the same kinds of needless and costly administrative roadblocks to access basic data suffered under the previous administration at Point Reyes.

On Sunday June 6, I read the May 1, 2009 NPS Briefing Statement for the first time and discovered that NPS had installed a hidden camera (now understood to be multiple hidden cameras). On Monday June 7, at the MMC meeting on Disputed NPS Harbor Seal Data, I asked for the photo series from two dates: March 14, 2008 and March 23, 2008, both with implications concerning DBOC

oyster boats, NPS Harbor Seal Data, NPS observer integrity and the MMC deliberations.

About a half-hour after the meeting concluded, while Kevin and I were standing in the parking lot after the meeting, Dave Press came over, handed us a B&W print from one of the photos (March 14, 2008) and acknowledged that they were easy to find (since they are date and time stamped). Further, he indicated that there were about 10 photos (one per minute). Dave said he'd send the photos later that day. He didn't. Two days later on June 9, I requested these photos from him and you. On Friday June 11, the correct photos from March 14 arrived, and I was also sent some photos from March 23.

The March 23, 2008 photos were puzzling. They contained no boat, and they were from camera #2 and not camera #1. I wrote back to Dave and you on June 15 asking for the correct photos from March 23 (i.e., the ones allegedly containing the DBOC boat) and I got no reply. Then I wrote again one week later. You replied yesterday that your focus now is on a FOIA request, and because of it, you cannot reply at this time.

The history in this matter is well-documented. FOIA requests to PRNS and the Western Regional Office have not been answered in a timely basis and more often than not, been used to withhold and delay information, not make it available. In 2007, I was denied the requested and already public harbor seal data. Senator Feinstein intervened. NPS tried to explain that it might be expensive and after the Senator directed that the bill be sent to her, the harbor seal data was finally released. As you heard at the MMC meeting, NPS refused to answer the simplest question about the NPS claim, made in 2007 at a Board of Supervisor's meeting that harbor seals had declined 80%. I asked: "at which site?" That question took two years to get an answer to, and the answer given to the NAS panel was quite different from the answer given to the MMC panel. By the way, I was ultimately told back in Summer, 2007, after several months and rounds of appeal, that if I wanted the data, I would have to sue the federal government.

In 2008, I asked Ben Becker, David Press and Sarah Allen to provide me copies of documents submitted to the NAS. Your staff stated to the MMC that the May 1 Briefing Paper was submitted to the National Academy of Sciences. That is not correct.

David Press demonstrated that these photos are readily accessible and available. I

request that NPS honor the commitment to provide this data so that it can be reviewed and analyzed. We are under severe time constraints because of MMC. They want to complete their report and have told us that we must submit our analysis promptly.
President Obama made "transparency" a cornerstone of his presidency. The President issued directives to improve transparency on his very first day in office. FOIA should not impede access to information.

Please help us meet our commitments to the MMC and arrange to have this data made available immediately.

By the way, I am also still waiting to hear from you concerning the questions you promised to answer concerning the May 1, 2009 Briefing Statement. No one -- from the scientists to Dave Graber to you -- have yet answered three simple questions concerning this 33-page document:

Who requested it?
Who wrote it?
Who received it?

Thanks very much.

Corey

On Jun 21, 2010, at 10:42 AM, cicely_muldoon@nps.gov wrote:

Hi Corey,

My responsibility on the response time - had intended to send you one more comprehensive response last week to a series of questions you have sent to a variety of NPS staff so that the lines of communications could be a little less cluttered. Regrettably my intentions exceed the time I've had available, and as I presume you are aware we received a FOIA request last week on this same subject from the Point Reyes Light, for which we are in the process of assembling a much more comprehensive response. I'm sure you will understand that our priority has to be the FOIA response, but I do hope to get you a clarification as you request on the photos already sent.

I'm out of the office today, but will be in contact with Dave, and hope to get back to you as soon as I can.

Thanks

Cicely

(Embedded image moved to file: pic07267.gif)

Corey Goodman
EX 6
EX 6

06/21/2010 09:40 AM

To: Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>

cc: David Weiman <agresources@erols.com>, Kevin Lunny <kevin@EX 6 Tim Ragen <tragen@mmc.gov>

Subject: Re: the photos you sent

David and Cicely,
Nearly a week ago, I wrote and asked for further photographs, or further clarification, of photos from Sunday March 23. I never heard back from either of you. Would you please send me all of the photos from that day from both cameras, or at the very least the photos, and 30 minutes to either side, of the DBOC boat on the estero. This is a time sensitive request.
Could you please confirm how you plan to respond.
Thanks very much.
Best wishes,
Corey

On Jun 15, 2010, at 5:21 AM, Corey Goodman wrote:

David and Cicely,

Thanks very much for sending the CD with the photos. However, it is possible that may not have sent the right photos. Please correct me if I am mistaken.

When I made my request for photos last week, I was only aware of one camera pointing at Drakes Estero (you had not told us at the meeting on Monday June 7 that there was a second camera). I asked for photos from two days: March 14, 2008 (the date of a disturbance event) and March 23, 2008 (a Sunday cited in the May 1, 2009 "Briefing Statement" for which "NPS has time stamped images of a DBOC boat present on Drakes Estero").

Since my request, you have identified that you have two cameras on Drakes Estero, one (#1) further south pointing west at the lateral channel and oyster bags on UEN and OB, and the other (#2) further north and pointing northwest at UEF and the mouth of Schooner Bay.

For March 14, 2008, who correctly sent me photos of the lateral channel from camera #1 showing the image of a boat.

For March 23, 2008, who sent me a small number of photos pointing northwest from camera #2. These photos do not show a boat. Do you have other photos showing the DBOC boat?

In the "Briefing Statement", were you citing a DBOC boat in camera #1 or #2?

If you were citing camera #1, please send me those photos. If you were citing camera #2, please explain.

I presume it is simply a matter of sending me the correct photos from the appropriate camera.

Thanks for taking care of this.

Best wishes,

Corey

Corey S. Goodman, Ph.D.
EX 6
EX 6

<pic07267.gif>

Cicely.

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Cicely Muldoon/PORE/NPS
06/23/2010 09:11 AM

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cc
bcc
Subject Fw: info requested

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
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Subject RE: info requested

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Hi Cicely,

I am puzzled by your June 21 reply concerning the digital photos.

We have all committed to improving communications, but I fear the past several weeks foreshadow more of the same. I fear I am still experiencing the same kinds of needless and costly administrative roadblocks to access basic data suffered under the previous administration at Point Reyes.

On Sunday June 6, I read the May 1, 2009 NPS Briefing Statement for the first time and discovered that NPS had installed a hidden camera (now understood to be multiple hidden cameras). On Monday June 7, at the MMC meeting on Disputed NPS Harbor Seal Data, I asked for the photo series from two dates: March 14, 2008 and March 23, 2008, both with implications concerning DBOC oyster boats, NPS Harbor Seal Data, NPS observer integrity and the MMC deliberations.

About a half-hour after the meeting concluded, while Kevin and I were standing in the parking lot after the meeting, Dave Press came over, handed us a B&W print from one of the photos (March 14, 2008) and acknowledged that they were easy to find (since they are date and time stamped). Further, he indicated that there were about 10 photos (one per minute). Dave said he'd send the photos later that day. He didn't. Two days later on June 9, I requested these photos from him and you. On Friday June 11, the correct photos from March 14 arrived, and I was also sent some photos from March 23.

The March 23, 2008 photos were puzzling. They contained no boat, and they were from camera #2 and not camera #1. I wrote back to Dave and you on June 15 asking for the correct photos from March 23 (i.e., the ones allegedly containing the DBOC boat) and I got no reply. Then I wrote again one week later. You replied yesterday that your focus now is on a FOIA request, and because of it, you cannot

reply at this time.

The history in this matter is well-documented. FOIA requests to PRNS and the Western Regional Office have not been answered in a timely basis and more often than not, been used to withhold and delay information, not make it available. In 2007, I was denied the requested and already public harbor seal data. Senator Feinstein intervened. NPS tried to explain that it might be expensive and after the Senator directed that the bill be sent to her, the harbor seal data was finally released. As you heard at the MMC meeting, NPS refused to answer the simplest question about the NPS claim, made in 2007 at a Board of Supervisor's meeting that harbor seals had declined 80%. I asked: "at which site?" That question took two years to get an answer to, and the answer given to the NAS panel was quite different from the answer given to the MMC panel. By the way, I was ultimately told back in Summer, 2007, after several months and rounds of appeal, that if I wanted the data, I would have to sue the federal government.

In 2008, I asked Ben Becker, David Press and Sarah Allen to provide me copies of documents submitted to the NAS. Your staff stated to the MMC that the May 1 Briefing Paper was submitted to the National Academy of Sciences. That is not correct.

David Press demonstrated that these photos are readily accessible and available. I request that NPS honor the commitment to provide this data so that it can be reviewed and analyzed. We are under severe time constraints because of MMC. They want to complete their report and have told us that we must submit our analysis promptly.

President Obama made "transparency" a cornerstone of his presidency. The President issued directives to improve transparency on his very first day in office. FOIA should not impede access to information.

Please help us meet our commitments to the MMC and arrange to have this data made available immediately.

By the way, I am also still waiting to hear from you concerning the questions you promised to answer concerning the May 1, 2009 Briefing Statement. No one -- from the scientists to Dave Graber to you -- have yet answered three simple questions concerning this 33-page document:

Who requested it?

Who wrote it?
Who received it?

Thanks very much.

Corey

On Jun 21, 2010, at 10:42 AM, cicely_muldoon@nps.gov wrote:

> Hi Corey,
>
> My responsibility on the response time - had intended to send you one more comprehensive response last week to a series of questions you have sent to a variety of NPS staff so that the lines of communications could be a little less cluttered. Regrettably my intentions exceed the time I've had available, and as I presume you are aware we received a FOIA request last week on this same subject from the Point Reyes Light, for which we are in the process of assembling a much more comprehensive response. I'm sure you will understand that our priority has to be the FOIA response, but I do hope to get you a clarification as you request on the photos already sent. I'm out of the office today, but will be in contact with Dave, and hope to get back to you as soon as I can.
>
> Thanks
>
> Cicely
>
> (Embedded image moved to file: pic07267.gif)

Corey Goodman
EX 6 [redacted]
EX 6

06/21/2010 09:40 AM

To: Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>

cc: David Weiman <agresources@erols.com>, Kevin Lunny EX 6 [redacted], Tim

Ragen <tragen@mmc.gov>
Subject
Re: the photos you sent

David and Cicely,
Nearly a week ago, I wrote and asked for further photographs, or further clarification, of photos from Sunday March 23. I never heard back from either of you. Would you please send me all of the photos from that day from both cameras, or at the very least the photos, and 30 minutes to either side, of the DBOC boat on the estero. This is a time sensitive request.
Could you please confirm how you plan to respond.
Thanks very much.
Best wishes,
Corey

On Jun 15, 2010, at 5:21 AM, Corey Goodman wrote:

> David and Cicely,
>
> Thanks very much for sending the CD with the photos. However, it is possible that may not have sent the right photos. Please correct me if I am mistaken.
>
> When I made my request for photos last week, I was only aware of one camera pointing at Drakes Estero (you had not told us at the meeting on Monday June 7 that there was a second camera). I asked for photos from two days: March 14, 2008 (the date of a disturbance event) and March 23, 2008 (a Sunday cited in the May 1, 2009 "Briefing Statement" for which "NPS has time stamped images of a DBOC boat present on Drakes Estero").
>
> Since my request, you have identified that you have two cameras on Drakes Estero, one (#1) further south pointing west at the lateral

channel and oyster bags on UEN and OB, and the other (#2) further north and pointing northwest at UEF and the mouth of Schooner Bay.

For March 14, 2008, who correctly sent me photos of the lateral channel from camera #1 showing the image of a boat.

For March 23, 2008, who sent me a small number of photos pointing northwest from camera #2. These photos do not show a boat. Do you have other photos showing the DBOC boat?

In the "Briefing Statement", were you citing a DBOC boat in camera #1 or #2?

If you were citing camera #1, please send me those photos. If you were citing camera #2, please explain.

I presume it is simply a matter of sending me the correct photos from the appropriate camera.

Thanks for taking care of this.

Best wishes,

Corey

Corey S. Goodman, Ph.D.
EX 6 X 6

EX 6
EX 6

<pic07267.gif>

Cicely Muldoon/PORE/NPS
06/22/2010 01:38 PM

To "David M Weiman" <agresources@erols.com>
cc "Kevin Lunny" <kevin@drakesbayoyster.com>, Tim Ragen <tragen@mmc.gov>
bcc Alma Ripps/WASO/NPS@NPS; Ben Becker/PORE/NPS@NPS; Ann Nelson/PORE/NPS; dave press; Sarah Allen/PORE/NPS@NPS; Ann Nelson/PORE/NPS
Subject RE: info requested

Dave, this is my understanding of the timeline for the harbor seal monitoring cameras at Drakes Estero -

2007: one camera
2008: two cameras
2009: one camera
2010: one camera - I believe this camera was non operational as of early June - the grad student who was using this camera injured her knee and hasn't been able to monitor the camera for the last few weeks

the map already sent represents the camera angles and approximate locations

can you be more specific about your last question related to any other cameras for any other purposes - are you interested in terrestrial wildlife in and around the Estero as well? also, when you refer to prior, how far back are you interested in - prior to Kevin's operation in the Estero?

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

"David M Weiman" <agresources@erols.com>

"David M Weiman" <agresources@erols.com>
06/21/2010 12:40 PM

To <Cicely_Muldoon@nps.gov>
cc
Subject RE: info requested

Cicely.

Thank you for responding to my email. In the future, any inquires will be coordinated with your office, as requested. If my inquiry caused confusion, my apologies.

Immediately after the meeting, the Lunnys and I speculated that there were likely more cameras. Hence, the inquiry. This was prior to our learning of the second camera from the Citizen's interview with Dave Graber.

To further clarify and to make certain we fully understand the situation, is it correct to say there are only two cameras, those [redacted] on the map you provided Kevin and Nancy? And, there were only two cameras?

[redacted], today or prior are or were there any other cameras?

[redacted] today or prior, were there any other cameras at [redacted] time and for any other purpose?

We just want to make certain that the situation is accurately understood.

Thank you.

Dave W.

-----Original Message-----
From: Cicely_Muldoon@nps.gov [mailto:]
Sent: Monday, June 21, 2010 12:10 PM
To: agresources@erols.com
Cc: Ben_Becker@nps.gov; Sarah_Allen@nps.gov; Dave_Press@nps.gov
Subject: info requested

Hi David - a request - would you please add me to any email that you send out to Point Reyes staff requesting information? It will be more efficient, and keep everyone in the loop, if communications are coordinated through my office. We talked about this at the MMC meeting, but possible you weren't part of that conversation? Thanks for your help with this.

To follow up on your point of clarification question - there is one remote camera at [redacted] focussed on the Estero (the UEF site, I believe). The grad student who is using the camera on [redacted] project through SF State injured her knee, so we are uncertain if it is functioning at present. I sent Kevin a map on 6/14 regarding the approximate location and field of view of the remote cameras that [redacted] been used for the OB and EUF sites over the past couple of years. I assume he shared this with you?

Cicely

(Embedded image moved to file: pic05538.gif)

Dave Press
06/22/2010 14:53 EDT

To: Cicely Muldoon/PORE/NPS
cc: Sarah Allen/PORE/NPS@NPS
Subject: Re: Fw: Fw: One more question

The earlies photos that I found begin May 5, 2007. I really don't think the cameras were placed any earlier than that. If so, we no longer seem to have the photos. The early images face northwest to UEF with Creamery Bay in the background.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
Cicely Muldoon

Cicely Muldoon
06/22/2010 01:24 PM EDT

To: "Dave Press" <Dave_Press@nps.gov>
cc:
Subject: Fw: Fw: One more question

Can you confirm sarah thinks march

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

Alma Ripps

----- Original Message -----
From: Alma Ripps
Sent: 06/22/2010 01:02 PM EDT
To: Cicely Muldoon
Cc: Sarah Allen
Subject: Re: Fw: One more question

Really need to know this date ASAP.

Alma

Alma Ripps
Management Assistant
Office of the Director
National Park Service
1849 C Street, NW, Room 3115
Washington, DC 20240

Private Line: 202 208-3326
General Line: 202 208-3818
Fax: 202 208-7889
Email: Alma_Ripps@nps.gov

Cicely Muldoon/PORE/NPS

Cicely Muldoon/PORE/NPS
06/21/2010 01:14 PM

To Sarah Allen
cc Alma Ripps/WASO/NPS@NPS
Subject Fw: One more question

Sarah, can you provide this information?
thanks
c

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

----- Forwarded by Cicely Muldoon/PORE/NPS on 06/21/2010 10:13 AM -----

Alma Ripps/WASO/NPS
06/21/2010 10:10 AM

To Cicely Muldoon/PORE/NPS@NPS
cc
Subject One more question

Briefing paper said that cameras were first placed out in 2007. Could you be more definitive about the month?

Got your other message, thanks for the info.

Alma

Alma Ripps
Management Assistant
Office of the Director
National Park Service
1849 C Street, NW, Room 3115
Washington, DC 20240

Private Line: 202 208-3326
General Line: 202 208-3818
Fax: 202 208-7889
Email: Alma_Ripps@nps.gov

Cicely Muldoon/PORE/NPS
06/22/2010 10:33 AM

To Alma Ripps/WASO/NPS@NPS
cc
bcc
Subject Re: Fw: One more question

Believe march 07, like to confirm, need database guy who is not in yet

---
Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

Alma Ripps

----- Original Message -----
From: Alma Ripps
Sent: 06/22/2010 01:02 PM EDT
To: Cicely Muldoon
Cc: Sarah Allen
Subject: Re: Fw: One more question
Really need to know this date ASAP.

Alma

Alma Ripps
Management Assistant
Office of the Director
National Park Service
1849 C Street, NW, Room 3115
Washington, DC 20240

Private Line: 202 208-3326
General Line: 202 208-3818
Fax: 202 208-7889
Email: Alma_Ripps@nps.gov

Cicely Muldoon/PORE/NPS

Cicely Muldoon/PORE/NPS
06/21/2010 01:14 PM

To Sarah Allen
cc Alma Ripps/WASO/NPS@NPS
Subject Fw: One more question

Sarah, can you provide this information?
thanks
c

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

---- Forwarded by Cicely Muldoon/PORE/NPS on 06/21/2010 10:13 AM ----

Alma Ripps/WASO/NPS
06/21/2010 10:10 AM

To Cicely Muldoon/PORE/NPS@NPS
cc
Subject One more question

Briefing paper said that cameras were first placed out in 2007. Could you be more definitive about the month?

Got your other message, thanks for the info.

Alma

Alma Ripps
Management Assistant
Office of the Director
National Park Service
1849 C Street, NW, Room 3115
Washington, DC 20240

Private Line: 202 208-3326
General Line: 202 208-3818
Fax: 202 208-7889
Email: Alma_Ripps@nps.gov

Cicely Muldoon
06/21/2010 20:45 EDT

To: "Sarah Allen" <Sarah_Allen@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>
cc:
Subject: Fw: info requested

I believe I have all this info but will verify with you tomorrow, thx

---
Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

----- Original Message -----
From: "David M Weiman" [agresources@erols.com]
Sent: 06/21/2010 03:40 PM AST
To: Cicely Muldoon
Subject: RE: info requested

Cicely.

Thank you for responding to my email. In the future, any inquires will be coordinated with your office, as requested. If my inquiry caused confusion, my apologies.

Immediately after the meeting, the Lunnys and I speculated that there were likely more cameras. Hence, the inquiry. This was prior to our learning of the second camera from the Citizen's interview with Dave Graber.

To further clarify and to make certain we fully understand the situation, is it correct to say there are only two cameras, those identified on the map you provided Kevin and Nancy? And, there were only two cameras?

Or, today or prior are or were there any other cameras?

And today or prior, were there any other cameras at any time and for any other purpose?

We just want to make certain that the situation is accurately understood.

Thank you.

Dave W.

-----Original Message-----
From: Cicely_Muldoon@nps.gov [mailto:]
Sent: Monday, June 21, 2010 12:10 PM
To: agresources@erols.com
Cc: Ben_Becker@nps.gov; Sarah_Allen@nps.gov; Dave_Press@nps.gov
Subject: info requested

Hi David - a request - would you please add me to any email that you send out to Point Reyes staff requesting information? It will be more efficient, and keep everyone in the loop, if communications are coordinated through my office. We talked about this at the MMC meeting, but possible you weren't part of that conversation? Thanks for your help with this.

To follow up on your point of clarification question - there is one remote camera at present focussed on the Estero (the UEF site, I believe). The grad student who is using the camera on a project through SF State injured her knee, so we are uncertain if it is functioning at present. I sent Kevin a map on 6/14 regarding the approximate location and field of view of the remote cameras that have been used for the OB and EUF sites over the past couple of years. I assume he shared this with you?

Cicely

(Embedded image moved to file: pic05538.gif)

Dave Press
06/21/2010 11:15 EDT

To: Cicely Muldoon/OAKLAND/NPS
cc:
Subject: Fw: Point of Clarification

FYI

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
----- Forwarded by Dave Press/GOGA/NPS on 06/21/2010 08:15 -----

"David M Weiman" <agresources@erols.com>
06/20/2010 09:34 AST

To: "Becker, Ben" <ben_becker@nps.gov>, "Press, Dave" <dave_press@nps.gov>, "Allen, Sarah, Ph.D." <sarah_allen@nps.gov>
cc:
Subject: FW: Point of Clarification

Ben, David and Sarah.

We are anxious to have this matter clarified.

May we please have a response?

Thank you.

dave w.

From: David M Weiman [mailto:agresources@erols.com]
Sent: Wednesday, June 09, 2010 5:26 PM
To: 'ben_becker@nps.gov'; 'dave_press@nps.gov'; Allen, Sarah, Ph.D. (sarah_allen@nps.gov)
Subject: Point of Clarification

Ben, David and Sarah.

Kevin and Nancy were reviewing the MMC meeting, and called me to discuss it. One part of that discussion centered on the camera taking photos of the Estero.

Someone indicated that NPS regularly uses these cameras, and, at present, they are in use elsewhere at Point Reyes.

The question emerged, does NPS have more than one camera pointed at the Estero, on or off shore, or is this the only camera?

We request that this be clarified at your earliest opportunity.

Thank you.

dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

"David M Weiman"
<agresources@erols.com>
06/21/2010 12:40 PM

To <Cicely_Muldoon@nps.gov>
cc
bcc
Subject RE: info requested

History: This message has been replied to and forwarded.

Cicely.

Thank you for responding to my email. In the future, any inquires will be coordinated with your office, as requested. If my inquiry caused confusion, my apologies.

Immediately after the meeting, the Lunnys and I speculated that there were likely more cameras. Hence, the inquiry. This was prior to our learning of the second camera from the Citizen's interview with Dave Graber.

To further clarify and to make certain we fully understand the situation, is it correct to say there are only two cameras, those identified on the map you provided Kevin and Nancy? And, there were only two cameras?

Or, today or prior are or were there any other cameras?

And today or prior, were there any other cameras at any time and for any other purpose?

We just want to make certain that the situation is accurately understood.

Thank you.

Dave W.

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Sent: Monday, June 21, 2010 12:10 PM
To: agresources@erols.com
Cc: Ben_Becker@nps.gov; Sarah_Allen@nps.gov; Dave_Press@nps.gov
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Hi David - a request - would you please add me to any email that you send out to Point Reyes staff requesting information? It will be more efficient, and keep everyone in the loop, if communications are coordinated through my office. We talked about this at the MMC meeting, but possible you weren't part of that conversation? Thanks for your help with this.

To follow up on your point of clarification question - there is one remote camera at present focussed on the Estero (the UEF site, I believe). The grad student who is using the camera on a project through SF State injured her knee, so we are uncertain if it is functioning at present. I sent Kevin a map on 6/14 regarding the approximate location and field of view of the remote cameras that have been used for the OB and EUF sites over the past couple of years. I assume he shared this with you?

Cicely

(Embedded image moved to file: pic05538.gif)

Dave Press/GOGA/NPS
06/21/2010 10:52 AM

To Cicely Muldoon/OAKLAND/NPS@NPS, Sarah Allen/PORE/NPS@NPS, Ben Becker/PORE/NPS@NPS
cc
bcc
Subject Fw: Information Request: Cameras in parks for wildlife surveillance?

FYI -

I will work on assembling information from the other network parks.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
----- Forwarded by Dave Press/GOGA/NPS on 06/21/2010 10:51 -----

Peter Budde
06/21/2010 11:12 MDT

To: deborah_angell@nps.gov, kristen_beaupre@nps.gov, margaret_beer@nps.gov, john_boetsch@nps.gov, jennifer_burke@nps.gov, kristina_callahan@nps.gov, les_chow@nps.gov, bret_christoe@nps.gov, rob_daley@nps.gov, gordon_dicus@nps.gov, linda_dye@nps.gov, patrick_flaherty@nps.gov, russell_frith@nps.gov, whitney_granger@nps.gov, jennifer_haack@nps.gov, mark_hart@nps.gov, ronald_holmes@nps.gov, bill_johnson@nps.gov, Fagan_Johnson@nps.gov, rebecca_key@nps.gov, kelly_kozar@nps.gov, adam_kozlowski@nps.gov, michael_kunze@nps.gov, lena_lee@nps.gov, mark_lehman@nps.gov, scott_miller@nps.gov, sean_mohren@nps.gov, bill_moore@nps.gov, missy_powell@nps.gov, dave_press@nps.gov, tom_richie@nps.gov, dale_roberts@nps.gov, ann_rodman@nps.gov, gareth_rowell@nps.gov, geoffrey_sanders@nps.gov, Joshua_Schmidt@nps.gov, dennis_skidds@nps.gov, cuyler_smith@nps.gov, allison_snyder@nps.gov, heidi_sosinski@nps.gov, angie_southwould@nps.gov, helen_thomas@nps.gov, bob_truitt@nps.gov, sarah_wakamiya@nps.gov, alan_williams@nps.gov, stephen_k_wilson@nps.gov, brian_witcher@nps.gov, christina_wright@nps.gov
cc:
Subject: Information Request: Cameras in parks for wildlife surveillance?

Greetings.

Bert Frost has asked for a summary of number of parks that may have deployed passive or infrared cameras for wildlife surveillance. If any of you are aware of these activities, can you please send me a list of parks and number of cameras in each respective park?

Thanks!

Peter

Peter Budde, GIS Team Lead
Inventory & Monitoring Division (IMD)

Cicely Muldoon/PORE/NPS
06/21/2010 10:42 AM

To EX 6 EX 6
cc David Weiman <agresources@erols.com>, David Press <dave_press@nps.gov>, Kevin Lunny <kevin@EX 6 m>, Tim Ragen <tragen@mmc.gov>
bcc George Turnbull/OAKLAND/NPS; Ann Nelson/PORE/NPS; Sue_Husari@nps.gov; Ben Becker/PORE/NPS@NPS; Gordon White/PORE/NPS; markb@ptreyes.org; Alma Ripps/WASO/NPS@NPS; John A Dell'Osso/PORE/NPS
Subject Re: the photos you sent

Hi Corey,

My responsibility on the response time - had intended to send you one more comprehensive response last week to a series of questions you have sent to a variety of NPS staff so that the lines of communications could be a little less cluttered. Regrettably my intentions exceed the time I've had available, and as I presume you are aware we received a FOIA request last week on this same subject from the Point Reyes Light, for which we are in the process of assembling a much more comprehensive response. I'm sure you will understand that our priority has to be the FOIA response, but I do hope to get you a clarification as you request on the photos already sent. I'm out of the office today, but will be in contact with Dave, and hope to get back to you as soon as I can.

Thanks

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

Corey Goodman <EX 6 m>

Corey Goodman
<EX 6
06/21/2010 09:40 AM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
cc David Weiman <agresources@erols.com>, Kevin Lunny <kevin@EX 6 Tim Ragen <tragen@mmc.gov>
Subject Re: the photos you sent

David and Cicely,
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Could you please confirm how you plan to respond.
Thanks very much.

Best wishes,
Corey

On Jun 15, 2010, at 5:21 AM, Corey Goodman wrote:

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> possible that may not have sent the right photos. Please correct me
> if I am mistaken.
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> Drakes Estero, one (#1) further south pointing west at the lateral
> channel and oyster bags on UEN and OB, and the other (#2) further
> north and pointing northwest at UEF and the mouth of Schooner Bay.
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> have other photos showing the DBOC boat?
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> In the "Briefing Statement", were you citing a DBOC boat in camera
> #1 or #2?
>
> If you were citing camera #1, please send me those photos. If you
> were citing camera #2, please explain.
>
> I presume it is simply a matter of sending me the correct photos
> from the appropriate camera.
>
> Thanks for taking care of this.
>
> Best wishes,
>
> Corey
>
> Corey S. Goodman, Ph.D.
> [redacted]
>
> [redacted]
> [redacted]
>
>

Corey Goodman
EX 6

06/21/2010 09:40 MST

To: Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
cc: David Weiman <agresources@erols.com>, Kevin Lunny <kevin@l[EX 6]im Ragen <tragen@mmc.gov>
Subject: Re: the photos you sent

David and Cicely,
Nearly a week ago, I wrote and asked for further photographs, or further clarification, of photos from Sunday March 23. I never heard back from either of you. Would you please send me all of the photos from that day from both cameras, or at the very least the photos, and 30 minutes to either side, of the DBOC boat on the estero. This is a time sensitive request.
Could you please confirm how you plan to respond.
Thanks very much.
Best wishes,
Corey

On Jun 15, 2010, at 5:21 AM, Corey Goodman wrote:

> David and Cicely,
>
> Thanks very much for sending the CD with the photos. However, it is possible that may not have sent the right photos. Please correct me if I am mistaken.
>
> When I made my request for photos last week, I was only aware of one camera pointing at Drakes Estero (you had not told us at the meeting on Monday June 7 that there was a second camera). I asked for photos from two days: March 14, 2008 (the date of a disturbance event) and March 23, 2008 (a Sunday cited in the May 1, 2009 "Briefing Statement" for which "NPS has time stamped images of a DBOC boat present on Drakes Estero").
>
> Since my request, you have identified that you have two cameras on Drakes Estero, one (#1) further south pointing west at the lateral channel and oyster bags on UEN and OB, and the other (#2) further north and pointing northwest at UEF and the mouth of Schooner Bay.
>
> For March 14, 2008, who correctly sent me photos of the lateral channel from camera #1 showing the image of a boat.
>
> For March 23, 2008, who sent me a small number of photos pointing northwest from camera #2. These photos do not show a boat. Do you have other photos showing the DBOC boat?
>
> In the "Briefing Statement", were you citing a DBOC boat in camera #1 or #2?
>
> If you were citing camera #1, please send me those photos. If you were citing camera #2, please explain.
>
> I presume it is simply a matter of sending me the correct photos from the appropriate camera.
>
> Thanks for taking care of this.
>

> Best wishes,
>
> Corey
>
> Corey S. Goodman, Ph.D.
> EX 6
>
> EX 6
> EX 6
>
>

Cicely Muldoon/PORE/NPS
06/21/2010 09:10 AM

To agresources@erols.com
cc Ben Becker/PORE/NPS@NPS, Sarah Allen, Dave Press/GOGA/NPS@NPS
bcc George Turnbull/OAKLAND/NPS; Sue_Husari@nps.gov; Ann Nelson/PORE/NPS
Subject info requested

Hi David - a request - would you please add me to any email that you send out to Point Reyes staff requesting information? It will be more efficient, and keep everyone in the loop, if communications are coordinated through my office. We talked about this at the MMC meeting, but possible you weren't part of that conversation? Thanks for your help with this.

To follow up on your point of clarification question - there is one remote camera at present focussed on the Estero (the UEF site, I believe). The grad student who is using the camera on a project through SF State injured her knee, so we are uncertain if it is functioning at present. I sent Kevin a map on 6/14 regarding the approximate location and field of view of the remote cameras that have been used for the OB and EUF sites over the past couple of years. I assume he shared this with you?

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

"David M Weiman" <agresources@erols.com>
06/20/2010 09:34 AST

To: "Becker, Ben" <ben_becker@nps.gov>, "Press, Dave" <dave_press@nps.gov>, "Allen, Sarah, Ph.D." <sarah_allen@nps.gov>
cc:
Subject: FW: Point of Clarification

Ben, David and Sarah.

We are anxious to have this matter clarified.

May we please have a response?

Thank you.

dave w.

From: David M Weiman [mailto:agresources@erols.com]
Sent: Wednesday, June 09, 2010 5:26 PM
To: 'ben_becker@nps.gov'; 'dave_press@nps.gov'; Allen, Sarah, Ph.D. (sarah_allen@nps.gov)
Subject: Point of Clarification

Ben, David and Sarah.

Kevin and Nancy were reviewing the MMC meeting, and called me to discuss it. One part of that discussion centered on the camera taking photos of the Estero.

Someone indicated that NPS regularly uses these cameras, and, at present, they are in use elsewhere at Point Reyes.

The question emerged, does NPS have more than one camera pointed at the Estero, on or off shore, or is this the only camera?

We request that this be clarified at your earliest opportunity.

Thank you.

dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

"David M Weiman" <agresources@erols.com>

06/18/2010 12:01 AST

To: <dave_press@nps.gov>
cc: "Lunny, Kevin" <kevin@drakesbayoyster.com>, "'Cichantek, Melissa'" <melissa.cichantek@gmail.com>
Subject: May 1, 2009 NPS Paper-- Request

Dave.

We are reviewing the May 1, 2009 NPS "Briefing Statement -- Naitonal Park Service Response to Goodman's January 18, 2009 Letter to NRC, May 1, 2009."

On page 2 (first full bullet) it is stated, at the end of that paragraph, "In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, also a Sunday."

Would you please provide us with (a) a copy of the referenced photograph; and (b) the entire sequence of photos (at least 30 minutes either side of the observation)?

Please send to Kevin and provide me a copy.

Kevin could stop by your office to pick it up later today or as soon as its available. We are obligated to respond to the MMC on a very short timetable and therefore would ask that this documentation be provided as quickly as possible.

Thanks for your assistance and cooperation.

dave w.

David M. Weiman
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635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

Sarah Allen/PORE/NPS
06/17/2010 07:49 AM

To Cicely Muldoon/PORE/NPS@NPS, Dan Wenk/WASO/NPS@NPS
cc
bcc
Subject Fw: sign

History: This message has been forwarded.

in case you did not receive

Sarah G. Allen, PhD
Oceans Stewardship
National Park Service, Pacific West Region
c/o Point Reyes Station, CA 94956
510-817-1396 (PWRO)
415-464-5187 (PORE)

"For all at last return to the sea--to Oceanus,
the ocean river, like the ever-flowing stream of time,
the beginning and the end." -- Rachael Carson

----- Forwarded by Sarah Allen/PORE/NPS on 06/17/2010 07:47 AM -----

Sarah Allen/PORE/NPS
06/16/2010 05:54 PM

To Cicely Muldoon/PORE/NPS, Dan Wenk/WASO/NPS
cc Dave Press/GOGA/NPS@NPS
Subject sign

Hi Dan:

Here is the sign that I believe is associated with cameras that we use when we put out cameras. The date in the corner is updated automatically when the file is opened, hence the 6/16/2010 date.

Sarah G. Allen, PhD
Oceans Stewardship
National Park Service, Pacific West Region
c/o Point Reyes Station, CA 94956
510-817-1396 (PWRO)
415-464-5187 (PORE)

---

sCIENCE Project Area Sign.doc

SCIENCE DIVISION PROJECT AREA

PLEASE DO NOT ENTER OR DISTURB

Tampering with federal equipment is illegal under CFR and can result in up to a $5000 fine.
Any questions or concerns, please call Sarah Allen: 415-464-5187

National Park Service
Point Reyes National Seashore
08/03/10

00033002 NPS-PWR-B06-00006-000001 Page 78 of 290

Cicely Muldoon/PORE/NPS
06/16/2010 05:21 PM

To Dan Wenk/WASO/NPS
cc
bcc Ann Nelson/PORE/NPS; George Turnbull/OAKLAND/NPS; Rory_Westberg@nps.gov
Subject requested info

Dan, hope this helps:

- wildlife observation cameras are not new to Point Reyes: we've used them over the years for inventory and monitoring, research, and management. This has included cameras on harbor seals, elephant seals, elk, and wildlife in general. PORE also used remote cameras extensively after the Vision Fire, and most recently on the Giacomini Wetland restoration project. This is a common tool used in wildlife management/study everywhere.
- the Drakes Estero cameras were put out to understand why there was a drop in harbor seal numbers at the OB site, and to document if there were disturbances that might help explain the drop in numbers
- the cameras - in Drakes Estero and elsewhere - are camoflauged to protect against vandalism, theft, and accidental disturbance by cattle, wildlife, birds, etc...
- timeline to the best of my knowledge:
- 2010: there is one camera at Drakes Estero right now, being used by a student from SF State on her masters thesis focussed on harbor seals and disturbance.
- 2009: one camera focussed on OB haul out site
- 2008: there were two cameras at Drakes Estero, aimed at seal haulout sites in the upper estero, referred to as OB and UEF (see attached map) - these are two major harbor seal haulout areas that have shown the largest declines in seal numbers. These declines are documented in two peer reviewed scientific papers; one published in 2009, one to be published in 2010.
- 2007: there was one camera focussed on the OB site
- the allegations that these cameras were not focussed on haul out sites is false - the images have seal haul out sites in the foreground; they can show, when present, boats in the background - any boat would show up, kayak, oyster boat, or whatever is out there. Attached is an image that shows a kayak. This camera -when functioning- would pick up any disturbance.
- the cameras were active during the breeding season, generally March-June
- images from the cameras have not yet been analyzed in any depth - a handful of images have been used publicly: in the Marine Mammal Commission meeting that happened here in February, and in a briefing statement prepared here at PORE this time last year, in response to Corey Goodman's letter to the NRC
- an additional note: the briefing statement, which references the cameras, has been posted since at least February on the publicly accessible Marine Mammal Commission web site. EX 5 (dp) EX 5 (dp)

Attached are: map showing the camera angles in Drakes Estero; sample photos from the cameras; the briefing statement prepared last May

oyster_activity_seal_cameras.pdf IMG_0003.JPG IMG_0037.JPG IMG_2193.JPG T0004101.JPG

NPS Response to Goodman NRC May 2009.pdf

thanks

c.

Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC
May 1, 2009

This briefing statement addresses allegations and criticisms put forth in a January 18, 2009 letter from Dr. Goodman to the National Research Council (NRC). There are additional documents in support of this rebuttal. Dr. Goodman has made several accusations that fall into three categories: falsified data, manipulated and withheld information, and not following NPS protocols. His accusations are based on a number of assumptions, little data and faulty analyses. Here, we refute the accusations with sound data and scientific analyses.

Allegations of falsified data

The allegation of falsified data on April 29, 2007 is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when sandbars are submerged and that seals are not disturbed by sources > 300 ft away. This is no supporting evidence for these allegations.

- Seals regularly hover over and rest on sandbars in Drakes Estero and elsewhere before the sandbars are exposed by falling tides. Also, disturbances of seals documented by NPS were recorded during the *breeding* season when females and pups are commonly on the sandbars. Dr. Goodman used incomplete tidal data for his analyses and analyzed tidal effects during January when seals are less common at the site.
- Dr. Goodman implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service recommends generally a distance of 300 ft for not disturbing marine mammals; however, the published literature is replete with information on harbor seals disturbed at greater distances.

Allegations of manipulated and withheld data

The record of Dr. Becker's communications to the NRC and the editor of the Journal of Marine Mammal Science (MMS) demonstrates clearly that NPS did not manipulate data or mislead either the NRC (in his presentation to the NAS panel in September 2008 and in the final published paper in MMS which he shared with them) or the editor of MMS (in correspondence back and forth in final preparation of the paper). In the process of revising the paper, Dr. Becker found additional disturbances in the database that were missed during the first version of the paper but those omissions were rectified and fully explained to both the NRC and the MMS editor.

Allegations of NPS failing to follow protocols and QA/QC

Dr. Goodman challenged the validity of the survey on April 29, 2007 because he states that it did not meet the protocol criteria of the pinniped monitoring program based on tide height and the experience of the volunteers. The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, *disturbance* data are not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. First year observers, all of who must attend trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether a disturbance occurs in poor weather conditions or at a high or low tide. Nevertheless, the volunteers in question had at least one previous year of experience which Dr. Goodman did not recognize from the pinniped database, and their count data met the protocol for tide level.

We note that in previous letters from Dr. Goodman that he criticized the NPS statistical modeling techniques. His critiques were closely examined by editors and peer reviewers at MMS and were flatly rejected. He now primarily focuses on data handling and alleges NPS falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of both the editors of MMS and the DOI Inspector General that there was no evidence of scientific misconduct. Separately, the NRC refused to consider his allegations of scientific misconduct.

National Park Service Response to
Goodman's January 18, 2009 Letter to NRC
May 1, 2009

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Goodman to the National Research Council (NRC). We are not addressing all of the allegations in the letter because many of them were presented in earlier letters of Dr. Goodman that we previously rebutted. Because Dr. Goodman's letter addresses many themes and frequently revisits them in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Several of the short responses below are supported by additional referenced documents that are attached in appendices.

1. Allegation that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 and on numerous other pages in his letter to the NRC that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."

The allegation of falsified data on April 29, 2007 is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, that DBOC generally does not operate on Sundays, and that several volunteers and NPS staff separately fabricated disturbance data on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

- Assumption that seals do not use submerged sandbars (Goodman Letter, pages 7-12) Seals (especially mothers with pups) regularly hover over and rest on sandbars in Drakes Estero before they are exposed by falling tides, and this is a common behavior of harbor seals elsewhere. NPS has time stamped images of seals on the sandbars at similar falling tides during the 2008 *breeding* season in Drakes Estero. Furthermore, the disturbances documented by NPS were recorded during the breeding season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January, the time of the "experiment" that Goodman cited in his letter. See **Appendix A** regarding tidal comparisons.

- Assumption that seals are not disturbed beyond the 300 foot Protective Zone (Goodman Letter, page 6) Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft

(190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Assumption that DBOC does not operate on Sundays (Goodman Letter, page 5) The April 29, 2007 disturbances occurred on a Sunday, however, Dr. Goodman states that DBOC does not normally operate on Sundays. We do not know at what frequency that DBOC boats operate on weekends; however, the DOI OIG investigation reports from an interview with the Chief Ranger of Point Reyes National Seashore that "Smith said that it was not uncommon for DBOC employees to take boats out into the estero after hours to fish." (see page 26 of the DOI-OIG report July 2008). The NPS harbor seal monitoring database also reports DBOC activity in Drakes Estero on Sunday, May 11, 2007. In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, also a Sunday.

- Assumption of improbability of disturbances (Goodman Letter, pages 6-7) Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. There is no basis for Dr. Goodman to have assumed this, and subsequently discounting the events as logistically impossible is unclear. Possibly, the boat staged its operations from a barge moored within Drakes Estero, which is a common practice.

- Assumption that there are no other DBOC disturbance records (Goodman Letter, page 5) Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

- Assumption that the count occurred on April 29 at 3:15 PM (Goodman Letter, page 7) Dr. Goodman used a different time at which the volunteers conducted their full count of Drakes Estero from what is in the pinniped database. The database and datasheet clearly document that the data were collected at 2:15 PM. However, apparently based on a note on the photocopied datasheet Dr. Goodman assumes that the data were collected at 3:15 PM in his letter.

"Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15. If

the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?"

The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which incorrectly supported his claims that earlier disturbances could not have occurred.

2. Allegation that 2003 disturbance data were covertly manipulated among versions of the MMS paper:

Dr. Goodman states on page 16 in his letter to the NRC that:

"The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II."

During preparation for the first Marine Mammal Science (MMS) journal submission, Becker inadvertently overlooked the 2003 disturbances. The datum (one disturbance) was in the dataset that D. Press, the NPS data manager, provided to Becker preparing the first MMS manuscript. While preparing for the NRC presentation on September 4, 2008, Becker realized his error of omission, and ***therefore, included an asterisk by the 2003 data with "possible disturbance" on the NRC presentation*** **(see Appendix B).** Additionally, in Becker's Sept. 22, 2008 letter to the MMS editor, he clearly included this one disturbance in an analysis on page 8 (that particular analysis was not used in the final paper).

Then, after the NRC meeting, when revising the MMS paper in late September, 2008, and after the first letter was sent to MMS, D. Press found an additional disturbance event in the comments section of the data sheet for that the 2003 survey day. In sum, there were two actual disturbances in 2003. Becker incorporated both into the final paper which he shared with NRC as soon as it was accepted by the editor of MMS. The MMS editor himself read through and made minor editorial corrections on the near final copy of the paper with the corrected two disturbances in it. Thus, communications to both the NRC (in the presentation and in the final paper) and the MMS editor (in correspondence back and forth) clearly demonstrate that the NPS was openly exchanging information.

3. Allegation that NPS withheld information from the MMS editor.

Dr. Goodman states on page 19 that

"In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:

"For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the

2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis""

Goodman's allegation is incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. The editor approved, and it was included in the final paper. See attached email to the MMS editor in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly with the MMS Editor, who in addition to reviewing them himself, passed them on to the Associate Editor of MMS and the two original peer reviewers. Thus, the notion that we cherry-picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the DOI Inspector General report. The MMS editor also corresponded directly with the NRC and The California Department of Fish and Game. We also offered to the MMS Editors our raw data and NPS pinniped database, so they could conclude for themselves whether the datasets were credible, that our handling of the data was appropriate, and whether Dr. Goodman's allegations had any merit.

Dr. Goodman also alleges that by our performing the correlations without some of the disturbances in order to show their robustness of the correlations, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement (quoted above) to show that even if some disturbance data are questioned, the positive correlation still exists when those data are not considered. Dr. Goodman had previously disputed only the NPS Trip Report of April 26, 2007 conducted by S. Allen. To demonstrate the robustness of the analyses to small sample size, we removed several disturbances, including the April 26 survey.

4. Inclusion of the 1996-1999, and 2008 disturbance data in the second paper.

Dr. Goodman states on page 2 that:

"In Becker II (the second revised version of the Becker et al. paper), Becker cherry-picked the data by arbitrarily going back to 1996 (instead of just 2000) to claim six oyster related disturbances in 1996 (and none in 1997-1999). Four of those six disturbances were fabricated."

We incorporated more years at the suggestion of Dr. Goodman's comments to the NRC and MMS in September of 2008. There is no cherry-picking as we included all appropriate data. The 1996-1999 data were not in the database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission. Similarly, we had not looked closely at the 2008 disturbance data prior to the first submission, but revisited it for the revision.

On page 2 of his report, Dr. Goodman asserts that we falsified disturbance records in 1996 to improve our statistical results and create a more dramatic graph.

The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidentally included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *possible* disturbances. We regret this error but it nonetheless does not alter the statistics or conclusions in any way. We will inform the Editor of MMS of our error and seek his guidance on whether a correction is warranted.

Nevertheless, the removal of two disturbances in 1996 does not change any conclusions or patterns described in the paper (see **Appendix D**). 1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remain exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is inconsistent with the facts and the analyses.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that "*many fishing and recreational motorboats enter the estero*" on page 17 of his letter is not supported by park records including law enforcement case reports, harbor seal monitoring field notes and park staff observations.

Finally, cherry-picking is alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero because some of lower estero haul-out sites are attached to the mainland). On November 12, we provided the NRC with a justification for solely analyzing the mariculture related disturbances and we explained in the MMS paper. See **Appendix E.**

5. Allegation that NPS did not follow stated QA/QC protocols:

Dr. Goodman states on page 12 that:

"April 29, 2007: Disturbance Survey Violated NPS Protocols."

Dr. Goodman challenged the validity of the survey based on tide height and the experience of the volunteers on April 29, 2007.

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level.

Dr. Goodman appears to have misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers are entered into the database and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database itself, which remain important NPS records.

Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

- poor visibility
- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regard to weather conditions

In addition, for the purposes of the Becker et al. paper, we limited the count data used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. This is clearly outlined in methods section of the MMS paper. We have confidence that our first year observers, all of who must attend trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

- Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leite) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007 (page 15). This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least one year of prior experience in our program before including their data for analysis.

6. Statement that the MMS paper title is incorrect.

Dr. Goodman states on page 25 that:

"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data only from 1997-2007, as the title describes. As is clearly explained in the paper, we include disturbance (but not *count*) data from 1996 and 2008. This data is not modeled but only used to report disturbance patterns. Count data were not complete enough to pass QA/QC protocols for 1996, and we did not model 2008 data since it was after reaffirmed guidelines that DBOC avoid seal areas during the breeding season. In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page 19 that:

> *"Becker told us that "This correlation is highly robust to sample size." As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation."*

Contrary to Dr. Goodman's assertion, the S-plus statistical software user's manual indicates that:

> *"Because both Kendall's and Spearman's methods are based on ranks, they are not so sensitive to outliers and non normality as the standard Pearson estimate."* (Insightful 2003).

Furthermore, in the MMS paper, our demonstration of the removal of several disturbances with continuing significance proves that the test is not succumbing to the effects of a "single anecdotal observation". Other correlation tests show similar results. Specifically, Pearson correlations (although not appropriate) and Kendall's Tau (which is an appropriate test).

Dr. Goodman also indicates that we must have gone back to the 1996 data only to get a stronger correlation (Page 22). However, if only considering the disturbance rate from 2000 – 2008, the P value is similar ($P < 0.03$), and the Spearman correlation is actually higher ($rs = 0.69$) than the full time series. Thus, there is no basis for the allegation that we cherry picked data (omission or commission) to improve our statistical results.

8. Conclusion

We note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques

were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of both the editors of Marine Mammal Science and the DOI Inspector General that there was no evidence of scientific misconduct (see **Appendix F**). Separately, the National Research Council refused to consider his allegations of scientific misconduct. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent allegations of scientific misconduct.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

References

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JOHNSON, A., AND A. ACEVEDO-GUTIERREZ. 2007. Regulation compliance by vessels and disturbance of harbor seals (Phoca vitulina).Canadian Journal of Zoology 85:290294.

SURYAN R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, Phoca vitulina richardii, to disturbance. Fisheries Bulletin 97:332–339.

APPENDIX A

Appendix A
NPS Review of Tidal Patterns and Harbor Seal Behavior in Drakes Estero

On January 18, 2009, Dr. Goodman submitted a document to the National Research Council entitled "New Information Shows that the National Park Service Committed Scientific Misconduct in the Documents it Presented to Your Panel".

Dr. Goodman devotes much of this document to discrediting harbor seal data collected in Drakes Estero on April 29, 2007. On this date, volunteers noted two disturbances by Drakes Bay Oyster Company (DBOC) when workers in a motorboat dropped oyster bags on a sandbar. Dr. Goodman challenged the validity of the April 29 survey based in part on the tide chart for that day and subsequent analysis of tidal patterns in Drakes Estero. Dr. Goodman concluded that no such disturbances could have occurred on April 29, 2007 because the tide was too high.

The April 29 survey began at 9:30 AM and concluded at 3:15 PM, as noted on the datasheet for that day. The harbor seal monitoring program standardizes its tides to San Francisco (Golden Gate Bridge), and the low tide for April 29 was 1.46 ft at 4:25 PM. The first DBOC disturbance occurred at 12:50 PM from DBOC's motorboat. The observers noted that at sandbar UEN, "mom and pup flushed when boat accelerated toward Bull Point from N. end of OB channel after throwing out bags." The second DBOC disturbance, again at sandbar UEN, occurred at 1:40 PM when the "boat returned, threw more bags, left again." The observers conducted the first and only full count of the harbor seals in Drakes Estero at 2:15 PM, documenting a total of 751 harbor seals. The events of the April 29 survey are summarized in Table 1.

Table 1. Summary of significant events on April 29, 2007. Low tide is standardized to San Francisco (Golden Gate Bridge).

Time	Time before low tide	Survey Event
9:30 AM	6 h 55 m	Start of observations.
12:50 PM	3 h 35 m	First DBOC disturbance at sandbar UEN.
1:40 PM	2 h 45 m	Second DBOC disturbance at sandbar UEN.
2:15 PM	2 h 10 m	Complete harbor seal count.
3:15 PM	1 h 10 m	End of observations.

DBOC attempted to better understand how the tides may have looked on April 29, 2007 by asking John Hulls of the Point Reyes Light newspaper to conduct an experiment. Mr. Hulls selected tides on January 1 and 2, 2009 and measured the high tide at sandbar OB to determine that there was an approximate 1.3 hr lag compared to the Point Reyes NOAA buoy tide chart. More importantly, Mr. Hulls measured the tidal heights at which the very highest points on UEN and OB first rose above the water, which were at +3.0 ft and +2.0 ft, respectively. Based on Mr. Hulls' observations in January 2009, Dr. Goodman went back to April 29, 2007 and concluded that the sandbars in Drakes Estero must have been underwater at the time of the disturbance events on that date and, therefore, no seals could have been present to be disturbed.

Dr. Goodman and Mr. Hulls missed several important points in their attempts to 1) model the tides at subsites OB and UEN in Drakes Estero and 2) subsequently predict harbor seal use of these subsites at certain tide levels. We find Mr. Hulls' experiment without merit and find it unreasonable for Dr. Goodman to discredit the April 29, 2007 survey based on an incomplete investigation of tidal and seal haul-out relationships.

Mr. Hulls and Dr. Goodman failed to recognize common harbor seal behavior which invalidates their conclusions that there were no harbor seals present to disturb on April 29, 2007. Researchers of harbor seals at Point Reyes and elsewhere have noted the presence of seals hovering nearby and over the haul out sites before sandbars are exposed by low tide and after sandbars are submerged by rising tides. This is particularly important for females with pups where they can nurse their pups in shallow waters. Flushing harbor seals from a submerged sandbar is entirely possible, and can be especially detrimental during the pupping season.

In regards to the tide experiment, we believe that a sample size of two dates is too small to develop these types of tidal predictions. Second, coastal winds and barometric pressure, which may affect tidal water level, were not taken into account. There can be a marked difference between the observed water level and predicted tidal water level due to winds and barometric pressure along coastal California (Largier et al. 1993). Lastly, it is incorrect to assume that the sandbar heights and configurations did not change between 2007 and 2009. The sandbars naturally shift on a seasonal and annual basis, and larger scale shifts may dominate for several years. In summary, tidal modeling and developing tidal predictions is a sophisticated science that must incorporate a variety of atmospheric, hydrographic and oceanographic driving forces. The NPS relies on our colleagues at NOAA, USGS, and university experts for this type of guidance.

The NPS has conducted its own review of the April 29, 2007 survey and associated tides because of the questions raised by Dr. Goodman. However, the NPS review of the survey took a different approach than Dr. Goodman and Mr. Hulls. We identified six dates during the peak breeding season in 2008 that closely match the tide chart for the April 29 survey. Table 2 shows that the dates selected (April 17-19, 2008 and May 2-4, 2008) more closely match April 29, 2007 than the tides selected by Mr. Hulls for study on January 1 and 2, 2009. Harbor seal use of Drakes Estero, particularly in the middle estero where the April 29 disturbances occurred, is reduced in January, and we felt that it was more appropriate to select dates during the harbor seal breeding season for comparison. Harbor seals haul out more often and for longer time periods during the breeding and molt seasons from March 1 to July 31.

For the six dates selected by NPS for review (Table 2), the NPS examined date and time stamped photographs taken of Drakes Estero by remote camera. The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM. The camera view encompassed the "lateral" channel with sandbar OB in the foreground.

Examination of the photo series for the selected dates shows that for a low tide similar to that on April 29, 2007, the OB sandbar becomes exposed at the low tide between approximately 3.5 and 2.5 hours prior to the low tide for San Francisco (Table 3).

Table 2. NOAA low tide data for April 29, 2007 and a series of dates selected for study by NPS and DBOC. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Low Tide Time	Low Tide Height	Type
April 29, 2007	4:25 PM	1.46 ft	Original Survey
April 17, 2008	4:22 PM	0.89 ft	This Study
April 18, 2008	4:56 PM	1.28 ft	This Study
April 19, 2008	5:29 PM	1.68 ft	This Study
May 2, 2008	3:30 PM	1.01 ft	This Study
May 3, 2008	4:13 PM	1.37 ft	This Study
May 4, 2008	4:56 PM	1.74 ft	This Study
January 1, 2009	8:16 AM	2.82 ft	DBOC Study
January 2, 2009	9:17 AM	2.51 ft	DBOC Study

Table 3. Time that harbor seals are first observed at sandbar OB and time that OB is just exposed by the falling low tide on six dates chosen for review by NPS. The time before the low tide is included in parentheses. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Time of First Harbor Seals	Time Sandbar First Exposed	Low Tide Time	Low Tide Height
April 17, 2008	12:23 PM (3h 59m)	1:17 PM (3h 5m)	4:22 PM	0.89 ft
April 18, 2008	2:01 PM (2h 55m)	2:15 PM (2h 41m)	4:56 PM	1.28 ft
April 19, 2008	1:43 PM (3h 46m)	2:25 PM (3h 4m)	5:29 PM	1.68 ft
May 2, 2008	11:52 AM (3h 38m)	11:58 AM (3h 32m)	3:30 PM	1.01 ft
May 3, 2008	12:54 PM (3h 19m)	13:05 PM (3h 8m)	4:13 PM	1.37 ft
May 4, 2008	2:18 PM (2h 38m)	2:40 PM (2h 16m)	4:56 PM	1.74 ft

In summary, the NPS concludes that subsite UEN may have been slightly underwater at the time this subsite was first disturbed at 12:50 PM on April 29, 2007, which occurred about 3.5 hours before the low tide (Table 1). However, if we accept the findings of Dr. Goodman and Mr. Hulls, who conclude that the UEN sits 1 ft higher than OB, then based on the NPS photographs, subsite UEN would have been well exposed by the time of the first disturbance.

In regards to harbor seal use of the sandbars, on each of the six dates selected by the NPS, harbor seals are clearly seen in the photographs using the OB sandbar *before* the sandbar is actually exposed by the low tide (Table 3). On April 17, 2008, for example, seals were present on the sandbar 40 minutes before it was first exposed by the low tide. By the time the OB sandbar was just exposed, up to a dozen harbor seals could already be seen resting on the sandbar. If Mr. Hulls had conducted his tidal experiment in Drakes Estero at the correct time of year, he too would likely have observed this pattern of harbor seal behavior and drawn different conclusions about the validity of the April 29, 2007 disturbances.

Although our review indicates that the UEN sandbar may have been underwater at 12:50 PM on April 29, 2007, the disturbance record for that day remains reliable based on our review of tidal data and seal behavior at that site. By the time the second DBOC disturbance occurred on April 29, 2007 at 1:40 PM and the complete harbor seal count occurred at 2:15 PM, the sandbars were, without question, well exposed. Although Dr. Goodman insists that "swimming harbor seals cannot be flushed off of a sandbar that is underwater", we have photographic documentation to the contrary.

To illustrate the findings of our inquiry, Figures 1-3 depict sandbar exposure and harbor seal presence at sandbar OB on a falling tide. Although we do not have similar images taken of sandbar UEN, we believe that these photographs provide supporting evidence that the April 29, 2007 survey was accurate for both disturbance and count data.

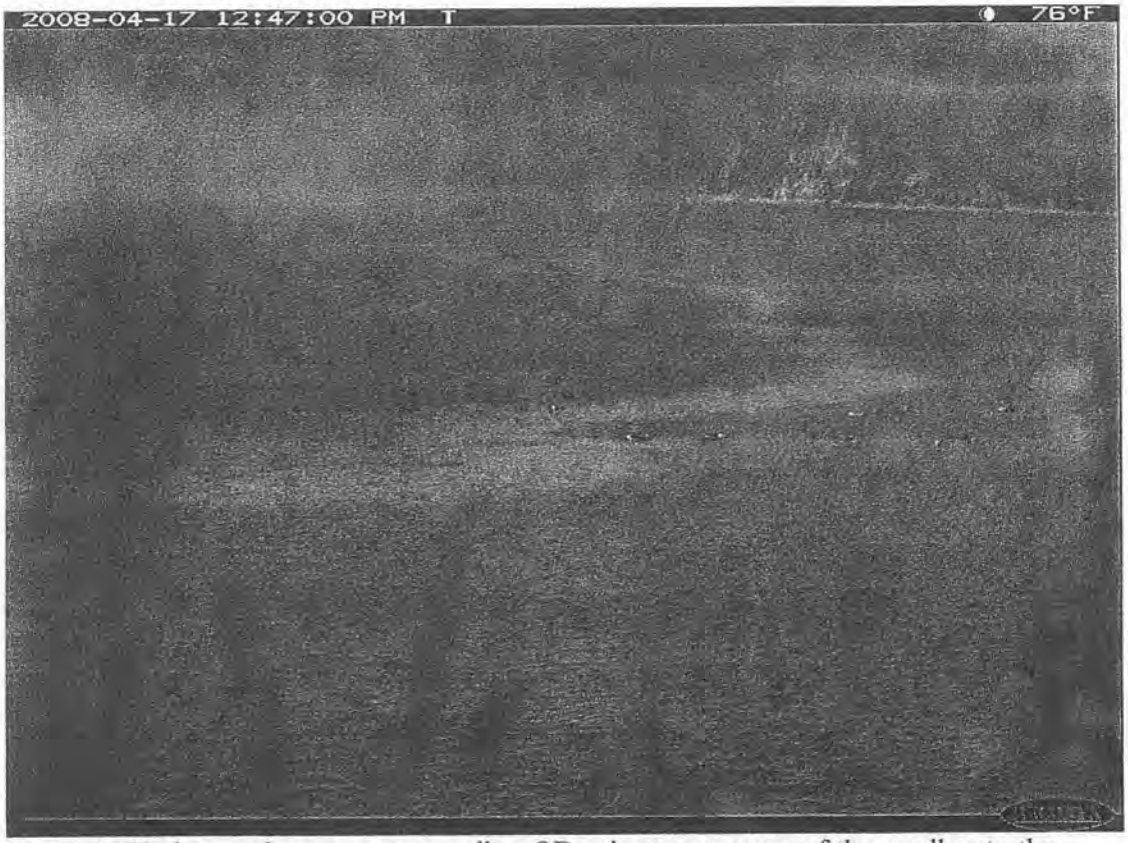


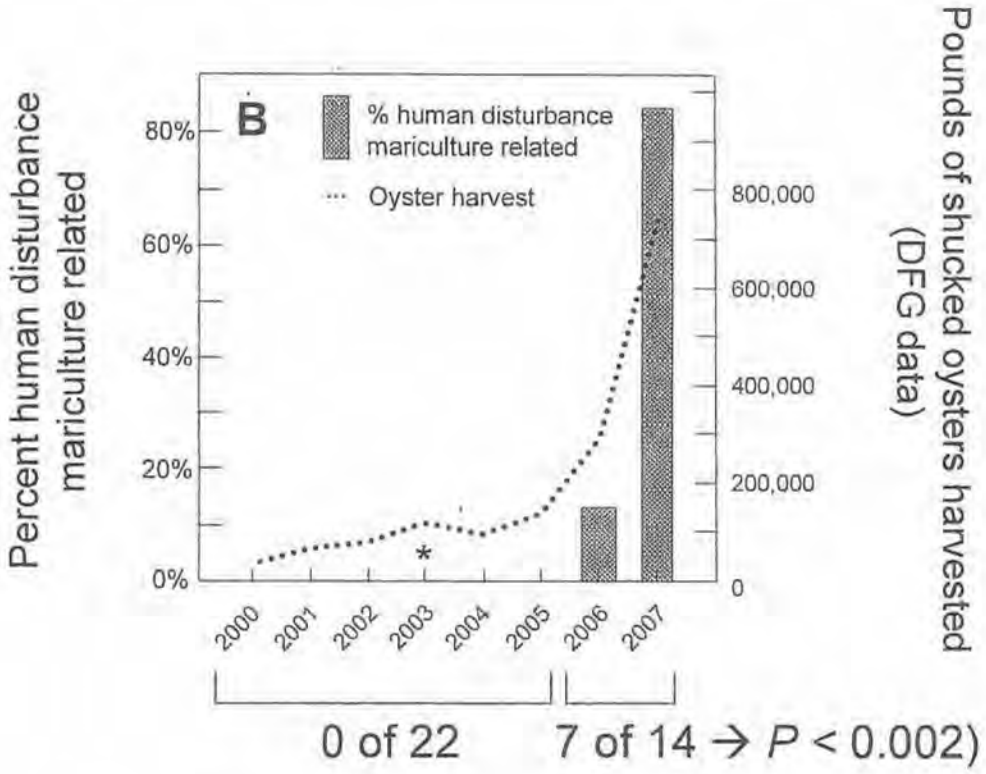
Figure 1. Harbor seals present on sandbar OB prior to exposure of the sandbar to the falling tide. Photograph taken at 12:47 PM on April 17, 2008, 3 hours and 35 minutes prior to a low tide of 0.89 ft at San Francisco. The first disturbance on April 29, 2007 also occurred 3 hours and 35 minutes before the low tide of 1.46 ft.

Figure 2. Harbor seals present on sandbar OB on the falling tide. Note paired heads of seals which are likely females with pups. Photograph taken at 2:44 PM on April 19, 2008, 2 hours and 45 minutes prior to a low tide of 1.68 ft at San Francisco. The second disturbance on April 29, 2007 also occurred 2 hours and 45 minutes before the low tide of 1.46 ft.

Figure 3. Harbor seals present on sandbar OB on the falling tide. Photograph taken at 1:20 PM on May 2, 2008, 2 hours and 10 minutes prior to a low tide of 1.01 ft at San Francisco. The full count on April 29, 2007 also occurred 2 hours and 10 minutes before the low tide of 1.46 ft.

APPENDIX B

Increase in percentage of human-related disturbance in upper estero (OB, UEN, UEF) due to mariculture: 2000 - 2007



- High statistical power ($1-\beta > 0.91$ at $\alpha = 0.05$)
- No mariculture related disturbances in middle-lower estero
- Human disturbance is less frequent in upper estero (~1-2/subsite/yr) than the middle-lower estero (~5 subsite/yr)

** Possibly one disturbance in 2003*

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APPENDIX C

Dear Dr. Boness,

Below is an outline of the substantive changes to ms #2668 discussed with either you or proposed by us and accepted by the reviewers. Please note that I used the previous MMS copy edited version as a starting point, hence the formatting style. Because of this, footnotes appear at the end of the document as endnotes. I have listed the most substantive changes in **bold.**

Introduction:

No substantive changes

Methods:

1. **We now use the updated oyster harvest value for 2007.**
2. **Lines 174-185: We now include disturbance data for 1996 – 2008. Previous paper only had 2000-2007. Count data modeled for 1997-2007 (as before) but we discuss 1996 and 2008 data in the discussion.**
3. **Lines 207 – 212: Description of new tests used to analyze disturbance data as proposed in previous MMS correspondence.**
4. Lines 219-240: Clarified data handling.
5. Lines 257-265: Clarified density dependence data used in models.
6. **Lines 266-275: Description of how we look at density dependence on a daily basis but also investigate effect on an annual mean basis. Description of how we model oyster harvest in the same year, but also investigate 1-year lag.**
7. Lines 303-307: Description of regression tree methods.

Results:

1. Lines 312-318: Shortened first paragraph
2. **Lines 319-329: Results of *oyster harvest vs. disturbance* correlation and rank tests. These are all now based on disturbance *rate* rather than *frequency*. <u>We illustrate here that omitting up to nine of the disturbances</u> (including the one in 2006 and 2/3 of those 2007) still would result in a significant increase in disturbance with increase in oyster harvest. Also see Figure 2B. We also note that this includes on lines 325-326:** "including two disturbances on one day in 2007 that the mariculture company challenged". Please let us know if this is OK or if you have a different idea for this statement. Alternatively, we could leave the parenthetical statement out and just leave the part that illustrates dropping many of the disturbance events still results in a significant relationship.
3. Lines 333-351: New GLM results using updated 2007 oyster harvest value and no time lag for oyster harvest. All model rankings are similar to previous paper.
4. Lines 355-364: GLM analyses also redone to test 1-year vs no year lag effects of oyster harvest, and using density dependence as a daily or annual value. All results were robust to these different approaches with Oyster always being

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important in the best models. We focus on same year oyster harvest values, though.

5. Lines 366-373: UEN best model (although weak fit) includes oyster harvest.
6. Lines 374-381: We now report a regression tree that corroborates GLM models. Tree shows lower counts with higher oyster harvest. This replaces prior 2002-2004 to 2005-2007 2-sample tests (t-test, Wilcoxon) comparisons in previous version.

Discussion:

1. Shortened first paragraph.
2. Lines 463-476: Discussion of potential reasons why lower performance of predictive model (OB model predicting UEF) when oyster harvest is high.
3. Lines 527-532: Discussion of middle-lower estero counts related to density dependent effects at upper subsites.
4. Lines 546-553: Presentation of unmodeled 1996 count data at OB and how it is low during the highest oyster harvest and the highest disturbance rate during the study period.
5. **Lines 554-577: Discussion of how small increase in 2008 subsite OB count data is consistent with restricted mariculture activity near the subsite due to a new (for 2008) California Coastal Commission guideline, and how disturbances subsequently dropped to only 1 in that year. We also suggest that this operational shift may weaken the simple use of "oyster harvest" as a proxy for modeling counts in the upper estero beyond 2007. Nonetheless, the modeling for 1997-2007 is unaffected.**

References:

1. Added Allen *et al.* 1989 (ENSO effects os seals) and Bejder *et al.* 2006 (Disturbance causing local redistribution of Dolphins).

Tables:

1. We have removed table 1, as figure 2B now illustrates these patterns and tests. We indicate in the results that human disturbance rates are higher in middle-lower estero.
2. Table 1 (Table 2 in previous version): updated with all new models, rankings are essentially the same.
3. Table 2 (Table 3 in previous version): updated with new best model coefficients.

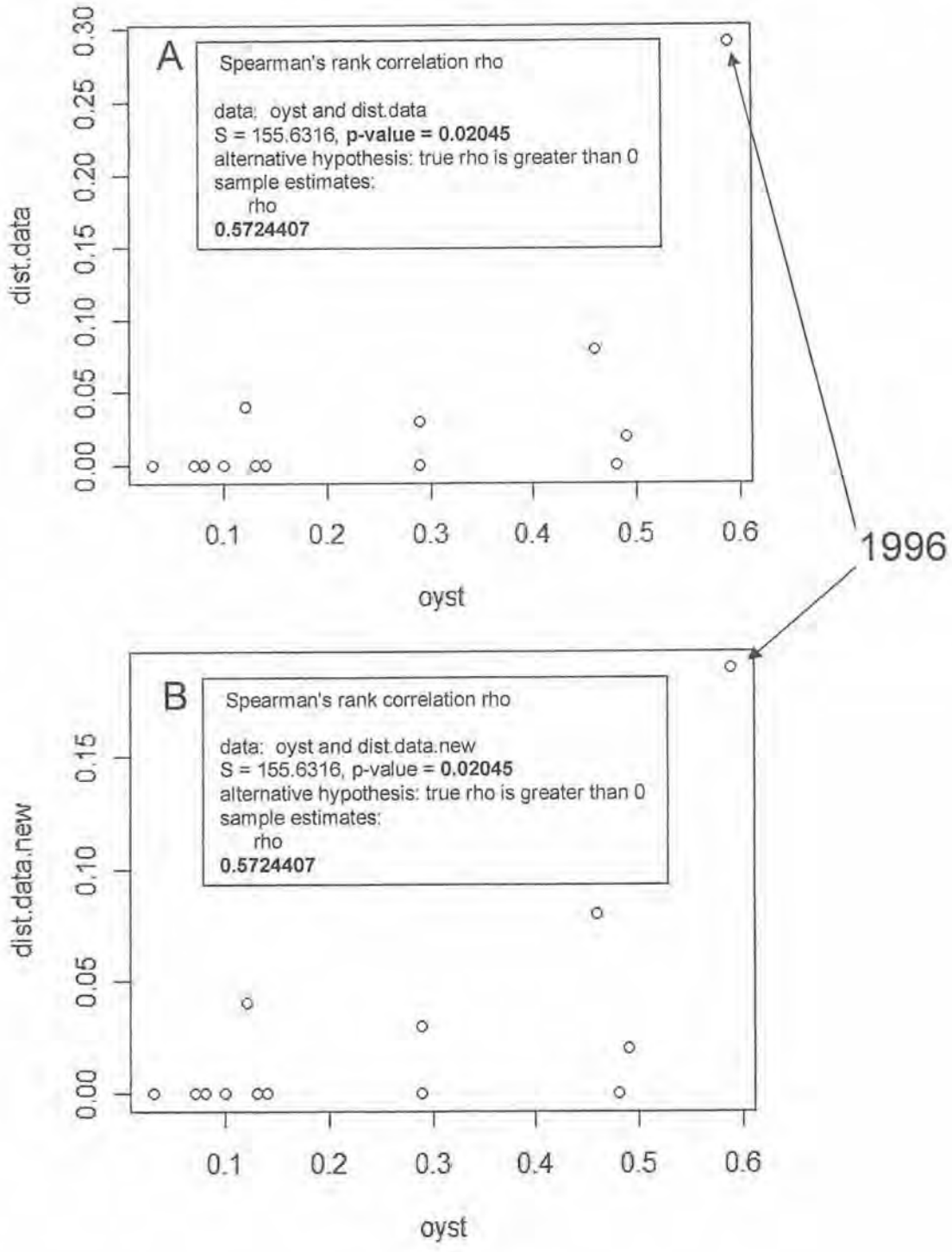
Figures:

1. Figure 2A: Now has corrected 2007 oyster harvest value.
2. Figure 2B: New, as proposed to reviewers in previous MMS correspondence. Replaces previous figure 2A.
3. Figure 3A: Similar to previous figure 3A, but is a scatter plot rather than a bar chart.
4. Figure 4: Regression tree replaces bar chart showing recent declines at OB. The new model is described in the text.

5. Figure 5: Drakes Estero Panel has been redone. There was a scaling problem (software bug) in the previous version when drawing multiple panels at the same scale that showed~15-20% fewer seals than reality at only drakes estero. We also added black bars to the Drakes Estero panel to indicate count pattern for the middle-lower estero used for density-dependence calculations.

APPENDIX D

Appendix D. (A) Original plot used in MMS paper with 6 disturbances in 1996 and (B) corrected plot with 4 disturbances in 1996. Note that 1996 is still by far the highest point, which is why the statistics have *no difference* between datasets. Note that the y-axis scale changes between plots. In the first version (MMS paper), we accidently counted two *potential* disturbances as *actual* disturbances. "Oyst" is annual lbs. oysters harvested x 10^{-6}. See text for details.



APPENDIX E

11/12/2008

To: National Research Council, Panel of Mariculture in Drakes Estero.

From: Ben Becker, David Press, Sarah Allen; Point Reyes National Seashore.

Re: Rationale for *not* modeling disturbances and counts in the entire Drakes Estero.

Becker, Press and Allen (MMS, in press) only modeled and considered disturbances in the upper estero (near oyster harvest activities) for the following reasons.

1. Subsites A, A1, OB, and UEN are the primary pupping sites for the Estero (see Figure 1). Thus, with one (and perhaps 2, OB and UEN) important pupping subsite potentially impacted by oyster harvest activities, this merited further investigation. Processes at subsite A were clearly related to attachment to the mainland. A1 was increasing (perhaps due to displacement from other sites such as A or others).

2. Plots of all 8 subsites in Drakes Estero from 1997 – 2007 indicate that the only subsites which experienced a significant decline since 2004 were subsites OB, UEF, and A (Figs 1-3). Subsite A was clearly reduced after attachment to the mainland in or around 2004 which resulted in several coyote predation events. Subsites OB and UEF had no other apparent changes other than proximity to increased oyster activities/harvest. DEM had a decline in 2006-2007, but had high inter-annual variation during the entire time series. Variation at DEM was likely because of changes in size and proximity to mainland due to wave action and tides at the mouth of the estero. Subsite L increased over time (especially in adult use), potentially related to increased visitor education on avoiding seal disturbance at the Limantour Beach access.

3. There was a clear and significant (proportions test or Fisher's exact test) increase in mariculture related disturbances in the upper estero (OB, UEF, UEN). During March-May of 2000-2004, anthropogenic, non-airplane disturbances were limited to one kayak, one clammer, and one oyster related. Then from March-May, 2005-2007, all anthropogenic, non-airplane disturbances, were related to mariculture with one in 2006 and six in 2007. This increase in mariculture related disturbances coincided with a decrease in adult and pups seals counts at subsite OB (and UEF), which warranted further investigation.

4. It is essential to model density-dependence. However, if considering all subsites, then it would not be possible to use the lower-middle estero as a control for density-dependence since all counts could not be assumed independent of the other seven sites (seals do of course move around and a loss at one site would likely result in an increase at another site). Furthermore, other regional colony data prior to 2000 had not been fully compiled before preparation of the manuscript. Nonetheless, local density-dependence (lower-middle estero) is more desirable since it more likely to reflect local processes in the estero because it (1) eliminates other confounding factors such as disturbance effects at other colonies, and (2) is closer, more similar habitat.

5. Modeling all sites and linking to mariculture would be a form of data dredging (several reviewers indicated this). We chose instead to follow an *a priori* multiple competing hypotheses approach.

6. Modeling disturbances without *a priori* hypotheses can be misleading because disturbance events require both a disturbance source *and* the presence of seals to disturb. This is illustrated clearly at subsite A: as the island attached to the mainland and seals began to abandon the subsite after 2004, disturbances also decreased.

Three figures follow

Fig 1. Mean (SE) seal **pups** at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

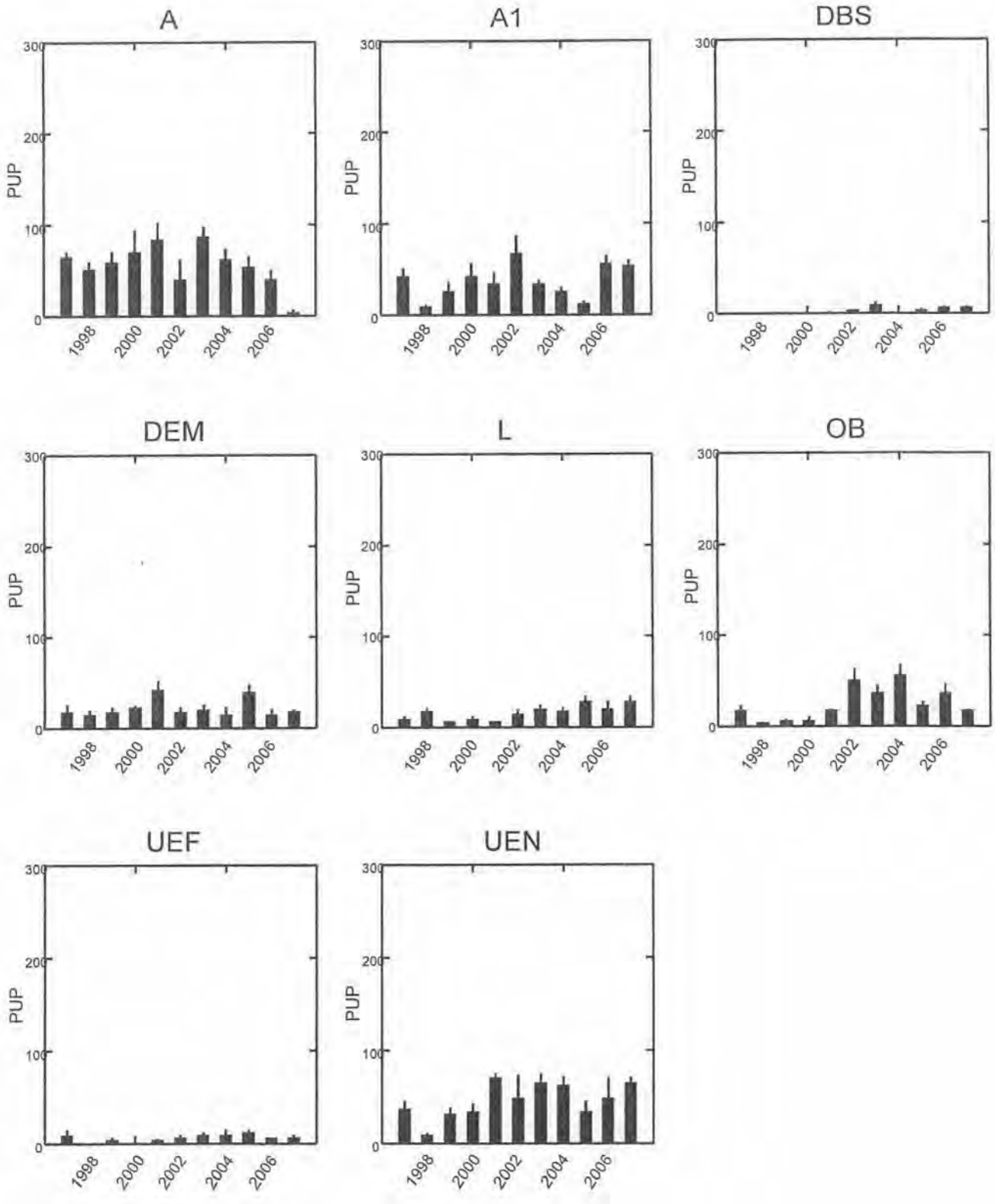


Fig. 2. Mean (SE) **adult** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

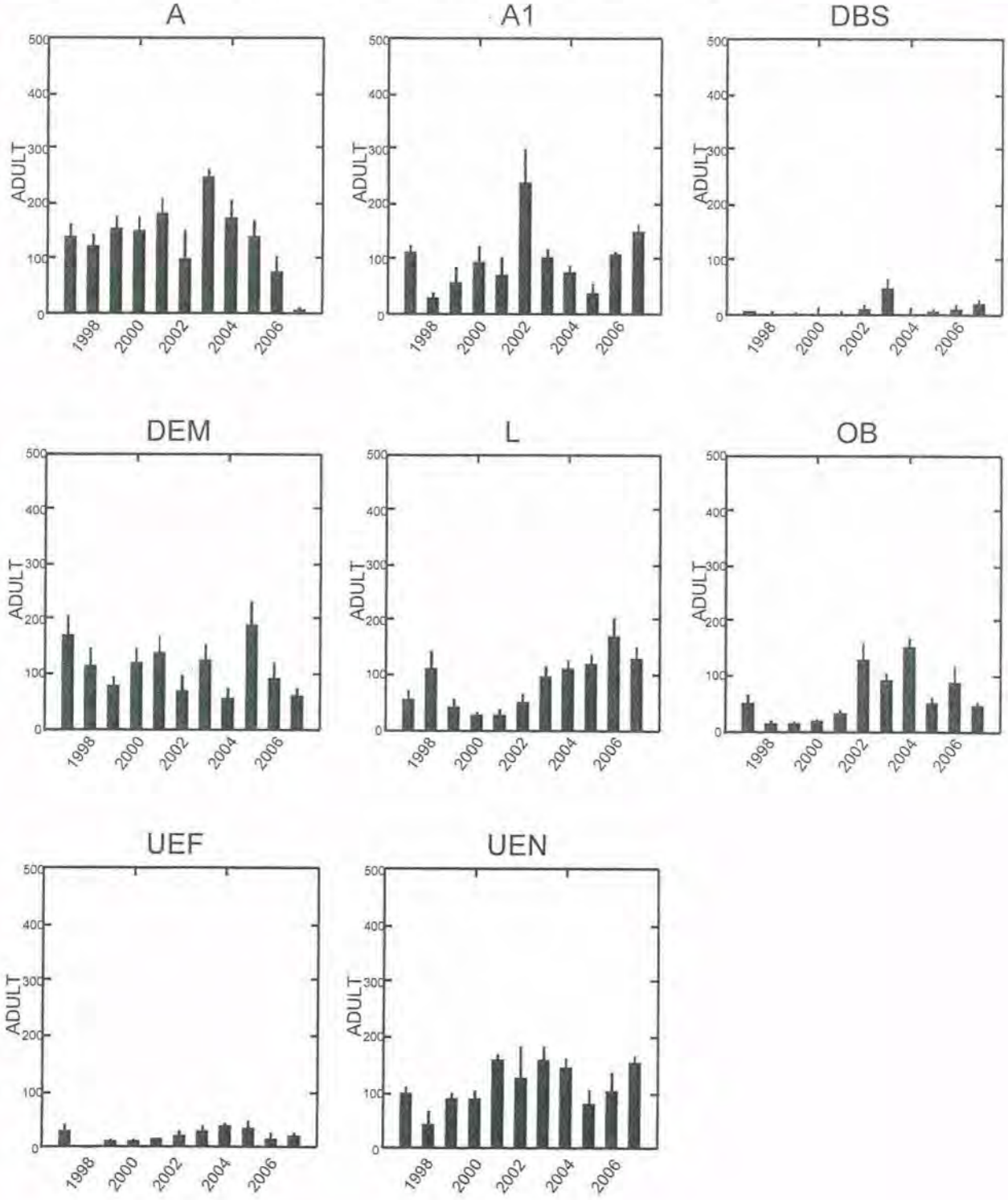
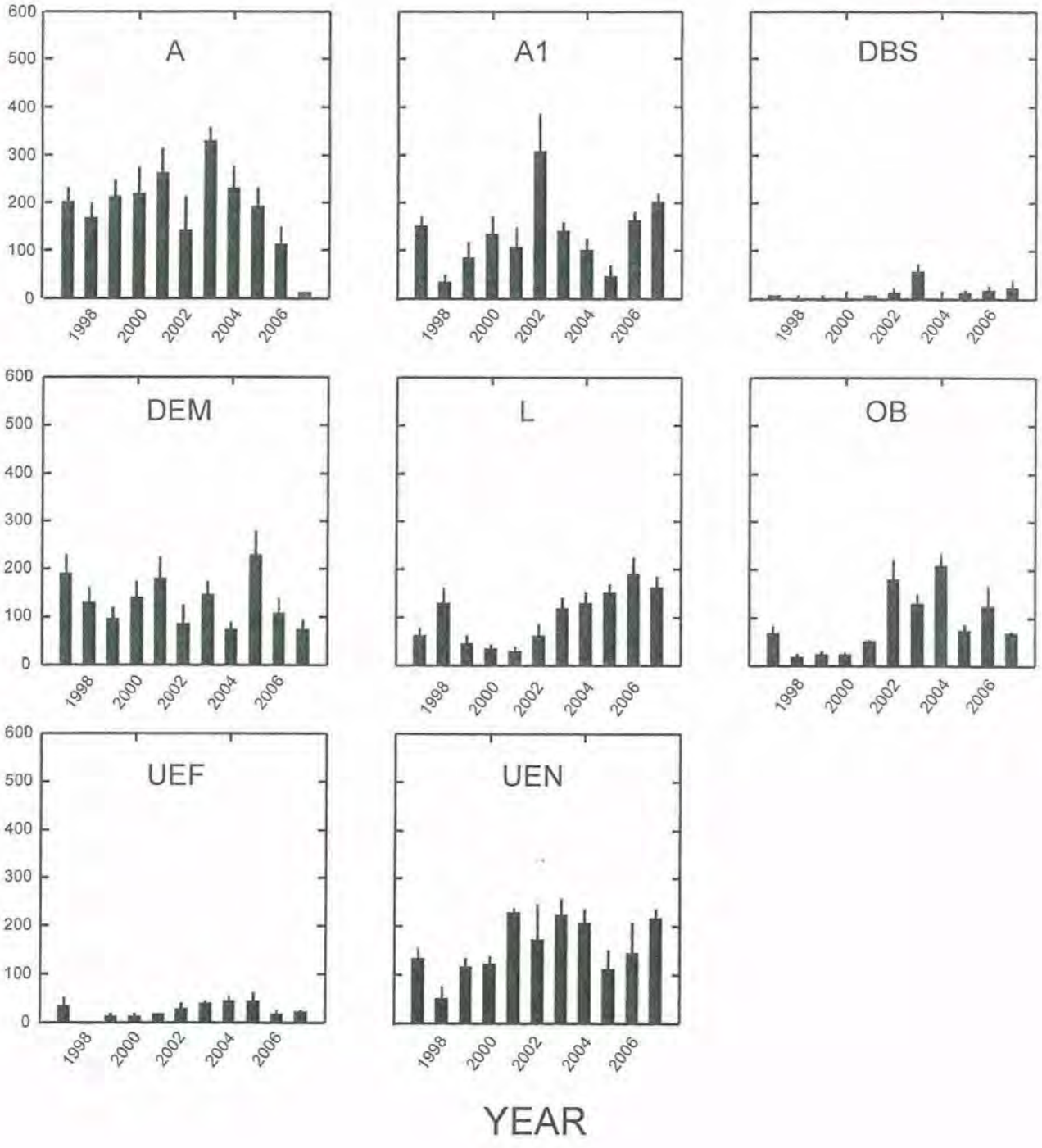


Fig 3. Mean (SE) **total** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.



APPENDIX F

"Daryl Boness"
<mmsci@megalink.net>
10/16/2008 08:56 AM

To <Ben_Becker@nps.gov>
cc "Marine Mammal Science"
<marinemammalscience@gmail.com>
bcc
Subject Decision on "Modeling the effects of El Niño, density dependence,and disturbance on harbor seal counts..."

History: This message has been replied to.

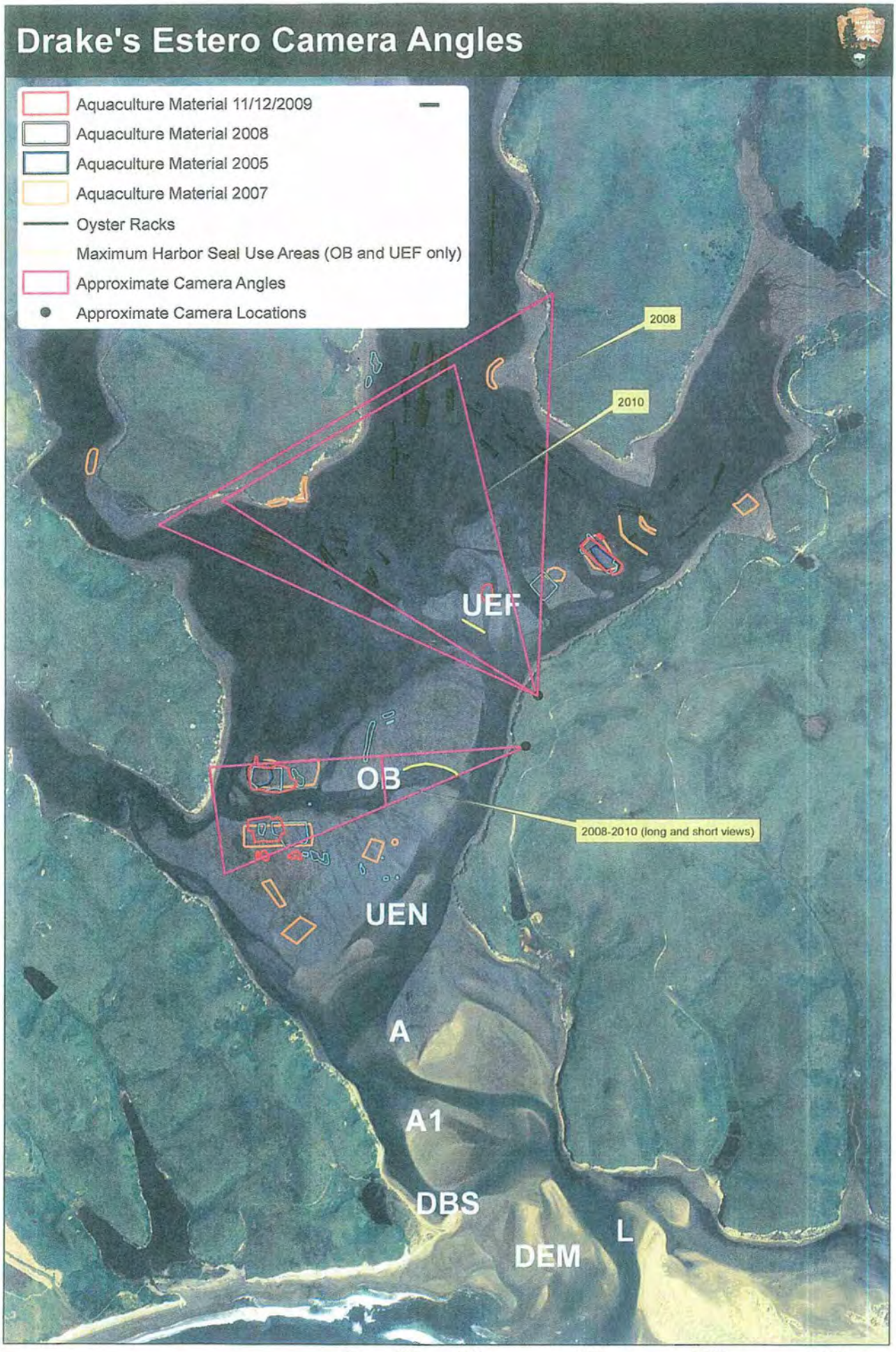
Dear Dr. Becker:

I have now received input from some of the original reviewers and Associate Editor on your replies to the concerns and questions raised by Dr. Corey Goodman (and others with similar points being made) concerning your in press paper entitled "Modeling the effects of El Niño, density dependence, and disturbance on harbor seal counts in Drakes Estero, California: 19972007." I have also spoken (or emailed) with Dr. Susan Roberts of the NRC and Dr. Tom Moore of the California Fish & Game. I am satisfied that there is no basis for considering pulling your paper from Marine Mammal Science for ethical grounds (scientific misconduct). The reviews I received based on your responses to Dr. Goodman's questions and your new analyses suggest there is no need to even revise your manuscript before publication should be allowed. I concur with the reviewers that the paper should be allowed to move forward with publication, but I also believe it would be best to include the updated information and improved analyses that you have proposed in your emails to me. In the revised paper, you should acknowledge the questioned data point and at least note that the conclusions would not change whether this point is included or not. Since you have information available on the 2008 harbor seal and oyster harvest levels I would also like to see you include in the discussion a statement about how this might affect your conclusions. It would be helpful if you identified in the revised paper where you have made the substantive changes as you indicate you will in your email replies.

I will process your revised paper as quickly as possible once I receive it. I appreciate your cooperation in this unusual situation regarding your paper that was accepted for publication in Marine Mammal Science.

Sincerely,

Daryl J. Boness
Editor
Marine Mammal Science


Drake's Estero Camera Angles
Aquaculture Material 11/12/2009
Aquaculture Material 2008
Aquaculture Material 2005
Aquaculture Material 2007
Oyster Racks
Maximum Harbor Seal Use Areas (OB and UEF only)
Approximate Camera Angles
Approximate Camera Locations
2008
2010
UEF
OB
2008-2010 (long and short views)
UEN
A
A1
DBS
DEM
L
0
250
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1,000
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Meters

2010-05-07 3:05:00 PM T
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RECON

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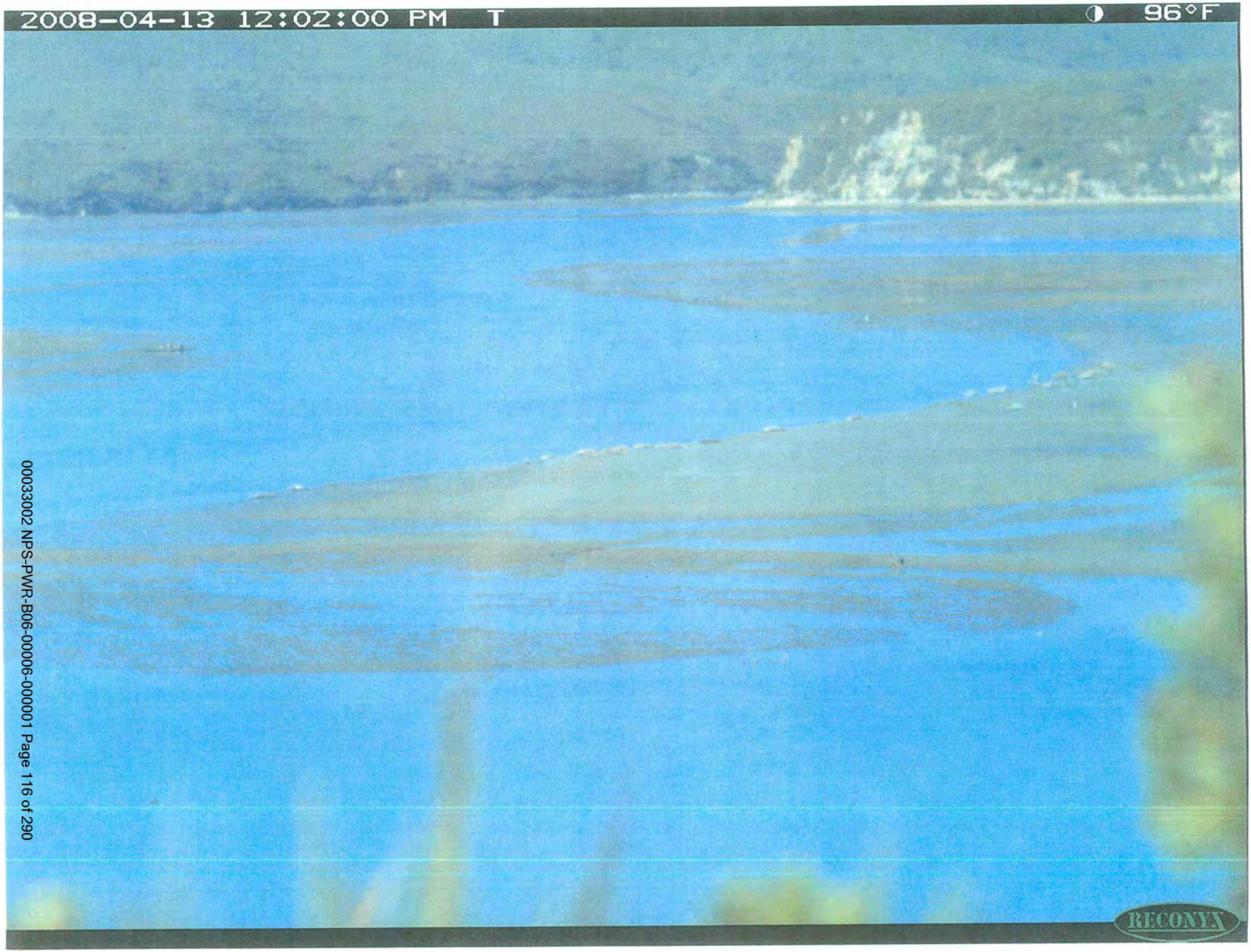
RECOVERY



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2008-05-27 12:00:12 PM T
76°F
WWW.RECONYX.COM

Dave Press/GOGA/NPS
06/16/2010 04:58 PM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc
bcc
Subject camera samples

History: This message has been forwarded.

Here are four sample photos. Two are facing OB, with one taken in 2008 and one taken in 2009. The 2008 image has a kayak which flushed seals from the sandbar. The other two face UEF, with one taken in 2008 and one taken in 2010.

Hope this is what you need.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

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2009-06-25 10:36:00 AM T
66°F
RICOH

2008-04-13 12:02:00 PM T
96°F
RECONYX

2008-09-27 12:00:12 PM
76°F
WWW.RECONYX.COM

Corey Goodman
<EX 6 [redacted] om>
06/15/2010 05:21 AM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
cc David Weiman <agresources@erols.com>, Kevin Lunny <kevin@EX 6 [redacted] Tim Ragen <tragen@mmc.gov>
bcc
Subject Fwd: the photos you sent

Sorry -- forgot to cc Tim.
Corey

Begin forwarded message:

From: Corey Goodman EX 6 [redacted] EX 6 [redacted]
Date: June 15, 2010 5:21:07 AM PDT
To: Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
Cc: David Weiman <agresources@erols.com>, David Press <dave_press@nps.gov>
Subject: the photos you sent

David and Cicely,

Thanks very much for sending the CD with the photos. However, it is possible that may not have sent the right photos. Please correct me if I am mistaken.

When I made my request for photos last week, I was only aware of one camera pointing at Drakes Estero (you had not told us at the meeting on Monday June 7 that there was a second camera). I asked for photos from two days: March 14, 2008 (the date of a disturbance event) and March 23, 2008 (a Sunday cited in the May 1, 2009 "Briefing Statement" for which "NPS has time stamped images of a DBOC boat present on Drakes Estero").

Since my request, you have identified that you have two cameras on Drakes Estero, one (#1) further south pointing west at the lateral channel and oyster bags on UEN and OB, and the other (#2) further north and pointing northwest at UEF and the mouth of Schooner Bay.

For March 14, 2008, who correctly sent me photos of the lateral channel from camera #1 showing the image of a boat.

For March 23, 2008, who sent me a small number of photos pointing northwest from camera #2. These photos do not show a boat. Do you have other photos showing the DBOC boat?

In the "Briefing Statement", were you citing a DBOC boat in camera #1 or #2?

If you were citing camera #1, please send me those photos. If you were citing camera #2,

please explain.

I presume it is simply a matter of sending me the correct photos from the appropriate camera.

Thanks for taking care of this.

Best wishes,

Corey

Corey S. Goodman, Ph.D.
EX 6 [redacted]

EX 6 [redacted]
EX 6 [redacted]

Cicely Muldoon/OAKLAND/NPS
06/14/2010 05:18 PM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc
bcc Dave Press/GOGA/NPS@NPS; Ben Becker/PORE/NPS@NPS; Sue_Husari@nps.gov; George Turnbull/OAKLAND/NPS; John A Dell'Osso/PORE/NPS; tragen@mmc.gov
Subject Re: Drakes Estero Camera

Hi Kevin -

Thanks for the opportunity to comment on the map you prepared of the approximate camera view - attached is the map that reflects both the OB and UEF views along with maximum harbor seal use areas. Please let me know if you have any questions.

Dave Press mentioned to me that you left him a message requesting the photographs that Corey requested last week - we'd be happy to send you the CD that we put in the mail to Corey and Tim already, and only didn't do so because Corey said he'd pass them along to you. I'll ask Dave to make a copy and get it in the mail to you.

Last, still hoping to schedule some time with you soon. This week is crazy, I'm sorry to say. Best times for me look like the 23rd or 24th in the afternoon. I think it would be most productive if it was just us (and of course Nancy) for the initial meeting to talk about improving communications and setting a new tone, as I believe we're all hoping to do, and as we talked about at the Monday meeting.

Thanks

Cicely

oyster_activity_seal_cameras.pdf

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
06/10/2010 08:07 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc
Subject Drakes Estero Camera

Dear Cicely,

I want to thank you for attending the MMC meeting earlier this week. It is my hope that the entire suite of issues can be resolved in the short term and I believe you can play a role in helping all of us get there. When the National Academy came out in 2008-09, their process was behind-closed-doors and non-inclusive at many levels. The MMC process has been the opposite. The MMC process directed by Tim Ragen is open and accessible. His goal, stated publicly and reinforced privately, is to get the parties working together, talking together and functioning together. We have welcomed his initiatives, and step-by-step, progress is occurring.

Following the meeting, we were asked by reporters from the Citizen and the Light about the hidden camera.

Among other things, they asked where the camera was pointed, as well as numerous other details about it. Based on the photos in the May 1, 2009 document and the single photo Dave Press shared with us in the parking lot after the meeting, we told the reporters that the camera appeared to be pointed mostly at a portion of our oyster operation. To understand what was being discussed, they asked for a map that displayed the approximate camera view. We prepared one and submitted it to both papers.

It is enclosed. Whether or not this map is to be published is not known.

If it not accurate, please tell us how it should be modified.

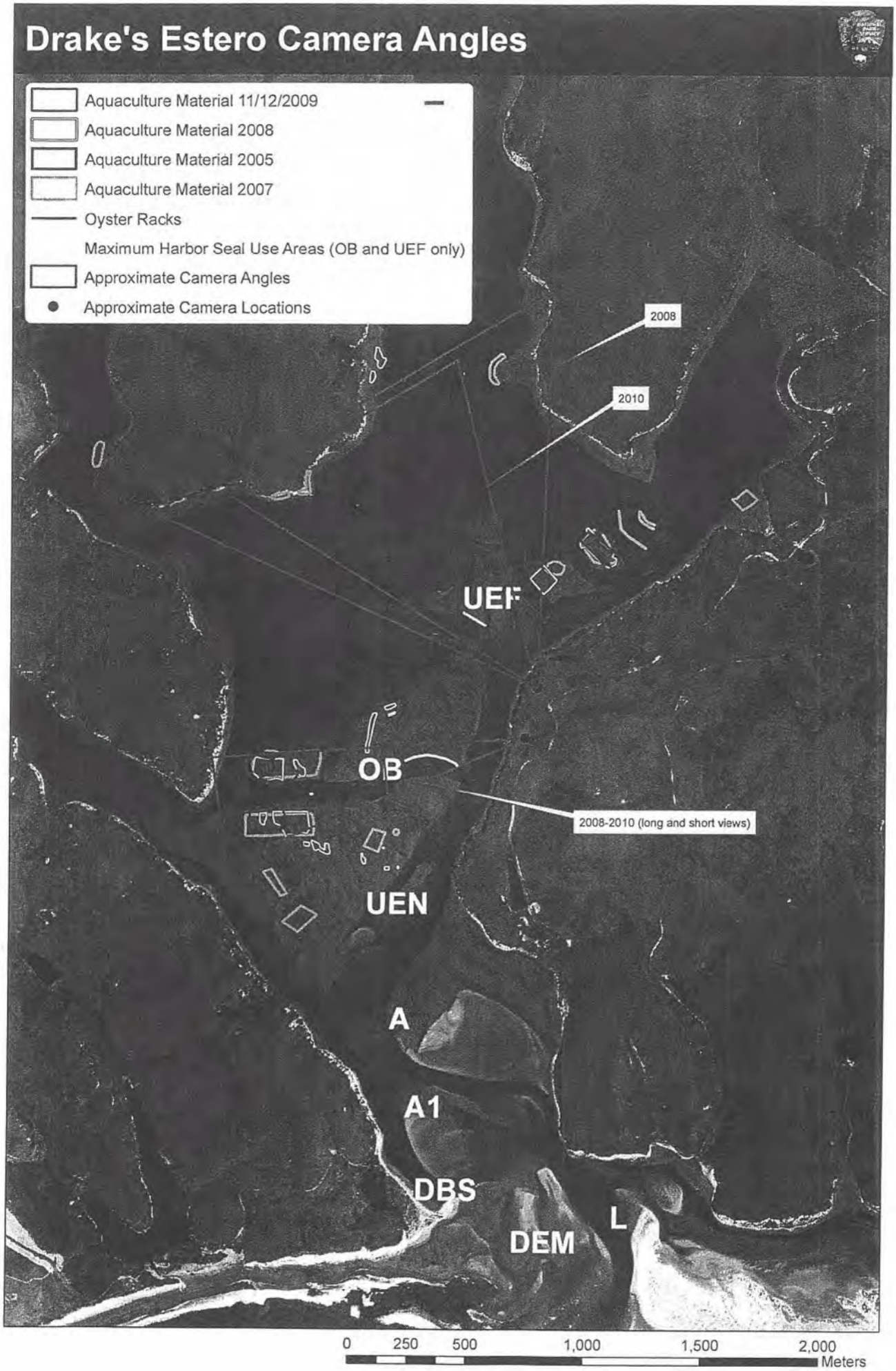
We believe Superintendent Neubacher's decision was inappropriate at many levels. We will have additional comments and questions about this matter, but wanted you to know what we were saying in response to questions being asked.

I was out all day and didn't get your message from Nancy until late last night. I will give you a call today.

Thank you,

Kevin

PRNS Hidden Camera.pdf


Drake's Estero Camera Angles
Aquaculture Material 11/12/2009
Aquaculture Material 2008
Aquaculture Material 2005
Aquaculture Material 2007
Oyster Racks
Maximum Harbor Seal Use Areas (OB and UEF only)
Approximate Camera Angles
Approximate Camera Locations
2008
2010
UEF
OB
2008-2010 (long and short views)
UEN
A
A1
DBS
DEM
L
0
250
500
1,000
1,500
2,000
Meters

Cicely Muldoon

06/14/2010 10:50 PDT

To: David Graber/SEKI/NPS@NPS
cc: "Ben Becker" <Ben_Becker@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, George Turnbull/OAKLAND/NPS, Sarah Allen/PORE/NPS@NPS, Gordon White/PORE/NPS, John A
Subject: Re: Fw: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

He sent the same message, essentially, to us. Let's keep to one point of contact for clarity, and funnel all responses back through me -let's talk about this at today's 3 pm call (which you might not be able to make Dave...foxes sound more fun...), and we'll respond from here. thx

c

Cicely Muldoon, Superintendent
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1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

David Graber/SEKI/NPS

David Graber/SEKI/NPS

06/14/2010 10:41 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>, George Turnbull/OAKLAND/NPS
cc "Ben Becker" <Ben_Becker@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, Sarah Allen/PORE/NPS
Subject Fw: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

EX 5 (dp) [redacted] Whoever wrote the briefing statement--and it's quite well written and cogent--to me is irrelevant. It's an NPS response EX 5 (dp) [redacted] EX 5 (dp) You may wish to advise how I respond ...or don't respond. EX 5 (dp) [redacted] EX 5 (dp) [redacted]

Sent from my BlackBerry
David Graber
Chief Scientist
Pacific West Region
National Park Service
559.565.3173 Sequoia
559.679.5999 Mobile

----- Original Message -----
From: Corey Goodman [EX 6 [redacted]
Sent: 06/13/2010 08:21 PM MST
To: David Graber
Cc: David Weiman <agresources@erols.com>; Kevin Lunny <kevin@EX 6 [redacted]
Tim Ragen <tragen@mmc.gov>
Subject: the May 1, 2009 Briefing Statement "Response to Goodman's January 18,

2009 Letter to NRC"

Dear Dave,

Thanks very much for attending the June 7 MMC meeting on disputed NPS harbor seal disturbance data attributed to DBOC.

At the meeting on Monday, when I brought up the May 1 2009 "Briefing Statement" document ("Response to Goodman's January 18, 2009 Letter to NRC"), David Press claimed that it had been made public last May because it had been given to both the National Academy of Sciences and to me on May 1 2009. Kevin has since checked with Dr. Susan Roberts at the NRC/NAS and she stated that the document was never given to the NAS. Moreover, the document was never given to Kevin or to me. When I asked the group who the authors were, everyone remained silent.

During a break, I took you aside and asked you who requested the document, who wrote it, and where it was sent. You said that you knew nothing about the document and had no idea who wrote it or where it was sent. You said that I should consider the authors the National Park Service.

Would you please tell me as soon as possible who requested the May 1 2009 Briefing Statement, who wrote it, who edited it, who took responsibility for it, and to whom it was submitted.

Thanks very much.

Corey

Corey Goodman, Ph.D.
EX 6

David Graber

06/14/2010 13:41 EDT

To: "Cicely Muldoon" <Cicely_Muldoon@nps.gov>, George Turnbull/OAKLAND/NPS
cc: "Ben Becker" <Ben_Becker@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, Sarah Allen/PORE/NPS
Subject: Fw: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

EX 5 (dp) Whoever wrote the briefing statement--and it's quite well written and cogent--to me is irrelevant. It's an NPS response EX 5 (dp)
EX 5 (dp) You may wish to advise how I respond ...or don't respond. EX 5 (dp)
EX 5 (dp)
EX 5 (dp)

Sent from my BlackBerry
David Graber
Chief Scientist
Pacific West Region
National Park Service
559.565.3173 Sequoia
559.679.5999 Mobile

----- Original Message -----
From: Corey Goodman [EX 6]
Sent: 06/13/2010 08:21 PM MST
To: David Graber
Cc: David Weiman <agresources@erols.com>; Kevin Lunny <kevin EX 6 >; Tim Ragen <tragen@mmc.gov>
Subject: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

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During a break, I took you aside and asked you who requested the document, who wrote it, and where it was sent. You said that you knew nothing about the document and had no idea who wrote it or where it was sent. You said that I should consider the authors the National Park Service.

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Thanks very much.

Corey

Corey Goodman, Ph.D.
EX 6

David Graber/SEKI/NPS
06/14/2010 10:45 AM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc
bcc
Subject Re: reply to your email concerning the oyster farm

EX 5 (dp) I was very clear and repeated myslef that the camera was there to observe seals and their behavior. Period.

Sent from my BlackBerry
David Graber
Chief Scientist
Pacific West Region
National Park Service
559.565.3173 Sequoia
559.679.5999 Mobile
Cicely Muldoon

----- Original Message -----
From: Cicely Muldoon
Sent: 06/13/2010 10:37 PM PDT
To: David Graber
Subject: Fw: reply to your email concerning the oyster farm

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

----- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/13/2010 10:36 PM -----

Corey Goodman
<EX 6
06/13/2010 09:48 PM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>
cc Tim Ragen <tragen@mmc.gov>, David Weiman <agresources@erols.com>, Kevin Lunny <kevin@EX 6
Subject reply to your email concerning the oyster farm

Hi Cicely,

Thanks for your note of June 9. Sorry for the delay in responding, but I've been traveling for work and am writing this from out of town.

I regret that you found the tone of my email divisive. That was not my intent. It is obvious we share a strong desire to resolve this very difficult situation at the Seashore. I seek to be as honest and transparent with you as I can, and unfortunately, emails have a tendency to feel less conversational and more harsh than face-to-face conversations. So I again request that you and I sit down together soon over coffee to discuss face-to-face both the history of this issue as I have experienced it, and our perspectives on what has happened. I truly believe that with we can only move forward by talking to each other openly, honestly, and frequently - and that in doing that, we can chart a path for a shared future.

Until we are able to meet, please allow me to explain the source of my frustration regarding our meeting last Monday June 7. What we discovered in the twenty-four hours leading up to that meeting was not encouraging. Moreover, the answers given by your employees and colleagues to my questions on Monday (even preventing me at times from finishing my comments), and what they told the local media in the following days, is also not very encouraging. By suggesting that you "clear the air," as I did at the end of my previous email, I am trying to suggest what I believe is the only path forward – one based on trust and truth. As the new Superintendent, you are in a unique position to change the way the Seashore reacts to difficult questions and errors once they are found. This is your opportunity to seize the moment.

Cicely, I confess that I am feel an even greater loss of trust in the Park now, given the recent discoveries about undisclosed cameras, secret documents, and errors in the database. I do not know how we can move past these discoveries if we cannot discuss them openly and fully, and if we continue to experience such serious breaches of trust. Please, lets sit down together, get to know where the other is coming from, and start to lay the groundwork for getting through issues like this in a better way than we have in the past.

After our meeting on Monday, Dave Graber said to Andrea Blum (reporter for the West Marin Citizen) that one purpose of the camera was to catch oyster farm disturbances, and that there was no reason for NPS to tell Lunny about its existence. Do you agree with his statement? Is this your PRNS policy that hidden cameras aimed at ranchers or farmers are acceptable? How do you feel that your employees never mentioned at our meeting on Monday that there were two -- and not one -- cameras aimed at that region? Finally, how do you feel about their unwillingness to tell me who wrote the May 1 2009 document, or where it was sent? Is this the path forward? Is this trust and truth?

If Kevin Lunny and I seem a little concerned on Monday, it is because we learned these things within the 24 hours prior to our meeting. It was only on Sunday morning at 10 am -- less than 24 hours before our meeting -- that I read for the first time the May 1, 2009 "Briefing Statement". I was surprised by what I read.

First, in that secret document (the May 1, 2009 "Briefing Statement", never given to me), I discovered many false and misleading statements made by PRNS employees in this secret document aimed at discrediting my assertions in response to my January 18 2009 public document on disturbance events given to the National Academy of Sciences (and the NPS; NAS ultimately sent my document to DOI Secretary Salazar in February and said it was his responsibility and not NAS's to investigate a claim of scientific misconduct). For example, you heard me cite one of those false claims on Monday -- a claim that David Press and David Graber immediately said they did not make, even though it is in the document as clear as can be -- namely, that even if Lunny's payroll records of employee time clock records show that workers were not working at the time of a disturbance, they might still have been out fishing after hours. I asked your colleagues whether they really thought that Lunny's workers were fishing in shallow water (six inches) with dense eelgrass and throwing out or hauling in oyster bags after hours for free? That is what NPS officials told the Inspector General several years ago. That is what NPS scientists wrote in the May 1, 2009 document. Your colleagues denied making such a claim. Please look at the "Briefing Statement" and the IG report.

Second, I discovered, at the bottom of the second page of Appendix A, the existence, at least in 2008, of a remote camera photographing the oyster beds and lateral channel every minute from 7 am to 7 pm. I immediately called Kevin that morning and confirmed that he did not know about the secret camera. Last Monday we learned that the camera has been photographing Kevin's oyster bags and boats every minute from 7 am to 7 pm for the past 2 1/2 years. Only a few days later did we learn that there are indeed two cameras in that vicinity.

When I asked your scientists about the May 1 2009 document on Monday, David Press held it up

and said that it was made public on May 1 2009. I asked to whom it was sent. He said it was submitted to the National Academy of Sciences and given to me. Kevin has since confirmed with Dr. Susan Roberts at NRC/NAS that the document was never submitted to the NAS. After all, their final report was issued just a few days later. Moreover, I asked David Press who wrote it, and he refused to answer. Neither Ben nor Sarah answered either. Everyone remained silent. Who are the authors? Who revised it? Who took charge? And who asked them to write this 33 page document aimed at rebutting my document? And to whom was it given? No one would answer. I took Dave Graber aside during one of our breaks and asked him the same questions. He claimed to have no knowledge of the document, did not know who wrote it, and did not know where it was distributed. Graber suggested I should ask you, which is what I did, and you said you would get me the information.

I asked you on Monday if you would find the answers to these questions about the secret document, and you said you would. I then followed up by email to you and asked again. You called my email divisive, but you did not commit to find out the requester, authors, and audience for this document. Would you please commit to finding out these answers as soon as possible? This will help clear the air.

In addition, when I brought up the camera, no one answered that there were indeed two cameras. Moreover, Sarah claimed that this camera was aimed at wildlife. As I said to you on Monday, if you and I wanted to maximize the view of harbor seals, we could find a half dozen better locations to place and aim the camera. Kevin and I have carefully examined the handful photos we have been given thus far, and, as pointed out in the map he sent you, the camera was not aimed at maximizing photos of harbor seals, but rather was aimed at maximizing the view of Kevin's oyster bags and boats in the lateral channel. Some of the photos do not even include any harbor seal haul-out sites at the lip of the deep main channel, but rather are focused on the lateral channel and oyster bags.

When the Marine Mammal Commission went out to the observation spot (on the west side of Drakes Estero) on Monday February 22 with both NPS officials and local media, at least three different people at that meeting remember (and have independently told me about) one of the MMC panel members pointing across to the east side of Drakes Estero and saying that the NPS should either have volunteers or a camera in that location because it would present a better view of the oyster bags and boats. NPS officials remained silent. We now know that the MMC panel member was pointing to precisely the location of the two cameras. Why wasn't the MMC panel told? Why wasn't the NAS panel told two years earlier? Why were we given this dubious answer on Monday that the camera is pointed at the seals when that is not its major or maximized view?

Cicely -- you say I am being divisive. To the contrary, I am trying to get answers to a troubling document and hidden camera that Kevin and I learned about less than 24 hours before our meeting. How can we trust the future when these sorts of things have been going on over the past year?

Let me repeat what I wrote to you last week. I have heard terrific things about you from lots of

people that I trust and admire. I want to work with you to move forward. You have inherited a messy situation. It was created by the past Superintendent. My advice: don't take ownership of a bad situation by allowing NPS employees to give false answers or hide the truth. You have the opportunity to clear the air -- by telling us that you will investigate the cameras, that you will share all of the photos, and that under your watch, ranchers and farmers will not be secretly photographed. Moreover, you have the opportunity to clear the air -- by behaving totally differently from the previous PRNS administration, by telling us who requested the May 1 2009 document, who wrote it, who revised it, and who submitted it and to where in the government or elsewhere it was sent.

Taking these actions would be a sign of great leadership and would go a long way to ending the divisive history and pointing to a collaborative future based on trust and truth. I am prepared to work with you. As a first step, why don't we get together soon.

Best wishes,

Corey

On Jun 9, 2010, at 1:38 PM, cicely_muldoon@nps.gov wrote:

> Hi Corey -
>
> Thanks for the note. I thought it was a positive and productive meeting on Monday, and was glad to have a chance to hear the discussion and reach resolution on how to address each data point. Dave and Sarah have already been faster than I at getting back in touch, and I know that Dave is burning the images you request onto a CD this afternoon, and that Sarah is attempting to reach the volunteer who made reference to digital images on the data sheet. I will see what I can find out about last year's briefing paper and get back in touch.
>
> You talked at the Monday meeting about how divisive this issue has been in the community. I agree, and believe we all have a real opportunity to change the tone of the discussion, acknowledging where we disagree, and doing so without rancor or malice. I confess the tenor of your message concerns me, as it seems to perpetuate the divisive tone that we are all committed to moving beyond. I look forward to discussing this further with you.
>
> Thanks,
>
> Cicely

(Embedded image moved to file: pic28318.gif)

Corey Goodman
EX 6 [redacted]

06/08/2010 02:08 PM

To: Cicely Muldoon <Cicely_Muldoon@nps.gov>

cc: Kevin Lunny <kevin@drakesbayoyster.com>, David Weiman <agresources@erols.com>

Subject: thank you and request

Dear Cicely,

It was a pleasure meeting you yesterday. I had heard great things about you from a number of people that I greatly trust and respect, and so I have great hopes for your tenure at PRNS to help heal the wounds in our community caused by your predecessor, and to find the right balance between the Seashore, the Park visitors, and the agricultural use of some of the lands. I look forward to working with you and supporting you at the Seashore in this endeavor.

Thanks also for attending the meeting yesterday. At some point soon, I would like to get together with you privately to give you some historical perspective on the Drakes Estero issue -- and the misuse of science -- so that you better understand what I discovered, why I did so, and what I have learned over the past four years. I worry that you are hearing only one side, and that side is biased. It would be healthy for you to hear a perspective that doesn't come from Dave Graber and others within the NPS. It would be valuable for you to get out of the NPS and hear the story from my perspective, as a National Academy of Sciences member and local resident who became involved at the request of Supervisor Steve Kinsey. Most of what I have said has been validated by the National Academy of Sciences panel, the Inspector General, and the Marine Mammal Commission.

As I mentioned to you yesterday when we talked after the meeting, I have four specific requests.

First, concerning the May 1, 2009 "Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC", would you please find out and tell me (i) who requested this document (i.e., why it was written), (ii) who wrote it (all of the authors please), and (iii) to whom it was sent and distributed. Naturally, I was surprised recently to discover this document, over one year after it was written and distributed. It contains many misleading statements, misrepresentations, and false arguments, all aimed at blunting a document I had given to the NRC and of course provided to the NPS. I hope that, in the future under your administration, documents coming from the PRNS will be authored, will be distributed to the relevant parties, and that if they attack the work of an individual, they will not be kept secret from that individual but rather will be shared to allow a fair critique. It should make you wonder why the folks who created this document didn't want me to see it. At a later date, I will share my critique of it with you.

Second, concerning the secret camera that has been focused on the lateral channel and Lunny's oyster beds for the past 2 1/2 years (without ever telling Lunny or the public), would you please immediately send to me the digital photos (at full resolution) from 12 noon to 1:15 pm on March 14, 2008, and the digital photos from March 23, 2008 (as cited in the "Briefing Statement") for a one hour period including 30 minutes before and after the claimed images of a DBOC boat present on Drakes Estero. Please don't be surprised if in the near-term I submit a FOIA request for access to all of the photos, but for the moment, these two dates are key. Thanks for getting these photos from the two key dates for me now.

Third, would you please send me the couple of digital photos that in the December 10, 2008 disturbance report, Sue Van Der Wal says she gave to Sarah Allen.

Fourth, I have some advice and a request concerning the secret camera photographing Lunny's oyster beds and oyster workers at UEN and OB and the lateral channel for the past 2 1/2 years. As I told you yesterday, this is very provocative to our community. You said that you thought that this camera was simply being used for wildlife photographs. The timing after the Neubacher assertions in 2007 and controversy, the positioning of the camera pointing right at Lunny's operation, and the location of the camera hidden in thorns and vines, suggests that it was set up to optimize the observation of homo sapiens and not harbor seals. PRNS officials and scientists have had many opportunities to reveal the existence of this camera and the digital photographs, and they have never done so. The community is likely to respond very poorly to this revelation. I encourage

you to make a strong statement to the community assuring them that under your administration, you will never use any photographic or listening device to spy on any of the ranchers or farmers within the Seashore. If you simply say that this camera is aimed at wildlife, you will regret such a statement as the photographs themselves, and their use in the May 1, 2009 "Briefing Statement", reveal the true intent -- the focus is on the lateral channel and the oyster beds, and is not optimized to get as many harbor seal haul-out sites as possible. I would recommend that you say that the hidden nature of this camera disturbs you -- as is the fact that Lunny was never told -- and that you will investigate its purpose and history, and that you will assure the agricultural community that you will not allow spying on ranchers and farmers.

Best wishes,

Corey

Dr. Corey S. Goodman
EX 6
EX 6
<pic28318.gif>

Sarah Allen/PORE/NPS
06/11/2010 08:59 AM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc Ben Becker/PORE/NPS@NPS
bcc Sarah Allen/PORE/NPS
Subject Re: Fw: map

Yes and I point out that the cameras are closer to the seals than to the equipment - the oyster equipment is barely seeable in the images because the seals were the focus of the cameras.

Sarah

Sarah G. Allen, PhD
Oceans Stewardship
National Park Service, Pacific West Region
c/o Point Reyes Station, CA 94956
510-817-1396 (PWRO)
415-464-5187 (PORE)

"For all at last return to the sea--to Oceanus,
the ocean river, like the ever-flowing stream of time,
the beginning and the end." -- Rachael Carson

Cicely Muldoon/OAKLAND/NPS
06/11/2010 08:43 AM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc
bcc George Turnbull/OAKLAND/NPS
Subject Re: Drakes Estero Camera

Kevin, good to see you last night, thanks for coming.

As requested, we're working on refining the map to accurately reflect camera angles for both OB and UEF - Dave P is out today, but I hope to get it back to you early next week.

Look forward to talking to you soon, have a good weekend.

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
06/10/2010 08:07 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc
Subject Drakes Estero Camera

Dear Cicely,

I want to thank you for attending the MMC meeting earlier this week. It is my hope that the entire suite of issues can be resolved in the short term and I believe you can play a role in helping all of us get there. When the National Academy came out in 2008-09, their process was behind-closed-doors and non-inclusive at many levels. The MMC process has been the opposite. The MMC process directed by Tim Ragen is open and accessible. His goal, stated publicly and reinforced privately, is to get the parties working together, talking together and functioning together. We have welcomed his initiatives, and step-by-step, progress is occurring.

Following the meeting, we were asked by reporters from the Citizen and the Light about the hidden camera.

Among other things, they asked where the camera was pointed, as well as numerous other details about it. Based on the photos in the May 1, 2009 document and the single

photo Dave Press shared with us in the parking lot after the meeting, we told the reporters that the camera appeared to be pointed mostly at a portion of our oyster operation. To understand what was being discussed, they asked for a map that displayed the approximate camera view. We prepared one and submitted it to both papers.

It is enclosed. Whether or not this map is to be published is not known.

If it not accurate, please tell us how it should be modified.

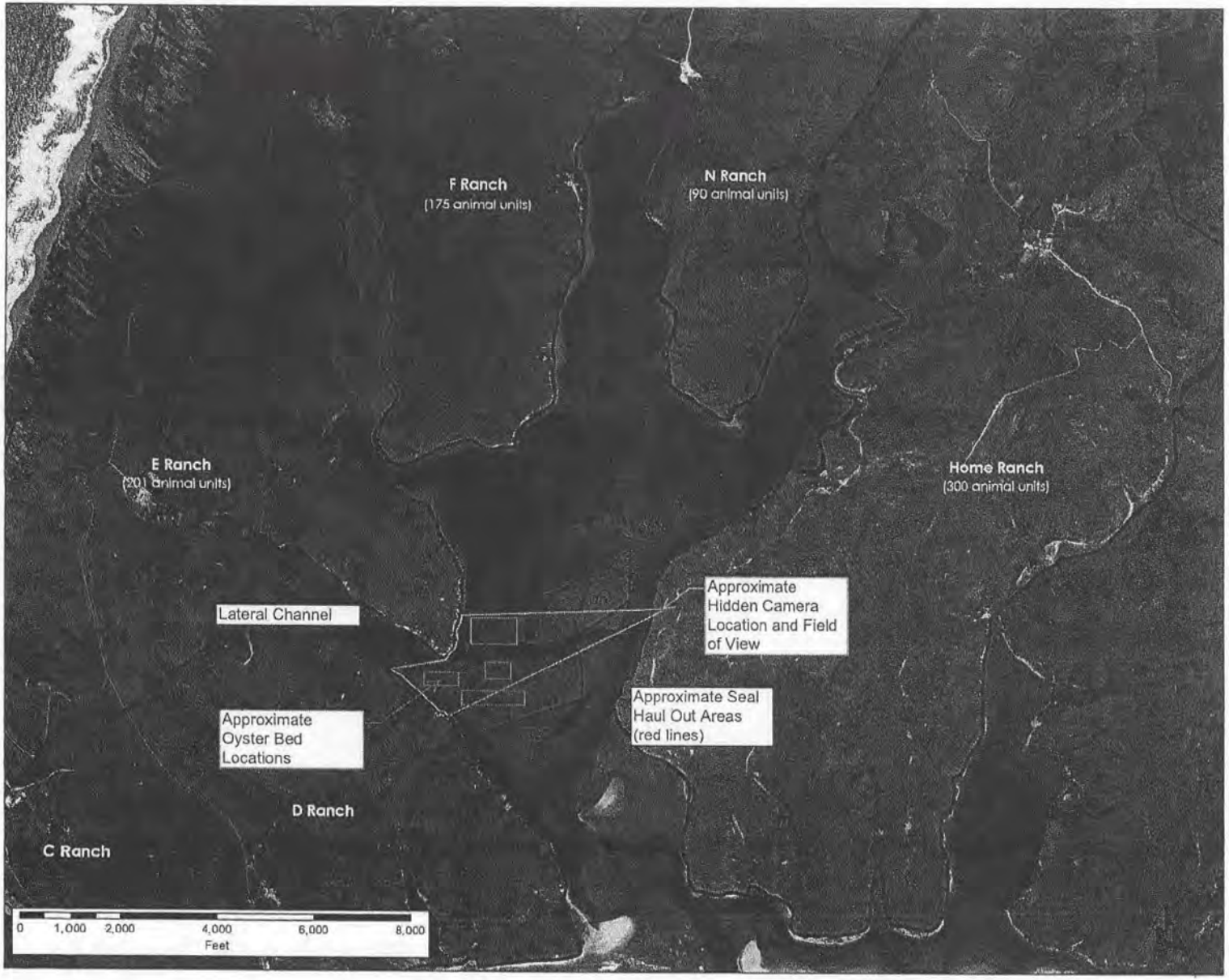
We believe Superintendent Neubacher's decision was inappropriate at many levels. We will have additional comments and questions about this matter, but wanted you to know what we were saying in response to questions being asked.

I was out all day and didn't get your message from Nancy until late last night. I will give you a call today.

Thank you,

Kevin

PRNS Hidden Camera.pdf



Drakes Estero Adjacent Ranches

Aquaculture Lease

Parcel Boundaries

Data Sources:

USDA, National Agriculture Imagery Program, 2006

California Dept. of Health Services

00033002 NPS-PWR-B06-00006-000001 Page 142 of 290

Cicely Muldoon
06/10/2010 08:17 PDT

To: Dave Press/GOGA/NPS@NPS, Ben Becker/PORE/NPS@NPS
cc:
Subject: Fw: Drakes Estero Camera

Dave, Ben - can you evaluate for accuracy - this shows most of the seal haul out areas out of the view of the camera, which I don't believe is accurate - thanks

c

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

---- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/10/2010 08:13 AM ----

"Kevin Lunny" <kevin@drakesbayoyster.com>
06/10/2010 08:07 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc
Subject Drakes Estero Camera

Dear Cicely,

I want to thank you for attending the MMC meeting earlier this week. It is my hope that the entire suite of issues can be resolved in the short term and I believe you can play a role in helping all of us get there. When the National Academy came out in 2008-09, their process was behind-closed-doors and non-inclusive at many levels. The MMC process has been the opposite. The MMC process directed by Tim Ragen is open and accessible. His goal, stated publicly and reinforced privately, is to get the parties working together, talking together and functioning together. We have welcomed his initiatives, and step-by-step, progress is occurring.

Following the meeting, we were asked by reporters from the Citizen and the Light about the hidden camera.

Among other things, they asked where the camera was pointed, as well as numerous other details about it. Based on the photos in the May 1, 2009 document and the single photo Dave Press shared with us in the parking lot after the meeting, we told the reporters that the camera appeared to be pointed mostly at a portion of our oyster operation. To understand what was being discussed, they asked for a map that displayed the approximate camera view. We prepared one and submitted it to both papers.

It is enclosed. Whether or not this map is to be published is not known.

If it not accurate, please tell us how it should be modified.

We believe Superintendent Neubacher's decision was inappropriate at many levels. We will have additional comments and questions about this matter, but wanted you to know what we were saying in response to questions being asked.

I was out all day and didn't get your message from Nancy until late last night. I will give you a call today.

Thank you,

Kevin
[attachment "PRNS Hidden Camera.pdf" deleted by Dave Press/GOGA/NPS]

Cicely Muldoon
06/10/2010 07:49 PDT

To: Dave Press/GOGA/NPS@NPS
cc: Sarah Allen/PORE/NPS@NPS
Subject: Re: camera info

so the OB monitoring camera is down? for how long? sorry, losing track...

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
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Dave Press/GOGA/NPS

Dave Press/GOGA/NPS
06/09/2010 09:38 PM

To Cicely Muldoon/OAKLAND/NPS@NPS, Sarah Allen/PORE/NPS@NPS
cc
Subject camera info

See below from Sarah Codde. The only camera is the one facing UEF, but [EX 6] is unable to maintain it. If she can't get a substitute, we should remove it. Sarah A will need to do that since tomorrow is Sarah Codde's last day before leaving for the Gulf. Let me know if you have any more questions.

Thanks, Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

-----Forwarded by Dave Press/GOGA/NPS on 06/09/2010 09:33PM -----

To: Dave Press/GOGA/NPS@NPS
From: Sarah Codde/PORE/NPS
Date: 06/09/2010 03:42PM
Subject: camera and google calendar

Hi Dave,
[EX 6] never put up the camera pointed at OB. So the only camera out there is pointed at UEF. She is trying to convince her boyfriend to change the batteries/memory card for her. So I told her to talk with Sarah about leaving the camera out there or not.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program

Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

Sarah Allen

06/10/2010 07:31 PDT

To: Dave Press/GOGA/NPS@NPS
cc: Cicely Muldoon/OAKLAND/NPS@NPS
Subject: Re: camera info

Hi:

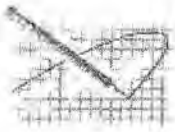
She said her boy friend might be able to maintain it and so I am waiting to hear back.

Sarah

Sarah G. Allen, PhD
Oceans Stewardship
National Park Service, Pacific West Region
c/o Point Reyes Station, CA 94956
510-817-1396 (PWRO)
415-464-5187 (PORE)

"For all at last return to the sea--to Oceanus,
the ocean river, like the ever-flowing stream of time,
the beginning and the end." -- Rachael Carson

Dave Press/GOGA/NPS



Dave Press/GOGA/NPS

06/09/2010 09:38 PM

To Cicely Muldoon/OAKLAND/NPS@NPS, Sarah Allen/PORE/NPS@NPS
cc
Subject camera info

See below from Sarah Codde. The only camera is the one facing UEF, but EX 6 is unable to maintain it. If she can't get a substitute, we should remove it. Sarah A will need to do that since tomorrow is Sarah Codde's last day before leaving for the Gulf. Let me know if you have any more questions.

Thanks, Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
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415-331-5530 (FAX)

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To: Dave Press/GOGA/NPS@NPS
From: Sarah Codde/PORE/NPS
Date: 06/09/2010 03:42PM
Subject: camera and google calendar

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Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

EX 6
E

06/10/2010 11:29 AM

Please respond to
EX 6

To Sarah_Allen@nps.gov
cc
bcc
Subject Re: camera

History: This message has been replied to.

Hi Sarah,
There is only one camera out there. The second one I have here with me- it hasn't been put out yet due to programming issues. I need the original program to program it correctly.

I will thanks. I am getting lots of rest and I can now move my knee a little.
EX 6

------Original Message------
From: Sarah_Allen@nps.gov
To: EX 6
Subject: Re: camera
Sent: Jun 10, 2010 7:41 AM

Hi - I wanted to verify is there 1 or 2 cameras that you have out? I thought you borrowed a second camera?

Take care of yourself.

Sarah

Sarah G. Allen, PhD
Oceans Stewardship
National Park Service, Pacific West Region
c/o Point Reyes Station, CA 94956
510-817-1396 (PWRO)
415-464-5187 (PORE)

"For all at last return to the sea--to Oceanus,
the ocean river, like the ever-flowing stream of time,
the beginning and the end." -- Rachael Carson

Sent via BlackBerry from T-Mobile

Dave Press/GOGA/NPS
06/10/2010 09:41 AM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject Fw: Drakes Estero Camera

Here is the map from DBOC.

Dave

PRNS Hidden Surveillance Camera.pdf

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
----- Forwarded by Dave Press/GOGA/NPS on 06/10/2010 09:40 -----

Cicely Muldoon
06/10/2010 08:17 PDT

To: Dave Press/GOGA/NPS@NPS, Ben Becker/PORE/NPS@NPS
cc:
Subject: Fw: Drakes Estero Camera

Dave, Ben - can you evaluate for accuracy - this shows most of the seal haul out areas out of the view of the camera, which I don't believe is accurate - thanks

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Cicely Muldoon, Superintendent
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1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
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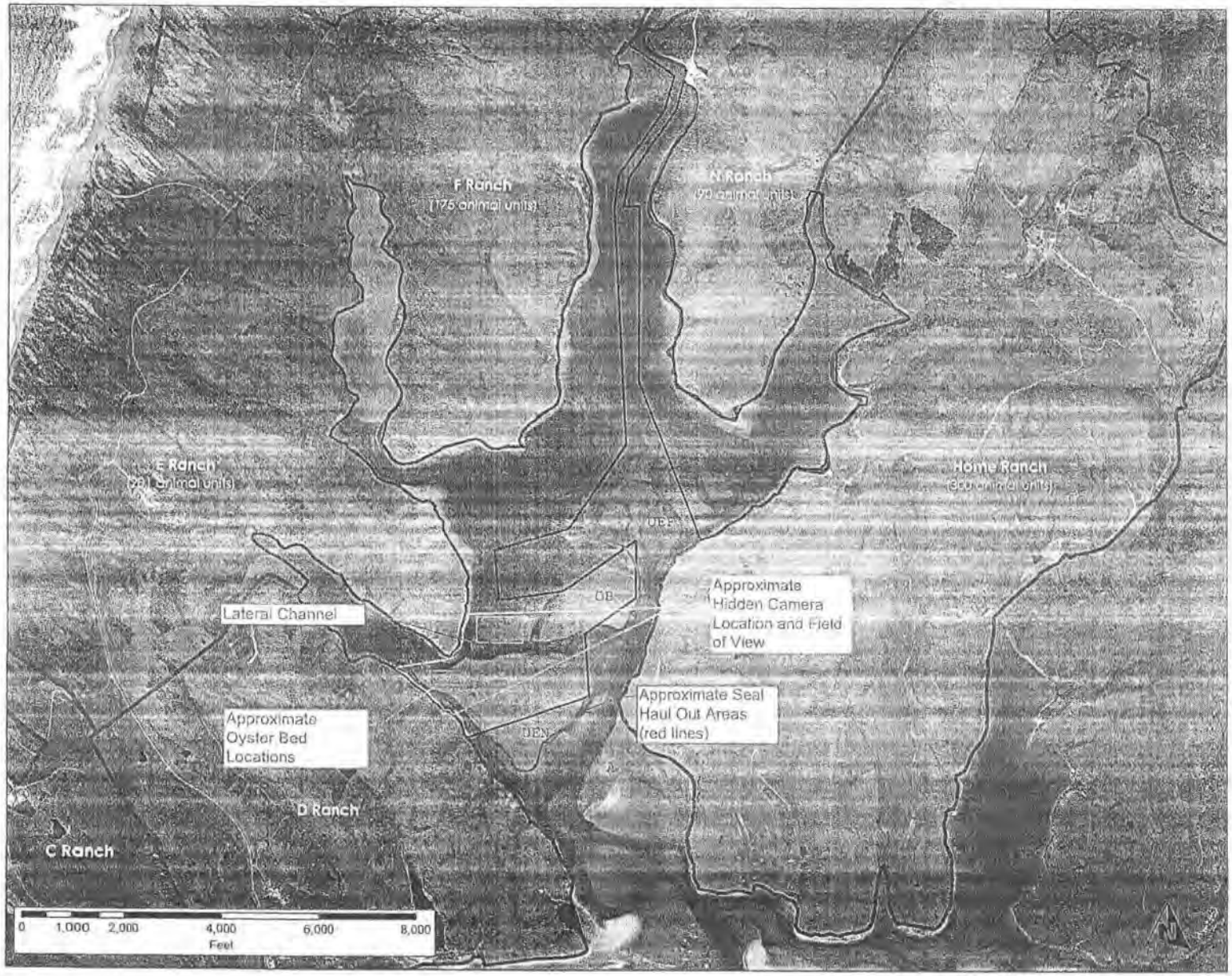
----- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/10/2010 08:13 AM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
06/10/2010 08:07 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc
Subject Drakes Estero Camera

Dear Cicely,

I want to thank you for attending the MMC meeting earlier this week. It is my hope that the entire suite of issues can be resolved in the short term and I believe you can play a



Drakes Estero
Adjacent Ranches

Aquaculture Lease
Parcel Boundaries

Data Sources:

USDA, National Agriculture Imagery Program, 2006

California Dept. of Health Services

00033002 NPS-PWR-B06-00006-000001 Page 151 of 290

Cicely Muldoon/OAKLAND/NPS
06/10/2010 08:17 AM

To Dave Press/GOGA/NPS@NPS, Ben Becker/PORE/NPS@NPS
cc
bcc
Subject Fw: Drakes Estero Camera

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---- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/10/2010 08:13 AM ----

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06/10/2010 08:07 AM

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cc
Subject Drakes Estero Camera

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Thank you,

Kevin

PRNS Hidden Camera.pdf

Dave Press/GOGA/NPS
06/09/2010 09:38 PM

To Cicely Muldoon/OAKLAND/NPS@NPS, Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject camera info

History: This message has been replied to.

See below from Sarah Codde. The only camera is the one facing UEF, but EX 6 is unable to maintain it. If she can't get a substitute, we should remove it. Sarah A will need to do that since tomorrow is Sarah Codde's last day before leaving for the Gulf. Let me know if you have any more questions.

Thanks, Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

-----Forwarded by Dave Press/GOGA/NPS on 06/09/2010 09:33PM -----

To: Dave Press/GOGA/NPS@NPS
From: Sarah Codde/PORE/NPS
Date: 06/09/2010 03:42PM
Subject: camera and google calendar

Hi Dave,
EX 6 never put up the camera pointed at OB. So the only camera out there is pointed at UEF. She is trying to convince her boyfriend to change the batteries/memory card for her. So I told her to talk with Sarah about leaving the camera out there or not.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

Sarah Codde/PORE/NPS
06/09/2010 15:42

To Dave Press/GOGA/NPS@NPS
cc
bcc
Subject camera and google calendar

Hi Dave,
EX 6 never put up the camera pointed at OB. So the only camera out there is pointed at UEF. She is trying to convince her boyfriend to change the batteries/memory card for her. So I told her to talk with Sarah about leaving the camera out there or not.

I added you to the google calendar. I think if you go to this webpage:
https://www.google.com/accounts/ServiceLogin?service=cl&passive=1209600&continue=http%3A%2F%2Fwww.google.com%2Fcalendar%2Frender&followup=http%3A%2F%2Fwww.google.com%2Fcalendar%2Frender
log into your account and then search for my calendar - its under my personal email address:
EX 6 - then you should be able to link to my calendar. We can try it together tomorrow if you can't figure it out at home.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

EX 6 [redacted]
EX 6 [redacted] c
EX [redacted]
06/09/2010 03:37 PM

To Sarah Allen <sarah_allen@nps.gov>
cc
bcc
Subject camera

History: This message has been replied to.

Hi Sarah,

I just spoke to Sarah Codde about the camera. That's great to hear that she is going to Florida to help with the oil spill. I also hear that there is no one to take care of the camera and you are thinking of taking it down for the time being. However, I may be able to convince my roommate EX 6 [redacted] or my boyfriend EX 6 [redacted] to take care of it while I am healing. Ill let you know asap.

EX 6 [redacted]

Your Photo on Bing.ca; You Could WIN on Canada Day! Submit a Photo Now!

Cicely Muldoon/OAKLAND/NPS
06/09/2010 03:18 PM

To Sarah Allen, Ben Becker/PORE/NPS@NPS
cc Dave Press/GOGA/NPS@NPS
bcc
Subject Fw: Point of Clarification

Thanks, let me know and I'll get back to Dave W, and ask him to route these info requests through me in the future, as we agreed to at the meeting -

c.

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

----- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/09/2010 03:14 PM -----

Dave Press/GOGA/NPS
06/09/2010 02:36 PM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc Ben Becker/PORE/NPS@NPS, Sarah Allen/PORE/NPS@NPS
Subject Fw: Point of Clarification

FYI

I'll let you know what we here from [redacted] (grad student) about how many cameras are currently present.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

----- Forwarded by Dave Press/GOGA/NPS on 06/09/2010 02:34 PM -----

"David M Weiman" <agresources@erols.com>
06/09/2010 05:26 PM AST

To: <ben_becker@nps.gov>, <dave_press@nps.gov>, "Allen, Sarah, Ph.D." <sarah_allen@nps.gov>
cc:
Subject: Point of Clarification

Ben, David and Sarah.

Kevin and Nancy were reviewing the MMC meeting, and called me to discuss it. One

part of that discussion centered on the camera taking photos of the Estero.

Someone indicated that NPS regularly uses these cameras, and, at present, they are in use elsewhere at Point Reyes.

The question emerged, does NPS have more than one camera pointed at the Estero, on or off shore, or is this the only camera?

We request that this be clarified at your earliest opportunity.

Thank you.

dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

Dave Press/GOGA/NPS
06/09/2010 02:36 PM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc Ben Becker/PORE/NPS@NPS, Sarah Allen/PORE/NPS@NPS
bcc
Subject Fw: Point of Clarification

History: This message has been forwarded.

FYI

I'll let you know what we here from EX 6 (grad student) about how many cameras are currently present.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
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"David M Weiman" <agresources@erols.com>
06/09/2010 05:26 PM AST

To: <ben_becker@nps.gov>, <dave_press@nps.gov>, "Allen, Sarah, Ph.D." <sarah_allen@nps.gov>
cc:
Subject: Point of Clarification

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dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002

(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

Corey Goodman
<EX 6 [redacted]>
06/09/2010 02:32 PM

To Dave_Press@nps.gov
cc David Weiman <agresources@erols.com>, Cicely Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny <kevin@drakesbayoyster.com>, Tim Ragen
bcc
Subject Re: photographs

Thanks,
Corey

On Jun 9, 2010, at 2:31 PM, Dave_Press@nps.gov wrote:

> FYI - the images went out with today's mail.
>
> Dave
> _____
> David Press
> Ecologist / Data Manager
> San Francisco Area Network
> Inventory and Monitoring Program
> 415-331-0168
> 415-331-5530 (FAX)
>
>
> |---------+------------------------------>
> | | Corey Goodman |
> | | EX 6 [redacted] |
> | | .com> |
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> | | 06/09/2010 12:55 |
> | | PM MST |
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>
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|
> | | To:
> Dave_Press
> @nps
> .gov
>
|
> | | cc: David Weiman <agresources@erols.com>, Cicely
> Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny |
> | | <kevin@drakesbayoyster.com>, Tim Ragen
> <
> tragen
> @mmc
> .gov> |
> | | Subject: Re:
> photographs
>
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>
> Thanks Dave,
> Corey
>
>
> On Jun 9, 2010, at 12:20 PM, Dave_Press@nps.gov wrote:
>
>> Corey,
>> I will send the images on CD by mail and will let you know when they
>> go out
>> the door. I will send the images to Tim also.
>>
>> Dave
>> _____
>> David Press
>> Ecologist / Data Manager
>> San Francisco Area Network
>> Inventory and Monitoring Program
>> 415-331-0168
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>> | | 06/09/2010 06:37 |
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> |
>> | To: David Press
>> <
>> dave_press
>> @nps
>> .gov
>>>
>>
> |
>> | cc: Kevin Lunny <kevin@drakesbayoyster.com>, David
>> Weiman <agresources@erols.com>, Tim Ragen <tragen@mmc.gov>, |
>> | Cicely Muldoon
>> <
>> Cicely_Muldoon
>> @nps
>> .gov
>>>
>>

> |
>> | Subject:
>> photographs
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>>
>> David,
>>
>> This is a reminder and request to please send us the following
>> digital
>> photographs from the camera focused on the UEN and OB oyster beds and
>> lateral channel. After the close of our meeting on Monday, and after
>> most folks had already left, you came back with a single B&W print of
>> one photo from March 14, 2008 and said you had now looked through the
>> series of photos with a boat in the lateral channel. You said you
>> would email these photos to the attendants of the meeting, since
>> these
>> are the photos that I had requested in the morning. Please send us
>> ASAP by email the full set of photos containing any sign of the boat
>> from 12 noon to 1:15 pm on March 14, 2008.
>>
>> Second, in the "Briefing Statement" document of May 1, 2009, you
>> write
>> that you have photos of a DBOC boat on Drakes Estero on Sunday March
>> 23, 2008. Please send that entire series as well, including the full
>> range of photos showing that boat.
>>
>> Please send all of these photos at the full resolution that you have.
>> I believe that is 3.1 megapixels.
>>
>> Thanks very much. If you want to send the photos on a DVD, my
>> address
>> is: EX 6 [redacted] Hopefully you can send them by
>> multiple emails. You need only send them to me on our side of the
>> table and I will distribute to Kevin and Dave.
>>
>> Thanks again,
>>
>> Corey
>>
>>
>>
>>
>>
>
>
>

Dave Press/GOGA/NPS
06/09/2010 02:31 PM

To Corey Goodman <[redacted]>
cc David Weiman <agresources@erols.com>, Cicely Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny <kevin@drakesbayoyster.com>, Tim Ragen
bcc
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David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
Corey Goodman <[redacted]>

Corey Goodman
[redacted]

06/09/2010 12:55 PM
MST

To: Dave_Press@nps.gov
cc: David Weiman <agresources@erols.com>, Cicely Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny <kevin@drakesbayoyster.com>, Tim Ragen <tragen@mmc.gov>
Subject: Re: photographs

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>
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> |---------+---------------------------->
> | | Corey Goodman |
> | | [redacted] |
> | | |
> | | 06/09/2010 06:37 |
> | | AM MST |
> |---------+---------------------------->
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> | To: David Press
> <
> dave_press
> @nps
> .gov
> >
>
|
> | cc: Kevin Lunny <kevin@drakesbayoyster.com>, David
> Weiman <agresources@erols.com>, Tim Ragen <tragen@mmc.gov>, |
> | Cicely Muldoon
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>
> Thanks very much. If you want to send the photos on a DVD, my address
> is: EX 6 [redacted] Hopefully you can send them by
> multiple emails. You need only send them to me on our side of the
> table and I will distribute to Kevin and Dave.
>

> Thanks again,
>
> Corey
>
>
>
>
>

EX 6
EX 6
EX 6
06/09/2010 02:19 PM

To Sarah Allen <sarah_allen@nps.gov>
cc
bcc
Subject RE: accident

Hi Sarah,
Ok then. I will. Is it not possible for someone out there to check on my camera? Batteries can last three weeks so it really only needs to be checked every three weeks. Can Sarah Codde do it? I realize everyone is very busy at Point Reyes. I may be able to convince my boyfriend to check on the camera as well. I am so disappointed this has happened. It has ruined everything for this summer.
thanks,
Andrea

> Subject: Re: accident
> To: EX 6 com
> CC: ehines@sfsu.edu
> From: Sarah_Allen@nps.gov
> Date: Mon, 7 Jun 2010 17:09:59 -0700
>
> EX 6 - I am so sorry to hear about your accident. You need to focus on
> your recovery and not worrry about your work - we will discuss plan B for
> your work when you are back on your feet.
>
> Take care.
>
> Sarah
>
>
> _____
>
> Sarah G. Allen, PhD
> Oceans Stewardship
> National Park Service, Pacific West Region
> c/o Point Reyes Station, CA 94956
> 510-817-1396 (PWRO)
> 415-464-5187 (PORE)
> _____
>
> "For all at last return to the sea--to Oceanus,
> the ocean river, like the ever-flowing stream of time,
> the beginning and the end." -- Rachael Carson
>
>
>
>
>
> EX 6
> EX 6
> To
> Sarah Allen <sarah_allen@nps.gov>

Cicely
Muldoon/OAKLAND/NPS
06/09/2010 01:38 PM

To Corey Goodman <[redacted]
cc David Weiman <agresources@erols.com>, Kevin Lunny <kevin@drakesbayoyster.com>, tragen@mmc.gov
bcc George Turnbull/OAKLAND/NPS
Subject Re: thank you and request

Hi Corey -

Thanks for the note. I thought it was a positive and productive meeting on Monday, and was glad to have a chance to hear the discussion and reach resolution on how to address each data point. Dave and Sarah have already been faster than I at getting back in touch, and I know that Dave is burning the images you request onto a CD this afternoon, and that Sarah is attempting to reach the volunteer who made reference to digital images on the data sheet. I will see what I can find out about last year's briefing paper and get back in touch.

You talked at the Monday meeting about how divisive this issue has been in the community. I agree, and believe we all have a real opportunity to change the tone of the discussion, acknowledging where we disagree, and doing so without rancor or malice. I confess the tenor of your message concerns me, as it seems to perpetuate the divisive tone that we are all committed to moving beyond. I look forward to discussing this further with you.

Thanks,

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

Corey Goodman <[redacted]

Corey Goodman
<[redacted]
06/08/2010 02:08 PM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>
cc Kevin Lunny <kevin@drakesbayoyster.com>, David Weiman <agresources@erols.com>
Subject thank you and request

Dear Cicely,

It was a pleasure meeting you yesterday. I had heard great things about you from a number of people that I greatly trust and respect, and so I have great hopes for your tenure at PRNS to help heal the wounds in our community caused by your predecessor, and to find the right balance between the Seashore, the Park visitors, and the agricultural use of some of the lands. I look forward to working with you and supporting you at the Seashore in this endeavor.

Thanks also for attending the meeting yesterday. At some point soon, I would like to get together with you privately to give you some historical perspective on the Drakes Estero issue -- and the misuse of science -- so that you better understand what I discovered, why I did so, and what I have learned over the past four years. I worry that you are hearing only one side, and that side is biased. It would be healthy for you to hear a perspective that doesn't come from Dave Graber and others within the NPS. It would be valuable for you to get out of the NPS and hear the story from my perspective, as a National Academy of Sciences member and local resident who became involved at the request of Supervisor Steve Kinsey. Most of what I have said has been validated by the National Academy of Sciences panel, the Inspector General, and the Marine Mammal Commission.

As I mentioned to you yesterday when we talked after the meeting, I have four specific requests.

First, concerning the May 1, 2009 "Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC", would you please find out and tell me (i) who requested this document (i.e., why it was written), (ii) who wrote it (all of the authors please), and (iii) to whom it was sent and distributed. Naturally, I was surprised recently to discover this document, over one year after it was written and distributed. It contains many misleading statements, misrepresentations, and false arguments, all aimed at blunting a document I had given to the NRC and of course provided to the NPS. I hope that, in the future under your administration, documents coming from the PRNS will be authored, will be distributed to the relevant parties, and that if they attack the work of an individual, they will not be kept secret from that individual but rather will be shared to allow a fair critique. It should make you wonder why the folks who created this document didn't want me to see it. At a later date, I will share my critique of it with you.

Second, concerning the secret camera that has been focused on the lateral channel and Lunny's oyster beds for the past 2 1/2 years (without ever telling Lunny or the public), would you please immediately send to me the digital photos (at full resolution) from 12 noon to 1:15 pm on March 14, 2008, and the digital photos from March 23, 2008 (as cited in the "Briefing Statement") for a one hour period including 30 minutes before and after the claimed images of a DBOC boat present on Drakes Estero. Please don't be surprised if in the near-term I submit a FOIA request for access to all of the photos, but for the moment, these two dates are key. Thanks for getting these photos from the two key dates for me now.

Third, would you please send me the couple of digital photos that in the December 10, 2008 disturbance report, Sue Van Der Wal says she gave to Sarah Allen.

Fourth, I have some advice and a request concerning the secret camera photographing Lunny's oyster beds and oyster workers at UEN and OB and the lateral channel for the past 2 1/2 years. As I told you yesterday, this is very provocative to our community. You said that you thought that this camera was simply being used for wildlife photographs. The timing after the Neubacher assertions in 2007 and controversy, the positioning of the camera pointing right at Lunny's operation, and the location of the camera hidden in thorns and vines, suggests that it was set up to optimize the observation of homo sapiens and not harbor seals. PRNS officials and scientists have had many opportunities to reveal the existence of this camera and the digital photographs, and they have never done so. The community is likely to respond very poorly to this revelation. I encourage you to make a strong statement to the community assuring them that under your administration, you will never use any photographic or listening device to spy on any of the ranchers or farmers within the Seashore. If you simply say that this camera is aimed at wildlife,

you will regret such a statement as the photographs themselves, and their use in the May 1, 2009 "Briefing Statement", reveal the true intent -- the focus is on the lateral channel and the oyster beds, and is not optimized to get as many harbor seal haul-out sites as possible. I would recommend that you say that the hidden nature of this camera disturbs you -- as is the fact that Lunny was never told -- and that you will investigate its purpose and history, and that you will assure the agricultural community that you will not allow spying on ranchers and farmers.

Best wishes,

Corey

Dr. Corey S. Goodman
EX 6 [redacted]
EX 6 [redacted]

Corey Goodman
<EX 6
06/09/2010 12:55 PM

To Dave_Press@nps.gov
cc David Weiman <agresources@erols.com>, Cicely Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny <kevin@drakesbayoyster.com>, Tim Ragen
bcc
Subject Re: photographs

Thanks Dave,
Corey

On Jun 9, 2010, at 12:20 PM, Dave_Press@nps.gov wrote:

> Corey,
> I will send the images on CD by mail and will let you know when they
> go out
> the door. I will send the images to Tim also.
>
> Dave
> _____
> David Press
> Ecologist / Data Manager
> San Francisco Area Network
> Inventory and Monitoring Program
> 415-331-0168
> 415-331-5530 (FAX)
>
>
> |---------+------------------------------>
> | | Corey Goodman |
> | | EX 6 |
> | | .com> |
> | | |
> | | 06/09/2010 06:37 |
> | | AM MST |
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>
> |
>
|
> | To: David Press
> <
> dave_press
> @nps
> .gov
> >
>
|
> | cc: Kevin Lunny <kevin@drakesbayoyster.com>, David
> Weiman <agresources@erols.com>, Tim Ragen <tragen@mmc.gov>, |
> Cicely Muldoon
> <
> Cicely_Muldoon
> @nps
> .gov

> >
>
|
> | Subject:
> photographs
>
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>
>
> David,
>
> This is a reminder and request to please send us the following digital
> photographs from the camera focused on the UEN and OB oyster beds and
> lateral channel. After the close of our meeting on Monday, and after
> most folks had already left, you came back with a single B&W print of
> one photo from March 14, 2008 and said you had now looked through the
> series of photos with a boat in the lateral channel. You said you
> would email these photos to the attendants of the meeting, since these
> are the photos that I had requested in the morning. Please send us
> ASAP by email the full set of photos containing any sign of the boat
> from 12 noon to 1:15 pm on March 14, 2008.
>
> Second, in the "Briefing Statement" document of May 1, 2009, you write
> that you have photos of a DBOC boat on Drakes Estero on Sunday March
> 23, 2008. Please send that entire series as well, including the full
> range of photos showing that boat.
>
> Please send all of these photos at the full resolution that you have.
> I believe that is 3.1 megapixels.
>
> Thanks very much. If you want to send the photos on a DVD, my address
> is: EX 6 Hopefully you can send them by
> multiple emails. You need only send them to me on our side of the
> table and I will distribute to Kevin and Dave.
>
> Thanks again,
>
> Corey
>
>
>
>
>

Dave Press/GOGA/NPS
06/09/2010 12:20 PM

To Corey Goodman <EX 6
cc David Weiman <agresources@erols.com>, Cicely Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny <kevin@drakesbayoyster.com>, Tim Ragen
bcc
Subject Re: photographs

Corey,
I will send the images on CD by mail and will let you know when they go out the door. I will send the images to Tim also.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)
Corey Goodman <EX 6

Corey Goodman
EX 6
om>
06/09/2010 06:37 AM
MST

To: David Press <dave_press@nps.gov>
cc: Kevin Lunny <kevin@drakesbayoyster.com>, David Weiman <agresources@erols.com>, Tim Ragen <tragen@mmc.gov>, Cicely Muldoon <Cicely_Muldoon@nps.gov>
Subject: photographs

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Please send all of these photos at the full resolution that you have. I believe that is 3.1 megapixels.

Thanks very much. If you want to send the photos on a DVD, my address is: EX 6 Hopefully you can send them by multiple emails. You need only send them to me on our side of the table and I will distribute to Kevin and Dave.

Thanks again,

Corey Goodman
<EX 6 [redacted]>
06/09/2010 06:37 AM

To David Press <dave_press@nps.gov>
cc Kevin Lunny <kevin@drakesbayoyster.com>, David Weiman <agresources@erols.com>, Tim Ragen <tragen@mmc.gov>, Cicely Muldoon <Cicely_Muldoon@nps.gov>
bcc
Subject photographs

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Thanks again,

Corey

Corey Goodman
<EX 6 [redacted]
06/08/2010 02:08 PM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>
cc Kevin Lunny <kevin@drakesbayoyster.com>, David Weiman <agresources@erols.com>
bcc
Subject thank you and request

History: This message has been replied to and forwarded.

Dear Cicely,

It was a pleasure meeting you yesterday. I had heard great things about you from a number of people that I greatly trust and respect, and so I have great hopes for your tenure at PRNS to help heal the wounds in our community caused by your predecessor, and to find the right balance between the Seashore, the Park visitors, and the agricultural use of some of the lands. I look forward to working with you and supporting you at the Seashore in this endeavor.

Thanks also for attending the meeting yesterday. At some point soon, I would like to get together with you privately to give you some historical perspective on the Drakes Estero issue -- and the misuse of science -- so that you better understand what I discovered, why I did so, and what I have learned over the past four years. I worry that you are hearing only one side, and that side is biased. It would be healthy for you to hear a perspective that doesn't come from Dave Graber and others within the NPS. It would be valuable for you to get out of the NPS and hear the story from my perspective, as a National Academy of Sciences member and local resident who became involved at the request of Supervisor Steve Kinsey. Most of what I have said has been validated by the National Academy of Sciences panel, the Inspector General, and the Marine Mammal Commission.

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Best wishes,

Corey

Dr. Corey S. Goodman
EX 6 [redacted]

"Mark Bartolini"
<markb@ptreyes.org>
06/08/2010 11:57 AM

To <Cicely_Muldoon@nps.gov>
cc
bcc
Subject RE: the MMC meeting DEADLINE TODAY

Secret cameras...Actually the park has several cameras set up to observe wildlife we don't release the location because of fear of vandalism/theft but we will be happy to show you recordings to show that we do in fact monitor wildlife in several areas of the park.

Some of her other questions are quite legitimate. Go for it

Mark Bartolini
Executive Director
Point Reyes National Seashore Association (PRNSA)
Office: (415) 663-1200 x 301
Fax: (415) 663-8174
e-mail: markb@ptreyes.org
www.ptreyes.org

-----Original Message-----
From: Cicely_Muldoon@nps.gov [mailto:Cicely_Muldoon@nps.gov]
Sent: Tuesday, June 08, 2010 8:46 AM
To: markb@ptreyes.org
Subject: Fw: the MMC meeting DEADLINE TODAY

(Embedded image moved to file: pic03068.gif)
----- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/08/2010 08:46 AM -----

Sue Husari/OAKLAND/NPS
06/08/2010 08:37 AM

To "Cicely Muldoon" <cicely_muldoon@nps.gov>
cc
Subject Fw: the MMC meeting DEADLINE TODAY

Fyi

From: andrea blum [andreablu[redacted]]
Sent: 06/08/2010 08:28 AM MST
To: Sarah Allen
Cc: Ben Becker; Dave Press
Subject: the MMC meeting DEADLINE TODAY

Hi there.
Hope all went well yesterday. I need your help in getting the NPS and your personal POV in this matter. It's important considering the other paper is now run by Dr. Goodman. Could you give me a roundup of what happened yesterday and with the disputed data points having to do with Lunny's operation? Were they eliminated, changed, reinterpreted? Where were the disagreements/ common ground? LUNNY seemed to come armed with proof that he was not working on certain days (payroll, time clocks) i.e. April 2007, why then is an volunteer observer trumping that information and the data not reinterpreted? When and why was a camera set up in the estero? please explain the purpose and who ordered the camera. Why wasn't this public information? It was never announced nor was it mentioned in the hike out to the estero during the MMC visit. Why is the camera set up in the lateral channel? What information have you gleaned form the camera? Is it also to keep an eye on the oyster boats? Will you share the photos?

Finally, can someone respond to this question: what was the overwhelming data in 2007 when Don Neubacher said there was overwhelming evidence that Lunny was hurting the estero? Does that evidence still hold in your opinion? This is important because it's this comment that started this whole story, war, debacle, epic... Can we set the record straight? is Lunny hurting the estero and causing harbor seal populations to decline? Are the data points from April 2007 the ones that make this theory true/false? Can I get a statement from you that explains all this? Are any of you available to talk asap this morning? THx, Andrea

Andrea Blum
Environmental Reporter
West Marin Citizen
mobile: 415-300-6686
andreablum@[redacted]

EX 6 [redacted]

06/05/2010 06:29 PM

To Ben Becker <ben_becker@nps.gov>
cc
bcc
Subject RE: accident

thank you!
I asked Sarah Codde who told me to talk to Sarah Allen about it... I emailed her but no reply yet.
I really hope I can find someone to look after it for me.

Andrea

> Subject: Re: accident
> To: EX 6 [redacted]om
> From: Ben_Becker@nps.gov
> Date: Sat, 5 Jun 2010 17:58:58 -0700
>
> Hi,
>
> So sorry about the injury! Best of luck with the recovery.
>
> Let me know if there is anything I can help with. Is there someone who can
> simply keep your camera in service?
>
> -Ben
>
> _____
>
> Ben Becker, Ph.D.
> Director and Marine Ecologist
> Pacific Coast Science and Learning Center
> Point Reyes National Seashore
> 1 Bear Valley Road
> Point Reyes Station, CA 94956
>
> tel: 415-464-5247
> fax: 415-868-1202
> ben_becker@nps.gov
> http://home.nps.gov/pore/parkmgmt/pcslc.htm
> _____
>
> The Pacific Coast Science and Learning Center is one of 19 Research
> Learning Centers at National Parks across the country working to increase
> the effectiveness and communication of research and science through:
>
> · Facilitating the use of parks for scientific inquiry
> · Supporting science-informed decision making
> · Communicating relevance and providing access to research knowledge
> · Promoting resource stewardship through partnerships
>
>

>
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>
> EX 6
EX 6 eld
> [redacted]
> Ben Becker <ben_becker@nps.gov>
> 06/05/2010 05:21 cc
> PM
> Subject
> accident
>
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>
>
> Hi Ben,
>
> I have some bad news... i had an accident- I fully dislocated my knee cap.
> I was in the hospital all day yesterday. Now I'm on crutches and I have a
> leg brace, and I'm basically stuck in bed. I can't believe this has
> happened. It has ruined all my plans for the summer. I can't move up to
> point reyes now. I can't do my research. I will be stuck in the city for 6
> weeks and then have physio.
>
> I supposed there is always a possibility of me being able to move into sac
> landing later this summer but I have no idea how long it will take for me
> to fully recover and be able to hike out to my site.
> Sorry for any inconvenience.
> EX 6
>
> Enter for a chance to get your town photo on Bing.ca! Submit a Photo Now!
>

Your Photo on Bing.ca: You Could WIN on Canada Day! Submit a Photo Now!

From: Sarah Codde/PORE/NPS
To: EX 6 [redacted]

Date: Thursday, May 20, 2010 04:46PM
Subject: Fw: camera

Hi EX 6 [redacted]
Sarah A has a new computer so the Reconyx program is not on this one. We're not sure why its not working or how to install the program. So I think you are going to need to call Reconyx. Sorry.

~ Sarah

P.S. Since Sarah is not going to be in Point Reyes very often any more, you can leave the memory cards with me to download.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----Forwarded by Sarah Codde/PORE/NPS on 05/20/2010 04:43PM -----

> To: EX 6 [redacted]com
> From: Sarah Codde/PORE/NPS
> Date: 05/17/2010 01:25PM
> Subject: Fw: camera
>
> Ooops, sorry. I just saw the card reader in Sarah's office. I can't get it to work either - the Schedule button doesn't open to anything. The only thing I can think of is maybe the Silent Image program needs to be download onto the computer, but I can't seem to figure out how to do that either. Is the program downloaded on your computer or do you just use the CD everytime? I tried to use it on Sarah's computer because I'm pretty sure the program is on her computer, but she is in the process of moving to an office in Oakland and her computer is not in the office next door to me. When she is back in the office I'll see if the program is on her computer.
>
> ~ Sarah
>
> Sarah Codde
> Biological Science Technician
> Pinniped Monitoring Program
> Point Reyes National Seashore
> Phone: (415) 464-5210
> Fax: (415) 663-8132
> Sarah_Codde@nps.gov
>
> -----Forwarded by Sarah Codde/PORE/NPS on 05/17/2010 01:10PM -----
>
> > To: EX 6 [redacted] E
> > From: Sarah Codde/PORE/NPS
> > Date: 05/17/2010 01:00PM
> > Subject: camera

Hi [redacted]
I wasn't able to work on the camera settings because you have the card reader. According to the manual, you need to program the settings onto the card which needs to be connected to the computer. It seems like you just open the Camera Settings tool and click on the Schedule option. But since I can't try it I'm not sure if that would work for me or not. Is that how you were trying to do it?

~ Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

From: Sarah Codde/PORE/NPS
To: EX 6

Date: Thursday, May 13, 2010 12:19PM
Subject: Re: camera

Hi EX 6
I think Sarah A forgot that she was the one that set up the camera. I never had to program that one. I've only had to program the camera that is already out. I'm not going to be at Pt Reyes on Friday. If you want to leave it on my desk I can try to take a look at it next week. There's also a chance that Sarah still has the manual in her office or you can try to look it up on the internet. Sorry.

Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----EX 6 EX 6 > wrote: -----

> To: Sarah Codde <sarah_codde@nps.gov>
> From: EX 6 EX 6
> Date: 05/12/2010 08:11PM
> Subject: camera
>
> Hi Sarah,
>
> I was talking to Sarah Allen and she said that you are the one to ask about the camera. I have the older reconyx camera but I am having some issues in programming it. I have set it to take one picture every minute but the program will not let me open the schedule so that I can change when it turns on and off. Right now, it just runs continuously. Any ideas? Are you familiar with the program to set the camera? I am coming down to Point Reyes on Friday- will you be around by any chance?
>
> Thanks,
>
> EX 6
>
> 30 days of prizes: Hotmail makes your day easier! Enter now

Sarah Codde/PORE/NPS
05/12/2010 16:54

To Dave Press/GOGA/NPS@NPS
cc
bcc
Subject DE camera info

Here is where I saved the PDFs:
U:\Natural_Databases\Pinniped\UpperDrakesEstero2008

There are two files, 1 for the camera set up for OB and 1 for the camera set up for UEF:

File Names:
UEF Camera data
OB Camera data

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

From: Sarah Codde/PORE/NPS
To: EX 6

Date: Friday, May 07, 2010 09:38AM
Subject: Camera sign

Hi EX 6
I have a sign ready for you for the second camera. Do you also need a tripod?

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

Sarah Codde/PORE/NPS
05/03/2010 15:26

To [redacted]
cc
bcc
Subject Re: camera

Hi [redacted]
I don't have any plans to be on the Estero trail any time soon. Sorry.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

----[redacted] wrote: ----

To: Sarah Codde <sarah_codde@nps.gov>
From: [redacted]
Date: 05/02/2010 05:00PM
Subject: camera

Hi Sarah,

So my camera was knocked (by a bird or something) last week. I thought I fixed it back to the right angle...however I am looking at the pictures from last week and they are too high. I have attached one for you to see the angle. If you happen to take the Estero trail please can you fix it (dont go out of your way)? If not, it's ok, I will be out there on fri...

[redacted]

Hotmail & Messenger. Get them on your phone now.

From: Sarah Codde/PORE/NPS
To: [redacted]

Date: Friday, April 30, 2010 03:55PM
Subject: Re: Satellite tagged animal at DE

Hi [redacted]
Sorry I was out at another habor seal site all day. Hopefully another time I can go out with you. You'll have to ask Sarah A about another lock. At one time we had one so maybe she knows where it is. I can get you another sign.

Have a great weekend.

~ Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

From: Sarah Codde/PORE/NPS
To: EX 6

Date: Friday, April 16, 2010 04:44PM
Subject: Harbor Seals at UEF

Hey EX 6
One of my volunteers reported that they saw 40 seals on UEF during their 3:40 count (sometime between 3:40 and 4:30) on 4/10. When you download the pictures from that day can you check that. They're probably right but it just sounds like a lot since we are just now seeing some there so I want to double check that they didn't mis-identify UEF.

Thanks,
Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

Ben Becker/PORE/NPS
04/13/2010 01:56 PM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject current Drakes Studies

Sarah,

These are the only Drakes Estero studies that are ongoing.

Current / Proposed Studies in Drakes Estero

1. Phytoplankton community responses to nutrient regimes in Drakes Estero Marine Conservation Area, CA. Ex 6 , SFSU, Marine Biology MsC candidate.

2. Potential rapid survey for Naturalized Manila Clams in Drakes Estero: Summer 2010.

3. Monitoring Possible Effects of Disturbance on Pacific Harbor Seals in Drakes Estero, CA., EX 6 , SFSU, MS student.

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

EX 6
EX 6

03/14/2010 02:01 PM

To <ben_becker@nps.gov>
cc
bcc
Subject RE: fellowship

History: This message has been replied to.

Hi Ben,

I really appreciate you doing this for me! I realize it is last minute and this deadline really crept up on me. I know how busy you are and I am thrilled you can do this for me. I have attached the proposal for your review and any comments you may have on it will be greatly appreciated. Let me know what you think.

Thank you so much,

EX 6

> To: Sarah_Codde@nps.gov
> CC: EX 6 com
> From: Ben_Becker@nps.gov
> Subject: Re: Fw: fellowship
> Date: Fri, 12 Mar 2010 16:10:18 -0800
>
> Hi EX 6
>
> I can write you a letter of support, but I'd need to see a rough draft of
> your proposal. At minimum an abstract, title, and basic methods and
> results. I can send the email to Elliot Dale on monday.
>
> For this fellowship application, I suggest you be sure to closely tie
> anticipated study results to informing park management.
>
> Good luck,
>
> -Ben
>
> _____
>
> Ben Becker, Ph.D.
> Director and Marine Ecologist
> Pacific Coast Science and Learning Center
> Point Reyes National Seashore
> 1 Bear Valley Road
> Point Reyes Station, CA 94956
>
> tel: 415-464-5247
> fax: 415-868-1202
> ben_becker@nps.gov
> http://home.nps.gov/pore/parkmgmt/pcslc.htm
> _____

>
> The Pacific Coast Science and Learning Center is one of 21 Research
> Learning Centers at National Parks across the country working to increase
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>
> To   Ben Becker/PORE/NPS@NPS
> cc
> bcc
> Subject   Fw: fellowship
> Sarah Codde/PORE/NPS
>
> 03/12/2010 03:50 PM
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> Hi Ben,
> Sarah is working with a Master's student from SFSU on the drakes

> estero/oyster farm issue and this student needs a statement from park
> personnel on the importance of the research to park management for a
> fellowship application. The application is due this Monday and I don't
> want to bother Sarah with this. Is there any way you can help with this?
> Do you know about this student and her research? I don't feel like I am an
> appropriate person to write this statement. I also feel this is a little
> last minute and with the harbor seal training tomorrow, I don't have the
> time to deal with this. I also understand if you don't have the time to
> deal this, since EX 6 should have contacted me sooner. If you can help,
> the attached document and EX 6 email has more information.
>
> Thanks,
> Sarah
> _____
> Sarah Codde
> Biological Science Technician
> Pinniped Monitoring Program
> Point Reyes National Seashore
> Phone: (415) 464-5210
> Fax: (415) 663-8132
> Sarah_Codde@nps.gov
>
> -----Forwarded by Sarah Codde/PORE/NPS on 03/12/2010 03:43PM -----
>
> To: Sarah Codde <sarah_codde@nps.gov>
> From: EX 6 d <EX 6 m>
> Date: 03/12/2010 03:10PM
> Subject: fellowship
>
> Hi Sarah,
>
> Since Sarah Allen is taking some time off work, I was wondering if you
> could do this for me. This deadline crept up on me. I am working on an
> application for a fellowship (attached info) that gives students funding
> for work in national parks.
> It asks for:
> "Statement(s) of support (email messages are ok) from appropriate park
> personnel addressing the relevance of
> the research to park management."
>
> Would it be possible for you to write something short for me? It says
> emails are ok.
> I am sorry about the short notice (this whole week at school has been
> midterms for me).
>
> Thank you,
>
> EX 6
>
>
> IM on the go with Messenger on your phone. Try now.
> - GMW Climate Change Fellowship.2010.pdf
>
>

>
>
>

IM on the go with Messenger on your phone. Try now. ProposalAD.doc

Research Proposal

Literature Review

Recent pinniped research projects indicate the importance of spatial and temporal scales in habitat selection (Womble et al. 2009). Overall, it seems that the life history of pinnipeds is generally understood. However, previous studies are lacking in the understanding of pinniped habitat requirements. Studies that have been conducted are primarily centralized on the terrestrial habitat requirements of pinnipeds (Allen 1991) and few empirical studies have determined the effects of disturbance on pinnipeds.

Disturbance is defined as any activity that alters normal behavior, and in many locations, disturbance is an important factor affecting the haul-out patterns of pinnipeds (Suryan and Harvey 1999). Examples of disturbance include aircraft, boats, seismic activities, pedestrians, kayakers, and of course natural predators. Disturbance can be anthropogenic or non-anthropogenic and both can be severely detrimental to pinniped populations. Anthropogenic disturbance is seen to affect haul-out site choice (Schneider and Payne 1983), breeding behaviors, feeding, and in result may cause population declines (Stevens and Boness 2003). In some situations, pinnipeds have become accustomed to disturbance, while in other situations disturbance has led to the eventual abandonment of haul-out sites. Disturbance can cause separation of mothers and pups and can be a significant source of pup mortality. Wildlife oriented recreation may also may a part since ecotourism activities are increasing (Duffus and Dearden 1990). The distances between the pinniped and the disturbance as well as the length of exposure are key factors in pinniped behavioral response and adverse effects (Green et al. 2003). Studies assessing the potential impact of fisheries have pointed to declines in marine mammal populations due to anthropogenic interactions and recommend comprehensive monitoring of population trends and improved regulations in order to minimize impacts on local pinniped populations (Thompson et al. 2006). In regards to mariculture, previous

research has shown that seal disturbance rates increased with increases in oyster harvest, and that haul-out site choice can be best explained by mariculture activities (Becker et al. 2009). To monitor pinniped populations, current research projects indicate the value of using video cameras to capture rare behavioral characteristics, identify critical habitat types including important foraging areas, determine local preferred prey species, and examine dive times (Williams et al. 2000). Valuable information can be obtained on habitat use, prey species, behaviors, abundance, distribution, physiology, disturbance and foraging ecology. There is immense significance and application in using video cameras to observe pinnipeds. Many conservation and management issues can be clarified and ameliorated using video camera techniques. In the context of disturbance, video cameras are an effective tool to monitor population dynamics in the hopes of improving regulations in order to minimize impacts on local pinniped populations.

Introduction

The harbor seal is a small phocid seal common to waters along the west coast of north America, and ranges from Baja California to Alaska (Grigg et al. 2009). The harbor seal is the dominant pinniped and only year-round resident in the San Francisco Bay Area. The colony at Point Reyes National Seashore represents the second largest concentration of harbor seals in California and accounts for 20% of the mainland population (Lowry et al. 2005). Most of the Point Reyes coastline remains relatively pristine and provides important marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal (Truchinski et al. 2008). There have been several studies on the haul-out patterns of harbor seals in undisturbed areas but the effects of anthropogenic activities on haul-out patters have rarely been examined (Allen et al. 1984).

This project will investigate the effects of disturbance on the Pacific harbor seal (*Phoca vitulina richardii*) populations at Drakes Estero located near a mariculture operation at Point Reyes National Seashore, California. The hypothesis is that there are no observable effects of disturbance from the mariculture operations on the harbor seal populations. The alternative hypothesis is that the harbor seal populations are subject to disturbance effects from mariculture operations.

Methods

At Drakes Estero and Estero de Limantour, there are eight haul-out sites where the colony referred to as the Drakes Estero or Limantour seal colony hauls out. Harbor seals use haul-out sites for breeding, resting areas, thermoregulation, and for predator avoidance. This study investigates disturbance at three of the eight haul-out sites in the estuary. These prime haul-out sites are in close proximity to mariculture operations. Prime haul-out sites are sites that have easy access to the water and proximity to food sources.

Long term surveys will be conducted from March 2010 to August 2011at an observation point overlooking the three haul-out sites. I will be taking into account a number of factors that are known to influence the degree of harbor seal response to disturbance such as season (presence of pups is important because mothers with pups means higher sensitivity to disturbance and prey availability), site topography, and number of seals present at the haul-out sites. Each survey will last at least 2 hours and data will be collected on the location, number of adult/immature seals, the number of pups and dead pups present. Disturbance will be recorded during each survey and data collected includes the type of disturbance, duration, and harbor seal behavioral response.

A stationary video camera will be used to document harbor seal population dynamics, haul-out site choice and disturbance effects. The video camera will be positioned at the haul-out site closest to the mariculture operations as this is the site predicted to exhibit the highest incidence of disturbance. This particular haul-out site has been subject to a large scale disturbance from

mariculture operations whereby the seals have abandoned the site. Now that the large-scale disturbance has been removed, recolonization of this previously disturbed haul-out site can be investigated. This footage, along with the surveys, will then be analyzed from a behavioral perspective and statistical analyses will be conducted.

Conclusion

Long term effects of disturbance are difficult to assess but the application of video cameras strategically positioned at haul-out sites in these areas that may be affected by disturbance will provide insight into pinniped response and the resulting population dynamics. Since minimizing disturbance effect and protecting haul-out sites is crucial to conserving populations, this project will have important implications for the management and conservation of harbor seals at Point Reyes National Seashore.

References

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From: Sarah Codde/PORE/NPS
To: [redacted]

Date: Thursday, March 04, 2010 08:02AM
Subject: Re: friday

I'm not sure if Sarah or I will be here Friday afternoon. Aren't there are a few memory cards in the bag? Also, keep an eye on the weather forecast today because I think it is supposed to rain tomorrow.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----[redacted] wrote: -----

> To: Sarah Codde <sarah_codde@nps.gov>
> From: [redacted]
> Date: 03/03/2010 11:36PM
> Subject: friday
>
> Hi Sarah,
>
> Just wanted to let you know that I'll be heading out to the field on fri. I have some data to download on your computer (or Sarah Allen's computer) before I head out in the field. Will you be around fri afternoon? Or can i just download the data onto your computer for you? The memory cards are full.
>
> Hope your week is going well for ya,
> [redacted]
>
> ---
>
> Take your contacts everywhere. Try Messenger for mobile

From: Sarah Codde/PORE/NPS
To: EX 6 <EX 6 >

Date: Friday, February 26, 2010 07:24PM
Subject: RE: This friday

Yes, the office should be open. The person who works in dispatch gets there around 9:30 or 10, I think. In regards to how long you should be at the site, you should discuss that with your advisor. I would think if you really want to start learning their behavior, you should stay out there for at least 3 hours doing a survey every 1/2 hour. When I was out there I stayed out for 4 - 6 hours (depending on the time of low tide).

I'll see you on the 13th (if not before). Let me know if you need a ride on the 13th.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----EX 6 <EX 6 m> wrote: -----

To: Sarah Codde <sarah_codde@nps.gov>
From: EX 6 <EX 6 m>
Date: 02/26/2010 03:03PM
Subject: RE: This friday

Hi Sarah,
Thank you!
Yeah it is strange indeed- one leg of the tripod slipped. The camera was still upright, but shifted so the view was crooked.
Now, Im thinking about heading out to the site on Sunday- will the office be open for me to get new batteries, clipboard, etc?
Also, I am wondering: how long should I be at my site for, meaning how many surveys should I do? (one every half hour)
Thanks,

EX 6

ps. I will definitely come out to the training session on March 13th.

Subject: Re: This friday
From: Sarah_Codde@nps.gov
To: EX 6 n
CC:
Date: Thu, 25 Feb 2010 08:44:53 -0800

Hi EX 6
Everything is going well, just super busy. That's weird about the camera, we never once had it fall before. The next time you are out there just double check that it is really stable on the ground. Its supposed to be bad weather tomorrow so I don't know if you'll make it out here, but just play it by ear and check the weather reports tomorrow. Low tide is -0.8 ft at 4:30PM. Here is a good website to check the tides:

http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=9414290%20San%20Francisco,%20CA&type=Tide+Predictions
The low tide is 45 minutes later than SF tide listed in the website.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----EX 6 d <EX 6 m> wrote: -----

To: <sarah_codde@nps.gov>
From: EX 6 d <EX 6 m>
Date: 02/24/2010 10:37PM
Subject: This friday

Hi Sarah,

How is your week going? Anything exciting happen with the elephant seals? I actually went out hiking in Point Reyes on sat. with my bf. It was gorgeous weather and we took the shuttle bus service up to the light house area and saw some amazing elephant seals! We didn't see any whales though, but we'll have better luck in March.

As for updates on my site: When I got out there, the tripod had slipped. Footage from the video card showed that it happened at night during the week (owl?). I corrected the camera as best I could and from the video card footage, it seems I have it in the right spot exactly! So this makes me happy and hopefully this week I will have some good video of the seals.

I am planning on coming out on friday (not sure how the weather will hold up) and im wondering about the tides???

Talk to you soon,

EX 6

Live connected with Hotmail on your phone. Learn more.

Live connected with Hotmail on your phone. Learn more.

From: Sarah Codde/PORE/NPS
To: EX 6 [redacted]

Date: Wednesday, February 17, 2010 02:43PM
Subject: RE: Drakes Estero

I created a folder for you to put your completed datasheets in and there is also a folder that has copies of your data sheets. Feel free to take them and you can make more copies on your own. You will see these folders when you come into my office. They are on the desk next to mine and have the batteries and memory cards on top of them.

I also emailed Sarah Allen a copy of the data sheets and she was going to email them to Ellen, so check with Ellen if she has these.

Do not record seals that are in the water, only ones that are on the sandbars.
Its too bad you can't make it to the trainings, but don't worry Sarah or I will get out with you soon.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----EX 6 [redacted] wrote: -----

To: <sarah_codde@nps.gov>
From: EX 6 [redacted]
Date: 02/17/2010 02:20PM
Subject: RE: Drakes Estero

Hi Sarah,
Thanks for the tide info. My roommate is taking me out to the site so that should be fun. I am glad the camera might be on track now.
Right, on my datasheet I put UEF for 3 seals... but they were in the water near the sandbar but not on the sandbar. Do we still count them? or just make a note that they were in the water? And can I please make photocopies of the datasheets?

Looking at the dates for the harbour seal training, I am sad to say that I have class fieldtrips on both of those days! What are the chances?! So I am disappointed in that. If the field trips are close by to Point Reyes, I might be able to swing it, and I'll let you know closer to the date if I can stop by. I really do want to be a part of seal training.
Thank you for all the information and I hope to see you Fri morning:)
EX 6 [redacted]

Subject: Re: Drakes Estero
From: Sarah_Codde@nps.gov
To: EX 6 [redacted]
CC:
Date: Wed, 17 Feb 2010 12:09:16 -0800

Friday should be a good day. Low tide at Drakes is around 9:30AM and high tide is at 4:00 but its only 4 ft. So going out in the morning should be perfect, probably leave headquarters sometime between 8 and 8:30. I checked out the images from after you moved the camera and its a little foggy and the sandbars aren't very exposed so its hard to tell if its aimed at the right spot but it is definitely low enough. Now we just need to see if the sandbars show up in the image or if we need to move it over to the right a little. On your datasheet you put that you saw 3 seals on UEF, so that is the sandbar the camera is pointed at. Is that right? I didn't see anything in the pictures which makes me wonder if maybe the camera is not pointed at the right sandbar and it might need to move over to the right a little. But we should probably wait until we look at the pictures from this past week. I attached a picture from the most recent camera move.

Here are the details about the harbor seal trainings. If you need a ride let me know. It should be fine you just need to get a ride to San Rafael and I will probably need to get to headquarters around 8, which means leaving San Rafael around 7:20.

HARBOR SEAL TRAINING DETAILS

The first training on **Feb. 27** will just be classroom material and we will not be going out into the field. All you will need to bring with you is a lunch, a notebook, and pencil/pen.

For the second training on **Mar. 13** we will be splitting the day with classroom in the morning and a fieldtrip in the afternoon. P lease bring hiking boots, a backpack, rain gear, layers of clothing for warm and cold weather, a lunch, snacks, plenty of water, a notebook and pencil/pen, and anything else you need to be comfortable outdoors for an extended amount of time.

SCHEDULE

Feb 27 – meet at the Red Barn at Bear Valley Head Quarters at 9:00 am

We will have bagels, fruit, and coffee/tea for everyone in the morning.

This training will include an overview of marine mammals, some information regarding the natural history of the park and the harbor seal monitoring program, and information on harbor seal research being done by a local biologist.

BRING YOUR OWN LUNCH.

The training should be over around 3:00.

March 13 – meet at Red Barn at 9:00am, unless notified otherwise at the Feb. 27 training.

The focus of this training will be learning how to use your equipment, monitor and collect data.

We will also cover site mentors, elephant seals, research at Point Reyes, and safety.

BRING YOUR OWN LUNCH .

After lunch we will be hiking out to a harbor seal haulout and surveying the site.

We should be back to park headquarters and finished by 5:00pm .

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----EX 6 m wrote: -----

To: Sarah_Codde@nps.gov
From: EX 6 com
Date: 02/17/2010 10:42AM
Subject: Re: Drakes Estero

Hi Sarah, I'm thinking of coming out to the field on fri. How are the tides looking? Hope ur having a good week,
EX 6

------Original Message------
From: Sarah_Codde@nps.gov
To: EX 6
Subject: Re: Drakes Estero
Sent: Feb 10, 2010 5:08 PM

Hi EX 6 Yes, be at the site by 2:30 (or earlier - depending on how much time you want to spend out there). I will leave the memory card and batteries on my desk. When I checked the status the batteries were at 65% so we still haven't needed to change them. One more recommendation - before you remove the memory card, move the camera down, let it take a few pictures, and then switch the card. That way we can see on Friday if the camera is in a good spot or not. I will most likely be in the

field Friday afternoon with Sarah Allen. _____ Sarah Codde
Biological Science Technician Pinniped Monitoring Program Point Reyes National
Seashore Phone: (415) 464-5210 Fax: (415) 663-8132 Sarah_Codde@nps.gov -----
EX 6 wrote: ----- To: Sarah_Codde@nps.gov From:
EX 6 Date: 02/10/2010 09:30AM Subject: Re: Drakes Estero Hi
Sarah,
Sent via BlackBerry from T-Mobile

Windows® phone-your Windows stuff, on the go. See more.

From: Sarah Codde/PORE/NPS
To: EX 6

Date: Wednesday, February 10, 2010 05:08PM
Subject: Re: Drakes Estero

Hi EX 6
Yes, be at the site by 2:30 (or earlier - depending on how much time you want to spend out there). I will leave the memory card and batteries on my desk. When I checked the status the batteries were at 65% so we still haven't needed to change them. One more recommendation - before you remove the memory card, move the camera down, let it take a few pictures, and then switch the card. That way we can see on Friday if the camera is in a good spot or not. I will most likely be in the field Friday afternoon with Sarah Allen.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

From: Sarah Codde/PORE/NPS
To: [redacted] <[redacted]m>

Date: Monday, February 08, 2010 05:05PM
Subject: Drakes Estero

Hi [redacted],
I'm planning on going out to Drakes Estero tomorrow (Tuesday) to adjust the camera. I know this is kind of last minute but hopefully you can come out with me. I'm pretty sure I won't be available on Thursday or Friday of this week. But if you can't come out tomorrow then I'll go ahead and adjust the camera and maybe you can come out on your own later this week to change the memory card so we can see if the pictures are better.
I'll probably be leaving tomorrow around 12 or 12:30 and I'll be in the office until then so you can email me or call me if you want to meet up with me. This is also depending on weather. There is a chance of rain tomorrow so if its pouring then I'm not going to go.

~ Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

EX 6
EX 6
[redacted]
02/04/2010 01:52 PM

To Sarah Allen <sarah_allen@nps.gov>
cc
bcc
Subject RE: This Friday

History: This message has been replied to.

Hi Sarah,

I am wondering if you got a chance to talk to Sarah about the camera and if she was able to get out there to adjust it. I am still available to go up on Friday to check it as well.

EX 6 [redacted]

> Subject: Re: This Friday
> To: EX 6 [redacted] EX 6 Sarah_Codde@nps.gov
> From: Sarah_Allen@nps.gov
> Date: Tue, 26 Jan 2010 11:08:04 -0800
>
> If you can come early in the morning - check with Sarah on time, then we
> can arrange to get the camera and you set up.
>
> Sarah
>
> Sarah G. Allen, PhD
> Senior Science Advisor
> Point Reyes National Seashore
> Point Reyes Station, CA 94956
> 415-464-5187
>
>
>
>
>
> EX 6 [redacted]
> EX 6 [redacted]
> EX 6 [redacted] To
> Sarah Allen <sarah_allen@nps.gov>
> 01/26/2010 09:54 cc
> AM
> Subject
> This Friday
>
>
>
>
>
>
>
>
>
>

From: Sarah Codde/PORE/NPS
To: EX 6

Date: Monday, February 01, 2010 08:15PM
Subject: Fw: Re: Re: This Friday

Hi EX 6
In case you don't get a chance to call me here are some answers to your questions. Tomorrow is still a good day to go. It might rain but it might not. Don't go out if its pouring rain, but if its just lightly raining you should still go. I'll be in the office around 8:20 and leaving to go out in the field around 8:30. I could give you a ride to your site, but if it doesn't rain then I need to pick you up between 1 and 2. If it does start raining then I would end my survey early. I could probably lend you a radio so we could keep in contact in case I end my survey early. But hopefully you will have a car. To continue doing these surveys you will need to have your own car. It won't be very often that I can drive you to the site and no one else will be able to either.

If I don't see you, I will leave a memory card and backup batteries on my desk. Just a reminder, when you get to the camera take off the cover, press the 'OK' button to check how much battery is left. If there is less than 60% then change the batteries. Before you remove the memory card or the batteries turn the camera off, then switch the memory cards and change the batteries (if needed). Turn the camera back on, then press 'OK' to arm the camera, put the cover back on and you're set.

Call me if you have more questions. EX 6 55

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----Forwarded by Sarah Codde/PORE/NPS on 02/01/2010 07:50PM -----

To: EX 6 m
From: Sarah Codde/PORE/NPS
Date: 02/01/2010 04:18PM
Subject: Re: Re: This Friday

Hi EX 6
I just got back from the field and I still need to talk to Sarah A. about some things so why don't you call me later this evening on my cell phone, EX 6 5. I might be able to drive you to the site, but I don't know if the timing will work to pick you

up. I might be out in the field longer than you will need to be. Also, there is a chance of rain tomorrow which might limit what I do. Call me tonight.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----EX 6 [redacted]m wrote: -----

To: Sarah_Codde@nps.gov
From: EX 6 [redacted]com
Date: 02/01/2010 04:08PM
Subject: Re: Re: This Friday

Hi! Is tomorrow still a good day to come out and check the camera? I may be able to borrow a car. Is there anyone else who could possibly do this? If I get up to the park (without my own car) can someone take me to my site? I have a lot of questions. May I call you later about this (and other info)? I've been in class all day without a break. What number may I reach you at?

From: Sarah Codde/PORE/NPS
To: [redacted]

Date: Wednesday, January 27, 2010 10:21AM
Subject: Fw: Re: This Friday

Let's actually meet at my office at 8:15.

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----Forwarded by Sarah Codde/PORE/NPS on 01/27/2010 10:20AM -----

To: [redacted]
From: Sarah Codde/PORE/NPS
Date: 01/26/2010 11:45AM
Subject: Fw: Re: This Friday

Hi [redacted]
I will be taking you to the site this Friday. Weather should be ok, but I have some things I need to do in the afternoon so we are going to have to do this near high tide in the morning. But I've been to this site many times and should be able to know where the sandbar is without actually seeing it. Lets plan on you meeting me at my office around 8:00. My office is in the Admin building (the first building on your right when you turn onto the road towards the visitor center). It has a flag pole right in front of it and I'm the first office on the right when you enter the building. If you've never been here before I can give you better directions. Just let me know.

Thanks,
Sarah

Sarah Codde
Biological Science Technician
Pinniped Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@nps.gov

-----Forwarded by Sarah Codde/PORE/NPS on 01/26/2010 11:22AM -----

To: [redacted] Sarah Codde/PORE/NPS@NPS
From: Sarah Allen/PORE/NPS
Date: 01/26/2010 11:08AM
Subject: Re: This Friday

If you can come early in the morning - check with Sarah on time, then we can arrange to get the camera and you set up.

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

EX 6 EX 6 EX 6 EX 6

EX 6 EX 6
EX 6

To Sarah Allen
<sarah_allen@nps.gov>
cc
01/26/2010 09:54 AM
Subject This Friday

Hi Sarah,

I am just wondering if Friday still works for you. I am all set to come up on Friday but I know the weather has been and continues to be bad. Let me know closer to the day if I can still come up. Hopefully it won't be raining!
Have a good week and hope to see you soon,
EX 6

Spread the cheer with Messenger for mobile. Learn more.

EX 6 <EX 6 EX 6 >

01/04/2010 11:22 AM

To Sarah_Allen@nps.gov
cc
bcc
Subject Re: Drakes Estero

History: This message has been replied to.

Hi Sarah,

I never heard back from you and wanted to make sure you received the last email I sent you with the Drakes Estero info attached. I also wanted to let you know that I have mailed out the CD's containing the photos. They should be arriving this or next week. Let me know if you have any questions.

Warmly,
EX 6

On Mon, Nov 9, 2009 at 6:05 PM, EX 6 <EX 6 > wrote:

Hi Sarah,

I hope everything is going well at Point Reyes, I miss it terribly. I have attached a word document which contains the activity at Drake's Estero captured by the camera. I apologize that I am sending it to you two months after I took the camera down, I'm hope Sarah Codde told you that I lost the original word document when my computer crashed and thus had to look through the photos a second time. Not bad photos to look at though! I tried to describe the activity clearly and in an organized fashion, but if you have ANY questions about it please let me know and I will clarify. Also, if there is any type of information missing that you were hoping to have I would be happy to add it on. I am also mailing you the CDs that contain the photos so you have them for your records. I Hope you are doing well!

Warmly,
EX 6

EX 6 [redacted]
<EX 6 [redacted]>

11/09/2009 03:05 PM

To Sarah_Allen@nps.gov
cc
bcc
Subject Drakes Estero

Hi Sarah,

I hope everything is going well at Point Reyes, I miss it terribly. I have attached a word document which contains the activity at Drake's Estero captured by the camera. I apologize that I am sending it to you two months after I took the camera down, I'm hope Sarah Codde told you that I lost the original word document when my computer crashed and thus had to look through the photos a second time. Not bad photos to look at though! I tried to describe the activity clearly and in an organized fashion, but if you have ANY questions about it please let me know and I will clarify. Also, if there is any type of information missing that you were hoping to have I would be happy to add it on. I am also mailing you the CDs that contain the photos so you have them for your records. I Hope you are doing well!

Warmly,

EX 6 [redacted] DrakesEstero.doc

Drake's Estero

No activity seen from start date 4-17 until 4-30.

4-30-09
7:50-7:54 boat approaches UEM from above OB.
7:54-8:11 tending to beds on UEM
8:11 to 8:13 boat leaves taking route above OB.
*Seals present on sandbars, no disturbance.

8:19 to 8:20 boat approaches UEM from above OB
8:20 to 8:43 tending to beds on UEM
8:43 to 8:46 boat leaves taking route above OB.
*Seals present on sandbars, no disturbance.

5-1-09
7:26-7:28 boat approaches UEM from above OB
7:28-7:32 stays in same spot near UEM, but no tending.
7:32-7:35 boat leaves taking route above OB.
*no seals present on sandbars.

9:57-9:58 boat approaches UEM from above OB
9:58 to 10:00 tending to beds on UEM.
10:00 to 10:01 boat leaves taking route above OB.
*Seals present on sandbars, no disturbance.

5-3-09
5:35-5:36 1 kayak travels down the channel between OB and UEM.
*Seals present on sandbars, no disturbance.

5-8-09
12:18-12:20 Boat approaches UEM from above OB.
12:20-2:24 Tending to beds on UEM.
2:24-2:28 Boat leaves taking route about OB.
*no seal present on sandbars.

1:07-1:08 Second boat approaches UEM from above OB.
1:08-1:13 tending to beds on UEM.
1:14-1:16 boat leaves taking route above OB.
*no seals present on sandbars.

5-12-09
8:33-8:34 Boat approaches UEM from above OB.
8:34-8:39 tending to beds on UEM.
8:39-8:41 leaves taking route above OB.
*no seals present on sandbars.

5-21-09
1:48-1:50 boat approaches UEM from above OB.
1:50-1:58 tending to beds on UEM.
1:58-2:00 boat leaves taking route above OB.
(no seal present)

2:01-2:15 boat approaches OB from above OB (do not get out of boat). Boat then travels to another spot on OB (do not get out of boat). Boat then leaves taking route above OB.
*seals present, no disturbance.

5-23-09
10:45-10:47 boat approaches UEM from above OB.
10:47-10:49 tending to beds on UEM.
10:49-10:51 boat travels across channel to OB.
10:51-10:56 tending to beds on OB.
10:56-11:00 boat leaves taking route above OB.
*no seals present on sandbars.

3:02-3:10 boat approaches OB from above OB.
3:10-3:18 tending to beds on OB.
3:18-3:26 boat leaves taking route above OB.
*no seals present on sandbars.

5-26-09
Disturbance:
7:55 Half of the harbor seals on OB flush to water. The cause of disturbance is unknown.
8:05 Harbor seals re-haul.

5-28-09
8:28-8:27 boat approaches UEM from above OB.
8:27-8:34 tending to beds on UEM.
8:34-8:36 boat leaves taking route above OB.
*no seals present on sandbars.

5-29-09
7:43-7:47 boat approaches OB from above OB.
7:47-7:49 boat stays at OB, but do not tend to beds.
7:49-7:52 boat moves to another spot on OB.
7:52-7:55 boat stays at OB, but do not tent to beds.
7:55-7:59 boat moves from OB to UEM.
7:59-8:05 tending to beds on UEM.
8:05-8:08 boat leaves taking route above OB.
*no seals present on sandbars.

6-16-09
8:38-8:42 boat approaches OB from above OB.
8:42-8:51 tending to beds on OB.
8:51-8:58 boat leaves taking route above OB.
*seal present on sandbars, no disturbance.

9:18-9:21 boat approaches UEM from above OB.
9:21-9:31 tending to beds on UEM.
9:31-9:33 boat leaves taking route above OB.
*Seals present on sandbars, no disturbance.

10:19-10:26 boat approaches OB from above OB.
10:26-11:39 tending to beds on OB.
11:29-11:37 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

6-17-09
8:40-8:46 boat approaches UEM from above OB.
8:46-10:49 tending to beds on UEM.
10:49-10:52 boat travels from UEM to OB.
10:52-12:23 tending to beds on OB.
12:23-12:28 boat leaves taking route above OB.
*no seals present on sandbars.

6-19-09
10:34-10:41 boat approaches UEM from above OB.
10:41-10:47 tending to beds on UEM.
10:47-10:50 boat leaves taking route above OB.
*no seal present on sandbars.

12:45-12:46 boat approaches UEM from above OB.
12:46-12:55 tending to beds on UEM.
12:55-12:56 boat leaves taking route above OB.
*no seals present on sandbars.

6-23-09
1:59-2:04 boat travels to UEM from above OB and back.
*no seals present on sandbars.

6-25-09
11:09-11:12 boat approaches UEM from above OB.
11:12-11:20 tending to beds on UEM.
11:20-11:22 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

7-3-09
11:14-11:20 five kayaks travel across OB and UEM.
*no seals present on sandbars.

11:40-11:43 two kayaks travel across OB and UEM.
*no seals present on sandbars.

11:43-11:45 one canoe travels across OB and UEM.
*no seals present on sandbars.

11:46-11:48 two kayaks travel across OB and UEM.
*no seals present on sandbars.

12:04-12:07 one canoe and one kayak travel across OB and UEM.
*no seals present on sandbars.

12:20-12:22 one canoe and one kayak travel across UEM and OB.
*no seals present on sandbars.

12:53-12:55 one kayak travel across OB and UEM.
*no seals present on sandbars.

1:12-1:15 boat approaches UEM from above OB.
1:15-1:33 tending to beds on UEM.
1:33-1:35 boat leaves taking route above OB.
*no seals present on sandbars.

1:48-1:55 four kayaks travel across UEM and OB.
*no seals present on sandbars.

1:55-1:58 four kayaks travel across UEM and OB.
*no seals present on sandbars.

2:14-2:24 four kayaks travel near OB and UEM.
*no seals present on sandbars.

2:40-2:41 one kayak travels across OB and UEM.
*no seals present on sandbars.

2:44-3:01 two kayaks travel in channel between OB and UEM.
*no seals present on sandbars.

3:40-3:42 two kayaks travel near UEM and OB.
*no seals present on sandbars.

7-9-09
12:42-12:45 boat approaches UEM from above OB.
12:45-1:01 tending to beds on UEM.
1:01-1:03 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

2:37-2:40 boat approaches UEM from above OB.They do not get out of boat to tend.
2:40-2:44 boat leaves taking route above OB.
*no seals present on sandbars.

7-10-09
10:54-10:56 boat approaches UEM from above OB.
10:56-11:11 tending to beds on UEM.
11:11-11:13 boat travels from UEM to OB.
11:13-11:37 tending to beds on OB.
11:37-11:40 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

7-11-09
3:29-3:32 two kayaks travel near OB and UEM.
*no seals present on sandbars.

3:34-3:39 two kayaks travel near OB and UEM.
*no seals present on sandbars.

4:38-4:46 boat travels from OB to UEM and then leaves taking route above OB. They do not get out of the boat to tend.
*no seals present on sandbars.

7-12-09
Disturbance:
11:07-11:20 one kayak travels down OB channel and into the protected area.
11:19 100% of harbor seals on OB flush to water.
11:25 some of the seals re-haul, but not all.

2:08-2:22 two kayaks travel down OB channel.
*seals present on sandbars, no disturbance.

7-17-09
8:19-8:22 boat approaches UEM from above OB.
8:22-8:25 tending to beds on UEM.
8:25-8:28 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

1:11-1:13 one kayak travels near OB and UEM.
*no seals present on sandbars.

1:58-2:00 one kayak travels near UEM and OB.
*no seals present on sandbars.

3:01-3:04 five kayaks travel near UEM and OB.
*no seals present on sandbars.

Disturbance:
4:05-4:08 one kayak travels from UEM over OB and enters into protected area.
4:08 100% of seals on OB flush to water. It was almost low tide so not a lot of seals were hauled out. None of the seals re-hauled.

7-21-09
8:29-8:32 boat approaches UEM from above OB.
8:32-8:42 tending to beds on UEM.
8:42-8:46 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

1:04-1:08 boat approaches UEM from above OB.
1:08-1:41 tending to beds on UEM.
1:41-1:45 boat leaves taking route above OB.
*no seals present on sandbars.

2:43-2:52 one kayak travels in channel above OB and UEM.
*no seals present on sandbars.

7-22-09
12:39-12:43 boat approaches UEM from above OB.
12:43-2:09 tending to beds on UEM.
2:09-2:13 boat leaves taking route above OB.
*no seals present on sandbars.

7-23-09
Disturbance:
9:19-9:51 four kayaks moored on UEM.
9:51-10:06 kayaks travel down OB channel and enters protected area.
10:05 50% of seals on OB flush to water.
10:05-10:25 some of the seals re-haul (not all).

Disturbance:
9:31-9:42 one kayak travels down OB channel and enters protected area.
9:42 all but about ten seals flush to water.
9:45 most seals re-haul.

7-29-09
11:09-11:10 one small white motorboat travels under OB and UEM with wake.
*seals present on sandbar, no disturbance.

7-30-09
8:20-8:23 boat approaches UEM from above OB.
8:23-8:38 tending to beds on UEM.
8:23-8:46 boat leaves taking route above OB.
*seals present on sandbars, no disturbance

11:38-11:40 two kayaks travel below OB and UEM.
*seals present on sandbars, no disturbance.

12:18-12:19 boat approaches UEM from above OB.
12:19-12:28 tending to beds on UEM.
12:28-12:32 boat leaves taking route above OB.
*seals present on sandbars, no disturbance.

3:37-3:51 boat approaches UEM from above OB and then leaves taking same route above OB. They do not get out of boat to tend to beds.
*no seals present on sandbars.

3:54-3:56 two kayaks travels below UEM and OB.
*no seals present on sandbars.

7-31-09
3:32-3:46 boat approaches UEM from above OB. Then leave taking same route above OB. They do not get out of the boat to tend to beds.
*no seals present on sandbars.

3:40-3:43 one canoe travels over UEM and OB.
*no seals present on sandbars.

8-1-09
11:05-11:06 boat approaches UEM from above OB.
11:06-11:49 tending to beds on UEM.
11:49-11:55 boat leaves taking route above OB.
*no seals present on sandbars.

12:36-12:41 one kayak travels over OB and UEM
*no seals present on sandbars.

Sarah Allen/PORE/NPS
09/11/2009 09:20 AM

To Don Neubacher/PORE/NPS@NPS
cc John A Dell'Osso/PORE/NPS@NPS
bcc
Subject Fw: camera

This is turning into a very complicated process. I think we might consider purchasing the camera but the other parts next fiscal year and we can have Bill Shook or some one else who is tech savy to make decisions about parts.

Sarah

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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See next
9.10.09 08:17am

----- Forwarded by Sarah Allen/PORE/NPS on 09/11/2009 09:19 -----

Shawn Brown
<sbrown@parks.ca.gov
>
09/09/2009 11:55 MST

To: <Sarah_Allen@nps.gov>
cc:
Subject: Re: camera

Our setup is as follows:

We have an iQeye 711 camera inside a Cohu housing. We are using a Directed Perceptions Pan Tilt unit. We contracted with a local solar company for the solar power. Fat Spaniel is who we are using to monitor our solar array. We are using Web Relays to control the power from the internet. We are using an Airlink POE switch for power and internet. The wireless link we have is from a company called HauteSpot. Those are the major components for this setup. The main issue is it looks like a lot of the components that we purchased have been upgraded and I am not sure about the new equipment. There are other electronic converter parts that you will need to purchase as needed when you are setting up the device.

Camera http://www.iqeye.com/index.php
Housing http://cohu.com/
PT Unit http://www.dperception.com/
Solar Array http://www.santacruzsolar.com/
Solar Monitoring http://www.fatspaniel.com/

Web Relay http://www.controlbyweb.com/webrelay/
Wireless Link http://www.hautespot.net/

If you have any questions please let me know.

Shawn Brown
CA State Parks
Information Systems Analyst
(916) 204-7194
sbrown@parks.ca.gov

On 9/1/09 9:27 AM, "Sarah_Allen@nps.gov" <Sarah_Allen@nps.gov> wrote:

> Hi Shawn:
>
> Gary Strachan from Ano Nuevo gave me your name regarding the camera that was set up there.
>
> At Point Reyes, we are interested in setting up a similar camera.
>
> Can you give me the specificiations for the came, contacts, even an invoice. Could you also tell me what if any limitations you faced in the installation.
>
> Sincerely,
>
> Sarah
>
> ---
>
> Sarah G. Allen, Ph.D.
> Senior Science Advisor
> National Park Service
> Point Reyes National Seashore
> One Bear Valley Road
> Point Reyes Station, CA 94956
> Phone 415-464-5187
> Fax 415-464-5182
> sarah_allen@nps.gov
>
> ><((((º>`·.¸¸.·´&hibar;`·.¸¸.·´&hibar;`·...¸><((((º>¸...

Sarah Allen/PORE/NPS
09/10/2009 08:17 AM

To John A Dell'Osso/PORE/NPS@NPS, Don Neubacher/PORE/NPS@NPS
cc
bcc
Subject Fw: camera

I will pursue this tomorrow on costs.

Sarah

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

><((((º>`·.¸¸.·´¯`·.¸¸.·´¯`·...¸><((((º>¸...

Well, cam — never purchased

----- Forwarded by Sarah Allen/PORE/NPS on 09/10/2009 08:17 -----

Shawn Brown <sbrown@parks.ca.gov>
09/09/2009 11:55 MST

To: <Sarah_Allen@nps.gov>
cc:
Subject: Re: camera

Our setup is as follows:

We have an iQeye 711 camera inside a Cohu housing. We are using a Directed Perceptions Pan Tilt unit. We contracted with a local solar company for the solar power. Fat Spaniel is who we are using to monitor our solar array. We are using Web Relays to control the power from the internet. We are using an Airlink POE switch for power and internet. The wireless link we have is from a company called HauteSpot. Those are the major components for this setup. The main issue is it looks like a lot of the components that we purchased have been upgraded and I am not sure about the new equipment. There are other electronic converter parts that you will need to purchase as needed when you are setting up the device.

Camera http://www.iqeye.com/index.php
Housing http://cohu.com/
PT Unit http://www.dperception.com/
Solar Array http://www.santacruzsolar.com/
Solar Monitoring http://www.fatspaniel.com/
Web Relay http://www.controlbyweb.com/webrelay/

Wireless Link http://www.hautespot.net/

If you have any questions please let me know.

Shawn Brown
CA State Parks
Information Systems Analyst
(916) 204-7194
sbrown@parks.ca.gov

On 9/1/09 9:27 AM, "Sarah_Allen@nps.gov" <Sarah_Allen@nps.gov> wrote:

> Hi Shawn:
>
> Gary Strachan from Ano Nuevo gave me your name regarding the camera that was set up there.
>
> At Point Reyes, we are interested in setting up a similar camera.
>
> Can you give me the specificiations for the came, contacts, even an invoice. Could you also tell me what if any limitations you faced in the Installation.
>
> Sincerely,
>
> Sarah

Web Cam never purchased

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

><((((º>`·.¸¸.·´&hibar;`·.¸.·´&hibar;`·...¸><((((º>¸...

From: Sarah Codde/Partner/NPS
To: EX 6 <EX 6 m>

Date: Tuesday, September 08, 2009 01:33PM
Subject: Re: CDs

Hey EX 6
Thanks for the update. Things are going well here. I'm done with AmeriCorps and am now working as a contractor for the park service until the end of September. I've been doing all pinniped surveys which are very similar to elephant seal surveys, so its been nice to get back out to the headlands. I won't start my official job here until January.
I hope its been nice for you back home.
When you mail the CDs send them to:

Sarah Codde
Harbor Seal Monitoring Coordinator
Point Reyes National Seashore
1 Bear Valley Rd
Point Reyes Station, CA 94956

Thanks for finishing this up. If there's anything you don't have time to finish, just let me know.

Thanks,
Sarah

Sarah Codde
Volunteer Coordinator
Harbor Seal Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@partner.nps.gov

----- EX 6 <EX 6 > wrote: -----

> To: sarah_Codde@partner.nps.gov
> From: EX 6 <EX 6 >
> Date: 09/08/2009 11:17AM
> Subject: CDs
>
> Hey Sarah!
>
> Just wanted to let you know that I'm still working on the CDs. When my computer broke I lost the word documents on my hard drive so I've had to spend some time re-doing the first few CDs (thank god I switched over to writing it down in a notebook rather then on the comp or I would have lost everything!) I should be finished this week. How's everything going with you? Have you started the new job?
>
> Talk to you soon,
> EX 6

Sarah Allen/PORE/NPS
09/01/2009 09:27 AM

To sbrown@parks.ca.gov
cc Don Neubacher/PORE/NPS@NPS
bcc
Subject camera

Hi Shawn:

Gary Strachan from Ano Nuevo gave me your name regarding the camera that was set up there.

At Point Reyes, we are interested in setting up a similar camera.

Can you give me the specificiations for the came, contacts, even an invoice. Could you also tell me what if any limitations you faced in the installation.

Sincerely,

Sarah

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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camera for webcam — never bought

From: Sarah Codde/Partner/NPS
To: EX 6 <EX 6>

Date: Friday, August 21, 2009 05:31PM
Subject: Re: next week

That's fine. I'll be around on both of those days.

Sarah Codde
Volunteer Coordinator
Harbor Seal Monitoring Program
Point Reyes National Seashore
Phone: (415) 464-5210
Fax: (415) 663-8132
Sarah_Codde@partner.nps.gov

-----EX 6 <EX 6 EX 6 wrote: -----

To: sarah_Codde@partner.nps.gov
From: EX 6 <EX 6 EX 6
Date: 08/21/2009 11:45AM
Subject: next week

Hi Sarah,

So my plan is to come in on either monday or wednesday after 4 o'clock. When I come in I will have the CDs and spreadsheet for you. I will also finish filling out my timecard at that time. I am leaving for home on thursday so unfortunately I don't have time to do the last few CDs. I was going to try to come in at some point this week to get the last couple CDs and do them this week, but I have been working full time in stranding so I haven't had time to drive up to point reyes. Let me know if this sounds ok to you!

EX 6

Sarah Allen/PORE/NPS
03/23/2009 03:11 PM

To Don Neubacher/PORE/NPS@NPS
cc
bcc
Subject camera disks

Hi:

Do you remember if you have some of the camera disks at home or your office? I am going to set it up again.

Also I ordered the overflight to be done next week.

Sarah

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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Camera at Giacomini

Ben Becker/PORE/NPS
01/27/2009 10:04 AM

To Sarah Allen/PORE/NPS@NPS
cc Don Neubacher/PORE/NPS@NPS
bcc
Subject Reconyx

Hi Sarah,

Don said he has an error code on the automatic camera you gave him that is trained on Giacomini. The code says "ERROR: CPLD Version"

Do you know what he should do?

thanks,

-Ben

Camera at Giacomini marsh

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

Kan Dhillon/PORE/NPS
06/20/2008 12:56 PM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject The cameras....

Hey Sarah,

No problem on going out there yesterday. I had the time and I actually needed to take care of an errand at Home Ranch. It was beautiful out there as well.

So,

When I got there, I changed the card in the first camera (pc80??) and then went on to the next camera. When I got there, I noticed that the camera was pointed at the ground. I corrected it after changing the mem. card and the batteries. I also noticed that there was a small amount of condensation on the plexi glass over the lens.

In addition to the camera issues, there was a kite surfer surfing to his/her heart's content IN DRAKES ESTERO!!! They were not farther in than between Barries Bay and the end of the Sunset View Trail looking at the PORE Trail Map. So about the first 1/3 of DE approx. I contacted LE and they were NOT able to make contact with the person.

Just thought I should let you now.

I didn't have Erin F.'s e-mail address to cc: her about the camera.

Kan S. Dhillon
Biological Science Technician (Wildlife)
Point Reyes National Seashore
1 Bear Valley Rd.
Point Reyes, CA 94956
(415) 464-5194
FAX: (415) 464-5183

EX 6

06/06/2008 04:58 PM

To sarah_allen@nps.gov
cc
bcc
Subject Camera info

Hi Sarah,
Here is the information about the pictures that I have NOT looked at:

Silent Image: 5-5-2008, 7:00 AM thru 5-6-2008, 6:59 PM and 5-22-08, 9:46 AM until the most recently downloaded images

PC 85: 5-1-2008, 10:11AM thru 5-7-08, 3:10 PM and 5-22-08, 1:25 PM until the most recently downloaded images.

Here are the images from the stationary cameras that might be of interest:

PC 85 -
2008- 4-03, 2:08 Boat leaves OB channel and there is possibly one seal that flushes into the water.
2008 - 5 -15, 2:07 Boat leaves OB and some seals flush into the water

Silent Image -
2008 - 3 - 23, 5:23 Boat leaving Home Bay
2008 - 3 - 25, 5:01 Boat leaving Home Bay (might be a boat, its blurry)
2008 - 4 - 14, 6:21 and 6:25 Boat going into Home Bay and then leaving (possibly a boat, hard to tell)
2008 - 4- 15, 5:05 Boat leaving Home Bay
2008 - 4 - 26, 6:27 Boat heading down the bay
2008 - 4 - 26, 6:34 Boat dropping off platform and then heading back up to Schooner Bay
2008 - 5- 16, 5:41 and 6:17 Boat heading into Home Bay and then leaving Home Bay.

This is the location of the database and excel sheet:
U:\Natural_Databases\Pinniped\DrakesEstero2008

Here is my address:
EX 6
EX 6

You now have my email address and you already have my cell phone number so feel free to contact me if there are any questions about the data. Thanks for everything! This has been a great experience!

SCIENTIFIC RESEARCH AND COLLECTING PERMIT

Grants permission in accordance with the attached general and special conditions

United States Department of the Interior
National Park Service

Point Reyes NS

Study#: PORE-00511
Permit#: PORE-2010-SCI-0019
Start Date: Feb 01, 2010
Expiration Date: Dec 31, 2011
Coop Agreement#: n/a
Optional Park Code: n/a

Name of principal investigator:

Name: EX 6 **Phone:** EX 6 **mail:** EX 6

Name of institution represented:

San Francisco State University

Co-Investigators:

No co-investigators

Project title:

Monitoring Possible Effects of Disturbance on Pacific Harbor Seals in Drakes Estero, CA.

Purpose of study:

The harbor seal is the dominant pinniped and only year-round resident in the San Francisco Bay Area. The colony at Point Reyes National Seashore represents the second largest concentration of harbor seals in California and accounts for 20% of the mainland population. Most of the Point Reyes coastline remains relatively pristine and provides important marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal. Further studies are needed to investigate pinniped behavioral response to disturbance. Recent pinniped research shows the importance of spatial and temporal scales in habitat selection. While the life history of pinnipeds is generally understood, further research is needed on pinniped habitat requirements and the effects of disturbance on pinnipeds.

Disturbance is defined as any activity that alters normal behavior, and in many locations, disturbance is an important factor affecting the haul-out patterns of pinnipeds. Examples of disturbance include aircraft, boats, seismic activities, pedestrians, kayakers, and natural predators. Disturbance can be anthropogenic or non-anthropogenic and both can be detrimental to pinniped populations. Anthropogenic disturbance is seen to affect haul-out site choice, breeding behaviors, feeding, and in result may cause population declines. In some situations, pinnipeds have become accustomed to disturbance, while in other situations disturbance has led to the eventual abandonment of haul-out sites. Disturbance can cause separation of mothers and pups and can be a significant source of pup mortality. Wildlife oriented recreation may also be considered a disturbance. Studies assessing the potential impact of fisheries have pointed to declines in marine mammal populations due to anthropogenic interactions and recommend comprehensive monitoring of population trends and improved regulations to minimize impacts on local pinniped population. In regards to mariculture, previous research has shown that seal disturbance rates increased with increases in oyster harvest, and that haul-out site choice can be best explained by mariculture activities. Research projects have shown the value of using video cameras to capture rare behavioral characteristics, identify critical habitat types including important foraging areas, determine local preferred prey species, and examine dive times of pinnipeds. Valuable information can be obtained on habitat use, prey species, behaviors, abundance, distribution, physiology, disturbance and foraging ecology. Many conservation and management issues can be clarified and ameliorated using video camera techniques. In the context of disturbance, video cameras are an effective tool to monitor population dynamics in the hopes of improving regulations in order to minimize impacts on local pinniped populations.

Harbor seal haul-out site use may be affected by both natural and anthropogenic factors. This project will investigate the effects of disturbance on the Pacific harbor seal (Phoca vitulina richardii) populations at Drakes Estero located near a mariculture operation at Point Reyes National Seashore, California. The hypothesis is that there are no observable effects of anthropogenic or non-anthropogenic disturbance on the harbor seal populations. The alternative hypothesis is that the harbor seal populations are subject to disturbance effects.

Long term effects of disturbance are difficult to assess but the application of video cameras strategically positioned at haul-out sites in these areas that may be affected by disturbance will provide insight into pinniped response and the resulting population dynamics. Since minimizing disturbance effect and protecting haul-out sites is crucial to conserving populations, this project will have important implications for the management and conservation of harbor seals at Point Reyes National Seashore.

Subject/Discipline:

Animal Communities / Wildlife

Locations authorized:

The location of my research site is along the Drakes Estero trail, overlooking OB and UEF harbor seal haul-out sites.

Transportation method to research site(s):

Personal vehicle and rental vehicles

Collection of the following specimens or materials, quantities, and any limitations on collecting:

No Collection

Name of repository for specimens or sample materials if applicable: [redacted]

n/a

Specific conditions or restrictions (also see attached conditions):

No disturbance of Marine Mammals. Remain > 100 m away.

CARRY PERMIT WHILE WORKING AND LEAVE RESEARCH PLACARD ON DASHBOARD OF VEHICLE. ALL COLLECTIONS MUST BE MADE WITH MINIMAL IMPACT TO THE PARK'S RESOURCES AND VISITORS. Collect as few specimens as practical; in no case should the continued survival of a population of any species be jeopardized by your activities.

ALL TRAPS, TAGS, ETC., WHICH ARE TEMPORARILY LEFT IN THE FIELD MUST BE MARKED WITH YOUR PERMANENT STUDY NUMBER (for example: PORE-0019). They must be as unobtrusive as possible and must not interfere with visitor enjoyment of the park as a natural area.

PLASTIC FLAGGING SHOULD BE USED SPARINGLY AND MUST BE MARKED WITH YOUR STUDY NUMBER. It must be out of sight of trails and roads during all seasons, and it must be removed upon completion of your research project.

PLEASE CONDUCT YOUR ACTIVITIES OUT OF SIGHT OF HEAVILY USED VISITOR AREAS. Please work on weekdays when possible.

YOU ARE REQUIRED TO SUBMIT AN ONLINE REPORT OF YOUR RESEARCH ACTIVITIES EACH YEAR, and you must mail two copies of your final research report and any publications to our office upon completion of your project.

YOU MUST DELIVER GPS POINTS (NAD83 UTM Zone 10) of any permanent or temporary research plots to ben_becker@nps.gov within 7 days of establishing plots. Please include your permit number and name with the email.
AVOID introducing weed seeds and propagules.

Recommended by park staff(name and title):

Reviewed by Collections Manager:

Yes ___ No ___

Approved by park official:

SIGNATURE ON FILE

Date Approved:

Title:

Superintendent

I Agree To All Conditions And Restrictions Of this Permit As Specified
(Not valid unless signed and dated by the principal investigator)

SIGNATURE ON FILE

(Principal investigator's signature) (Date)

THIS PERMIT AND ATTACHED CONDITIONS AND RESTRICTIONS MUST BE CARRIED AT ALL TIMES WHILE CONDUCTING RESEARCH ACTIVITIES IN THE DESIGNATED PARK(S)

Directions to Drakes Estero camera location:

Take the Estero trail and continue on the Sunset Beach trail. When you are in front of the OB channel there should be a fence that you just passed, walk back to it and walk along the fence line. When you see a part in the barbed wire that is pushed down and easy to walk over, go over it. Follow the deer trail and head diagonally towards the cliff. When you get to the first set of coyote bush about 100 ft from the fence, you should see the camera.

How to use the camera:
Unlock the cord lock and take the cord out of the camera handles. Take the camera off the tripod.

Removing and Replacing the Camera's Cover
Before installing batteries or a memory card, you need to remove the camera's cover. To do this, open the clasp at the bottom of the camera using the thumb grip in the middle of the bottom edge. Then, lift the cover from the bottom, rotating it upward until you can remove it from the camera.
To replace the camera's cover, insert the cover along the bottom edge of the camera's faceplate and rotate it downward until it's flush with the camera. Snap the clasp, pressing firmly in the middle of the clasp, to secure the cover.
It's good practice to make sure the gasket and camera lenses are clean each time you open and close your camera.

Inserting and Removing the CompactFlash Card
Make sure the orientation is correct and that the card is aligned properly.

Then press gently to seat the card in the holder.

To change CF cards in the field:
1. Press <OK> to disarm (the camera will then show you status)
2. Turn the power off.
3. Remove the card by pulling it straight out of the receiver port.
4. Insert the new CompactFlash card into the receiver slot under the control buttons as shown.
5. The card must be inserted face up with the connecting ports in first.
Note: Always disarm and turn the power off before removing or inserting the CompactFlash card.
6. Turn the camera on, a message will appear telling you the status of the camera (battery remaining and % memory). Then the message will say <Arm Camera>, press the ok button and the put the cover back on the camera.

PC85

2008-3-14 8:27 BOAT AT OB OK
2008-3-17 12:33-12:36 PEOPLE ON VEN? w/ SMALL ZODIAC
12:36-3:36 " " OB " " "in
3:36 Depart by W channel
BIRDS ARRIVE 3:47 After boat left
2008-3-14 12:42 Boat at VEN in OB Channel
2008-3-17 11:19-12:36 ZODIAC ON VEN

2008-3-21 12:59-1:20 Boat approaching OB channel
2008-3-21 1:32 Boat
2008-3-22 2:02 Boat
2008-3-22 2:18-2:34 Boat
2008-3-27 9:58 Boat approaching OB channel
2008-3-27 10:04-10:13 People on OB
2008-3-27 10:40 Boat moving up the bay
2008-3-29 8:48-8:57 Boat approaching OB
2008-3-29 8:57-9:25 People on OB
2008-3-29 9:26 moved to S. OB site
2008-3-29 9:27 Person on S. OB
2008-3-29 9:30 Boat leaving OB
2008-3-29 11:02 Boat in OB channel
2008-3-29 11:03-11:13 Person on S. OB site
2008-3-29 11:13 Boat leaving OB channel
2008-3-31 9:10 Boat approaching OB channel
2008-3-31 9:24-10:18 Person on N. OB site
2008-3-31 10:18 Boat leaving OB channel

PC 85 cont.

2008-4-01	~~9:41~~ 9:39-9:44	Boat coming towards OB channel
2008-4-01	9:45 - 9:48	Boat departing OB channel
2008-4-02	11:07 - 11:11	Zodiak approaching OB
2008-4-02	11:11 - 1:23	People on S. OB side
2008-4-02	~~1:23~~ 1:23-1:27	Zodiak departing OB channel
2008-4-02	3:03 - 3:07	Boat in OB channel
2008-4-02	3:07 - 3:40	People on S. OB site
	~~3:40~~	~~Boat departing OB channel~~
2008-4-02	3:40 - 3:48	Boat and people moved to N. OB site
2008-4-02	3:48 - 3:49	Boat departing OB channel
2008-4-03	9:05	Boat heading S past OB channel
2008-4-03	9:18	Boat heading back N
2008-4-03	11:19	Boat in OB channel
2008-4-03	11:21 - 13:14	People on S. OB site
☆ Quick turnaround for OB 2008-4-03	13:14	Boat leaves OB channel
2008-4-03	13:59	Boat in OB channel
2008-4-03	14:00 - 14:08	People on S OB site
☆ 2008-4-03	14:08	Boat leaves OB channel ☆ possible seal flush (1)
2008-4-04	12:58	Boat in OB channel
2008-4-04	13:00 - 13:04	People on S. OB site
2008-4-04	13:04	Boat goes to N. OB site ~~leaves OB channel~~
2008-4-04	13:11	Boat leaves OB channel
2008-4-05	9:17	Boat in OB channel
2008-4-05	9:19 - 9:47	People on S. OB site
2008-4-05	9:47	Boat leaves OB channel
2008-4-05	13:23	Boat in OB channel

2008-4-05	13:28-13:36	People on S. OB site
2008-4-05	13:36 * Quick turnaround	Boat leaves OB channel
2008-4-05	14:39	Boat in channel & then heading N
2008-4-07	14:39	Boat near N. OB site
2008-4-07	14:46-14:56	Boat moves to S. OB site
2008-4-07	14:56	Boat leaves OB channel
2008-4-08	14:38	Boat in OB channel
2008-4-08	14:41	Boat leaves OB channel
2008-4-08	16:02-16:16	Boat at N. OB site
2008-4-08	16:16	Boat leaves OB channel
2008-4-10	8:22	Boat in OB channel
2008-4-10	8:25-10:43	People on N. OB site
2008-4-10	10:43	Boat moves to S. OB site
2008-4-10	10:43-10:59	People on S. OB site
2008-4-10	10:59	Boat leaves OB channel
2008-4-10	1:13	Boat in OB channel
2008-4-10	1:15-1:44	People on S. OB site
2008-4-10	1:45	Boat leaves OB channel
2008-4-11	7:28	Boat near OB
2008-4-11	12:58	Boat in OB channel
2008-4-11	12:59-1:11	People on S. OB site
2008-4-11	1:11	Boat leaves OB channel
2008-4-12	7:29	Boat near OB
2008-4-12	8:08-8:10	Boat gets near OB and then turns around
2008-4-12	8:26	Boat going in OB channel
2008-4-12	8:30-8:33	People on S. OB site
2008-4-12	8:34	Boat leaving OB channel

PC85 cont.

	2008-4-12	1:47	Boat in OB channel
	2008-4-12	1:48-2:50	People on N. OB site
good pictures ↓	2008-4-12	2:51	Boat leaving OB channel
12:02-12:05	2008-4-13	11:55-12:07	Kayak travelling S across OB
☆	2008-4-13	12:05	Seals flush into water
	2008-4-13	12:12-12:27	seals start to re-haul
☆	2008-4-13	12:29	Kayak travelling E in the channel
☆	2008-4-13	12:32	Some seals flush into water
	2008-4-13	2:04	Kayak travelling W in the channel
	2008-4-13	2:07	Seals re-haul
	2008-4-13	2:09	Kayak leaves channel
	2008-4-13	3:45-6:45	Heavy fog, can't see images
	2008-4-14	8:32-8:52	Boat moving around N. OB
	2008-4-14	9:02	Boat travelling to OB channel
	2008-4-14	9:05-10:06	Boat moving around S. OB site
	2008-4-14	10:06	Boat leaving OB channel
	2008-4-15	10:17-10:22	Boat at S OB site
	2008-4-16	9:27-9:38	Boat at N. OB site
	2008-4-16	10:17-10:24	Boat at N. OB site
	2008-4-16	10:52-11:06	Boat at S. OB site
	2008-4-16	2:16	Boat in OB channel
	2008-4-16	2:19-2:45	People on S. OB site
	2008-4-16	2:45	Boat leaving OB channel
	2008-4-17	9:10-11:50	Heavy fog, couldn't see images
	2008-4-22	3:09-3:13	Boat moving around S. OB site
	2008-4-23	1:09	Boat entering OB channel
	2008-4-23	1:13-1:23	People on S. OB site
	2008-4-23	1:24	Boat leaving OB channel

2008-4-23	2:24	Boat entering OB channel
2008-4-23	2:27 - 2:30	People on S. OB site
2008-4-23	2:31 - 2:37	Boat moves to N. OB site
2008-4-23	2:38	Boat leaves OB channel
2008-4-24	3:25	Boat entering OB channel
2008-4-24	3:27 - 3:36	People on S OB site
2008-4-24	3:37	Boat leaves OB channel
2008-4-26	9:42	Boat entering OB channel
2008-4-26	9:45 - 10:10	People on N. OB site
2008-4-26	10:11 * Quick turnaround and other pics show heading up Schooner Bay	Boat leaves OB channel
2008-4-26	11:08	Boat enters OB channel
2008-4-26	11:09 - 11:28	People on S. OB site
2008-4-26	11:28	Boat leaves OB channel
2008-4-29	10:45	Boat entering OB channel
2008-4-29	10:45 - 10:50	People on S. OB site
2008-4-29	10:51	Boat leaving OB channel
2008-4-30	9:41	Boat entering OB channel
2008-4-30	9:44 - 9:54	People on S. OB site
2008-4-30	9:55	Boat leaves channel
2008-5-1	8:35 - 8:49	Boat moving around N. OB site
2008-5-1	8:57	Boat entering channel
2008-5-1	9:00 - 9:05	People on S. OB site
2008-5-1	9:06 * Quick turnaround & other pics show boat heading towards Schooner Bay. (Pics not great)	Boat leaves channel
2008-5-1	9:46 - 10:11	Boat near OB

PC 85 (cont.)

2008-5-8	8:53	Boat enters OB channel
2008-5-8	8:56-11:13	People on S. OB site
2008-5-8	11:13	Boat leaves channel
2008-5-8	3:11	Boat enters channel
2008-5-8	3:15-3:44	People on S. OB site
2008-5-8	3:45	Boat leaves channel
2008-5-10	8:25	Boat enters channel
2008-5-10	8:29-8:57	People on N. OB site
2008-5-10	8:58	Boat leaves channel
2008-5-13	7:20	Boat enters channel
2008-5-13	7:23	Boat leaves channel
2008-5-13	10:28	Boat enters channel
2008-5-13	10:30-10:38	People on S. OB site
2008-5-13	10:38	Boat leaves channel
~~2008-5-13~~	~~12:46~~	~~Boat enters channel~~
2008-5-14	9:58	Boat w/platform near OB
2008-5-14	10:09	Boat leaves platform on W end of OB
2008-5-14	10:34	Boat returns to platform & leaves with it
2008-5-15	1:55	Boat entering channel
2008-5-15	1:57-2:03	People on S. OB site
2008-5-15	2:04	Boat leaving channel
2008-5-15	2:05	Boat stopped at Wedge of channel
2008-5-15	2:07	Boat leaves & some seals flush into water
2008-5-17	11:05-11:17	Boat moving around OB
2008-5-17	11:31-11:31	Boat moving around S. OB site
2008-5-17	11:52-11:55	Boat leaving OB

2008-5-19, 5:53 thru 2008-5-22, 9:43		Camera stopped working
2008-5-22	1:08	Boat enters channel
2008-5-22	1:10 - 1:23	People on S. OB site
2008-5-22	1:24	Boat leaves channel

SILENT IMAGE

2008-3-06 5:14:57

2008-3-8 10:03

2008-3-8 4:17 – 4:19

4:34

* 2008-3-11 3:18 – 3:20 BOAT

2008-3-11 4:21 – 4:23

2008-3-12 12:10 OBJECT IN CHANNEL

→ 2008-3-13 12:38-1240

2008-3-13 02:03 PM back of seal?

2008-3-13 3:35 PM BOAT IN BACK AREA

3-13 4:00 PM CK IMAGE

3-14 11:10 " " BOAT ON BAR?

2008-3-18 11:43 – 11:45 Boat ?

2008-3-20 10:37 – 10:40 Boat leaving Home Bay & going back to base

2008-3-20 1:13 PM – 1:15 Boat travelling up bay

2008-3-21 11:05 – 4:05 Visibility poor. Couldn't see images

2008-3-22 10:40 AM 6:59 PM Visibility poor. Couldn't see images

SUN 2008-3-23 11:20 AM – 4:30 PM

* 2008-3-23 5:23 PM – 5:29 ? Boat leaving Home Bay?

2008-3-24 1:25 – 3:28 Vis poor. Couldn't see images

2008-3-25 8:23 – 8:25 Boat near mouth of Schooner Bay

2008-3-25 8:25 – 8:50 Boat stopped near bed 6 or 7?

2008-3-25 8:51 – 8:55 Boat travelling back up bay

2008-3-25 8:55 – 9:05 Boat stopped

2008-3-25 9:05 – 9:08 Boat travelling back up Schooner Bay

2008-3-25 9:27 – 9:30 Boat travelling down ~~bay~~ Schooner Bay, but then lose sight of it

2008-3-25	4:01-4:06	Boat coming down Schooner Bay and then towards Home Bay
☆2008-3-25	5:01-5:02	Possibly see boat leaving Home Bay, but object is blurry.
2008-3-26	10:25-3:00	Vis poor. Couldn't see images
2008-3-27	8:09-8:17	Boat coming down Schooner Bay & then towards Home Bay
2008-3-27	8:17-8:51	stopped at racks
2008-3-27	8:51-8:54	boat moving N
2008-3-27	8:54-9:05	boat stopped
2008-3-27	9:05-9:09	boat travelling W
2008-3-27	9:09-9:18	boat stopped
2008-3-27	9:18-9:24	boat travelling back up Schooner Bay
2008-3-27	10:52	boat travelling up the bay

Silent Image cont.

2008-3-27	1:24-1:29	Boat departing Home Bay and going back to base
2008-3-28	8:18-8:21	Boat stopped at rack ~~in background~~
2008-3-28	8:29-8:30	Boat travelling S
2008-3-28	8:31-8:46	2nd boat travelling behind 1st boat. Stopped at another rack
2008-3-28	8:46-8:49	2nd Boat leaving (heading N)
2008-3-28	9:29-9:35	1st boat returing N (back to base)
2008-3-28	2:09-2:19	Boat moving down bay
2008-3-28	3:08	Boat moving back up bay
2008-3-31	10:07	Boat coming down bay
2008-4-1	8:46	Boat travelling towards Home Bay
2008-4-1	9:03	Boat travelling down channel in front of camera
2008-4-1	9:13	Boat travelling back up channel, then crosses across Route 3
2008-4-1	9:18	Boat moving up bay towards Schooner Bay
2008-4-1	11:52-12:00	Boat leaving Home Bay & going up Schooner Bay
2008-4-2	12:57-1:11	Boat in NW part of main estero
2008-4-2	1:11	Boat travelling S
2008-4-2	1:37-1:46	Boat travelling back up Schooner Bay
2008-4-2	1:58-2:05	Boat travelling up bay towards Home Bay
2008-4-2	2:55	Boat moving down the bay
2008-4-2	4:01	Boat moving back up the bay
2008-4-4	8:45	Boat coming out of Home Bay and up Schooner Bay
~~2008-4-4~~		
2008-4-4	1:35	Boat coming out of Home Bay and up Schooner Bay
2008-4-5	15:52	Boat leaving Home Bay up Schooner Bay

2008-4-7	13:03	Boat heading into Home Bay
2008-4-7	16:06	Boat travelling up the bay
2008-4-7	16:11	Boat leaving Home Bay
2008-4-8	8:26	Boat travelling up the bay
2008-4-8	14:45	Boat travelling up the bay & into Home Bay
2008-4-8	14:52	Boat leaving Home Bay
2008-4-9	13:24	Boat travelling down the bay
2008-4-9	13:28	Boat travelling up the bay
2008-4-9	13:50	Boat leaving Home Bay & up Schooner Bay
2008-4-10	8:07	Boat travelling down the bay & into Home Bay
2008-4-10	8:15	2nd boat travelling down the bay
2008-4-10	8:54	Boat leaving Home Bay
2008-4-10	9:52	Boat heading towards Home Bay
2008-4-10	11:11	Boat travelling up the Bay
2008-4-10	13:06	Boat travellingdown the bay
2008-4-10	13:49	Boat travelling up the bay
2008-4-11	12:45-16:09	Vis poor. Couldn't see images
2008-4-12	7:56	Boat travelling down the bay
2008-4-12	11:48-16:08	Vis poor. Couldn't see images
2008-4-13	11:50-5:05	Vis poor. Couldn't see images
2008-4-14	1:09	Boat travelling down the bay
2008-4-14	2:24	Boat leaving Home Bay & heading up Schooner Bay
2008-4-14	6:21 PM	Possible boat going into Home Bay
2008-4-14	6:25 PM	Possible boat leaving Home Bay
2008-4-15	7:44 AM	Boat travelling down the bay
2008-4-15	8:00	Boat travelling back up Schooner Bay
2008-4-15	10:05	Boat travelling down the bay

Silent Image cont.

2008-4-15	10:29	Boat travelling up the bay
2008-4-15	10:38	Boat leaving Home Bay & heading up Schooner Bay
2008-4-15	12:30-1:52	Vis poor. Couldn't see images
☆ 2008-4-15	5:05	Boat leaving Home Bay
2008-4-16	8:20	Boat leaving bed near mouth of Home Bay
2008-4-16	9:13	Boat travelling down the bay
2008-4-16	9:43	Boat travelling up the bay & into Home Bay
2008-4-16	10:45-4:35	Vis poor. Couldn't see images
2008-4-17	7:00-~~10:00~~ 1:45	Heavy fog, couldn't see images
2008-4-17	4:15-4:30	Fog back
2008-4-18	8:14-9:17	Boat at bed near mouth of Home Bay
SUNDAY 2008-4-18	9:22-9:33	Boat at bed near mouth of Schooner Bay
2008-4-18	9:33	Boat travelling up Schooner Bay
~~*~~ 2008-4-20	11:07	This is a bird ~~Boat in upper part of main bay~~
2008-4-22	9:58	Boat travelling up the bay
2008-4-22	1:24	Boat travelling towards Home Bay
~~*~~ 2008-4-23	7:00-9:50	Foggy, couldn't see pictures
2008-4-23	10:13	Boat near Home Bay heading W
2008-4-23	11:41	Boat travelling down the bay
2008-4-23	11:46	Boat travelling up the bay
2008-4-23	12:26	1st Boat travelling down the bay
2008-4-23	1:15	2nd Boat travelling down & towards Home Bay
2008-4-23	1:28	1st boat travelling back up the bay
2008-4-23	1:35	2nd boat travelling up the bay
2008-4-23	2:15	Boat travelling down the bay
2008-4-23	2:43	Boat travelling up bay & towards Home Bay
2008-4-23	3:05-3:12	2nd boat ~~travels~~ travelled down the bay & turns around to go back up

* Pls note starting 4-23 pictures 1:00 ~~1 PM~~ to 1:59 PM come before 1:00 - 12:59

2008-4-23	3:25	Boat travelling up the bay
2008-4-23	3:55	Boat travelling down the bay & into Home Bay
2008-4-23	4:14	Boat leaving Home Bay & going up the Schooner bay
2008-4-24	7:00-8:00	Foggy, couldn't see pictures
2008-4-24	8:10	Boat heading up the bay
2008-4-24	8:29	Boat heading down the bay
2008-4-24	9:31	Boat heading up the bay
2008-4-24	12:46	Boat heading down the bay
2008-4-24	1:07	Boat heading up the bay
2008-4-24	3:42	Boat heading up the bay
2008:4-24	4:07	Boat heading towards Home Bay
2008-4-24	4:16	Boat leaving Home Bay & going up Schooner Bay
2008-4-24	6:12-7:00 PM	No pictures taken
2008-4-25	7:00 AM - 10:53	No pictures
2008-4-25	11:33	Boat heading towards Home Bay
2008-4-25	11:50	Boat leaving Home Bay & going up Schooner Bay
2008-4-25	2:32	Boat heading down the bay
2008-4-25	2:58	Boat leaving Home Bay & going up Schooner Bay
2008-4-25	3:10	Boat heading towards Home Bay
2008-4-25	3:59-4:06	Boat leaving Home Bay & going up Schooner Bay
2008-4-25	5:23	Boat heading to Home Bay
2008-4-25	5:50	Boat leaving Home Bay & going up Schooner Bay
2008-4-26	7:00-8:10	Foggy, couldn't see images
2008-4-26	8:48	Boat leaving Home Bay
2008-4-26	9:23	Boat heading down the bay
2008-4-26	10:22	Boat heading up the bay
2008-4-26	11:02	Boat heading down the bay
2008-4-26	11:36	Boat heading up the bay

12:02

2008-4-26	6:27	Boat heading down the bay
2008-4-26	6:34	Drop off platform & head back up Schooner Bay
2008-4-28, 7:52 thru	2008-4-29, 11:28	No pictures
2008-4-29	12:33	Boat leaving Home Bay
2008-4-30	8:15	Boat heading down the bay
2008-4-30	9:18	Boat heading up the bay
2008-4-30	9:36	Boat heading down the bay
2008-4-30	10:04	Boat heading up the bay
2008-4-30	4:13	Boat leaving Home Bay
2008-5-1	7:43	Boat heading into Home Bay
2008-5-1	8:20	1st Boat heading down the bay
2008-5-1	8:53	2nd Boat heading down the bay
2008-5-1	8:56	1st boat heading up the bay
2008-5-1	9:15	2nd boat heading up the bay
2008-5-1	9:25	Boat heading down the bay
2008-5-1	10:19	Boat heading up the bay
2008-5-1	11:46	Boat leaving Home Bay
2008-5-2	7:58	Boat leaving Home Bay
2008-5-2	8:16	Boat leaving Home Bay
2008-5-2	8:55	Boat heading down the bay
2008-5-2	9:34	Boat heading up the bay
2008-5-2	12:53	Boat heading down the bay
2008-5-2	1:23	Boat heading up the bay
2008-5-3	9:26	Boat heading down the bay
2008-5-3	9:52	Boat heading up the bay

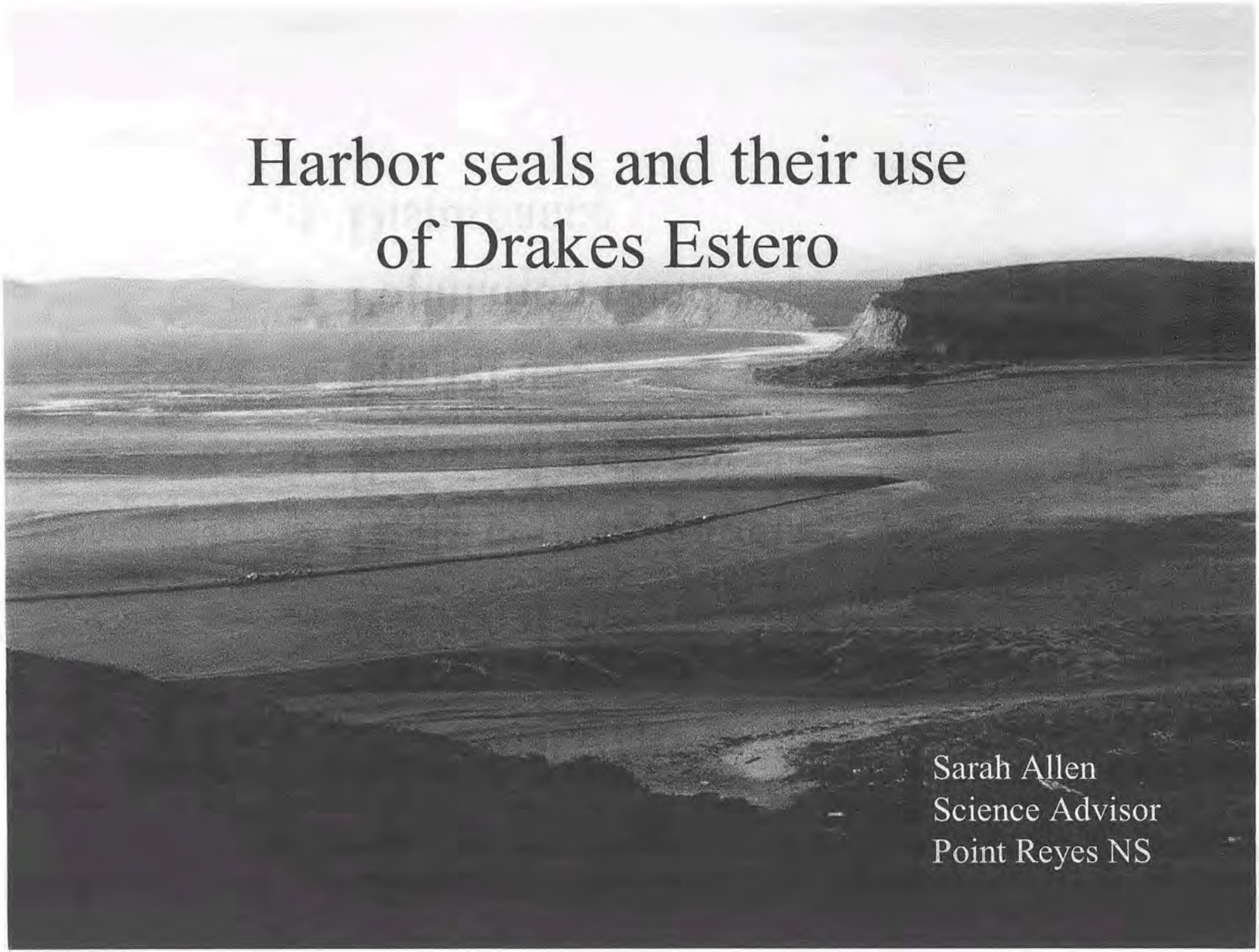
Silent Image (cont.)

2008-5-7	3:33	Boat travelling down the bay
2008-5-7	3:43	Boat travelling up the bay
2008-5-7	4:12	Boat going towards Home Bay
2008-5-7	4:17	Boat leaves Home Bay
2008-5-8	7:00-9:00	Foggy, couldn't see images clearly
2008-5-8	9:10	Boat leaves Home Bay
2008-5-8	9:51	Boat going towards Home Bay
2008-5-8	2:57	Boat leaves Home Bay & travels down the bay
2008-5-8	3:58	Boat travelling up the bay
2008-5-8	4:15	Boat leaves Home Bay
2008-5-9	8:06	Boat enters Home Bay ↳ Didn't see it leave Home Bay
2008-5-10	8:19	Boat travelling down the bay
2008-5-10	9:12	Boat travelling up the bay
2008-5-12	2:50	Boat travelling towards Home Bay
2008-5-13	7:11	Boat travelling down the bay
2008-5-14	7:00-8:13	Boat already at bed N of UEF
2008-5-14	8:13	Boat travelling up Schooner Bay
2008-5-14	9:37	Boat travelling towards Home Bay
2008-5-14	9:37	2nd Boat travelling down the bay
2008-5-14	9:49	Boat leaving Home Bay & going up Schooner Bay
2008-5-14	10:14	Boat travelling up the bay (2nd one)
2008-5-15	8:09	Boat travelling down Home Bay
2008-5-15	8:33	Boat leaving Home Bay & going up Schooner Bay
2008-5-15	9:27	Boat travelling down the bay
2008-5-15	9:45	Boat travelling up the bay
2008-5-15	1:51	Boat travelling down the bay

2008-5-15	2:12	Boat travelling up the bay
2008-5-16	9:38	Boat travelling down the bay
2008-5-16	10:03	Boat travelling up the bay
2008-5-16	10:55	Boat travelling towards Home Bay
2008-5-16	12:21	Boat leaving Home Bay + travelling up Thomas Bay
2008-5-16	1:22	Boat travelling towards Home Bay
2008-5-16	3:44	Boat leaving Home Bay
2008-5-16	5:41 ✱	Boat travelling towards Home Bay
2008-5-16	6:17 ✱	Boat leaving Home Bay
2008-5-17	11:00	Boat travelling down the bay
2008-5-17	11:23	2nd Boat travelling down the bay
2008-5-17	11:59	Boat travelling up the bay
2008-5-17	2:57 - 6:59 PM	Foggy - couldn't see images
2008-5-18	7:00 - 10:40	Foggy - couldn't see images
2008-5-19	8:21	Boat travelling towards Home Bay
2008-5-19	9:05	Boat leaving Home Bay
2008-5-19	3:10	Boat travelling down the bay
2008-5-20	10:44	Boat travelling down the bay
2008-5-20	11:40	Boat travelling up the bay
2008-5-21	8:14	Boat travelling down the bay

5-22 9:46

Harbor seals and their use of Drakes Estero



Sarah Allen
Science Advisor
Point Reyes NS

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Outline

- Regional significance
- Daily activity patterns
- Seasonal patterns
- Spatial use
- Population trend
- Disturbance

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Sources of information on Drakes Estero

- Baseline study of all haul outs in Point Reyes

  Allen and Huber 1982-83 and 1983-84

- Human interactions

  Allen and Huber 1983-84

- Movement and activity pattern study 1985-88

  Allen Miller 1988

- Monitoring 1996-2009

  NPS pinniped monitoring database

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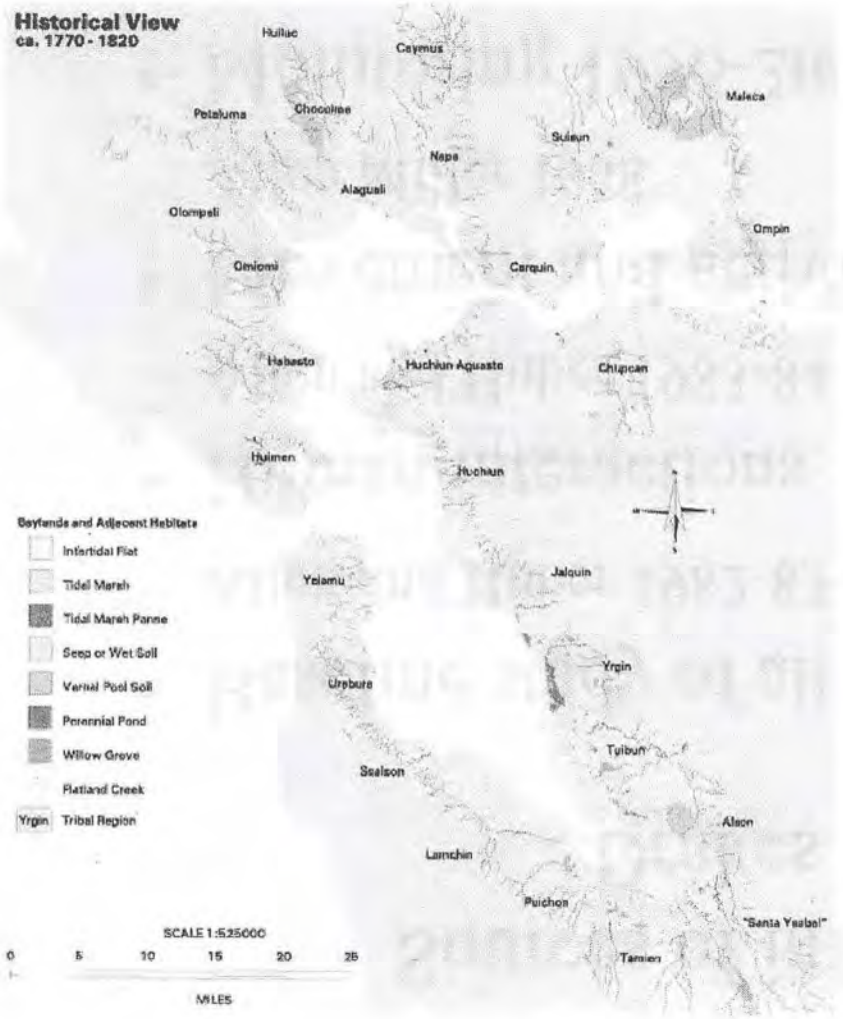
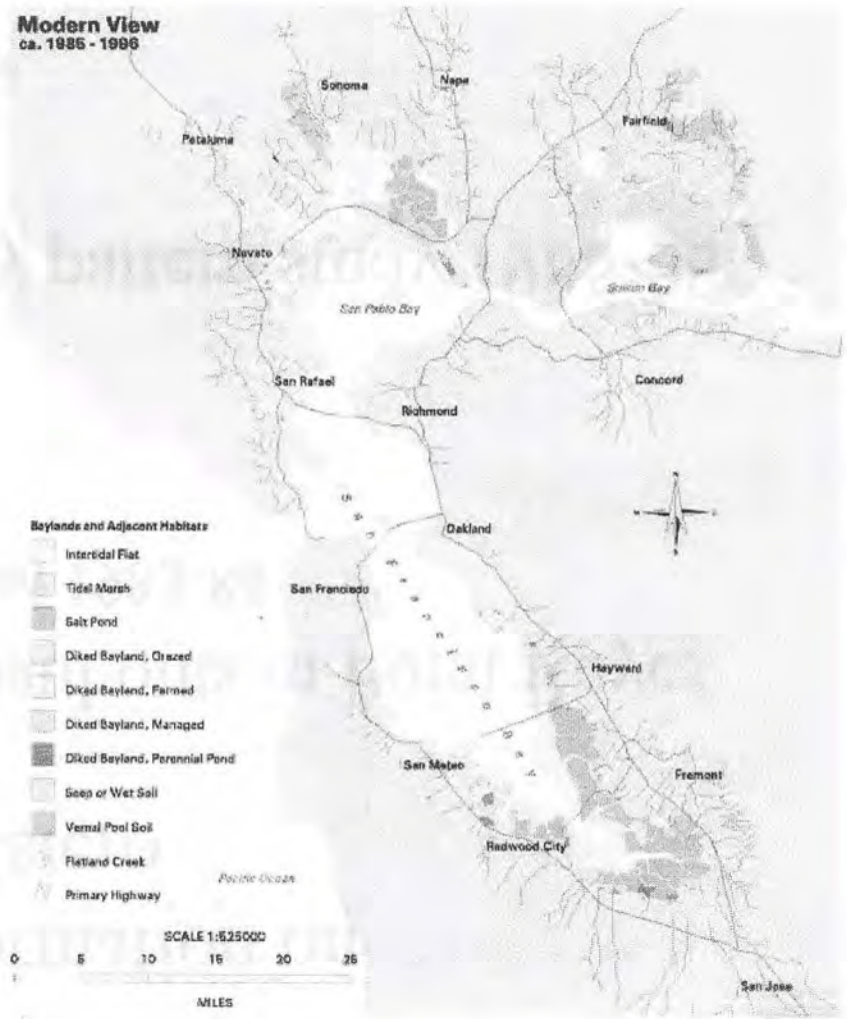
Urbanization of San Francisco Bay





Maps from the San Francisco Estuary Institute

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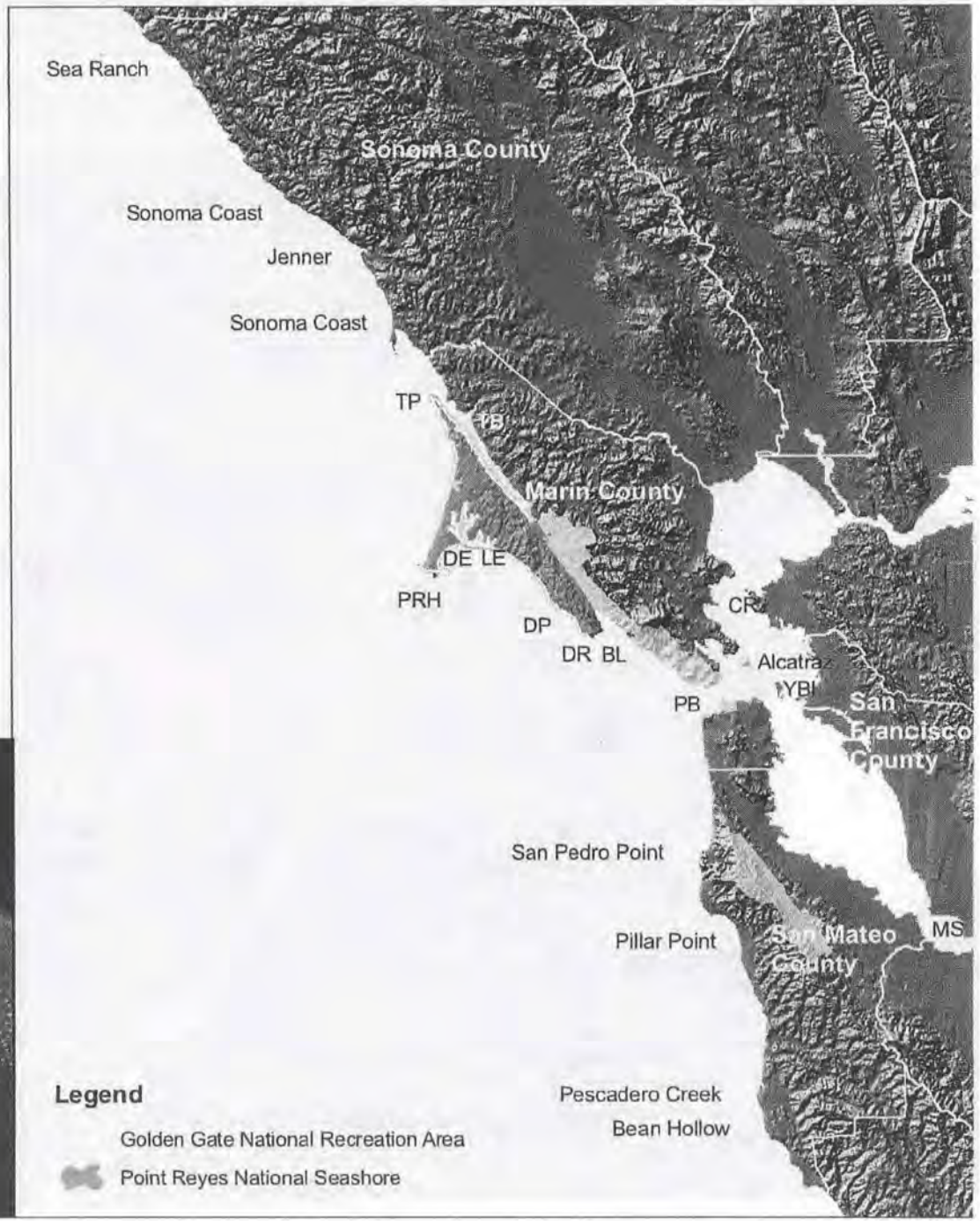
Regional harbor seal haul out sites

Marin County colonies = @ 20% of California mainland population (Lowry et al. 2005)



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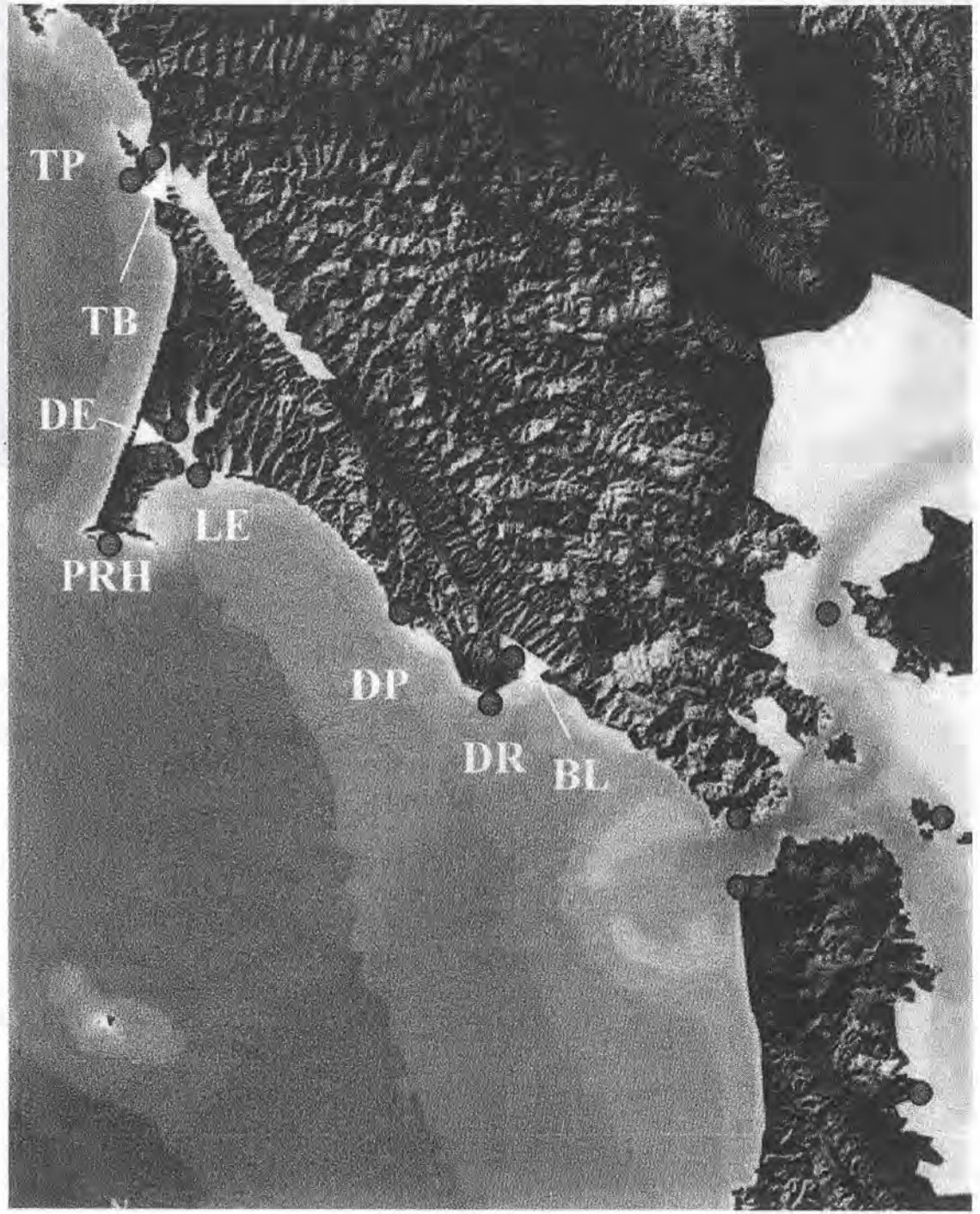
Marin County Colonies

DE accounts for
24-30% of total seals
29-33% of total pups

(from NPS annual reports)



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Harbor seal activity patterns in Drakes Estero

Many factors influence seal haul out patterns elsewhere: Loughlin 1978, Newby 1973, Slater and Markowitz 1983, Yochem et al. 1987, Jeffries 1986, Harvey 1987, Watts 1996, Thompson et al. 1997, Grigg et al. 2002, Lowry et al. 2005.

Daily Pattern
- Time of day
- Tide
- Hours per day

Seasonal Pattern
- Breeding (March-June)
- Molt (July-August)
- Non-breeding (Sept-Feb)

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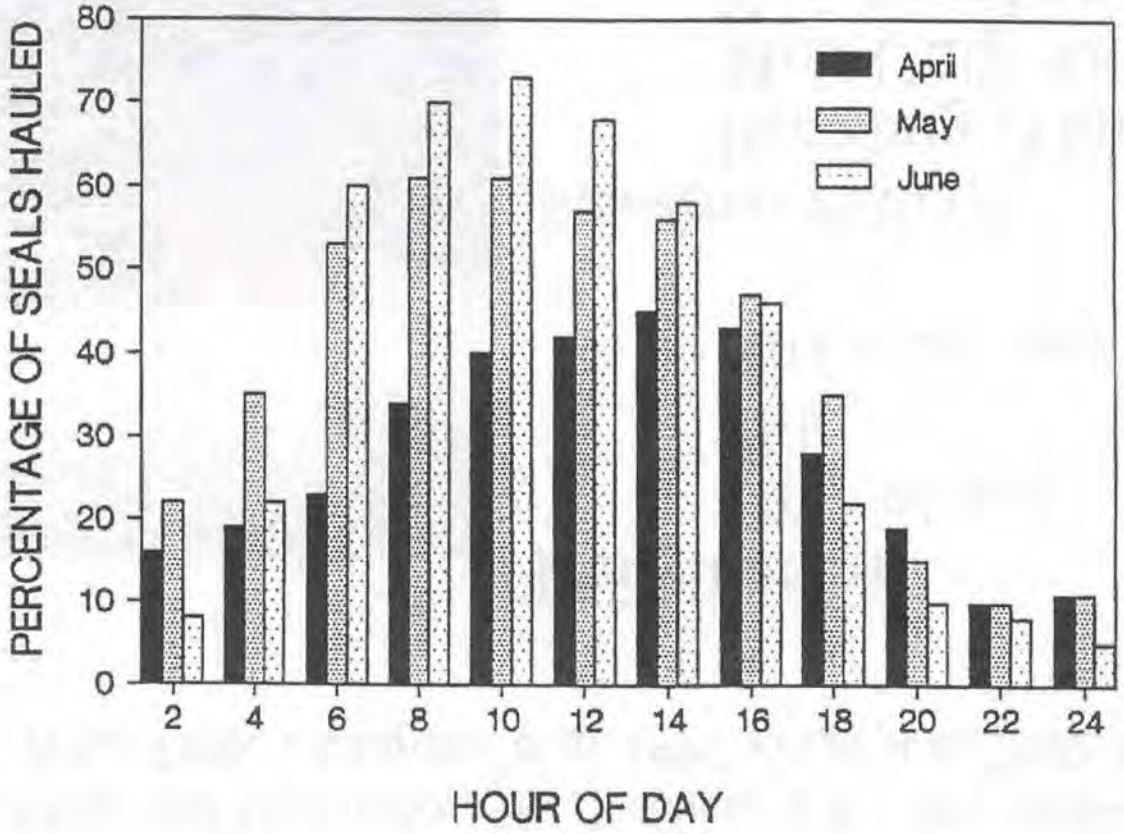
Daily patterns



Percentage of radio-tagged seals hauled out by hour of day for the months April –June. Regardless of season, the largest number of seals hauled out from 0500-1600 hr. Similar patterns seen by Yochem et al 1987, Harvey 1987.

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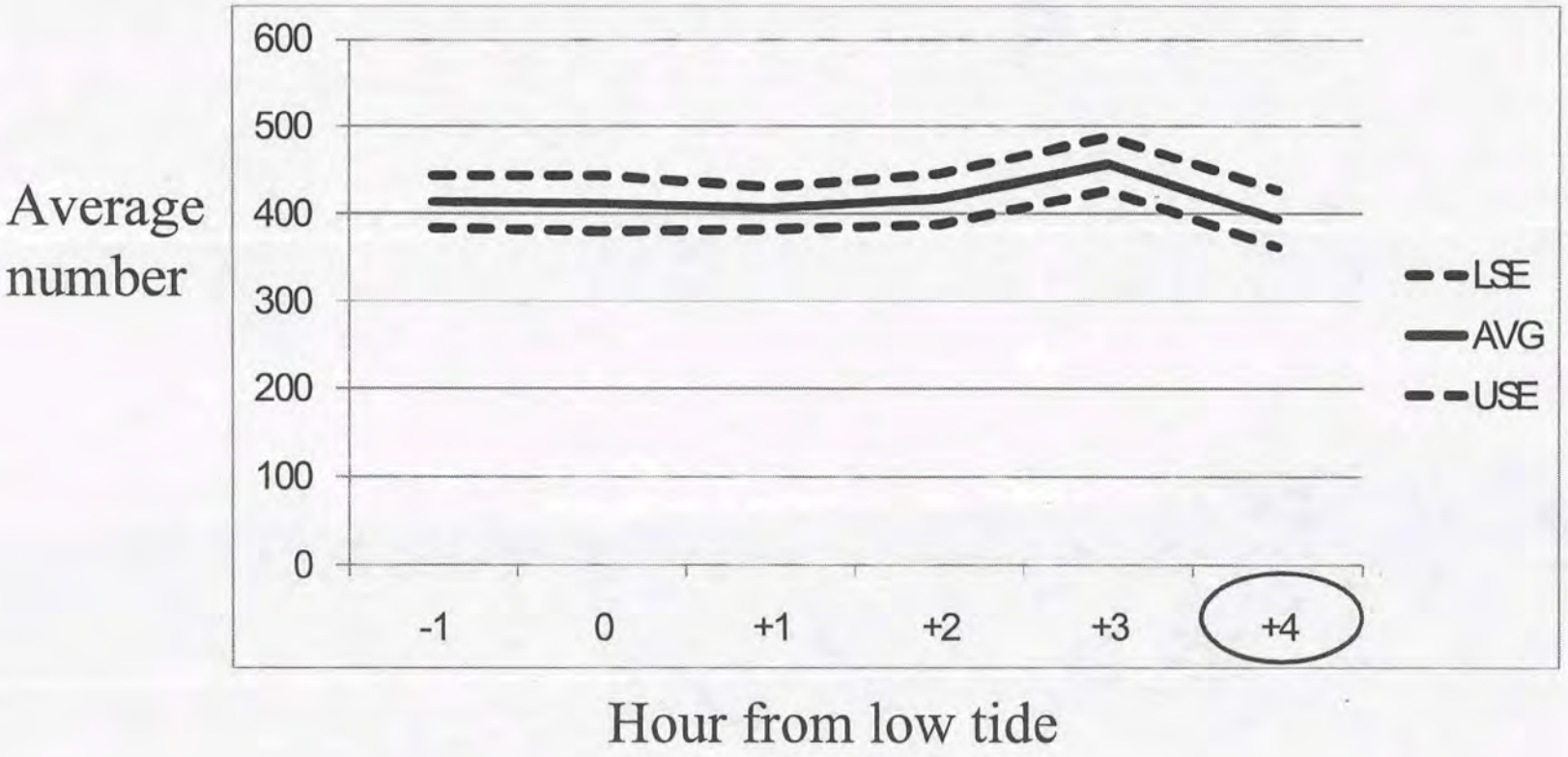
Daily patterns

More seals hauled out relative to tide from -1 hr before to +4 hours after low tide. After +4 hours, numbers drop off. Similar pattern seen by Stein 1989, Harvey 1987.



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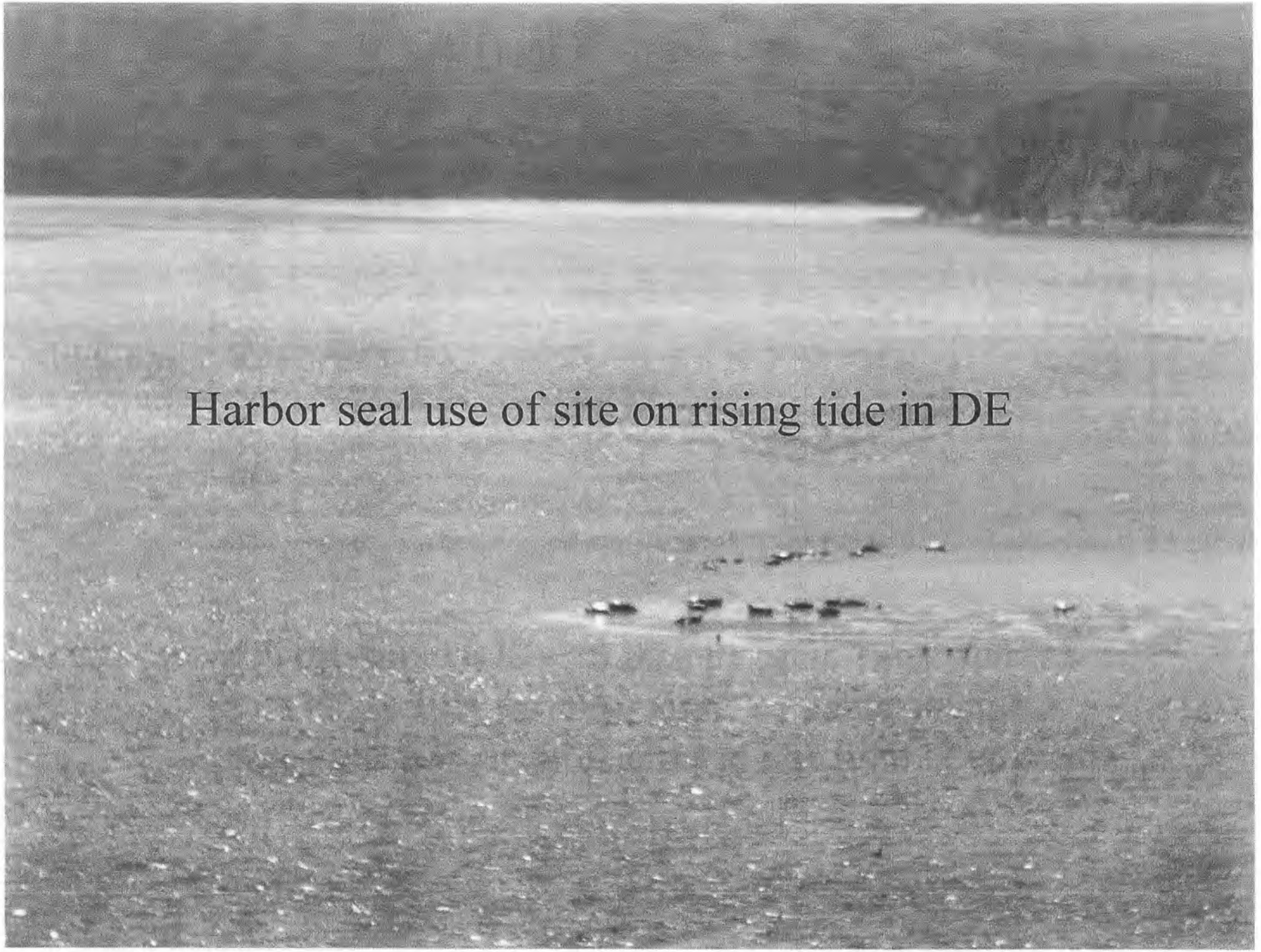

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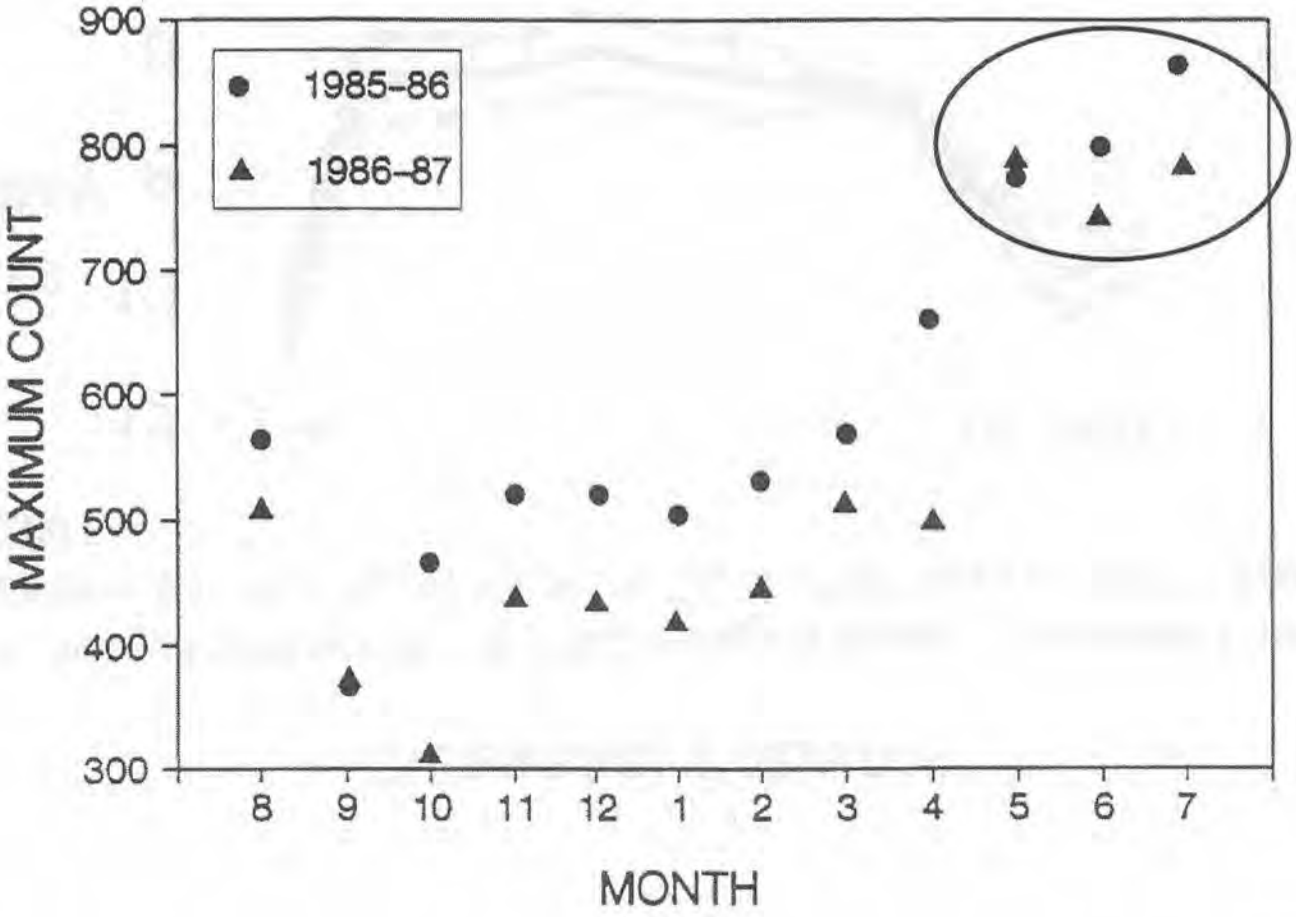
Seasonal Patterns

Monthly maximum number of seals counted between August 1985 and July 1987. Similar to Yochem et al. 1987, Harvey 1987, Suryan and Harvey 1999)



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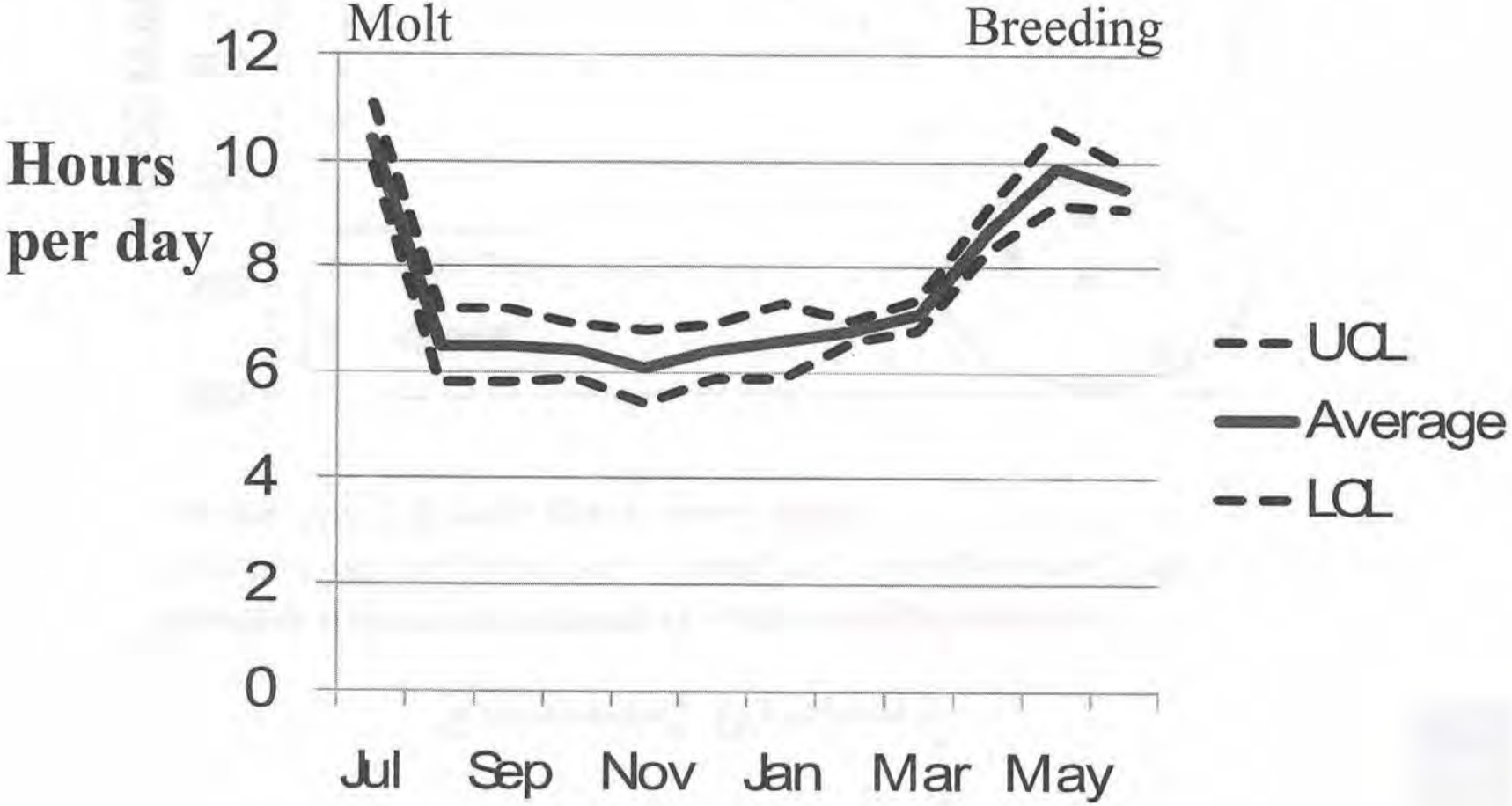
Seasonal Patterns

Average hours per day that radio-tagged female seals hauled out at Drakes Estero. Similar results to Stein 1989, Harvey 1987, Huber et al 2001.



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First Pups

Date of first pup observed in the season by location, 2000–2008. (From NPS Annual Report 2009).

Year	Date	Location
2000	March 14	Point Reyes Headland
2001	March 16	Tomales Bay
2002	March 3	Drakes Estero
2003	March 27	Bolinas Lagoon
2004	March 20	Double Point
2005	March 6	Drakes Estero
2006	March 9	Double Point
2007	March 2	Double Point
2008	March 16	Bolinas Lagoon

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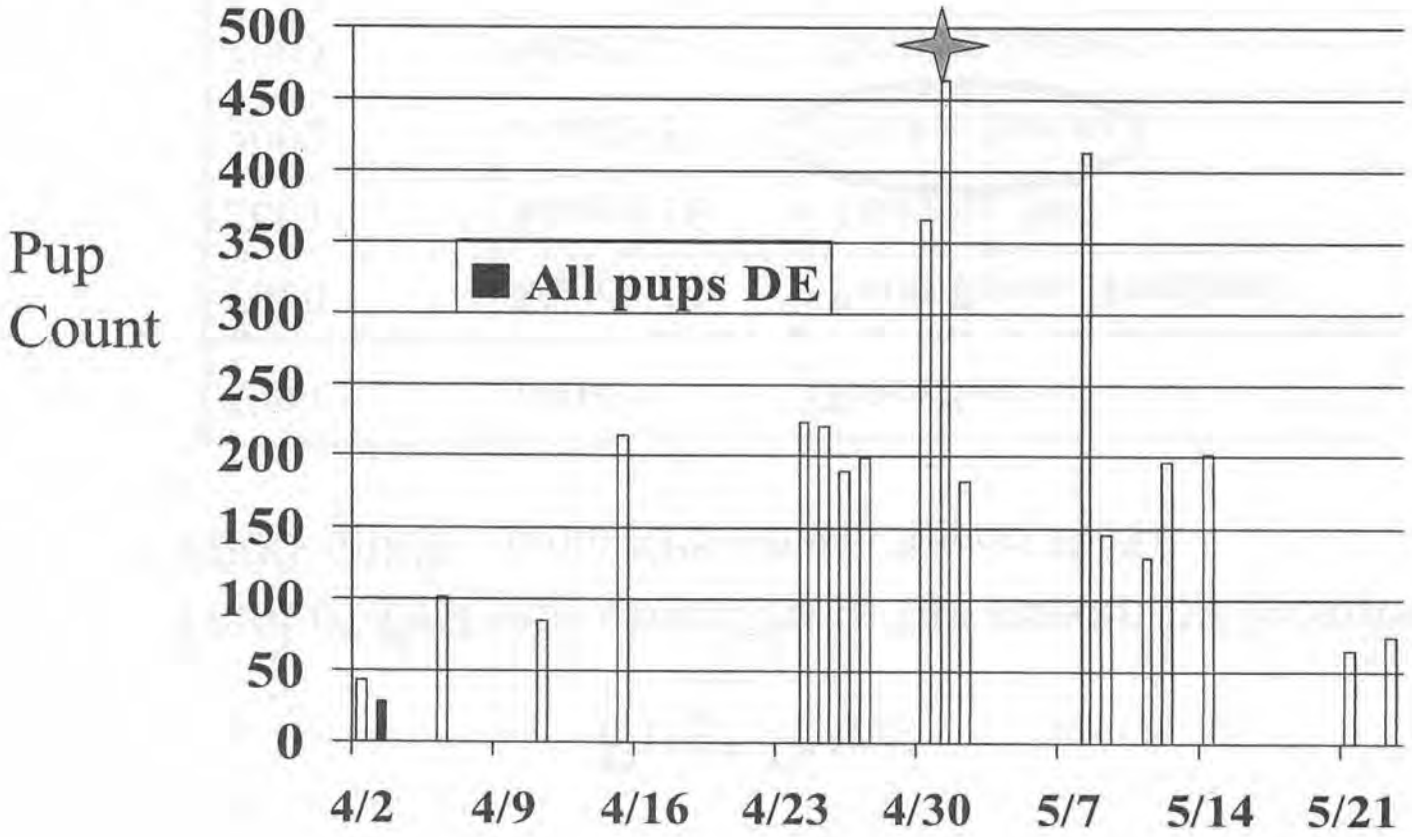
Pupping Season

Regardless of year, peak pup count for DE and region is between last week of April and first week of May. Proportion of pups is @ 0.3 regardless of year. (Example from 2004 NPS database).



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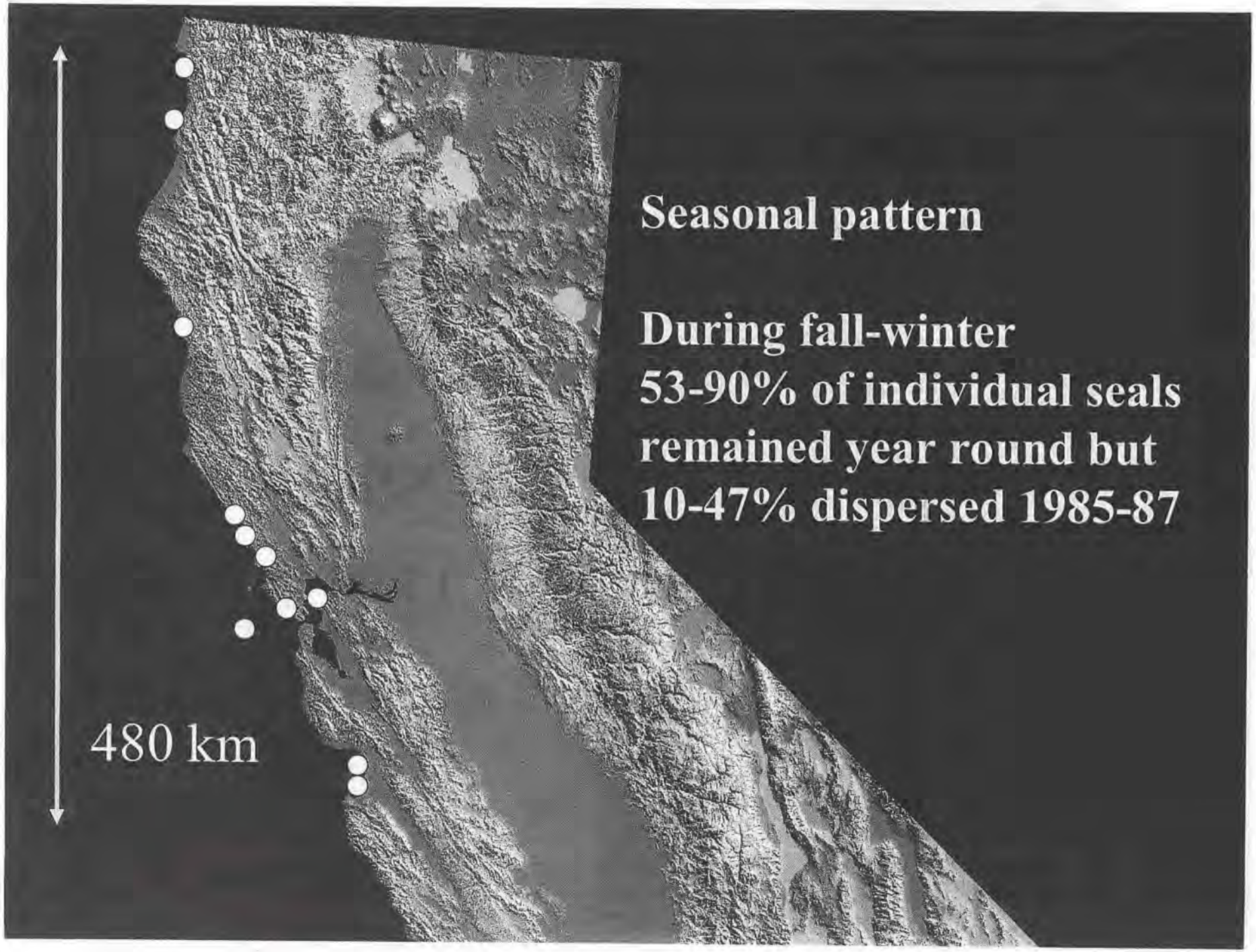

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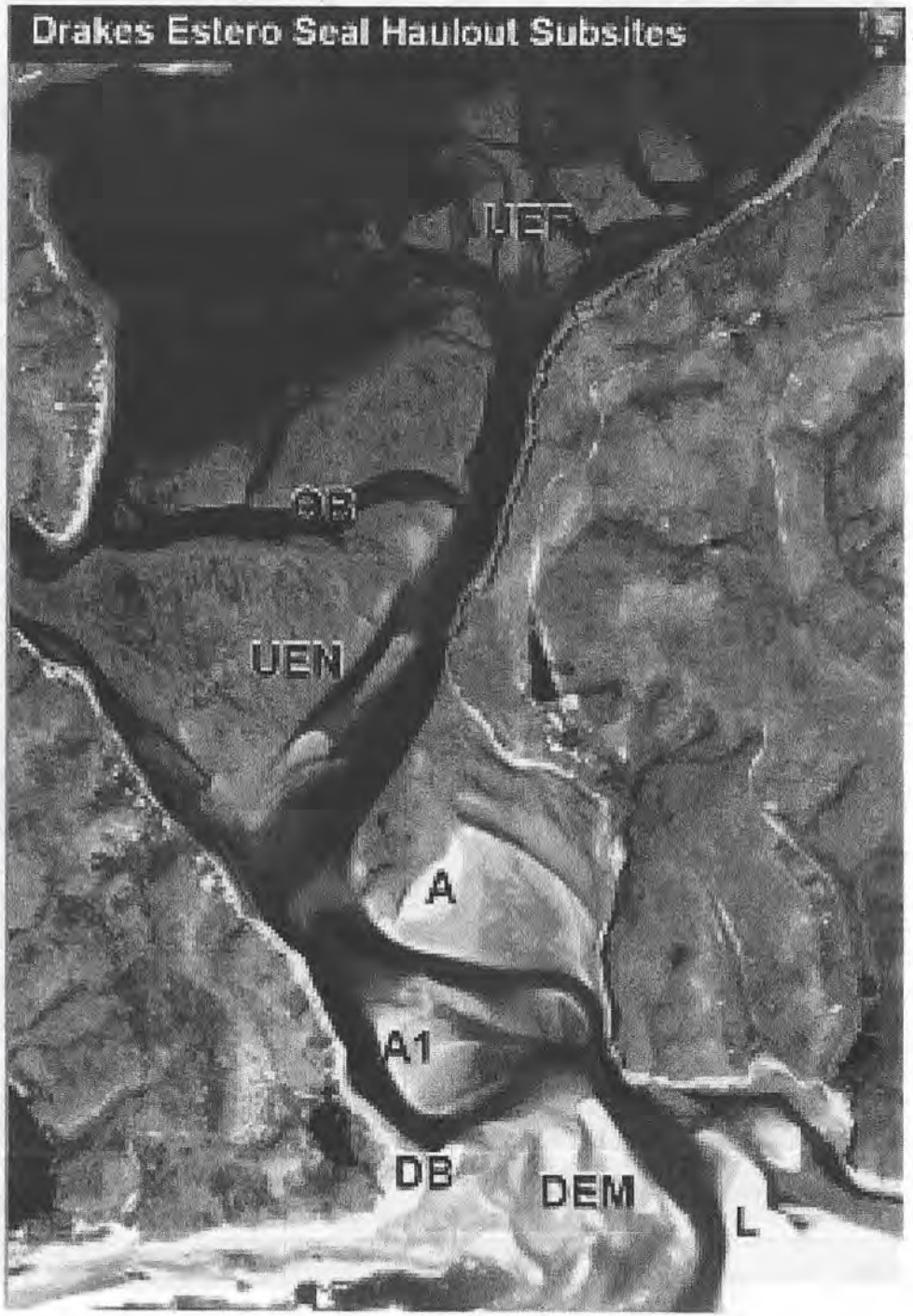
Spatial Patterns

Upper - UEN, OB, UEF
Middle -A, A1
Lower – DB, DEM, L

Isolated sandbars
A before 2003,
A1, UEN, OB, UEF, DEM

Attached to mainland
L, DB, A later after 2003



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Spatial Patterns

Females preferred isolated sand bars (A, A1 and U (includes UEF, OB and UEN) significantly more than sites attached to mainland (L). Segregation of sexes only occurred during the breeding season. This pattern persists to the present. Segregation seen at other sites by Knudtson 1977, Stein 1989, Slater and Markowitz 1983.

	Breeding Location			
Sex	A	A1	L	U
Female	55	76	14	52
Male	20	9	21	14

$X^2 = 33.55$

$p < 0.0001$

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Spatial Patterns

Individual seals, particularly females, displayed strong within-site fidelity during the breeding season and remained entirely within DE for the first 2 weeks after birth. Similar to other sites seen by Stein 1989, Thompson et al. 1994).

Photo Judy Bourke

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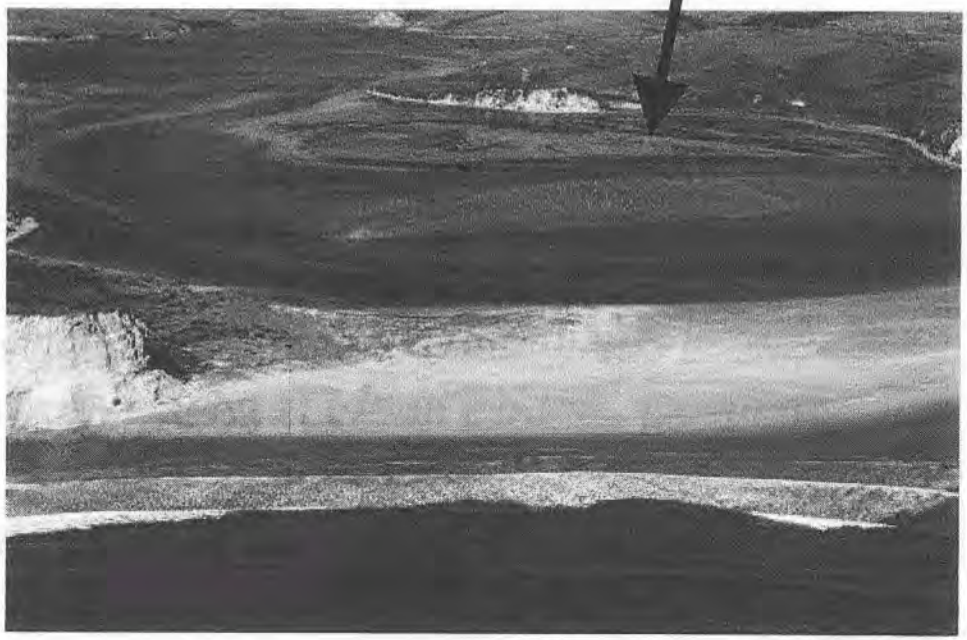
Habitat change over time

Channel

Channel absent

1986

2009



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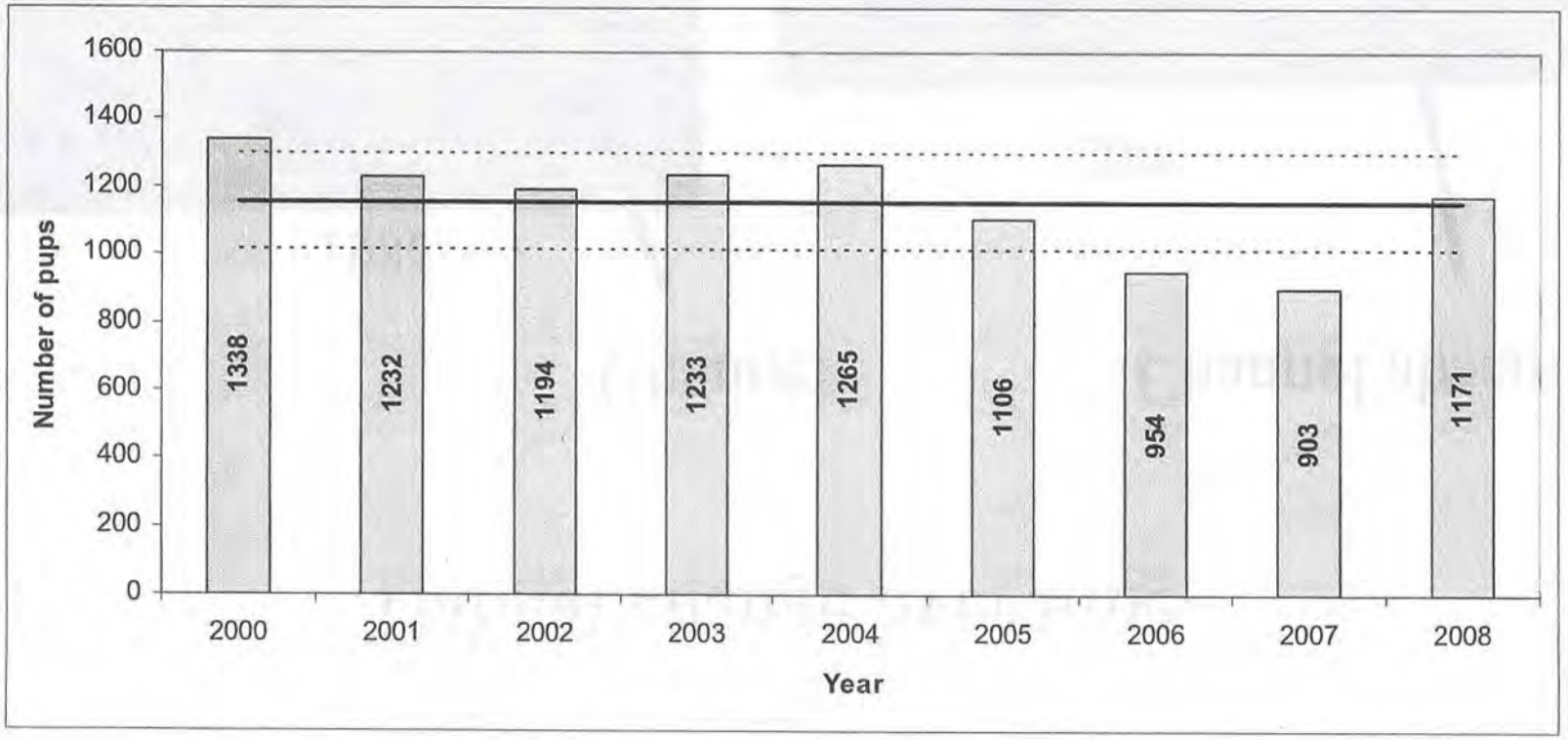
Population Trend

Maximum harbor seal pup counts for 2000–2008 at Marin County locations. The solid line on the graph represents the mean of the maximum pup counts from 2000-08 (mean = 1,155.1) and dashed lines represent one standard deviation from the mean (SD = 143.9; from NPS annual report 2009).



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Disturbance

Defined by MMPA

The term " harassment" means any act of pursuit, torment, or annoyance which—

(i) has the potential to injure a marine mammal or marine mammal stock in the wild. Level A Harassment

(ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Level B Harassment

NMFS prohibits

The negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal.

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Disturbance potential effects on pinnipeds

Short-term – direct

- Disturb resting period by visual, sound or smell cues from human actions (Newby 1971, Johnson 1977, Allen et al. 1984, Suryan and Harvey 1999)
- Disrupt seals in water foraging or mating (NAS 2009)
- Pup separation and potential mortality (Johnson 1977, Kenyon 1972, Lawson&Renouf 1987, Jansen et al. 2003)
- Temporary displacement to subprime habitat (Ragen 1999, Stevens and Boness 2003)

Long-term – indirect

- Reduced usage/abandonment (Bartholomew 1949, Newby 1971, Kenyon 1972, Schulmeister 1981, Allen&King 1991, Richardson 1995)
- Shift to nocturnal haul out (Paulbitski 1975, Grigg et al. 2002)
- Lower pup production (Slater&Markowitz 1983, Allen&Huber 1984, Ragen 1999)
- Reduced fitness from displacement from foraging areas, chronic stress, reduced nursing or resting of pups
- Permanent shift to subprime habitat leading to changes in demography and reduced population (Gerrodette and Gilmartin 1990)

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Seal responses to disturbance on land

- Head alert
- Flush to water
- Enter water

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Pinniped Response to Disturbance

Head alerts – vigilance time in search of a predator

- Varies with sex, age, location (Sullivan 1979)
- Females with pups scan more often than other seals (Suryan & Harvey1999)
- Tomales Bay seals were disturbed more often and alerted significantly more times than other sites in Marin (Allen and Huber 1984)

Distances triggering response on land

- Varies with species and population, and source
- NMFS guidelines = 300 ft (90 m)
- 50-600 ft (15-183 m) SF Bay (Alcorn and Fancher 1980)
- 80-500 m for small boats (Johnson and Acevedo-Gutierrez 2007)
- Within 200 m 75% of seals flushed (Jansen et al. 2003)
- 28-260 m seals flushed (Suryan and Harvey 1999)

Recovery time

- Varies with species and location
- @ 28 min +/-21 for seals to rehaul in Bolinas (Allen et al. 1984)
- Counts typically do not return to pre-disturbance levels within the same tidal cycle – (Suryan and Harvey 1999)

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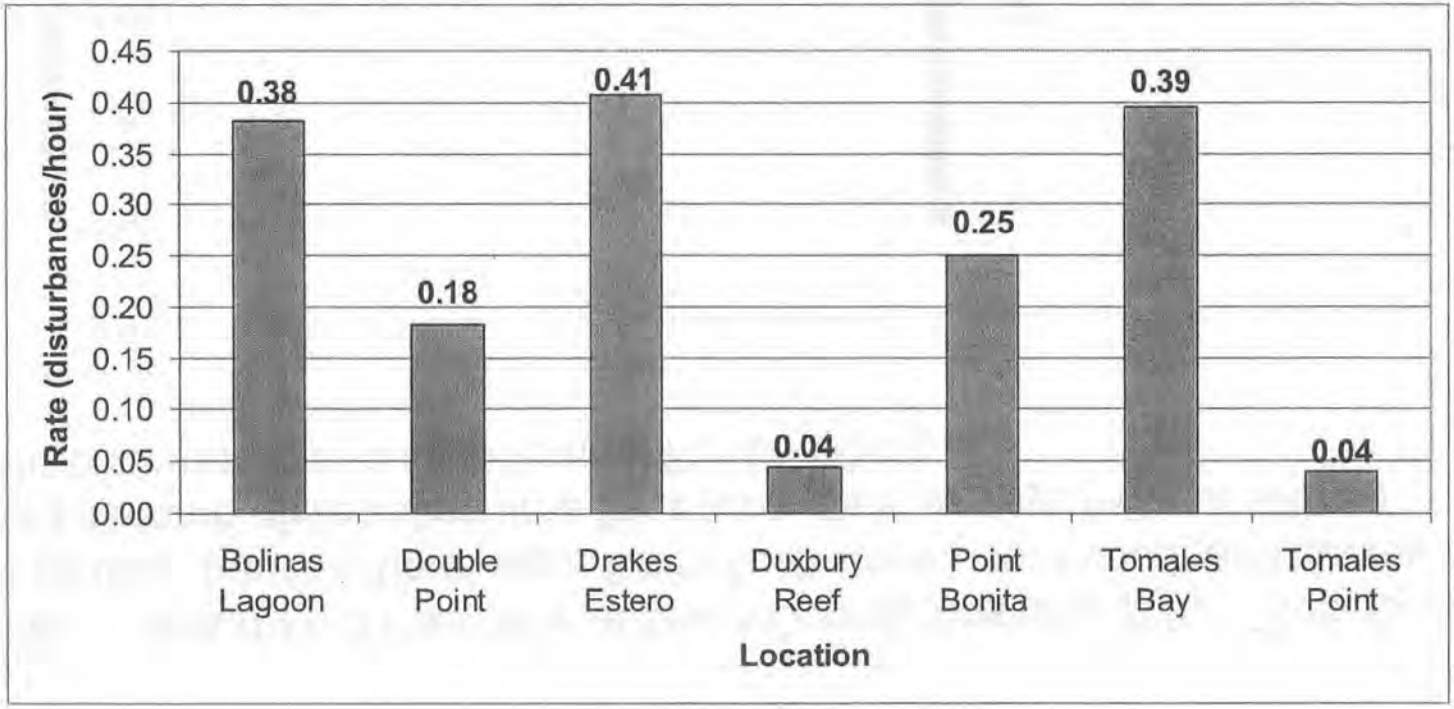
Disturbance Rate

Rates of disturbances per hour at Marin County locations from March through July 2008. Only actual disturbances (head alert, flush, flush water) were used and survey time was based on observation time for all complete surveys (with or without disturbances). (From NPS Annual Report 2008).



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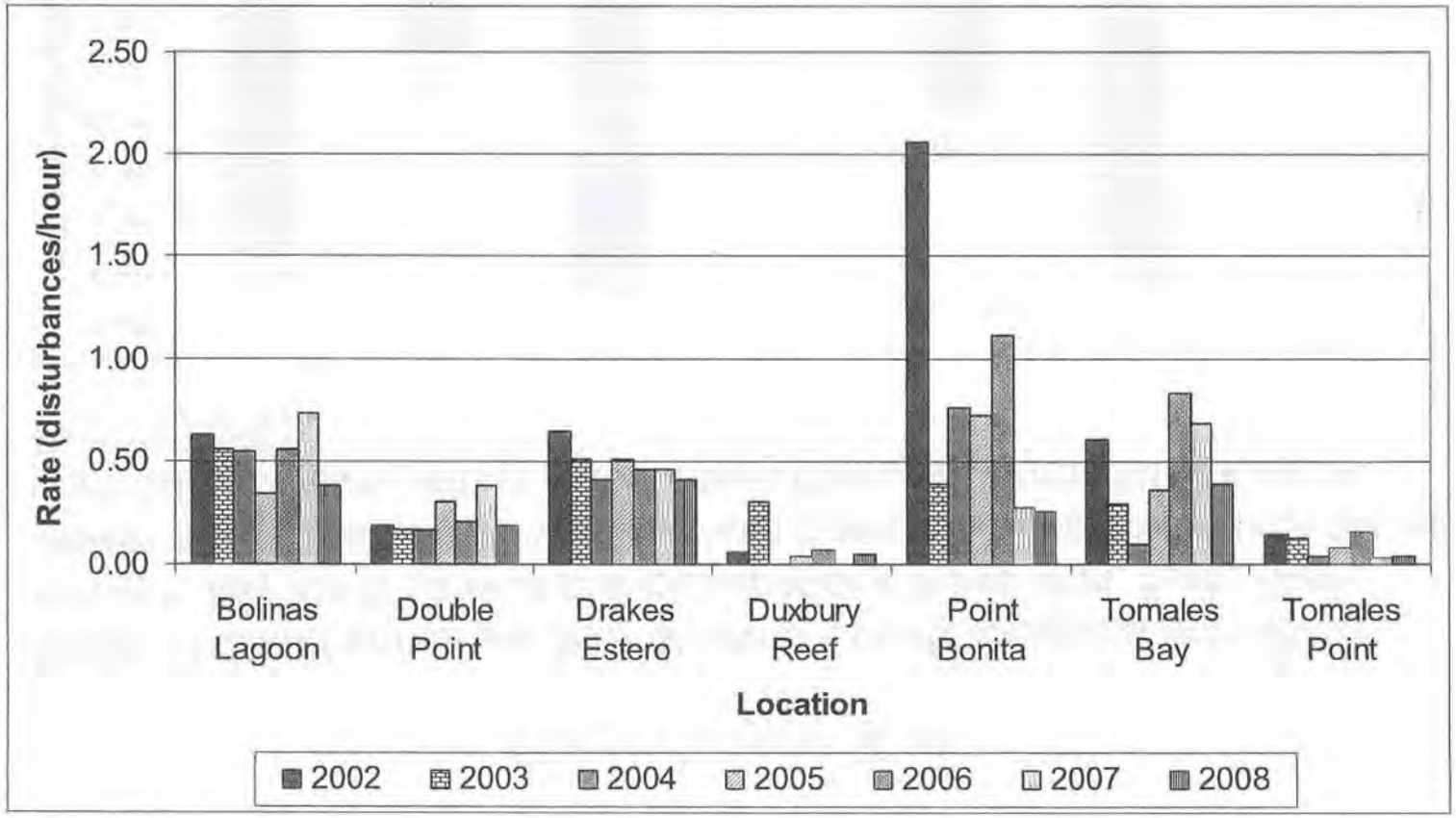
Disturbance Rate

Rates of disturbances per hour at Marin County locations 2002–2008. Only actual disturbances (head alert, flush, flush water) were used, and survey time was based on observation time for all complete surveys (with or without disturbances). (From NPS Annual Report 2008).



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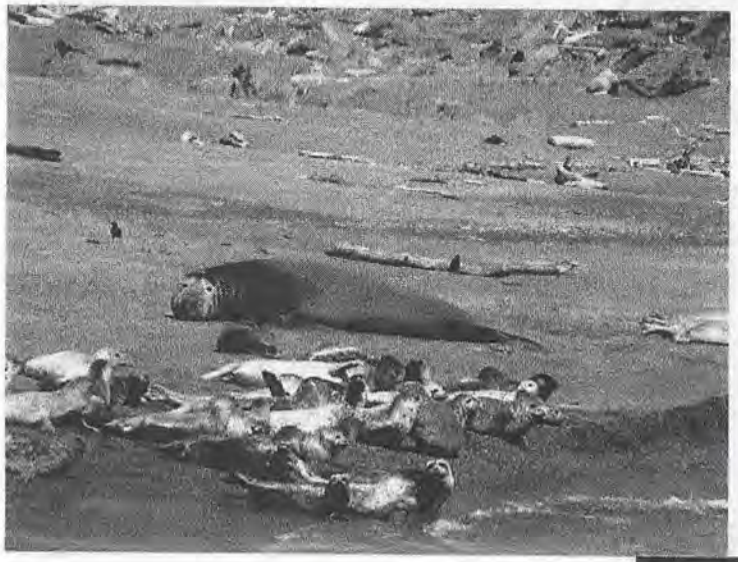
Predators disturb seals



(c) Chuck Davis/Tidal Flats, Ltd.

Photos NPS

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Human activities at Point Reyes disturb seals

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Mariculture activities that disturb seals in DE

- Bags/equipment on or adjacent to haul outs
- Boat traffic
- People adjacent to haul outs tending equipment for extended periods

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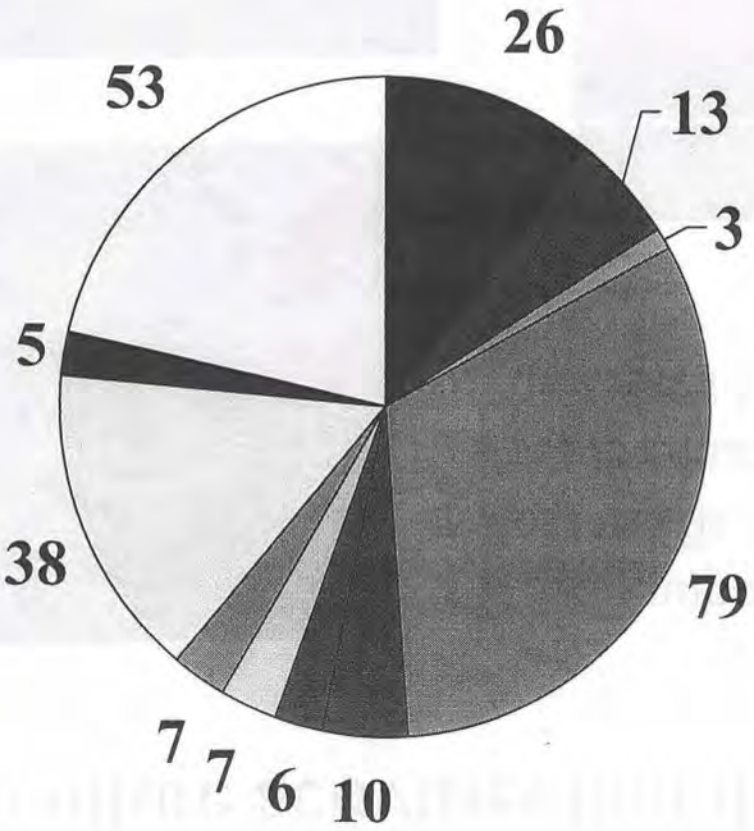
Number of disturbances by source at Drakes Estero
Breeding seasons 2000-2009



- aircraft
- clammer
- fisherman
- human
- motorboat
- non-motorboat
- researcher
- coyote
- bird
- other
- unknown

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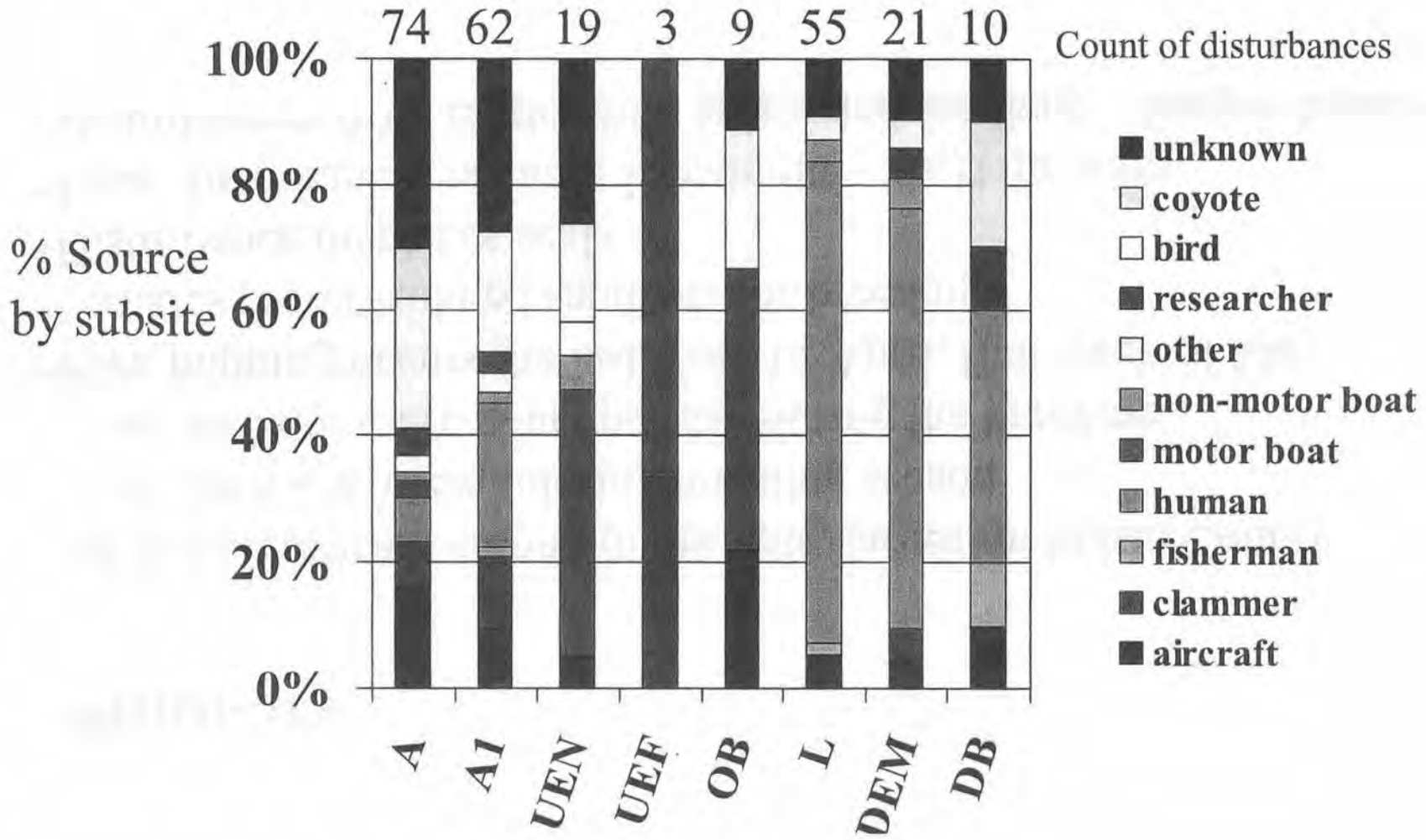
Sources for disturbance by subsite for breeding seasons 2000-2009



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Summary

- DE is a significant colony in the state, largest in Marin County
- More seals are present during breeding season
- Seals haul out more hours per day during the breeding
- Peak pupping occurs the last week of April, first week of May
- Females prefer isolated sandbars for breeding
- Disturbance displaces seals
- More disturbances occur at Limantour – short duration
- Disturbances from mariculture at isolated sandbars – longer duration

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Acknowledgments

Farallones Marine Sanctuary Association
NOAA Fisheries
Gulf of Farallones National Marine Sanctuary
San Francisco State University students
Stewards of Coast and Redwoods
The Marine Mammal Center
Volunteers of Point Reyes Pinniped Monitoring

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Major points on the use of wildlife cameras at Point Reyes National Seashore

- Wildlife observation cameras are not new to Point Reyes National Seashore: the park has used them over the years for inventory and monitoring, research, and management. This has included cameras on harbor seals, elephant seals, elk, and wildlife in general. The park also used remote cameras extensively after the Vision Fire in 1995, and most recently on the Giacomini Wetland restoration project.

- Cameras are a common tool used in wildlife management/study everywhere. At least 30 parks use cameras. For example, at Santa Monica Mountains National Recreation Area, the animal ecology team uses around 60-70 infrared cameras to detect and monitor wildlife while at Yellowstone National Park, six cameras were used last winter to collect data on bison movement along travel corridors. Use of cameras in parks is widespread.

- The Drakes Estero cameras were put out to understand why there was a drop in harbor seal numbers at the OB site and UEF site (these are seal pupping sites within Drakes Estero) and to document if there were disturbances that might help explain the drop in numbers.

- The cameras - in Drakes Estero and elsewhere - are camouflaged to protect against vandalism, theft, and accidental disturbance by cattle, wildlife, birds, etc.

Timeline of camera use

  - 2010: there is one camera at Drakes Estero right now being used by a student from San Francisco State University for her Master's thesis focused on harbor seals and disturbance. Note: this camera is no longer collecting data Ex 5 [redacted] Ex 5 [redacted]

  - 2009: one camera focused on the OB haul out site

  - 2008: there were two cameras at Drakes Estero, aimed at seal haul out sites in the upper estero, referred to as OB and UEF (see attached map) - these are two major harbor seal haul out areas that have shown the largest declines in seal numbers. These declines are documented in two peer reviewed scientific papers; one published in 2009, one to be published in 2010.

  - 2007: there was one camera focused primarily on the OB site.

  - Pre-2007/late 1990's: cameras, both still and video, have been used at Drakes Estero and other sites within the park for wildlife monitoring and inventory, and for other scientific purposes.

- The allegations that these cameras were not focused on haul out sites is incorrect - the images have seal haul out sites in the foreground; they can show, when present, boats in the

background - any boat would show up, kayak, oyster boat, or whatever is out there. Attached is an image that shows a kayak. This camera - when functioning - would pick up any disturbance.

- The cameras were active during the breeding season, generally February-July. They are not active the other times of the year.

- Images from the cameras have not yet been analyzed in any depth - a handful of images have been used publicly: in the Marine Mammal Commission meeting that happened at the park in February 2010, and in a briefing statement prepared at the park this time last year (May 2009), in response to Dr. Corey Goodman's letter to the National Research Council.

- An additional note: the briefing statement, which references the cameras, has been posted since at least January 29, 2010 on the publicly accessible Marine Mammal Commission web site. The NPS provided the May 2009 briefing statement to the Marine Mammal Commission on December 23, 2009.

FOIA 10 755 Miguel #8

CD "Harbor Seal Monitoring Data"; per Dave Press:

The enclosed CD contains harbor seal data collected within Point Reyes National Seashore (PORE) and Golden Gate National Recreation Area (GOGA) from 1996 through July 2009. As per your request (FOIA item #8), the enclosed CD includes all "supporting raw data" for "any and all documents for harbor seal population from 2006 to present in, on, and around Drakes Estero".

The data has been compiled from our current monitoring program, which falls under the direction of the San Francisco Area Network (SFAN) Inventory and Monitoring Program, but also includes incidental counts of harbor seals collected during northern elephant seal surveys and data that precedes our current monitoring program.

Each of the databases is provided in Microsoft Access 2003 format. The databases contain complete definitions of all tables and data fields, which can be viewed in the Relationships window.

Two additional files representing Drakes Estero harbor seal data from 1982-1993 have been made available in Microsoft Excel.

In accordance with Executive Order 12906, these data files have been provided with metadata records following the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Metadata (CSDGM). We suggest that you thoroughly review the provided metadata records and understand the content of these data files (1.2.1 Abstract), the use constraints of the data files (1.8 Use Constraints, 2.1.1 Attribute Accuracy Report), and the statement of liability assumed by the National Park Service (6.3 Distribution Liability).

The metadata files have been provided in standard XML format, which require a metadata reader for proper viewing. As a courtesy, we have also provided the metadata files in TXT format, which can be read using a variety of text readers, including Microsoft Word, Notepad, and WordPad.

The databases provided on the enclosed CD are:

SFAN_PHOCA_2000_2009

Harbor Seal Monitoring, San Francisco Area Network, March 2000 – July 2009. Maximum counts per survey for all locations. Additional data include the sources of disturbance to harbor seals and associated harbor seal responses.

PORE_PHOCA_SUBSITE_2008_2009

Harbor Seal Monitoring, Point Reyes National Seashore, August 2007 – July 2009. All subsite counts per survey for all monitoring locations. Additional data include the sources of disturbance to harbor seals and associated harbor seal responses.

GOGA_PHOCA_2000_2009

Harbor Seal Monitoring, Golden Gate National Recreation Area, April 2000 – July 2009. All subsite counts per survey for Point Bonita. Additional data include the sources of disturbance to harbor seals and associated harbor seal responses.

PORE_PHOCA_DE_SUBSITE_1997_2007

Harbor Seal Monitoring, Point Reyes National Seashore, Drakes Estero Subsite Data, March 1997 – July 2007. Maximum counts per survey of Drakes Estero reported according to subsite. Additional data include the sources of disturbance to harbor seals and associated harbor seal responses.

PORE_PHOCA_1996_1999

Harbor Seal Monitoring, Point Reyes National Seashore, March 1996 – August 1999. Maximum counts per survey for all locations, reported according to subsite for some surveys. Additional data include the sources of disturbance to harbor seals and associated harbor seal responses.

PORE_PHOCA_PRH_1997_2009

Incidental Harbor Seal Counts, Point Reyes Headlands, Point Reyes National Seashore, October 1997 – July 2009. Incidental harbor seal counts from pinniped surveys at Point Reyes Headlands. Additional data include the sources of disturbance to harbor seals and associated harbor seal responses.

PORE_PHOCA_DE_1982_1993

Harbor Seal Monitoring Count Data, Drakes Estero, Point Reyes National Seashore, 1982-1993. Maximum counts per survey of Drakes Estero reported according to subsite.

PORE_PHOCA_DE_DISTURBANCES_1982_1983

Harbor Seal Monitoring Disturbance Data, Drakes Estero, Point Reyes National Seashore, 1982-1983. Harbor seal disturbances observed in Drakes Estero.

02/10/10 Email from Dave Graber to Tim Ragen, George Turnbull, et al w/"Drakes Estero Seal Report 020610"

06/23/09 Document entitled "Inclusion of 2008 harbor seal data into the analysis presented in Becker et al 2009", Ben Becker, Dave Press and Sarah Allen

National Park Service "SFAN I&M Program Harbor Seal Monitoring", David Press, Ecologist/Data Manager

"Harbor seals and their use of Drakes Estero", Sarah Allen, Science Advisor, Point Reyes NS, was presented to the Marine Mammal Commission at a public meeting on February 20, 2010, and was posted to the MMC website a few weeks later.

"Modeling the effects of El Nino....Drakes Estero...1997-2007", Ben Becker, Dave Press and Sarah Allen

Don Neubacher/PORE/NPS
02/10/2010 01:47 PM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject Spatial use of Drakes Estero by harbor seals, 1982-2009

For files

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

----- Forwarded by Don Neubacher/PORE/NPS on 02/10/2010 01:47 PM -----

David Graber/SEKI/NPS
02/06/2010 12:31 PM

To tragen@mmc.gov
cc "Gordon Bennett" <gbatmuirb@aol.com>, "Neal Desai" <ndesai@NPCA.ORG>, "Cassidy Teufel" <cteufel@coastal.ca.gov>, "Kirsten Ramey" <KRamey@dfg.ca.gov>, sroberts@nas.edu, George Turnbull/OAKLAND/NPS@NPS, John Dennis/WASO/NPS@NPS
Subject Spatial use of Drakes Estero by harbor seals, 1982-2009

Dear Tim:

The scientific staff at Point Reyes National Seashore have assembled, for the use of the Marine Mammal Commission and any other interested parties, a peer-reviewed report of seal activities encompassing all available data. This report will be made available on the park public web site, and you are free to distribute as you wish. Please see my cover letter by way of explication.

Sincerely,
Dave Graber

Drakes Estero Seal Report 02-06-2010.pdf DMG Cover letter 10-02-06.pdf

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Chief Scientist, Pacific West Region, National Park Service
Sequoia & Kings Canyon National Parks
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Three Rivers, California 93271-9651
(559)565-3173

February 6, 2010

Dr. Tim Ragan
Executive Director
Marine Mammal Commission
4340 East-West Highway, Suite 700
Bethesda, Maryland 20814

Dear Dr. Ragen:

We are providing a report entitled *"Spatial use of Drakes Estero, California, by harbor seals correlated to anthropogenic disturbance and natural variation during 1982-2009"* by B. H. Becker, D. T. Press, and S. G. Allen for your panel to include in their review of the effects of human activities on harbor seals in Drakes Estero. The report addresses many of the questions and analysis recommendations that the National Academy Panel raised in its 2009 report (NRC 2009). The NRC reported that the National Park Service (NPS) pinniped monitoring program provides "as yet untapped potential for assessing trends in the abundance of harbor seals in Drakes Estero in relation to wider regional trends" (NRC 2009, p. 84). Based on the NRC's suggestions, the authors have expanded the Becker et al. (2009) analysis of seal use within Drakes Estero in response to mariculture by 1) adding ten additional years of data between 1982 and 2009, 2) improving the statistical methods, and 3) testing multiple factors (anthropogenic disturbance, regional scale population size, etc.) that may be related to seal use at three spatial scales. These scales ranged from *subsite* level seal counts and pup:adult ratios, to the *colony* level for distribution of seals within all of Drakes Estero, to the *regional* level comparing seal counts in Drakes Estero to the other surrounding colonies at the Point Reyes Peninsula.

The highlights of the results include:

1. The patterns found were consistent with the findings in the earlier Becker *et al.* (2009) paper.
2. They found no detectable relationship between human disturbance rate and the number of seals or pup:adult ratios at haul-out sites within Drakes Estero, suggesting that short-term human disturbance did not have a significant effect on spatial use.
3. Within Drakes Estero, the proportion of seals (total seals and pups only) hauled out near mariculture activities was lower during years of higher oyster harvest (-0.08 ± 0.02, ~ 59 seals). Regional population size was not a good predictor of seal use of the upper estero subsites near mariculture.
4. At the regional scale, oyster harvest, the counts at a nearby colony (Double Point), and the gradual loss of a major haul out site (subsite A) within Drakes Estero best explained pup and total seal use of Drakes Estero. Regional population size, short-term anthropogenic disturbance rate, and other factors were not important in explaining overall seal use of Drakes Estero compared to other colonies.

5. The proportion of regional area seals using Drakes Estero declined by -0.07 ± 0.02 for pups (-65 ± 18 total pups), and -0.05 ± 0.02 for total counts (-192 ± 58 total seals) during higher oyster harvest years.
6. The authors suggest how naturally fluctuating seal haul out availability may interact with mariculture activities to affect the proportion of regional Point Reyes area harbor seals (particularly pups) using high quality (isolated) subsites within upper Drakes Estero and Drakes Estero as a whole.

In addition to addressing the NRC's recommendations, this paper incorporates methodological and statistical suggestions from A. Solow (WHOI Statistician who advised the NRC on the analysis of seal-mariculture interactions in Drakes Estero), J. Laake (NOAA-National Marine Mammal Lab), and two anonymous reviewers. The report also benefitted greatly from comments by T. Gerrodette (NOAA) and G. Fellers (USGS), and a comprehensive statistical review by B. Halstead (USGS Statistician/Ecologist). The paper has undergone the draft NPS peer review protocols for scientific products.

We look forward to discussing these results and the underlying methodologies when the panel convenes at Point Reyes. These analyses and conclusions represent the work of the authors and do not represent an official policy or position of the National Park Service.

Sincerely,

David Graber, Ph.D.
Chief Scientist
Pacific West Region
National Park Service

Spatial use of Drakes Estero, California, by harbor seals correlated to anthropogenic disturbance and natural variation during 1982-2009

Benjamin H. Becker[1], David T. Press, and Sarah G. Allen

Point Reyes National Seashore

Point Reyes Station, CA 94956

Abstract

Long-lived, slowly reproducing K-selected species maximize their long-term survival and are predicted to respond to anthropogenic disturbances by moving away or remaining vigilant rather than habituating. Thus, spatial buffers in breeding areas may provide some resilience for populations facing disturbance as well as climate change, urbanization, and other anthropogenic and natural impacts. To better understand pinniped vulnerability to anthropogenic disturbance and displacement effects in a National Park, we used data collected between 1982 – 2009 to explore potential mechanisms which may affect the proportion of Point Reyes (California) harbor seals (*Phoca vitulina*) selecting haul-out sites within a large colony (Drakes Estero), and utilization of that colony in relation to other nearby colonies. Isolated sandbars had higher pup:adult ratios, indicating they are generally more important for pupping. There was no detectable relationship between human-related disturbance rate and the number of seals or pup:adult ratios at specific haul-out sites within Drakes Estero, suggesting that short-term human disturbance did not have a significant effect on spatial use, but rather that spatial use is

[1] ben_becker@nps.gov

determined by general sandbar isolation. However, within Drakes Estero, after removing effects of El Niño, the proportion of seals (total seals and pups only) hauled out near mariculture activities (a longer-term disturbance) was lower during years of higher oyster harvest (-0.08 ± 0.02, ~ 59 seals). Compared to oyster harvest, regional population size did poorly in explaining total seals or pups in the upper estero. Binomial generalized linear models ranked by quasi-AICc indicated that oyster harvest, seal counts at a nearby colony, and loss of a major haul out site within Drakes Estero, best explained pup and total seal use of Drakes Estero. Regional population size, short-term human disturbance rate, and other factors were not important in explaining overall seal use of Drakes Estero. Concurrent with higher oyster harvest and after removing effects of other covariates, the proportion of Point Reyes regional seals using Drakes Estero declined by -0.07 ± 0.02 for seal pups (-65 ± 18 total pups), and -0.05 ± 0.02 for total counts (-192 ± 58 total seals). This study, while correlational, supports the prediction that chronic human disturbance (as measured by mariculture activities) coupled with natural processes, affects seal haul out patterns at both the colony and regional scales.

Key Words

Phoca vitulina, *mariculture, disturbance, harbor seal, resilience, generalized estimating equations.*

Introduction

A variety of factors may influence habitat availability for breeding and molting pinnipeds, including coastal development (Seuront and Prinzivalli 2005), human encroachment and disturbance (Yochem et al. 1987, Gerrodette and Gilmartin 1990, Suryan and Harvey 1999, Thompson et al. 2001), predation (Nordstrom 2002), climate change (Freitasa et al. 2008), and natural variation in habitat suitability. Moreover, since longer lived, slowly reproducing K-selected species maximize their long-term survival, they tend to respond to anthropogenic disturbances by increasing heart rates and energetic costs. Thus, we expect seals to move away from, or remain vigilant to, disturbance sources rather than habituate as some smaller, quickly reproducing species do (Bisson *et al.* 2008). This might be particularly evident for females with pups which should be more risk averse than adult males. Further, Frid and Dill (2002) found that chronic, long-term disturbance stimuli resulted in habitat shifts and subsequently reduced access to resources in all of the fourteen bird and mammal studies they reviewed. In marine mammals, bottlenose dolphin (*Tursiops* sp.) declined in relative abundance due to long-term disturbance, primarily from tour boat vessels (Bejder *et al.* 2006). Similarly, Hawaiian monk seal (*Monachus schauinslandi*) pup survival was lower when seals were displaced to suboptimal habitats (Gerrodette and Gilmartin 1990). In the few disturbance studies where alternative habitat was not available, disturbed animals did not move, but may have sustained higher stress levels and reduced reproductive success (manatees: Buckingham *et al.* 1999, diving ducks: Knapton *et al.* 2000).

Wursig and Gailey (2002) stated that there is a "need to consider potential loss of feeding and breeding habitat from shellfish and finfish farms, particularly given predicted

increases in these facilities in nearshore environments." Negative impacts of aquaculture also have been found in ranging bottlenose dolphins (Watson-Capps and Mann 2005). Similarly, several questions are generated by recent findings that oyster harvest activities may have "potential negative interactions" with harbor seal use (*Phoca vitulina*) at two sites near mariculture operations in Drakes Estero, California (NRC 2009, Becker et al. 2009) and it is "likely that visits to these areas by oyster farm workers (within 500 m of seals) can be expected to lead to short-term disturbance of any seals using these haul-out areas at the time" (NRC, P. 49). First, are these potential negative interactions detected with additional years of monitoring data? Second, are females and pups sensitive to negative interactions? Third, is there a difference in the impact of typically short-term park visitor disturbance versus potentially longer-term activities that place and service mariculture structures on and adjacent to the sandbars where seals haul out? Last, could any spatial effects on seal use cascade up from the subsites near the oyster operations to throughout the entire estuary's breeding and pupping season population and to surrounding areas?

It is likely that proximate impacts of oyster harvest activities (or other disturbances) disturb seals and potentially cause them to move away from the subsites in Drakes Estero and elsewhere (NRC 2009, Becker et al., 2009, Allen and Huber 1984a, Montgomery et al. 2007). This would reduce available habitat for hauled out seals on either short or long time scales, depending on the length and frequency of the disturbance / displacement (Gill 2007). Affected seals might choose to haul out nearby, or leave the Estero for other areas. If the seals simply moved to other areas within the Estero, the proportion of the population using Drakes Estero compared to the rest of Point Reyes

would not change. Conversely, if there were some competition for space or reduced use of other naturally or anthropogenically deteriorated haul-outs by females with pups, it could cause crowding on limited sand bar sites, and lead to a cascading population level effect causing some seals to not use the estuary (Gill 2007).

The National Research Council (NRC) reported that the National Park Service (NPS) pinniped monitoring program provides "as yet untapped potential for assessing trends in the abundance of harbor seals in Drakes Estero in relation to wider regional trends" (NRC 2009, p. 84). Based on the NRC's suggestions, we expanded the Becker et al. (2009) analysis of seal use within Drakes Estero in response to mariculture by 1) adding ten additional years of data for a total of 21 years of survey between 1982 and 2009, 2) improving the statistical methods, and 3) testing multiple factors at three spatial scales that may be related to seal use (for total seals and pups). The scales ranged from a) *subsite* level seal counts and pup:adult ratios (13 years of data: 1997 - 2009), to b) *colony* level for distribution of seals within all of Drakes Estero (21 years of available data during 1982 – 2009), to c) the *regional* level comparing seal counts in Drakes Estero to the other surrounding colonies at the Point Reyes Peninsula (15 years of data during 1982 – 2009) (Fig. 1). This last regional effect would be somewhat surprising, since mariculture chiefly occurs in a limited area in the upper sandbars of Drakes Estero. However, cascading spatial effects in ecology are possible (Elkin and Possingham 2008) and reduced seal use of individual subsites where breeding/pupping occurs could lead to overall reduced use of the estero, and increased migration to other less disturbed colonies if available. Furthermore, the upper intertidal sandbars that are isolated from the mainland (and therefore from park visitors and predators) have historically had more

females and pups than the sandbars attached to the mainland near the mouth of the estero (Allen Miller 1988). We made several predictions that scaled from *subsite* to *intra-colony* to *regional* scales (Fig. 1).

Subsite scale - We predicted that 1) isolated island sandbars in Drakes Estero which are buffered from predators (Nordstrom 2002) and human disturbance should be more important for pupping (as measured by higher pup:adult ratios); 2) disturbance should reduce use of these island sandbars by females with pups (as measured by the pup:adult ratio); and 3) short-term human-induced disturbance would not be related to a reduced number of seals using subsites in Drakes Estero, since more seals could also lead to more opportunity for disturbance.

Intra-colony scale – We predicted that 1) changes in regional population size should be manifested in increased or decreased use of the upper estero due to density-dependence, and 2) increased mariculture activity (as measured by harvest level) would shift seal use away to other haul-outs. The second prediction is based on the assumption that oyster harvest should explain seal distribution better than overall human disturbance since the former is more likely to consist of long-term and persistent events (placement and tending equipment, long-term presence of equipment (NRC 2009, Fig. 1), while the latter is typically of brief duration by hikers and park visitors. We predicted this despite the fact that documented disturbances by visitors are far more common than by those by mariculture activities (Becker et al. 2009, NPS Data).

Regional scale - We predicted that 1) the effects of El Niño - Southern Oscillation (ENSO) on seal use of Drakes Estero as a whole, would be the same as for other colonies in the region; 2) regional population size expansion would only affect the proportion of regional seals using Drakes Estero if the estero had more good habitat than other colonies; 3) overall Drakes Estero human disturbance rates would not be related to overall seal use because disturbance would increase with population size and human disturbances are typically of short duration; and 4) relative use of Drakes Estero compared to other seal colonies would be influenced by (a) within site sandbar dynamics (e.g., natural loss of a major pupping subsite), (b) nearby colony dynamics (disturbance at a nearby colony that could move more seals to Drakes Estero), and (c) mariculture activity that would partially explain overall use of Drakes Estero in relation to other regional colonies. The latter could occur if seals were displaced locally by mariculture activity, but had reduced options for haul out areas due to factors (a) and (b).

Methods

Study Area

The Point Reyes peninsula is along the north-central California Coast (38°30'N to 37°30'N). The peninsula is located within the Point Reyes National Seashore, a unit of the National Park Service (NPS). The topographic diversity of the peninsula provides a broad range of substrates for harbor seals to haul out of the water. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. A "haul-out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of

young (Harvey 1987). A colony may be a collection of haul-out sites within a limited geographic area. Drakes Estero and Estero de Limantour encompass a complex of eight subsites where seals haul out (Fig. 1), which are referred to collectively as the Drakes Estero/Limantour colony. Seals used the subsites at various times of the year depending upon their reproductive status, molting condition, and the level of disturbance encountered (Allen Miller 1988). Within a day, seals shifted to adjacent sandbars when crowding occurred or when the tide rose limiting the amount of haul out space. At rising tides, seals also floated over submerged sandbars until the sand bars reemerged with receding tides.

All subsites were used during the breeding and molt seasons, and some were used regularly year-round. Females with pups disproportionately used the sand bars exposed at low tide in the upper and middle portions of the Estero that are isolated from the mainland, and consequently from humans and predators. Limantour Spit was mostly used by non-breeding seals during the breeding season (Allen Miller 1988). Subsites in the lower estero, which are generally closer or attached to the mainland, have historically suffered higher annual human disturbance rates during the breeding season when compared to the isolated island sandbars of the upper estero (Becker et al. 2009).

Human access to the seal haul-out sites within Drakes Estero was limited because it is part of a national park and a congressionally designated wilderness area. During the breeding season (1 March--1 July), no motorized boats were allowed within the Estero except for those from a commercial mariculture operation. Non-motorized boats, primarily Kayaks, were allowed until 1996, but thereafter were excluded during the breeding season to avoid seal disturbance. Research and rescue boats may enter the estero

in rare instances. Three of the subsites where seals haul out are proximate to the commercial mariculture operation (OB, UEN and UEF). Subsite OB was within the mariculture lease but was not used much for culture in the recent past (~1999-2004), portions of subsite UEN were within or adjacent to the lease, and subsite UEF was in a navigational channel that bisects a gap in the mariculture lease where mariculture boats traversed Drakes Estero (Fig. 1). The mariculture operation raised oysters and the California Department of Fish and Game (CDFG) produced an annual report on oyster harvest production. No annual report or data is available on manila clams produced (Kirsten Ramey, CDFG, E-mail: Jan. 14, 2010).

Datasets

Disturbance data - Survey methods are described in Becker et al. (2009). Disturbance rate was derived from the number of human related disturbances (park visitors, kayaks, airplanes, mariculture activity, etc.) that resulted in a head alert, a flush or a flush of seals into the water during March-May of each year, divided by the number of surveys conducted during that time period. Surveys were typically of similar duration throughout the study period (~2 hr), except for three longer surveys (5-9 hrs) during 1982-83. We also compared (with Spearman tests) daily and hourly disturbance rate between the years 1982 – 2009 (15 years surveyed) to ensure that variation in survey length during 1982-83 did not affect realized disturbance rate.

Intra-colony data - When assessing *intra-colony* variation in use (rather than population size), we used the daily counts (converted to binomial proportions when modeled) at each

subsite for all surveys during the peak breeding season (April 15 – May 15 of each year). For data from 1997 – 2009, QA/QC was identical to that used in Becker et al. (2009). We augmented the NPS seal count database with additional subsite data from 1) the years 1982 - 1983, 1986 – 1987, 1989, and 1991 - 1993 derived from field notes of SGA which were reviewed twice before transcribing the data to spreadsheets for analysis, and 2) annual maximum breeding season pup and adult colony counts derived from tables in Allen and Huber (1984a, 1984b), for a total of 21 years between 1982 and 2009. Oyster harvest data was obtained from the California Department of Fish and Game (1982 – 2006), the National Research Council (2007 – 2008), and was roughly estimated as 204,000 kg (450,000 lbs) for 2009[2], based on recent harvest values for 2007-2008.

Regional data - We used the maximum counts of pups and adults from the maximum total count of the day during the peak breeding season. Values for Drakes Estero were compared (again, in a binomial proportion) with pooled maximum counts (of pups and adults) at the other six colonies in the region (Tomales Bay, Tomales Point, Point Reyes Headlands (only one count per survey day at this site), Double Point, Bolinas Lagoon, and Duxbury Reef) (Fig. 1).

Analyses

Subsite scale: Subsite counts and pup:adult ratios related to disturbance rate - Linear mixed-effect models (the "lmer" function in R) were used with subsite as a random effect to test if spring anthropogenic (March – May) disturbance rate (explanatory variable) was

[2] Actual harvest values are determined from tax records and the 2009 harvest should be available in mid-2010 (Pers. Comm., Tom Moore, Cal. Dept. of Fish & Game).

related to annual maximum seal counts, maximum pup counts, and pup:adult ratios (response variables) within subsites and across all subsites between 1997 - 2009. Some upper estero subsites (OB, UEN, UEF) were occasionally pooled in the 1982-1993 field note data, so we therefore did not use those years for this within subsite analysis. However, this pooling did not affect data when pooling the total upper estero versus lower estero seals when analyzed at the colony scale (next section). The counts were modeled as quasi-Poisson, and the ratio model as binomial. Random intercept, random intercept and slope, and null models were compared with AIC and likelihood ratio tests, and were checked to ensure randomly distributed residuals.

Colony scale: shifts in haul-out (subsite) use in Drakes Estero related to mariculture, ENSO, disturbance rate, and regional population size - These models were designed to test if variation in the proportion of seals using the upper (near mariculture) versus lower (away from mariculture) estero were related to ENSO events, oyster harvest level, the spring (March – May) pooled disturbance rate (disturbances / # surveys) in either the upper or lower estero (Fig. 1), or the pooled maximum annual seal counts of all other Point Reyes area colonies (regional population size). We used a two-step process for modeling. Using the 15 year dataset, we used generalized linear mixed models (GLMMs) to asses for effects on seal distribution between the near (upper) and far (lower) mariculture areas of the estero due to *a priori* combinations of ENSO, binary high/low oyster harvest, anthropogenic disturbance rates, and regional counts (pup and total counts). We then tested models for the full time series (all 21 years) without regional

counts and disturbance covariates using generalized estimating equations (GEEs) (Venables and Ripley 2002, Faraway 2006, Zuur et al. 2009).

Binomial and quasibinomial GLMMs were ranked using AIC with the "lmer" and "glmmML" packages in R. Both of these packages report rounded AIC values. GLMMs were used rather than GEEs for this step because GLMMs allow calculation of AIC to compare non-nested models. Since regional population size and oyster harvest were correlated, they could neither be modeled together nor compared via likelihood ratio tests in nested models. Similarly, regional population size was tested *a priori* with disturbance measures, but not with ENSO since there is no reason to believe that ENSO should interact with regional population or size differently at different colonies. Year was considered a random effect.

We expanded and improved the analysis in Becker et al. (2009) in three significant ways. First, the GEEs explicitly model the temporal autocorrelation of multiple harbor seal counts taken during the breeding season within each year. GEEs are therefore a form of mixed-effects (or hierarchical) modeling (Gelman and Hill 2009). The GEEs also allow flexible distributions for the entire dataset and for the within year counts, neither of which were normally distributed. Second, the GEEs and GLMMs were run as binomial models comparing the three subsites near mariculture (OB, UEN, UEF) against the five subsites farther away from mariculture (A, A1, L, DEM, DBS). Third, the aforementioned inclusion of spring (March – May) anthropogenic disturbance rates for the upper and lower estero and regional population size (pups or total seals) were included as covariates for step one of the analysis for 1982 - 1983 and 1997 - 2009.

We modeled "years since ENSO" as *log(years since ENSO+1)* because both observational and theoretical evidence suggest that any ENSO effects should taper off and not be linear. Annual changes in the areal extent of sandbars in Drakes Estero and other regional colonies are not available and were therefore not modeled. However, dramatic changes in the size and access of subsite A were documented and we explicitly modeled that process in the following "*regional scale*" section.

GEEs were run in the software R 2.9.2 using the "geeglm" function in the "geepack" library with year as the grouping variable to account for within year autocorrelation of counts at the same subsite. The correlation structure was set as autoregressive since the counts were during the one month peak pupping period (April 15 – May 15) in each year and counts closer together should have higher correlation since seal counts generally rise, peak, and decline during this time.

Nested models (e.g., ENSO + oyster vs. ENSO only) were tested for differences with likelihood ratio tests with the simplest adequate (difference not less than $P < 0.05$) model retained. We then transformed the final model logit coefficients (Crawley 2007) to calculate the proportional change in seals using the three subsites near mariculture model, and multiplied the proportion by the mean seal count (pups and total) in the estuary during the time series to estimate a change in the number of seals using those subsites due to any significant factors.

Regional Scale: Drakes Estero compared to surrounding colonies - We examined regional anthropogenic effects during the breeding season by comparing maximum seal counts (pups and total) in Drakes Estero, and all other Point Reyes colonies combined

(Tomales Bay, Tomales Point, Point Reyes Headlands, Double Point, Bolinas Lagoon, and Duxbury Reef) (Fig. 1). We examined several variables, as well as a null model, in relation to the annual maximum proportion of seals (total seals and pups only) using Drakes Estero compared to the proportion using the other six Point Reyes area colonies (Fig. 4A). These included:

- *Year*, to account for any linear time trends.
- *Proportion of Drakes Estero seals using haul out subsite A*, a major pupping subsite in Drakes Estero that attached to the mainland and exposed to predators around 2004. This should account for variation in the importance of this site through time.
- *Maximum annual count of seals at nearest colony (Double Point)*. Seals are thought to transit easily between Double Point and Drakes Estero, and in 2003 an elephant seal likely displaced numerous harbor seals from Double Point to Drakes Estero.
- *Annual spring (March-May) human related disturbance rate (disturbances/survey) in Drakes Estero*. This includes disturbances by hikers, kayakers, dogs, airplanes, and mariculture. Kayaks have been prohibited from the estero during the breeding season since 1996.
- *Years since the last major ENSO* (1982-83 and 1997-98). Strong ENSO events appear to depress reproductive success and thus may influence habitat choice.

- *Regional annual maximum count (less Drakes Estero).* Density-dependent effects could alter spatial use of Drakes Estero, especially if all haul-out sites are not equally desirable.
- *Annual oyster harvest* (Table 1) as a measure of mariculture activity and equipment placement in the estero.
- *Five-year and six-year periods of lowest oyster harvest* (2000-2004 and 1999-2004) (Table 1). This binary value may be useful for analyses for two reasons. First, the oyster harvest metric might not be linearly related to actual harvest activity near the seal haul-outs, and using a binary measure eliminates assumptions of such a relationship. Second, we do not have an official estimate for 2009 yet; the 2008 estimate departed from the actual harvest by 12%, indicating that some caution is needed when using estimates. While the use of total annual oyster harvest in the estuary was negatively correlated (when modeled with ENSO) with nearby seal haul out use (Becker et al. 2009, NRC 2009), total oyster harvest is surely not a perfect measure of activity near the seals (NRC 2009). The number and distribution of mariculture equipment (bags) on sandbars near seals for extended time periods is another potential measure. Bags need to be tended, potentially causing disturbance, and the simple presence of the bags themselves may cause seal displacement. We did have to make a decision as to where the cut point was for high/low and we did this based on the inferences in Table 1 regarding increased presence of oyster

equipment at sites near seal haul out sites and an apparent break point of around 138,000 lbs of oysters.

Aerial images confirm that oyster bags were present on top of and adjacent to seal haul out sites in 2005 – 2009. Personal observations (DTP) during regular fieldwork indicate that there were few or no bags on the upper seal islands from 2002-2004. We infer from the oyster harvest records that there were few or no bags in 2000-2001 since the harvest was lower than 2002-2004, and conversely that there likely was infrastructure from 1997-1998 when harvest was higher. The year 1999 is difficult to categorize based on the available data. Thus, we modeled the oyster harvest covariate for 1999 as both a high and low oyster harvest year (Table 1).

Modeling the pups and the total population was done separately because there is potential to have a greater disturbance/displacement effect on females with pups that 1) may be more sensitive to disturbance, or 2) seek out more isolated haul out sites (Allen Miller 1988, Allen and Huber 1984a Nordstrom 2002). We did not combine any covariates in a single model if the variance inflation factors (VIFs) were above 3 (Zuur et al. 2009). VIFs were calculated from models without the complementary covariate. For example, the VIF for low/high oyster was calculated without "oyster", since these would never be used in the same model. We also tested for interannual autocorrelation in the proportion of pups and total seals in Drakes Estero using detrended time series and the autocorrelation and partial autocorrelation functions in R.

We used binomial generalized linear models (GLM) which modeled the probability that any random seal is found in Drakes Estero (success) versus somewhere else in Point Reyes (failure). We bound "Drakes Estero" and "non-Drakes Estero" seal

maximum counts for each breeding season into a single matrix (pups or total) for use as the dependent variable in this model. Because of over-dispersion (variance larger than expected for binomially distributed data), we used a quasi-binomial family to assess *P* values and over-dispersion, and the binomial distribution to derive log-likelihoods to rank models using an over-dispersion adjusted Akaike's Information Criteria for small sample sizes (QAICc; Burnham and Anderson 2002). We also bootstrapped (refit the model with data from each year sampled at random with replacement) the best ranking models 2000 times to gain unbiased standard errors for the oyster harvest variable (Crawley 2007). Bootstrapping should also uncover any highly leveraged effects from one or two years of data. We report models and QAICc values for both the oyster harvest and the low/high oyster models, but only consider the 2000-2004 low/high variable when reporting Akaike weights and model averaging. Final model coefficients were calculated from the weighted (by Akaike weights) model coefficients of the best performing models (i.e., lowest 4 QAICc units). These weighted coefficients were then back transformed from binomial logits to proportions and multiplied by the mean number of pups or total seals in the Point Reyes area seal population during the study period. All analyses were done in R 2.9.2 (R Development Core Team 2009).

Results

During 1982 – 2009, the mean number of breeding season harbor seals hauled out in Drakes Estero was 775 ± 269 total seals and 180 ± 94 pups. The mean of the maximum annual breeding season counts in Drakes Estero were 1052 ± 279 total seals (range: 656-1644) and 302 ± 102 pups (range: 122-486). The other regional colonies had a combined

mean maximum breeding season count of 2499 ± 369 total seals (range: 1728-3125) and 710 ± 167 pups (range: 366-962). Oyster harvest experienced a low period from ~2000-2004 (Table 1, Fig 6B) and manila clam harvest levels are unknown. Daily maximum Drakes Estero seal breeding season counts varied throughout the study period, with upper estero seals showing a peak during 2002 – 2004 (Fig. 4). Annual maximum counts of harbor seals in Drakes Estero also peaked around 2002 – 2004, while the regional population size (less Drakes Estero) peaked from about 2000 – 2005 with two very high years in 2002 and 2004 (Fig. 5). Pup counts in Drakes Estero climbed from 2000-2004, while those in the rest of the region slowly declined (Fig. 5). Excluding the period from 2000 – 2004, the pup counts between Drakes Estero and the region appeared to have similar trends.

Subsite Scale: Seal counts, pup:adult ratios and disturbance rate – During 1997 – 2009, the upper intertidal sandbars (OB, UEN, UEF) generally had higher pup:adult ratios than the sandbars attached to the mainland or near the mouth of the estero (L, DEM, DBS: Fig. 2). Subsite A, while showing a high pup:adult ratio, lost nearly all of its productivity since attaching to the mainland in 2004, but subsite A1 was still the one major subsite away from mariculture that maintained a high pup ratio and high overall pup production each year. Lower estero subsites DBS and L (attached to the mainland), and DEM (at the mouth of the estero in high current), tended to have either low pup:adult ratios *or* relatively low absolute numbers of pups produced each year.

Annual human disturbance rate during spring (March-May) of each year (1982-83 and 1997-2009) had a similar pattern whether using daily or hourly rate (r_s = 0.99, n =

15) and so we used daily rate in all subsequent models and calculations. There were 153 spring anthropogenic disturbance events during this time. The daily disturbance rate averaged about 0.71 ± 0.41 for each year, with about 23% of disturbances being seal head alerts, 10% flushes without entry into the water, and 67% flushes into water. Neither subsite pup counts ($P > 0.38$) nor total seal subsite counts ($P > 0.28$) were related to spring anthropogenic disturbance rates in Drakes Estero (Figs 3A & B). When using a random intercepts (fixed slopes) model, spring disturbance rate appeared to be negatively related to reduced pup:adult ratios at seal haul outs within Drakes Estero ($n = 104$, groups = 8, $P < 0.001$, AIC = 889.3) (Fig. 3C). However, the random intercepts and random slopes model had a lower AIC (882.0), was a better fit in a likelihood ratio test ($X^2 = 9.2$, $P < 0.001$), and indicated no effect ($P > 0.32$) of spring disturbance rate on pup:adult ratios. The null model was a much poorer fit than either of the disturbance models (AIC = 910.5). Since "flushes" and "flushes into water" represented the majority of disturbances (~77%), removing the "head alerts" from the analysis should not alter the results. Based on this, we conclude that there is not a robust, detectable relationship between spring anthropogenic disturbance rate and pup:adult ratios. Further, individual subsite based binomial GLMs for the years 1997 – 2009 indicated that subsite pup:adult ratio trends with disturbance rate were not significant (Fig. 3C).

Colony Scale: Drakes Estero subsite models – Binomial GLMMs found that high-low oyster harvest and ENSO best explained the proportion of seals (pups and total) using the upper estero (Table 2a). Both the "lmer" and "glmmML" functions in R reported similar AIC rankings, as did quasibinomial and binomial distributions (for "lmer" only). Upper

estero disturbance rate was somewhat important in explaining pup presence in the upper estero, but this model was not a significantly better fit than the oyster + ENSO model alone (likelihood ratio test: $X^2 = 2.97$, $P < 0.08$). Regional population size was not important in explaining the proportion of seals using upper Drakes Estero with ΔAIC values of 9 (total seals) and 17 (pups) from the top ENSO + Oyster models.

Since disturbance rate and regional population size were not important in these 1982-83 and 1997 – 2009 models. We used GEEs to analyze the full time series including 1986-1987, 1989, and 1991-1993 for the relationship between the proportion of seals using the upper estero and just oyster harvest and ENSO as covariates. ENSO and oyster harvest (high/low) were not collinear ($P > 0.89$). The GEE showed that both ENSO and oyster harvest continue to explain seal use at sites closest to mariculture activity (Table 2b). Residual plots versus model predictions showed no model fitting issues with the GEE model. Within year autocorrelation was moderate (0.45 - 0.60), indicating that GEEs are an appropriate tool for this dataset. A nested likelihood ratio test indicated the Oyster + ENSO binomial model was a better fit over the ENSO only binomial model for both pups ($X^2 = 4.6$, $p < 0.03$) and total seals ($X^2 = 9.5$, $P < 0.002$). After accounting for the ENSO effect and not including the non-significant anthropogenic disturbance terms, the best GEE models estimated 14 ± 4 fewer pups and 59 ± 15 fewer total seals in the three "near mariculture" subsites during the higher oyster harvest years (Table 2b).

Regional Scale: Drakes Estero compared to surrounding colonies - The proportion of pups and adult seals using Drakes Estero versus the other Point Reyes colonies varied throughout the study period, with a peak from 2003-2004. The pup and adult time series

were generally similar, with the exception of 1997, when relative pup presence in Drakes Estero was low, but adult use was high (Fig. 6A). Because 1997 was an outlier for the adult and/or pup proportion of seals in Drakes Estero, we weighted the total seal count data for 1997 by the ratio of the proportion of pups to adults in that year (~0.3) (Venables and Ripley 2002). We felt this was reasonable (and preferable to omitting the data) since there was an anomalous harbor seal die-off of mostly adult females which began during the breeding season in 1997 that did not appear to affect pups, and appears to have affected other colonies (specifically Double Point) more than Drakes Estero (D. Grieg and F. Gulland, The Marine Mammal Center, pers. comm. & NPS unpubl. data), although the sampling from that study was not random.

Oyster harvest was alternately classified as low for both the 2000 – 2004 and 1999 – 2004 periods (Fig. 6B). Seal use of subsite A in Drakes Estero was high from 1982 – 2004, and dropped rapidly thereafter when the sandbar connected to the mainland. Seal use of Double Point increased from 1997 – 2002, dropped rapidly in 2003 due to an aggressive elephant seal (see Hayward 2003), and then rebounded in 2004 – 2005, followed by another smaller decline after 2005.

Spearman rank correlations indicated no issues with collinearity among the variables in the models tested (Table 3a). Variance inflation factors (VIF) also found no evidence of collinearity as long as year or ENSO were not modeled with subsite A (Table 3b). The detrended proportion of pups and total seals using Drakes Estero did not exhibit interannual autocorrelation or partial autocorrelation at any lag distance. Quasi-binomial GLMs showed that models of the proportion of seals in Drakes Estero were moderately over-dispersed for the seal pup global model (4.5) and somewhat more over-dispersed for

the total seal count global model (8.6). We used these values to calculate the QAICc for all the competing models. Binomial models almost always have some degree of over-dispersion with count data because there is no variance parameter in the model (Gelman and Hill 2009).

Among the models tested for pups, the two and three-way combinations of *low oyster + Double Point + subsite A* (always containing low oyster) models had an Akaike weight of 0.77), and the r^2 for the top model had a good fit (r^2 = 0.46 - 0.63) (Table 4). Annual change at Double Point, disturbance rate, ENSO, and year were poor predictors of seal use of Drakes Estero. ENSO appeared once in model 6, but we did not include it in the multimodel averages since the Akaike weight was only 0.09 and the weighted coefficient would have overlapped with a slope of zero. Similar patterns occurred for the total seal count models, with the exception of ENSO which did not appear at all in the top models (Table 4). Low/high oyster harvest alone had an r^2 of 0.26 and 0.29 for pups and total counts, respectively and a significant ($P < 0.05$) over-dispersion corrected P-value. Bootstrapped estimates of model coefficients were similar to those in Table 4 and the oyster harvest standard errors were smaller than those reported by model fitting alone, indicating robust and conservative estimates from the GLM (Table 5). After removing the effects of Double Point and subsite A, the best fit weighted coefficients suggest that there were about 65 ± 18 fewer seal pups and 192 ± 58 fewer seals overall using Drakes Estero (Table 5, Figs. 7 & 8) during high oyster harvest years.

Discussion

Long-lived, slow reproducing species that invest their energetic resources in long-term survival rather than rapid reproduction tend to have pronounced physiological costs

(increased heart rates and overall energetic costs) associated with human induced disturbance (Bisson *et al.* 2008, Ellenberg *et al.* 2006). Harbor seals have both a long lifespan (~20-25 years), and a single pup per year, suggesting that they are a candidate for realizing significant stress due to disturbance and might respond defensively (by moving) rather than quickly assimilating and continuing reproduction as is the case with short-lived, rapidly reproducing songbirds (Bisson *et al.* 2008). Our findings support those of Frid and Dill (2002) whereby long-term, chronic disturbance or displacement stimuli (in this case mariculture activity including equipment on haul out sites) is related to a habitat shift and subsequent reduced access to subsites in the estero. Conversely, shorter term disturbance stimuli (primarily park visitors) were not related to reduced pup:adult ratios at subsites in the estero, or strongly to detectable patterns in intra-estero (upper versus lower) or inter-colony proportional use by seals. Rather, pup:adult ratios at subsites appear to be strongly driven by their physical isolation from the mainland (Nordstrom 2002). Oyster harvest and ENSO were the primary variables associated with temporal variation in spatial use by seals in Drakes Estero. Our prediction that regional population size would be an important factor in partially explaining the proportion of Drakes Estero seals using the upper estero was not supported. Regional population size and human disturbance rate were also unimportant in explaining seal use of Drakes Estero in relation to the rest of the colonies. Instead, oyster harvest, internal subsite, and nearby colony dynamics were consistently important.

These analyses address suggestions of the NRC (2009) for research into factors driving seal spatial patterns in Drakes Estero. Although the results are correlational, we propose that the variation in oyster harvest paired with *a priori* multiple competing

mechanistic hypotheses represents a robust "natural" experiment which can be used to draw reasonable inferences. Oyster harvest was a human induced rather than a natural covariate, and so there is no reason to believe that oyster harvest is mechanistically correlated with some other unmeasured, non-anthropogenic parameter that also influences seal distribution. The apparently random correlation between oyster harvest and regional population size warrants some caution when interpreting the *colony scale* results. The fit of the oyster harvest models, though, were so much more parsimonious than those of regional population size (lower by 9-16 AIC units), that the pattern appears quite robust to both statistical methodology and length of the time series. Similarly, in our analysis of the 1997 – 2007 Drakes Estero data (Becker *et al.* 2009), we reported that the 2008 seal counts at one subsite appeared to deviate from the inverse relationship with oyster harvest found for the 1997 – 2007 models. This was based on preliminary information that oyster harvest increased in 2008 along with actual seal counts at one subsite (OB). The 2008 actual oyster production estimate, however, actually *declined* by 12% from 2007 to 2008), and is thus still consistent with the reported model for 1997 - 2007. Further, Becker *et al.* (2009) modeled counts in the estero rather than proportional shifts, so further comparisons are not informative here.

Our results do not indicate that the seals are lost from the overall Point Reyes area population (although that is possible), but rather assume a closed population within each year both within the estero (for the colony scale analysis) and between the estero and other Point Reyes area colonies (for the regional analysis). The use of regional population size as a covariate should account for any density-dependent effects and seals typically do not move between colonies during the breeding season (Lowry et al. 2005).

We focused on low versus high oyster production, but also report nearly identical results when using the continuous linear covariate of oyster harvest. While the binary oyster harvest variable required some inferences (Table 1), it is also somewhat more conservative than the continuous covariate because it does not assume a linear relationship between oyster harvest and seal response. This binary model is more appropriate if the simple presence of oyster equipment caused seal displacement, rather than the frequency of visits. Additionally, the oyster harvest value does not represent activities that may be due to cultivation of manila clams versus oysters in the estero. Any relationships between clam and oyster harvest are currently unknown to us, so a low/high metric may again avoid over-interpreting the impacts of the specific annual oyster harvest. A final benefit of using the high / low oyster metric is that it virtually eliminates the possibility of model errors if the actual 2009 oyster harvest is dramatically higher or lower than our estimate.

There are some inherent difficulties in the use of disturbance rates to infer effects on seals (Frid and Lawrence 2002, Hayward *et al.* 2005, NRC 2009). Johnson and Acevedo-Gutiérrez (2007) reported that disturbance rates of seals in Canada were related to frequency of powerboats nearby, but not the number of seals present. The NRC (2009) also noted that many disturbances related to mariculture in Drakes Estero likely go undetected, especially since about 50% of harbor seal surveys are on weekends and more visitors are out on weekends, while the oyster harvest work occurs primarily daily, but less frequently on Sundays (NRC 2009). Further, surveys may miss any disturbances on the ebb tide that might prevent seals from hauling out (NRC 2009). Nonetheless, we believe that because the survey methodology is standardized, it should represent an index

of annual changes. Similarly, the NRC suggested that additional disturbances by oyster boats during high tide might deter seals from using the upper sandbars when tides receded. However, since we did not partition mariculture and non-mariculture related human disturbance in this paper, these unrecorded and undetected disturbances (of all anthropogenic kinds) would be unlikely to alter our results.

The proportional reduction in seal use was generally larger for the upper estero (-0.08 pups and -0.08 total) versus the estero as a whole (-0.07 pups and -0.05 total counts). However, these proportional values, when scaled up from the Drakes Estero population to the entire Point Reyes regional population, suggests more individual seals were displaced from the overall estero than those simply displaced from the upper estero alone. It is possible that the combined effects of the loss of subsite A, impacts at Double Point, increased oyster activity in the upper estero and other unknown factors, led to the pronounced reduction in counts for the entire estero. Specifically, our findings are consistent with a scenario where subsite A lost habitat in 2003-4, which could have *increased* the proportion of seals using the upper estero. Increasing mariculture activity during 2005 – 2009, though, may have displaced seals away from the upper estero, and without access to subsite A, the overall proportion of seals using Drakes Estero therefore declined. Similarly, prior to 2000 when oyster harvest was generally high and subsite A was an isolated sandbar, the proportion of seals using the upper estero was also low. The additive processes among subsite A, Double Point, and oyster harvest fits a model where seal resilience in the ecosystem is a function of both natural and anthropogenic influences. In a similar scenario, Kent and Crabtree (2008) found that an Australian sea lion (*Neophoca cinerea*) reserve was ineffective because it did not provide suitable

habitat. They concluded that "because environmental conditions are variable over time, a fixed sanctuary zone will only aid in reducing impacts when conditions are suitable in that zone." Similarly, Stevens and Boness (2003) reported an ENSO related decline and recovery pattern in southern fur seals (*Arctocephalus australis*) in Peru. After the 1997-98 ENSO induced a decline in fur seals, the seals returning in 1999 avoided haul-out sites with higher human disturbance. In Drakes Estero, suitable conditions for females with pups may now be more limiting due to variable environmental conditions such as the loss of subsite A, mariculture equipment on the upper estero subsites, and the generally poor suitability of lower estero sites. The estero contains a dynamic system of sandbars and there will surely be additional changes in the future that both create and remove desirable seal habitat.

Subsite (or colony) recolonization may take years, while abandonment due to chronic displacement / disturbance may be rapid (Gerrodette and Gilmartin 1990). Such a decline was noted with abandonment of harbor seal colonies in San Francisco Bay (Allen 1991, Bartholomew 1949). Similarly, Hog Island in Tomales Bay (Fig. 1) was mostly abandoned by harbor seals in the early-1990s coincident with increasing numbers of boaters landing on the east side of the island (Allen and King 1993). Prohibition of boat landings coincided with a gradual resumption of use by seals (NPS Compendium; Unpubl. NPS data). The decline at subsites OB, UEF and UEN in the upper Drakes Estero follows this pattern, whereby after oyster harvest declined around 1999-2000, it took a few years (until 2002) for the proportion of Drakes Estero seals using the area to greatly increase, and then the counts (and proportion of seals using the subsites) rapidly declined again with increased mariculture in 2005. The *a priori* modeling suggested that

an ENSO effect may have explained some of the delayed recolonization in the upper estero, but perhaps simple time delayed movement into the area is also partially responsible (and also density dependence from the concurrent regional population increase). Such a model would then have a lag effect for recolonization as oyster harvest declined, but no lag as it increased, similar to seal response to subsite A attachment to the mainland and exposure to predators.

Additional processes occurring at other colonies in the San Francisco Bay Area could also affect the patterns we observed. This might include excessive disturbance, as well as immigration to or emigration from the entire study area. However, the fact that our modeled covariates (oyster harvest, double point, and subsite A) explain much of the intra- and inter-colony patterns observed, suggests that these are not likely to be spurious correlations.

Conclusion - Our results highlight the importance of building and preserving resilience in natural systems and the sensitivity of K-selected species to chronic disturbance or displacement. Gill (2007) concluded that (in birds), "declines in survival or fecundity will result from density-dependence and not directly through disturbance. Efforts to manage disturbance in order to maintain populations must therefore be based on an understanding of the density-dependent consequences of avoidance of disturbed areas." Our data and analyses are consistent with natural and anthropogenically (mariculture) driven seal colony dynamics both within Drakes Estero and between Drakes Estero and other colonies in the Point Reyes region. Encroachment of mariculture or other persistent activities on preferred pupping sandbars may displace seals but not

have a detectable effect on the colony or the region until natural fluctuations occur which further limit habitat, and cause additional competition for limited space resources.

While density dependence (in the form of regional population size) is likely an important component, it did not fully explain the spatial patterns observed at the colony and subsite scales. Although pup:adult ratios were higher at isolated sandbars presumably because of lower exposure to short-term disturbances, the apparent lack of spatial redistribution at the subsite, colony and regional scales due to short-term anthropogenic disturbance warrants further study since pinniped disturbances are a common concern. At a scale even larger than the Point Reyes region, seals transit between San Francisco Bay and the Point Reyes region (Kopec and Harvey 1995, Grigg et al. 2009), thus anthropogenic impacts on the Marin Coast may indirectly affect the mobility of seals displaced at other colonies in San Francisco Bay or elsewhere. While such a signal would be extremely difficult to detect, this concern may be particularly true for Drakes Estero which supports one of the largest breeding colonies in the state and the largest in the San Francisco Bay region (Lowry et al. 2005).

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Monitoring Program at Point Reyes National Seashore. This paper has gone through the NPS peer-review process; however, the analyses and conclusions presented here are the work of the authors and do not represent a policy of National Park Service.

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Table 1. Sources and inferences for level of oyster harvest activity on or near subsites OB, UEF, and/or UEN. Data from. CDFG and NRC. "Analysis scale" summarizes the years where complete seal count or disturbance data available and subsequently modeled in each of the three scales of analysis presented. Data sources: A&H: Allen and Huber 1984a, 1984b; SGA: Sarah G. Allen field notes; NPS: NPS pinniped database.

				Analysis scale			
Year	Oyster harvest (lbs)	Inferred level of mariculture use of sandbars near seals	Source(s) of inference	Haul-out site	Intra-colony	Regional	Seal data source
1982	360,004	high	harvest data		x	x	SGA / A&H
1983	440,139	high	harvest data		x	x	SGA / A&H
1986	437,043	high	harvest data		x		SGA
1987	634,869	high	harvest data, aerial image of bags		x		SGA
1989	549,953	high	harvest data		x		SGA
1991	442,745	high	harvest data		x		SGA
1992	606,484	high	harvest data		x		SGA
1993	662,388	high	harvest data		x		SGA
1997	476,791	high	harvest data	x	x	x	NPS
1998	292,188	high	harvest data, higher than 2005	x	x	x	NPS
1999	125,749	modeled high & low	slightly higher than 2000-2004, declining	x	x	x	NPS
2000	34,094	low	lower than 2002-2004	x	x	x	NPS
2001	65,676	low	lower than 2002-2004	x	x	x	NPS
2002	78,064	low	DTP, pers. obs, harvest data	x	x	x	NPS
2003	118,643	low	DTP, pers. obs, harvest data	x	x	x	NPS
2004	96,754	low	DTP, pers. obs, harvest data	x	x	x	NPS
2005	138,958	high	aerial image of bags, increasing activity	x	x	x	NPS
2006	291,538	high	increasing harvest, bags in '05	x	x	x	NPS
2007	468,000	high	aerial image of bags	x	x	x	NPS
2008	438,000	high	aerial image of bags	x	x	x	NPS
2009	450,000*	high	aerial image of bags	x	x	x	NPS

*Harvest estimate based on 2007-2008. Official data likely available in mid-2010. Only affects inferred mariculture level if harvest was less than ~138,000 lbs.

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Table 2a. Direct comparison of rounded delta AIC values from binomial GLMMs explaining the proportion of pups or total seals using the upper estero for the years 1982-83 and 1997-2009. "Oyst": high/low oyster value; "Oyster": continuous oyster value; "ENSO": El Nino; "up dist": spring upper estero disturbance rate; "lo dist": spring lower estero disturbance rate; "Regional pop": annual maximum regional population size (total or pups respectively, less Drakes Estero). Models less than 4 AIC units from the best model are shaded grey.

	ΔAIC	
Model	**Pups**	**Total**
Oyst+ENSO	1	0
Oyster+ENSO	3	2
Oyst+ENSO+up dist	0*†	4
Oyst+ENSO+up dist+lo dist	1	6
ENSO+up dist	4	6
ENSO+up dist+lo dist	4	6
Regional pop	17	9
Regional pop+up dist	18	11
Regional pop+lo dist	17	11
Regional pop+up dist+lo dist	16	13
Oyst	20	18
Null	14	19
up dist+lo dist	17	19

*Pup model upper estero disturbance coefficient = -0.62 ± 0.35.
†Likelihood ratio test indicates that *Oyst+ENSO+up dist* is not a better fit than *Oyst+ENSO* alone (X^2 = 2.97, P < 0.08).

Table 2b. Coefficients, proportional change, and effect size from binomial generalized estimating equation (GEE) for proportion of Drakes Estero Seals using the upper (OB, EUF + EUN) versus lower estero based on the 21 year time series. Effect size is proportion * mean Drakes Estero population size for time series and can be interpreted as the change from the long-term average number of seals. The mean of the maximum seal counts for 1982 - 2009 was 775 total and 180 for pups.

	Pups				Total seals			
Model	**Coefficient**	**Proportion**	**Effect size**	**P**	**Coefficient**	**Proportion**	**Effect size**	**P**
Intercept	-1.39 ± 0.34			< 0.001	-1.50 ± 0.25			< 0.001
log(ENSO + 1)	0.65 ± 0.20			< 0.001	0.52 ± 0.14			< 0.001
Oyster high/low	-0.41 ± 0.19	-0.08 ± 0.03	-14 ± 4	< 0.03	-0.44 ± 0.14	-0.08 ± 0.02	-59 ± 15	< 0.003

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Table 3a. Spearman rank correlations between independent variables. Significant ($P < 0.05$) correlations have an asterisk. N = 15. If adjusted for multiple comparisons using Holm's method, only the three oyster values are correlated. Oyster harvest (categorical or continuous) and annual regional population size had an r_s of ~0.78 ($P < 0.001$), and were also not used in the same model.

	Low oyster harvest 2000-2004	Low oyster harvest 1999-2004	Spring Disturbance rate	Proportion of seals at subsite A	Maximum counts at Double Point
Low oyster 1999-2004	0.87*				
disturbance rate	0.23	0.13			
Prop. seals at subsite A	-0.11	-0.17	-0.10		
Counts at Double Point	0.46*	0.50*	-0.21	0.29	
Year	0.00	0.09	-0.02	-0.92*	-0.24

Table 3b. Variance inflation factors from full models. VIFs of less than 3 represent no functional collinearity within the models (Zuur et al. 2009).

	Variance inflation factor	
Covariate	**Pups**	**Total**
Oyster harvest	1.39	1.27
Low oyster 2000-2004	1.17	1.12
Prop. seals at subsite A	1.23	1.05
Counts at Double Point	1.21	1.21
ENSO	1.09	1.06
Disturbance rate	1.13	1.14

Table 4. *A priori* models ranked by delta QAICc for the proportion of Point Reyes seal pups and total seals using Drakes Estero. Δi indicates QAICc distance from the best model and wi indicates model weight. Modeling oyster harvest as a continuous variable or low oyster during 1999-2004 gives similar results (see appendix). Models ranking within the lowest 4 QAICc units (in grey) were used for multimodel inference in table 5. Oyst: low oyster harvest from 2000-2004; DP: Double Point Counts; A: proportion of Drakes Estero seals using subsite A; Dist: anthropogenic disturbance rate.

Age class	Model	Δi	wi	r^2
Pup	Oyst + Double Point (DP)	0.0	0.35	0.51
	Oyst + DP + A	1.3	0.18	0.63
	Oyst + A	1.4	0.18	0.46
	Oyst + ENSO	2.6	0.09	0.42
	Oyst	3.3	0.06	0.26
	Year	5.0	0.03	0.20
	Oyst + Dist	5.6	0.02	0.32
	Oyst + DP + Dist + A	6.3	0.01	0.66
	DP + Year	6.4	0.01	0.29
	DP	7.3	0.01	0.12
	Null	7.7	0.01	0.00
	Regional pup count	10.3	0.00	0.02
Pup + Adult	Oyst + Double Point (DP)	0.0	0.55	0.54
	Oyst + DP + A	2.4	0.16	0.61
	Oyst + A	3.9	0.08	0.42
	Oyst	4.3	0.06	0.29
	Oyst + Dist	4.5	0.05	0.41
	Oyst + DP + Dist + A	6.1	0.02	0.67
	Oyst + ENSO	6.3	0.02	0.35
	Regional total count	7.9	0.01	0.19
	Year	8.5	0.01	0.17
	DP + Year	9.6	0.00	0.25
	DP	10.4	0.00	0.11

Table 5. Multimodel weighted coefficients of all models within 4 QAICc of the best model for pups and total seals in Drakes Estero (see table 4). Models represent an Akaike weight (wi) of 0.87 for both pups and total. Number in parentheses after the "low oyster" coefficients represent the bootstrapped standard error estimate of 2000 replicates. Proportional change represents change in use of Drakes Estero. Effect size is based on mean seal counts of all Point Reyes area colonies during the study period.

	Logit Coefficients		Proportional change		Effect Size	
Variable	**Pups**	**Total**	**Pups**	**Total**	**Pups**	**Total**
Intercept	-0.26 ± 0.19	-0.37 ± 0.16				
Low oyster (low/high)	-0.27 ± 0.08 (0.05)	-0.23 ± 0.07 (0.03)	-0.07 ± 0.02	-0.05 ± 0.02	-65 ± 18	-192 ± 58
Double Point (per 100 seals)	-0.04 ± 0.02	-0.04 ± 0.02	-0.010 ± 0.005	-0.010 ± 0.005	-10 ± 5	-36 ± 18
Subsite A (low to high)	-0.43 ± 0.22	-0.11 ± 0.07	-0.09 ± 0.05	-0.03 ± 0.02	-91 ± 51	-106 ± 71
Oyster (per 100,000 lbs)*	-0.06 ± 0.02	-0.08 ± 0.03	-0.019 ± 0.006	-0.020 ± 0.007	-19 ± 6	-71 ± 25

*not multimodel: from Oyster + Double Point count model.

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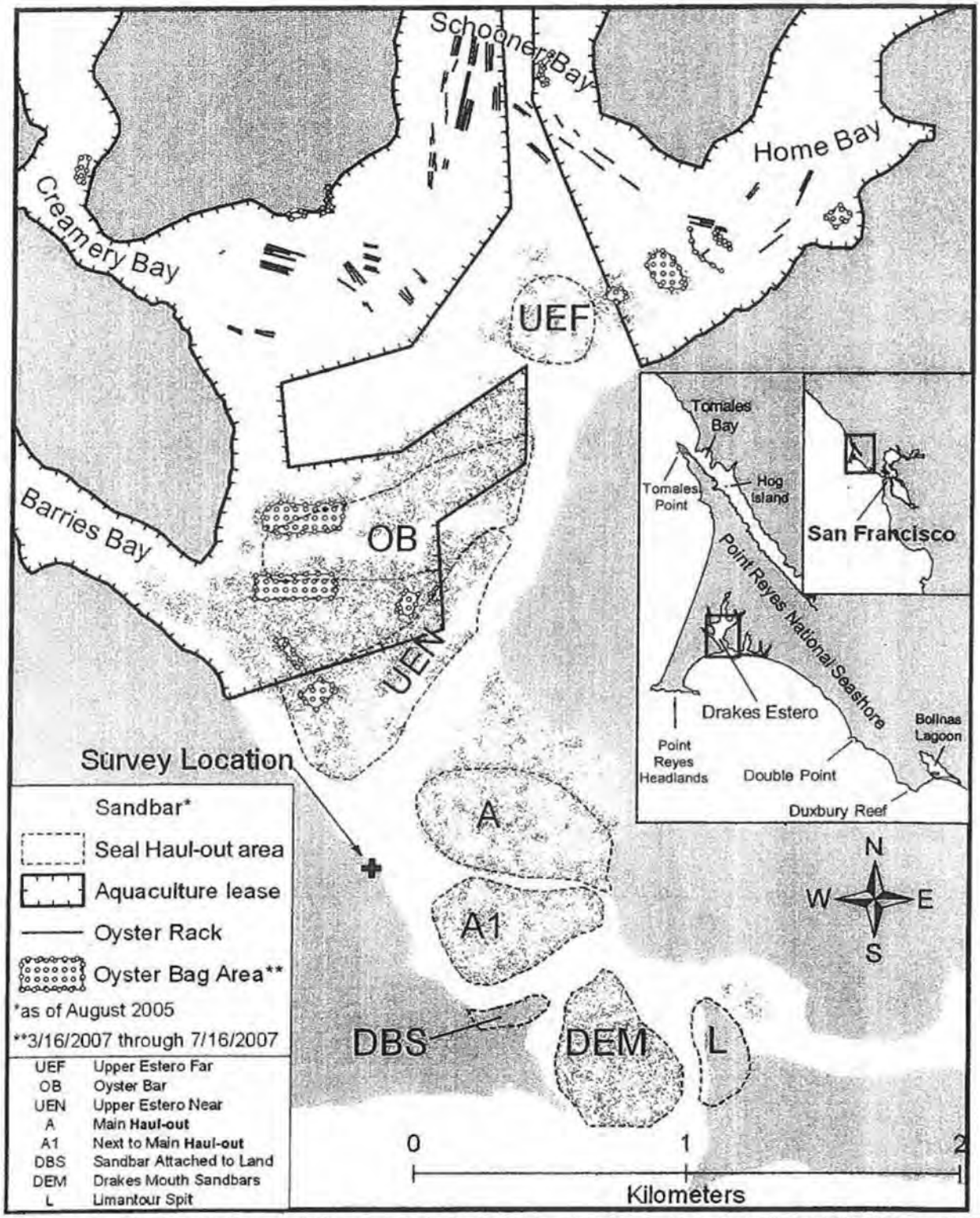

Figure 1. Drakes Estero and the eight labeled seal haul out subsites. Subsites UEF, OB, and UEN are considered "near" mariculture, while A, A1, DBS, DEM, and L are considered "away" from mariculture. Inset shows all the Point Reyes area colonies: Tomales Bay, Tomales Point, Point Reyes Headlands, Drakes Estero, Double Point, Duxbury Reef, and Bolinas Lagoon. Figure modified from Becker et al. (2009).

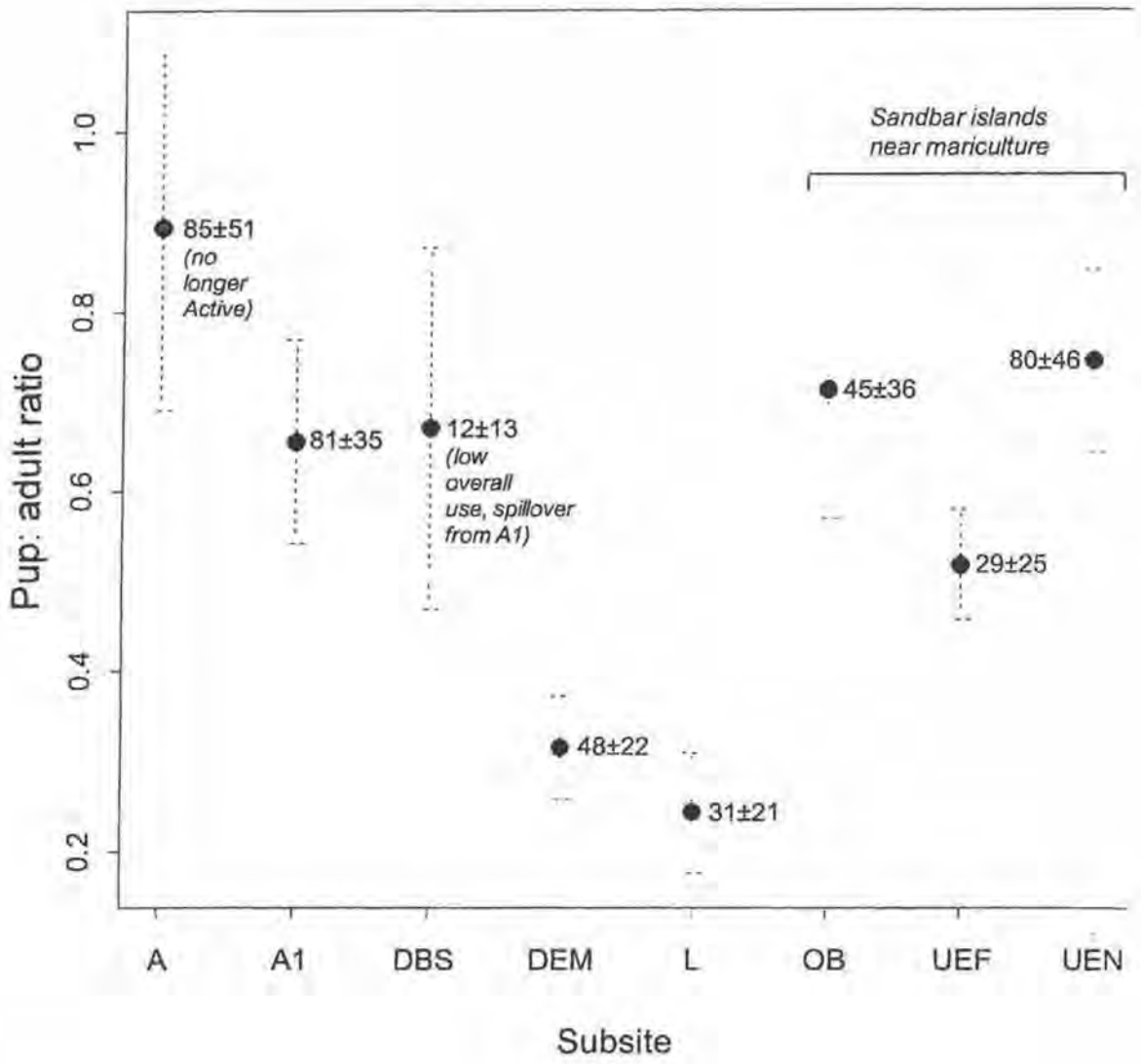

Figure 2. Mean (± SE) of maximum annual pup:adult ratios by subsite in Drakes Estero, 1997 - 2009. Numbers next to points represent the mean (±SD) of the maximum annual pup counts at that subsite from 1997 – 2009. The ratios at the estero mouth (DEM and L) are lower than the other six subsites and UEF is lower than A. DBS is adjacent to A1 has very low seal counts and pup production (~12/yr) indicating it is a minor site that appears to catch spillover seals when A1 gest crowded. Since 2004, seals have abandoned subsite A due to attachment to the mainland and subsequent predator and human access.

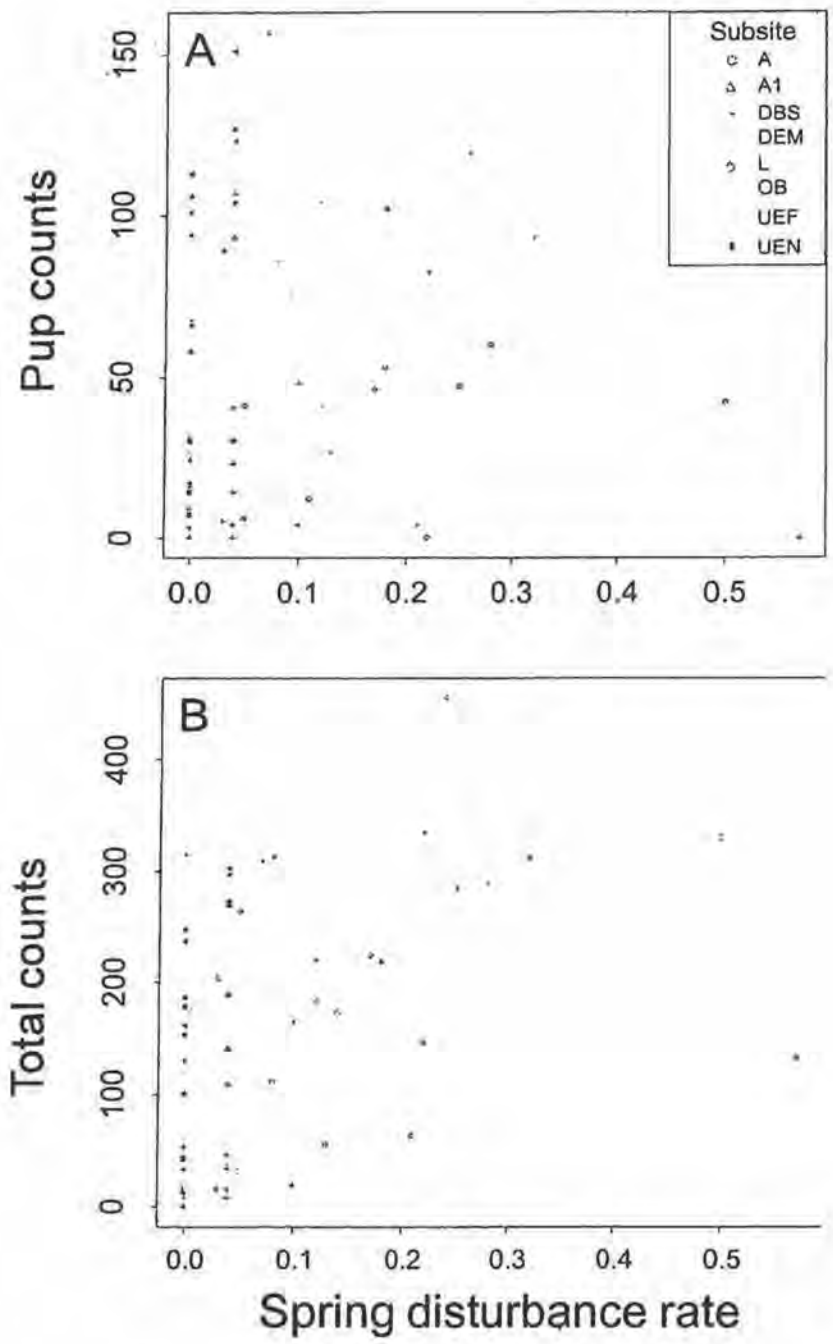

Figure 3 A & B. There is no significant relationship between Spring anthropogenic disturbance rate and (A) maximum annual pup counts at individual Drakes Estero subsites ($P > 0.38$) or (B) maximum annual total counts at individual Drakes Estero subsites ($P > 0.28$) for 1997 – 2009. Analyses were done with subsite as a random effect allowing random intercepts.

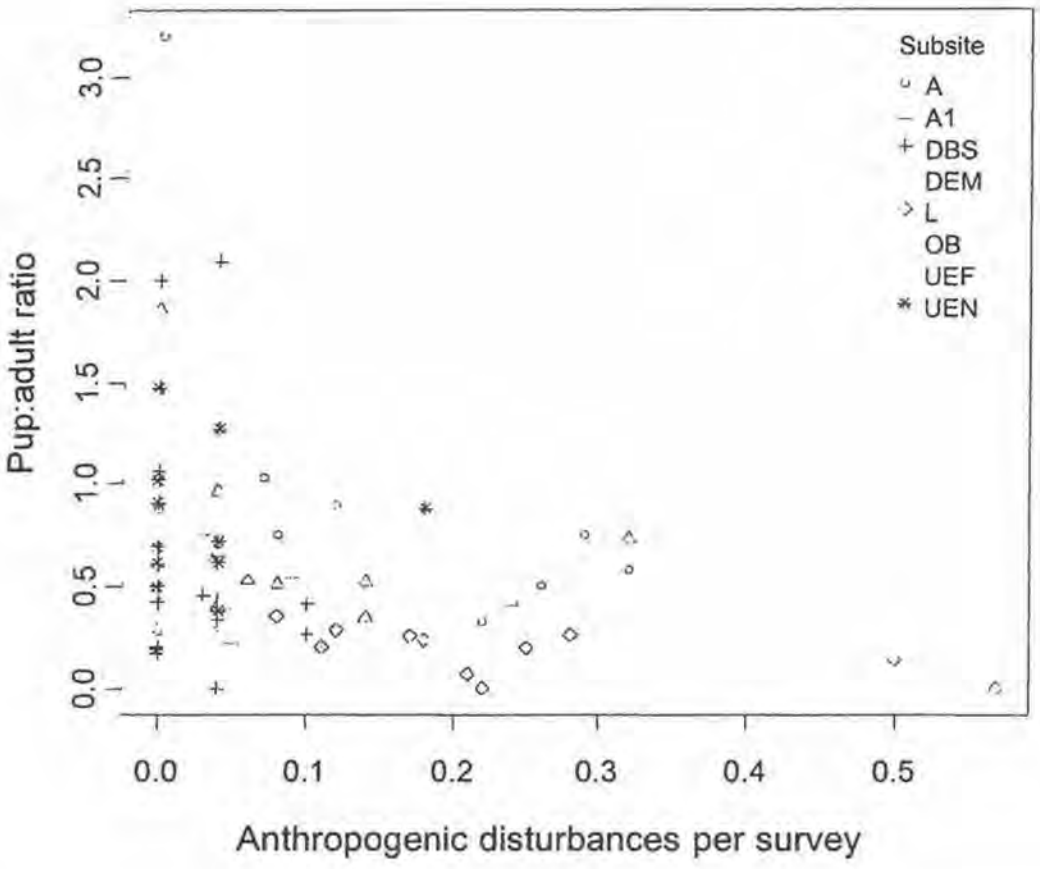

Figure 3C. The pup:adult ratio has no detectable relationship with anthropogenic disturbance rate either at the subsite level or the estero level.

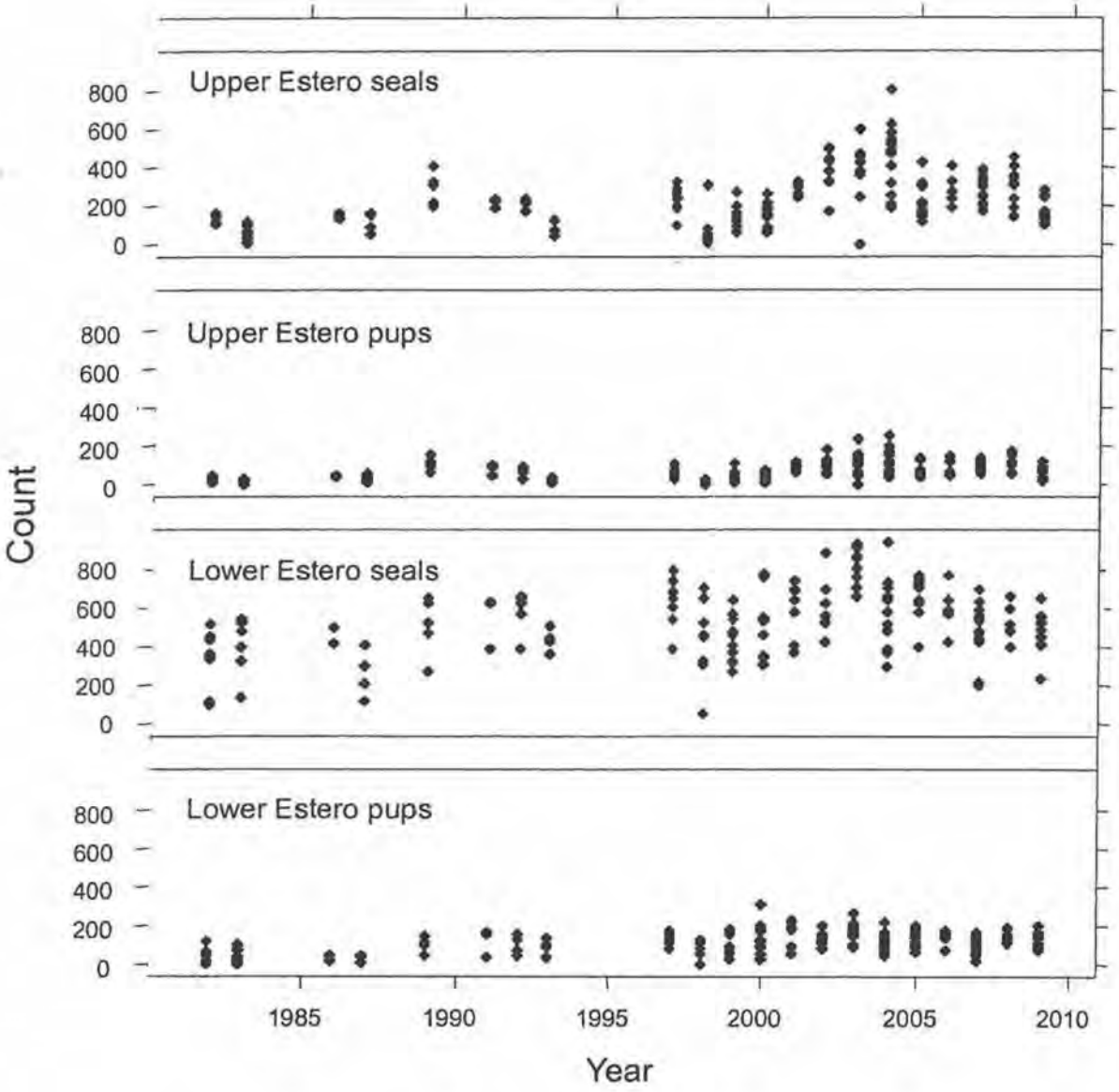

Figure 4. Daily maximum counts of harbor seals in Drakes Estero during April 15 – May 15, between 1982 and 2009.

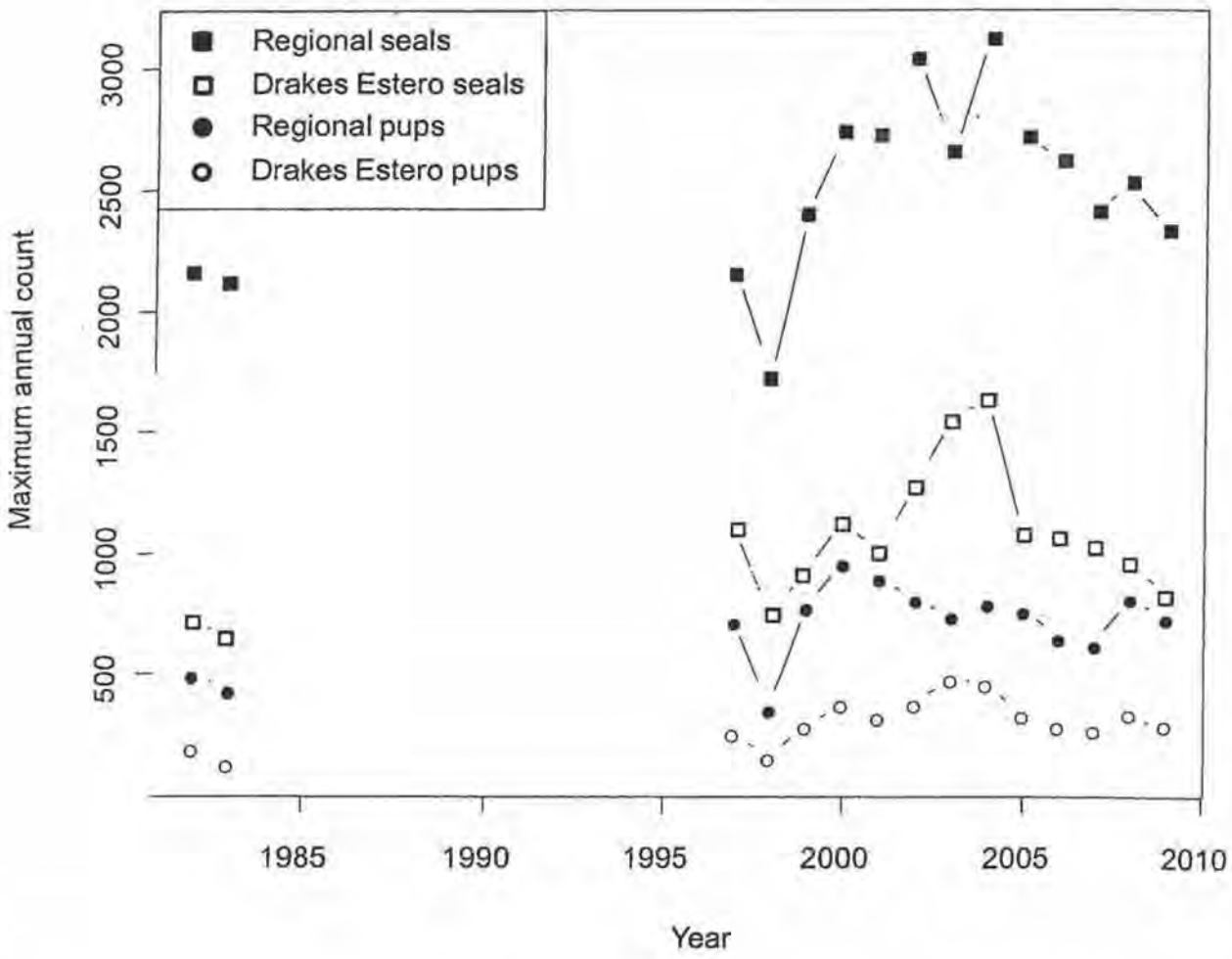

Figure 5. Annual maximum counts of harbor seals in Drakes Estero and the Point Reyes region (less Drakes Estero) during April 15 – May 15, between 1982 and 2009. Regional surveys were not conducted between 1984 and 1996.

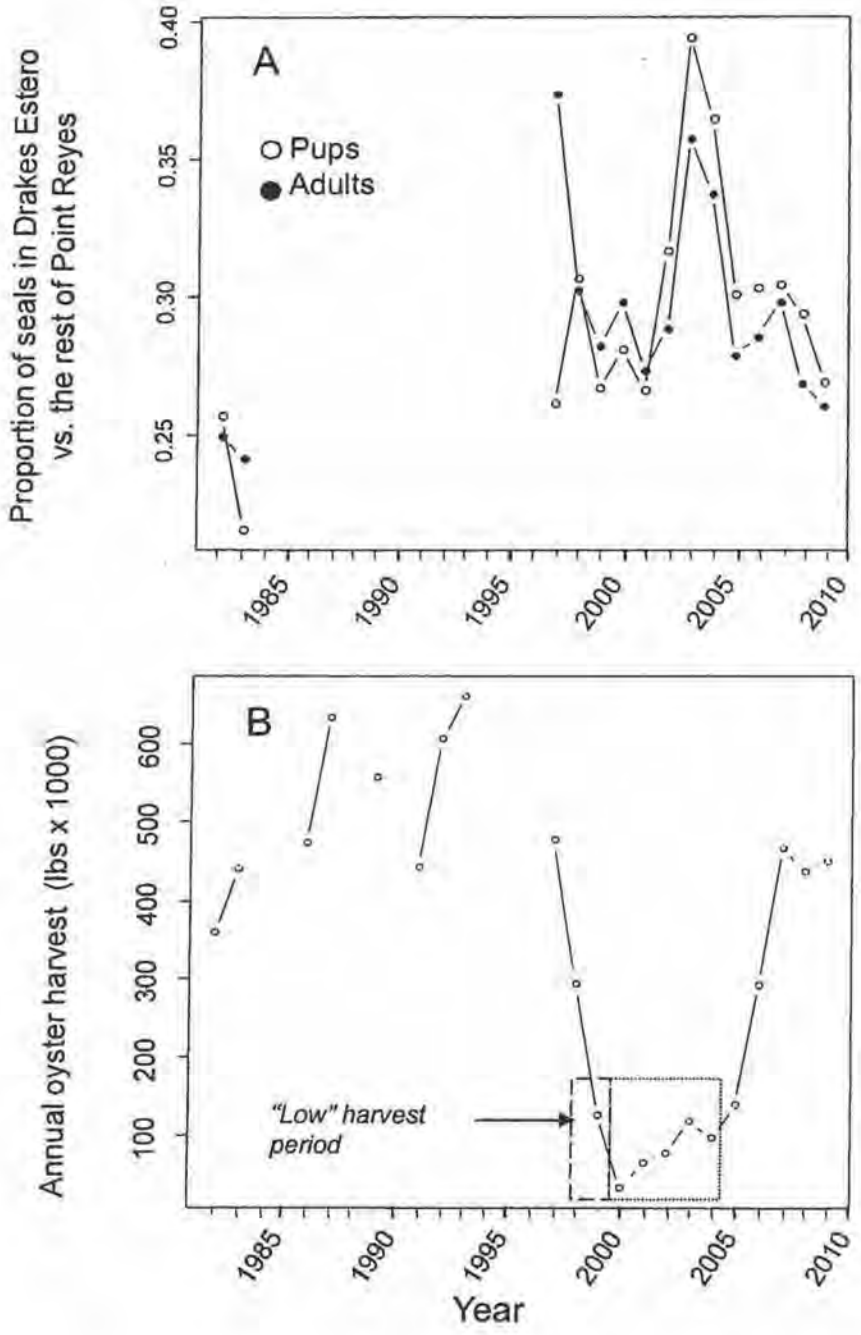

Figure 6. 1982 – 2009 time series of (A) proportion of Point Reyes region pup and adult harbor seals in Drakes Estero during the breeding/pupping season and (B) oyster harvest in Drakes Estero. Due to uncertainty in classification (Table 1), 1999 was modeled as both a "high" and "low" oyster harvest year. The 2009 oyster harvest is estimated based on 2007-2008 harvest.

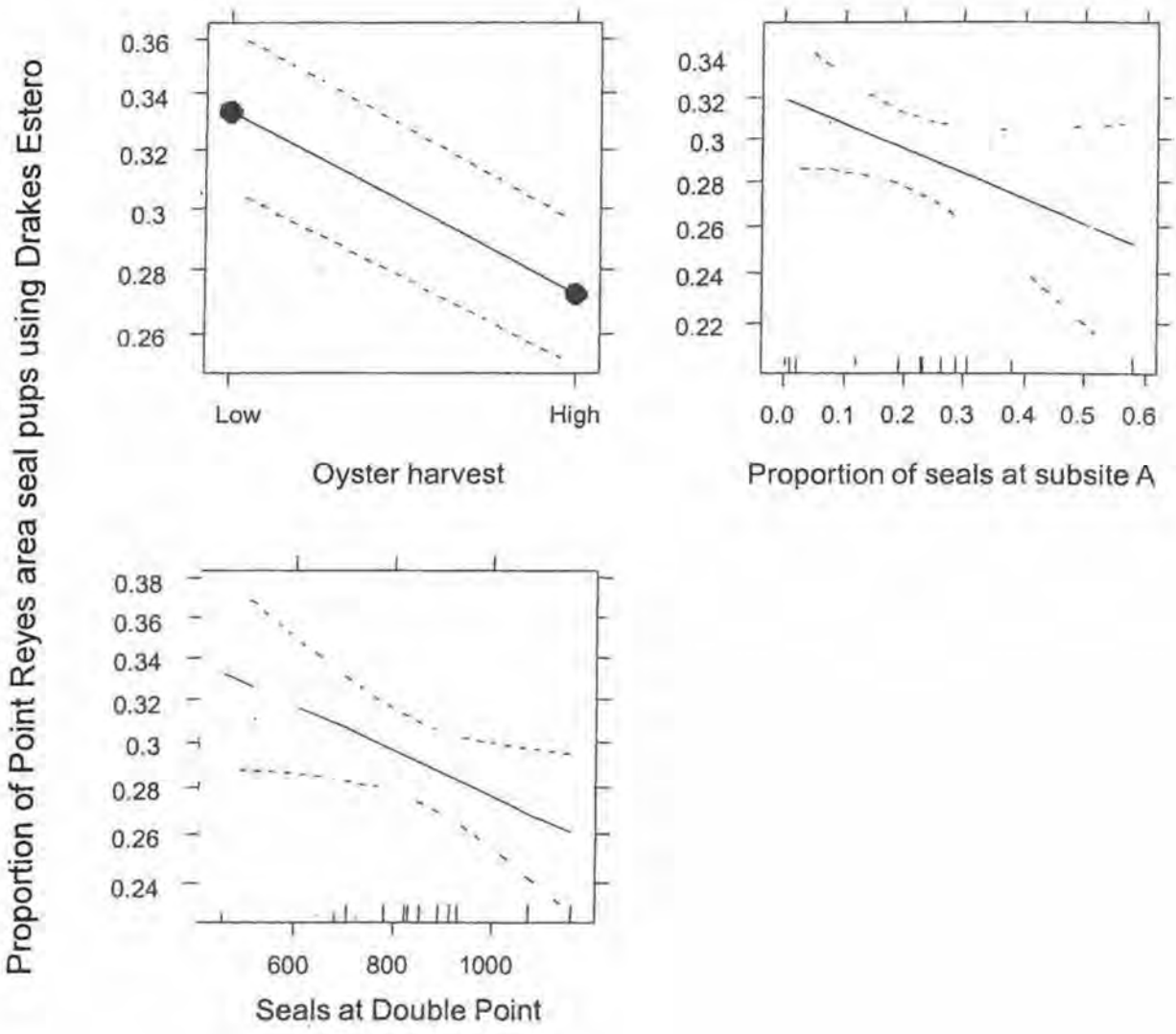

Figure 7. Model effects plots with standard errors for the proportion of Point Reyes area seal *pups* using Drakes Estero. Plots derived from the best model containing all three terms (oyster harvest, subsite A and double point. Multi-model averaged results are similar, but not identical (Table 5).

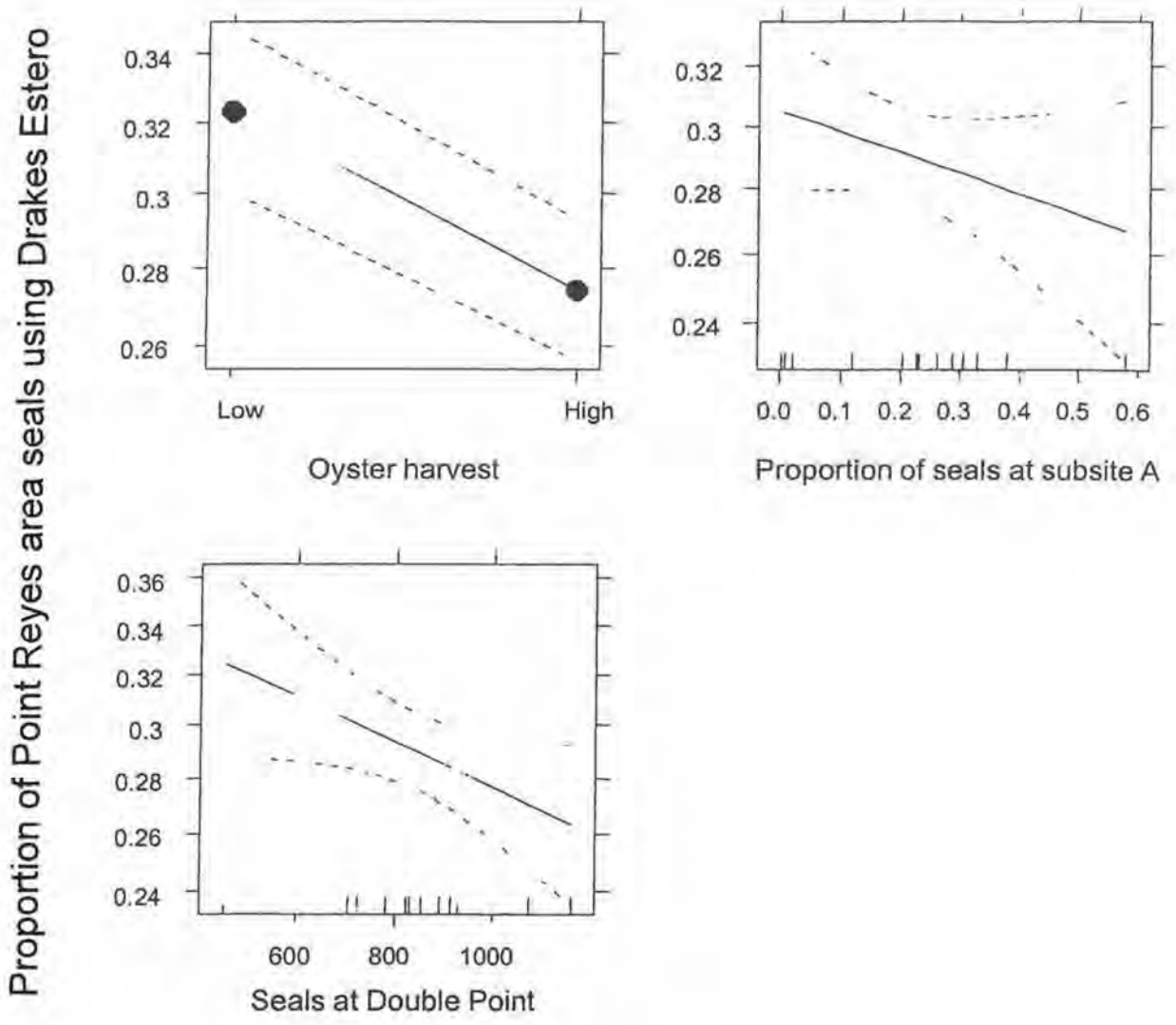

Figure 8. Model effects plots with standard errors for the proportion of Point Reyes area *seals* using Drakes Estero. Plots derived from the best model containing all three terms (oyster harvest, subsite A and Double Point). Multi-model averaged results are similar, but not identical (Table 5).

Supplement to Table 4. This table includes information in Table 4 and additional details of models tested. *A priori* models ranked by QAICc for the proportion of Point Reyes area seals using Drakes Estero. An "x" indicates the coefficient was selected in the model. Δi indicates QAICc distance from the best model and wi indicates model weight. "Low oyster 1999-2004" and "Oyster harvest" are only included for reference and not included in Akaike weights. Models ranking within the lowest 4 QAICc units are shaded grey and used for multimodel inference in table 5..

		Oyster related			Nearby colonies		Internal colony effects							
Age class	Model	Low oyster 2000-2004	Low oyster 1999-2004	Oyster harvest	Total regional counts	Double Point counts	Drakes Estero disturbance rate	Seals at A in Drakes Estero	ENSO	Year	Null	Δi	wi	r^2
Pup	1	x				x						0.0	0.35	0.51
	2			x		x		x				1.3		0.63
	3	x				x		x				1.3	0.18	0.63
	4	x						x				1.4	0.18	0.46
	5			x		x						1.5		0.46
	6	x							x			2.6	0.09	0.42
	7		x			x						3.3		0.40
	8	x										3.3	0.06	0.26
	9			x				x				3.4		0.40
	10		x					x				4.2		0.36
	11									x		5.0	0.03	0.20
	12	x					x					5.6	0.02	0.32
	13		x									6.3		0.16
	14	x				x	x	x				6.3	0.01	0.66
	15					x				x		6.4	0.01	0.29
	16			x								6.5		0.15
	17					x						7.3	0.01	0.12
	18										x	7.7	0.01	0.00
	19								x			7.7	0.01	0.11
	20							x				8.2	0.01	0.09
	21					x			x			9.1	0.00	0.19
	22			x			x					9.2		0.19
	23					x		x				9.8	0.00	0.17
	24				x							10.3	0.00	0.02
	25						x					10.6	0.00	0.01
	26					x	x					11.0	0.00	0.13
	27				x			x				11.9	0.00	0.10
Pup + Adult	1	x				x						0.0	0.55	0.54
	2	x				x		x				2.4	0.16	0.61
	3			x		x						2.5		0.47
	4		x			x						2.5		0.47
	5			x		x		x				3.8	0.09	0.57
	6	x						x				3.9	0.08	0.42
	7	x										4.3	0.06	0.29
	8	x					x					4.5	0.05	0.41
	9		x					x				6.0		0.36
	10	x				x	x	x				6.1	0.02	0.67
	11	x							x			6.3	0.02	0.35
	12		x									6.8		0.22
	13			x				x				7.5		0.32
	14				x							7.9	0.01	0.19
	15									x		8.5	0.01	0.17
	16			x								8.8		0.16
	17					x				x		9.6	0.00	0.25
	18			x			x					9.6		0.24
	19					x						10.4	0.00	0.11
	20				x			x				10.5	0.00	0.22
	21										x	10.9	0.00	0.00
	22							x				11.7	0.00	0.07
	23						x					12.4	0.00	0.05
	24								x			12.6	0.00	0.05
	25					x		x				13.0	0.00	0.15
	26					x	x					13.2	0.00	0.14
	27					x			x			13.4	0.00	0.14

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SFAN I&M Program
Harbor Seal Monitoring

David Press
Ecologist / Data Manager

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Outline

- Inventory and Monitoring Program
- Pinniped Monitoring Protocol
- Harbor Seal Field Methods
- Data Management
- Annual Data Work Flow
- Reporting

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- Harbor seal monitoring is a project of the San Francisco Area Network (SFAN) Inventory and Monitoring (I&M) Program
- SFAN is one of 32 national networks
- I&M program center Fort Collins, CO
- I&M Program a component of NPS Natural Resource Challenge, implemented in 1999

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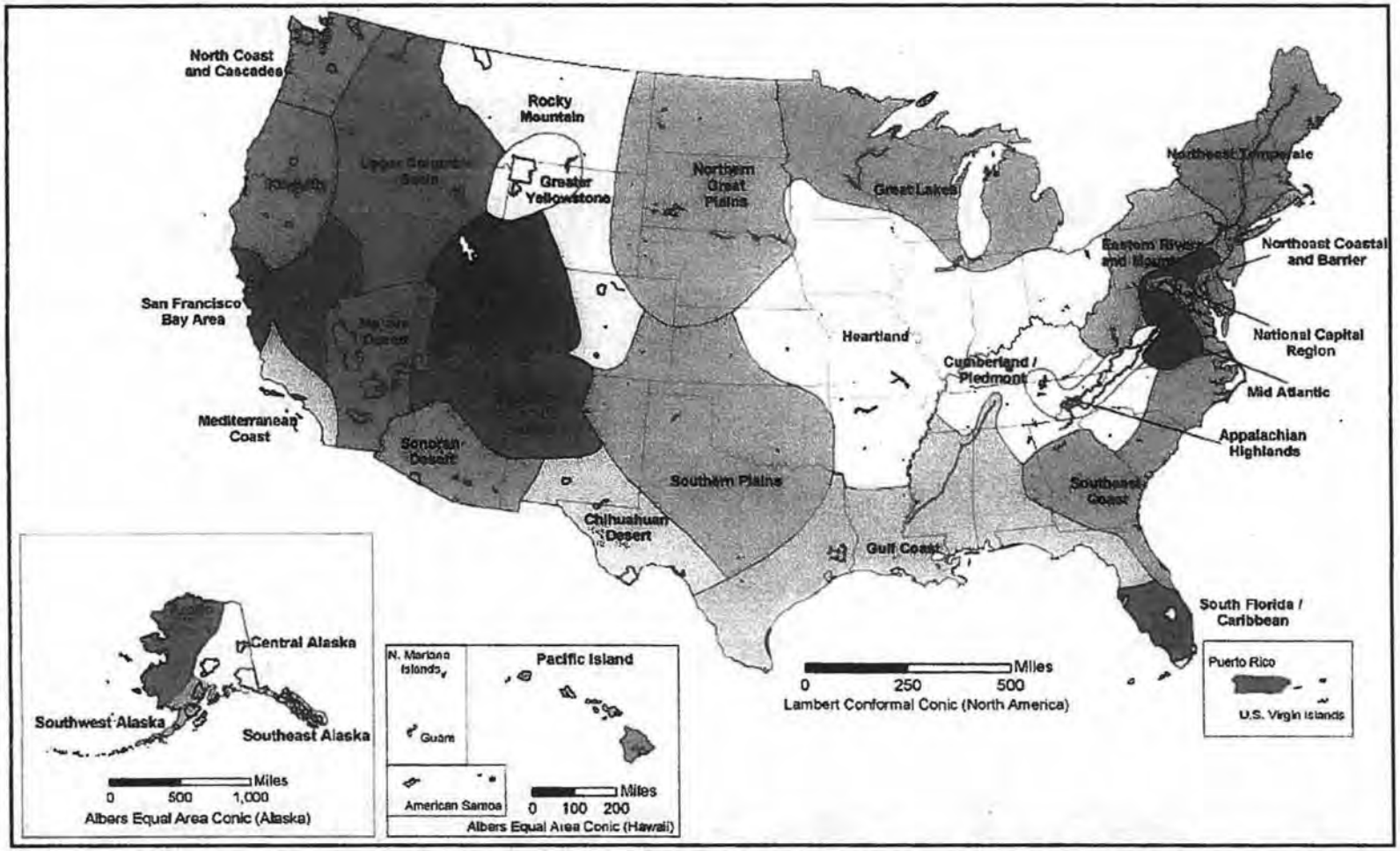

Map of the 32 I&M ecoregional networks that include more than 270 park units with significant natural resources. The 32 networks share core funding and a professional staff to inventory park natural resources and conduct long-term monitoring of park ecosystems.

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I&M National Program

- Techincal assistance: sampling design, statistical analyses, modeling, GIS, data management, website design
- Guidance documents: protocol production, data management, publications
- Tools: national databases, database templates, GIS applications
- Collaboration

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SFAN Monitoring Plan

- Completed in 2005. Includes network data management plan.
- Identified and ranked 63 biotic and abiotic vital signs.
- 18 vital signs prioritized for initial funding.
- Budget restrictions likely to reduce funded programs to 10 vital signs

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SFAN Vital Signs

- Air Quality
- Amphibs/Reptiles
- Invasive Plants
- Salmonids
- Landbirds
- Landscape Dynamics
- Raptors (PINN)
- Pinnipeds
- Stream Flow
- Water Quality
- Wetlands
- Western Snowy Plovers
- Northern Spotted Owls
- Rocky Intertidal
- Stream Flow

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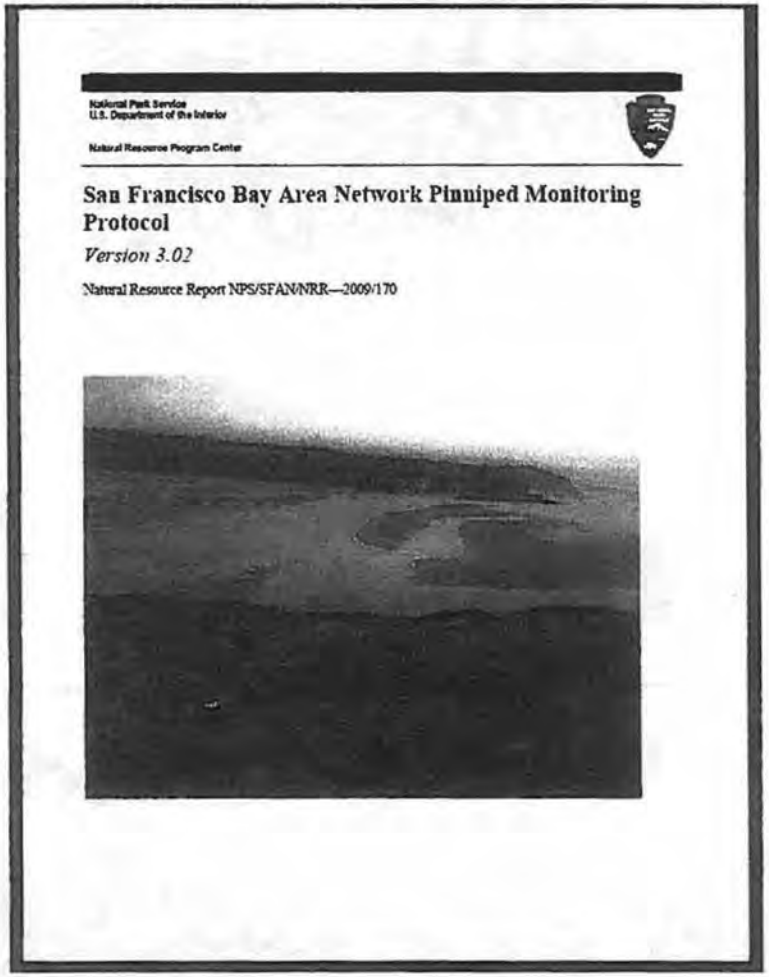
Pinniped Monitoring Protocol


National Park Service
U.S. Department of the Interior

Natural Resource Program Center

San Francisco Bay Area Network Pinniped Monitoring Protocol

Version 3.02

Natural Resource Report NPS/SFAN/NRR—2009/170

- Protocol approved December 2009.
- Harbor seals and northern elephant seals
- Open peer review 2004
- Dr. David Ainley, Dr. Jim Harvey

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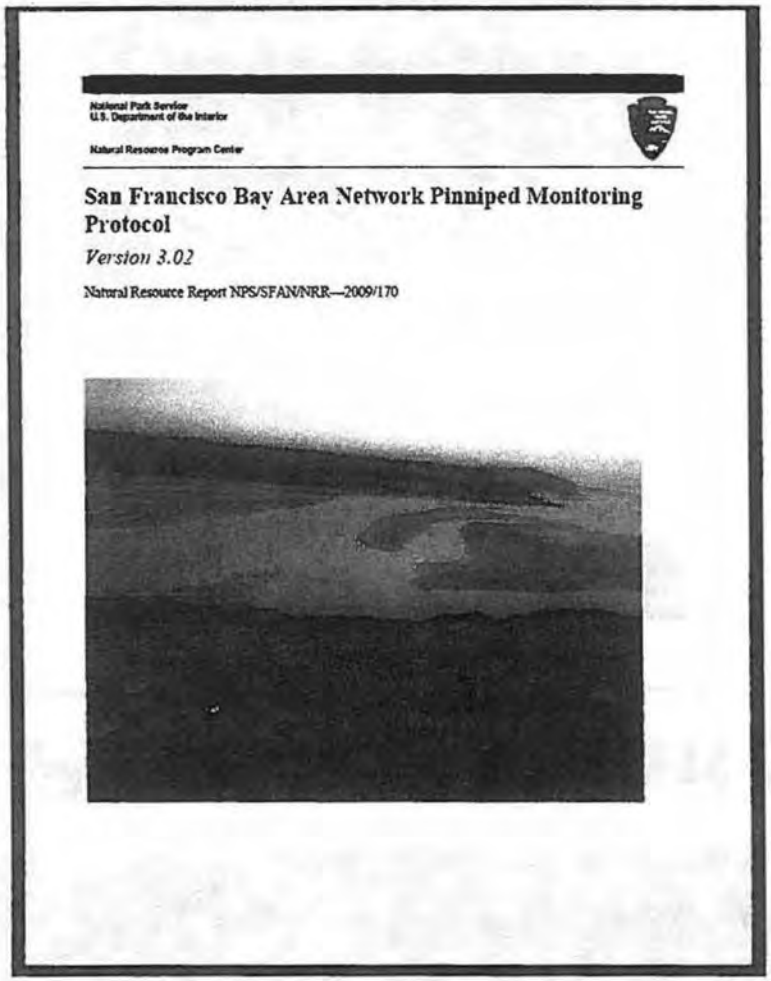
Pinniped Monitoring Protocol



- 2008 blind peer review coordinated by NPS and University of Washington
- 2 anonymous reviewers, Dr. Jim Agee (UW), Dr. Penny Latham (NPS)
- No modifications required to data collection or analytical methods.
- Protocol approved December 2009.

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Pinniped Monitoring Protocol

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- Monitoring Objectives

1. Determine the long-term trends in population size and seasonal distribution of harbor seal populations at primary sites in the SFAN parks during the breeding and molt seasons.
2. Determine long-term trends in reproductive success of harbor seals through annual estimates of pup production at PORE and GOGA.
3. Determine the long-term trends in sources, frequency and level of effects of natural and anthropogenic disturbances on harbor seal haul out use and productivity.

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Pinniped Monitoring Protocol

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- Power to Detect Trends

  Adults: 90% power to detect 10% annual decline in the six major SFAN sites over 3 years.

  Pups: 88% power to detect 10% annual decline in the six major SFAN sites over 4 years.

  Drakes Estero: 80% power to detect 25% decline takes 21 years for adults and 15 years for pups

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Pinniped Monitoring Protocol

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- Standard Operating Procedures

  - Field Methods
  - Data Management
  - Data Analysis and Reporting
  - Safety Procedures

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Field Methods

- Volunteers and NPS wildlife biotech
- 2009: 49 volunteers, 450 hours of monitoring March-July
- Eight monitoring locations.
- Breeding season: March 1 – May 31
- Molt Season: June 1 – July 31

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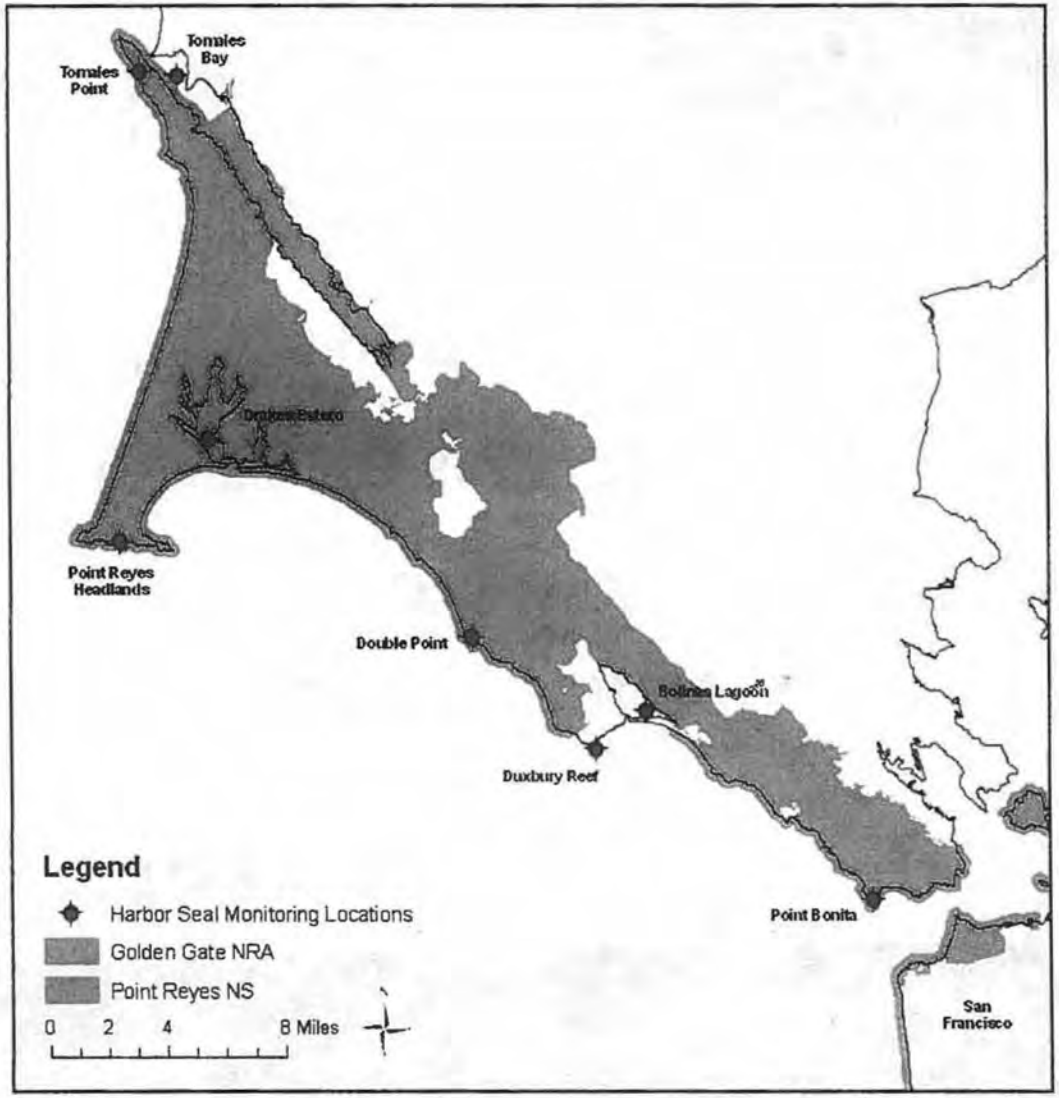

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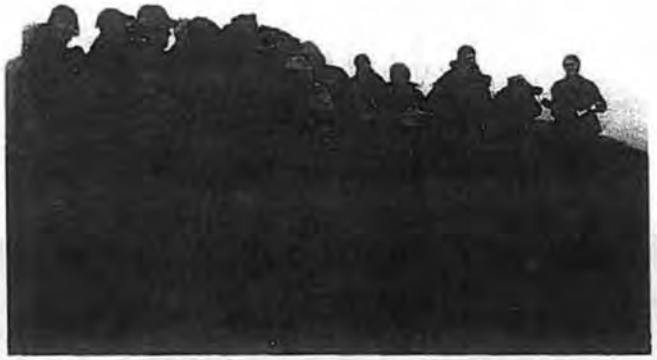
Field Methods

- Data collected by trained volunteers and staff from fixed observation points.
- Two classroom sessions.
- One field session.
- Pup identification.
- Mentoring program.
- Quality certification.



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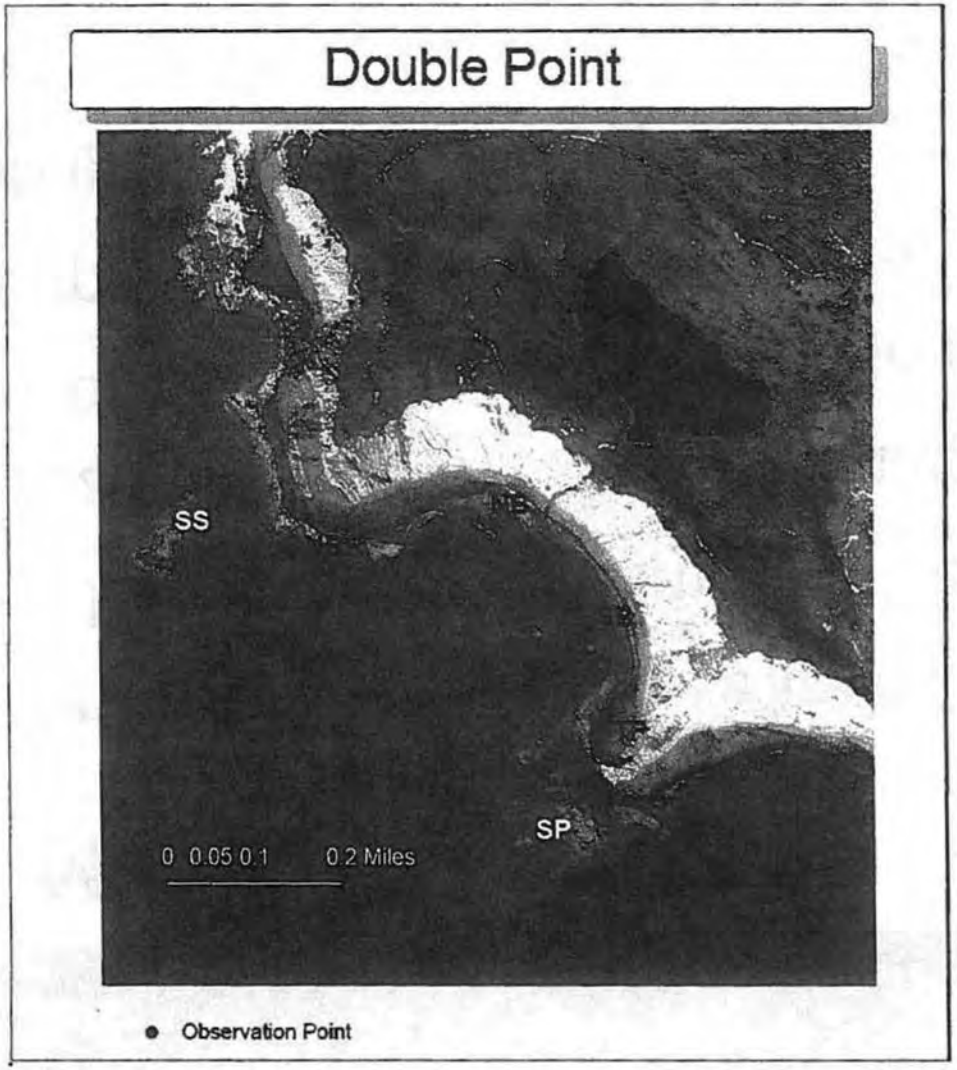

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Field Methods

Census Data

- Adults / Immatures
- Pups (March 1 – May 31 only)
- Dead pups
- Red-pelaged seals
- Shark-bite seals
- Time / Subsite

Disturbance Data

- Time / Subsite
- Source Category
- Specific Source
- Source number
- Response
- Flush numbers

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POINT REYES NATIONAL SEASHORE HARBOR SEAL SURVEY Page ___of____

Date:_____ Day of Week_____Year_____ Location: _____

Start Time:_____End Time_____Observers:_____

Weather: Visibility (1,2 or 3)_____ Rain (Y/N)____ Low Tide Level closest to survey time _____

# of White Pelicans:_____ # of Brown Pelicans:_____ All subsites surveyed? (Y or N) _____

Time (Survey every ½ hr)	Sub-Site^	# of Adults & Imm	# of Live and Dead Pups	Subsite Total	# of Dead Pups	# of Red Seals	# of Shark Bite	Disturb-ance Sources Y/N	Survey Total All subsites Each ½ hour	Comments

Visibility: 1=clear, 2=slightly obscured but still able to count, 3=unable to conduct an accurate or full count

^**SUBSITES:** **Drakes Estero** (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) **Double Point** (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) **Tomales Point** (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) **Tomales Bay** (SI=Seal Island, CI=Clam Island, HI=Hog Island) **Bolinas Lagoon** (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) **Duxbury Reef** (DUX=Duxbury Reef)

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POINT REYES NATIONAL SEASHORE HARBOR SEAL DISTURBANCE SURVEY

Date: _____Year_____ Location: _____ Observers: _____

Time	Source *	Number	Sub-Site	Seal Behavior **	No. Before Disturbance (Total Seals)	No. Adult Immature Seals Remain On site	No. pups Remain On site	No. Seals Flush Into Water	Seals Rehaul (Y/N) Time	Comments (vessel/aircraft identification)

*SUBSITES: Drakes Estero (A=A sandbar, A1=A1 sandbar, DEM=Drakes Estero Mouth, OB=Oyster Bar, UEF=Up Estero Far, UEN=Up Estero Near, L=Limantour Spit, DB=Drake's Beach) Double Point (SB= South Beach, NB=North Beach, NBR=North Beach Rock, TP=Tide Pools, SP=South Point, SS=Stormy Stack) Tomales Point (BR=Bird Rock, RB=Rope Beach, TRB=Two Rock Beach) Tomales Bay (SI=Seal Island, CI=Clam Island, HI=Hog Island) Bolinas Lagoon (KI=Kent Island, PWI=Pickleweed Island, HWY1= Highway 1 channel, other) Duxbury Reef (DUX=Duxbury Reef)

**SEAL BEHAVIOR: NR=no response; HA=head alert; F=flush; FW=flush into water. (Record Strongest Reaction)

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EXPERIENCE
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Data Management

- Relational MS Access database
- Harbor seal and elephant seal monitoring data
- Data entry, QA/QC, data summaries.
- Complete user-interface
- Custom queries built for data summaries and QA/QC

Data Management

- Database modeled after national database template
- Spatial component of data built-into database
- Table relationships completely defined
- Definitions for all tables and fields

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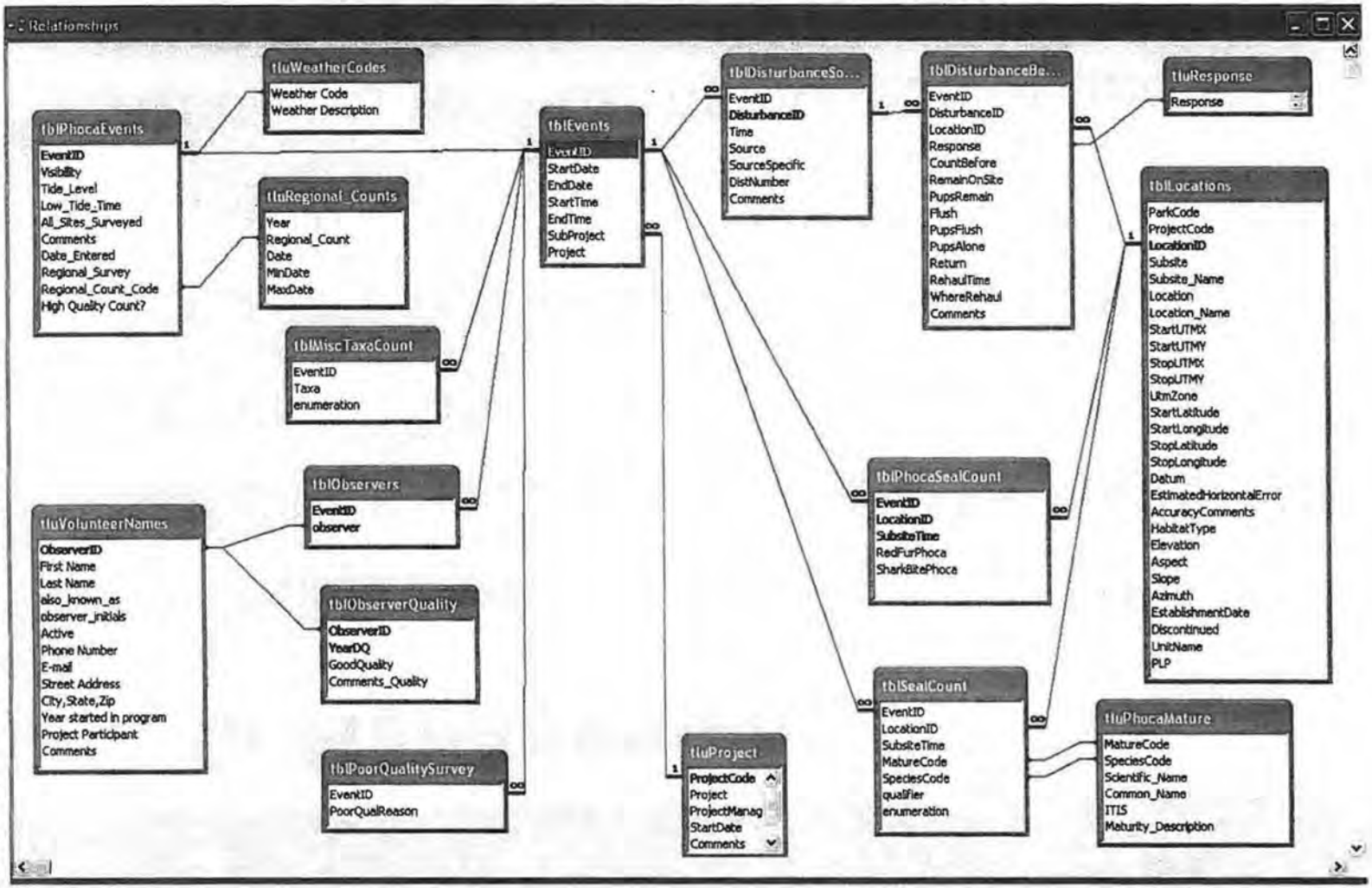

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Data Management

- Metadata records compliant with FGDC standards as required under Executive Order 12906
- Metadata records accompany all FOIA requests
- Metadata records maintained online at NPS Data Store public website

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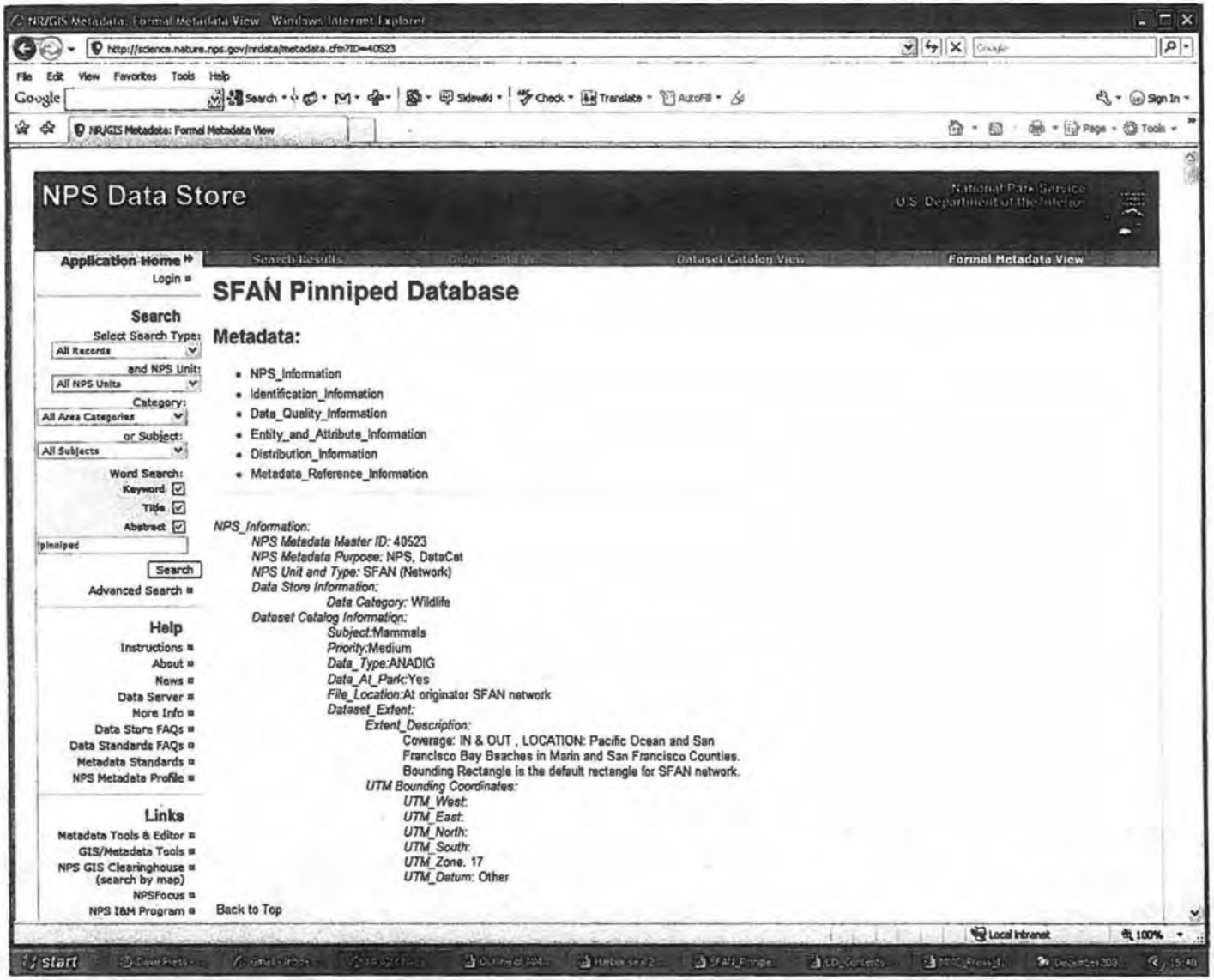

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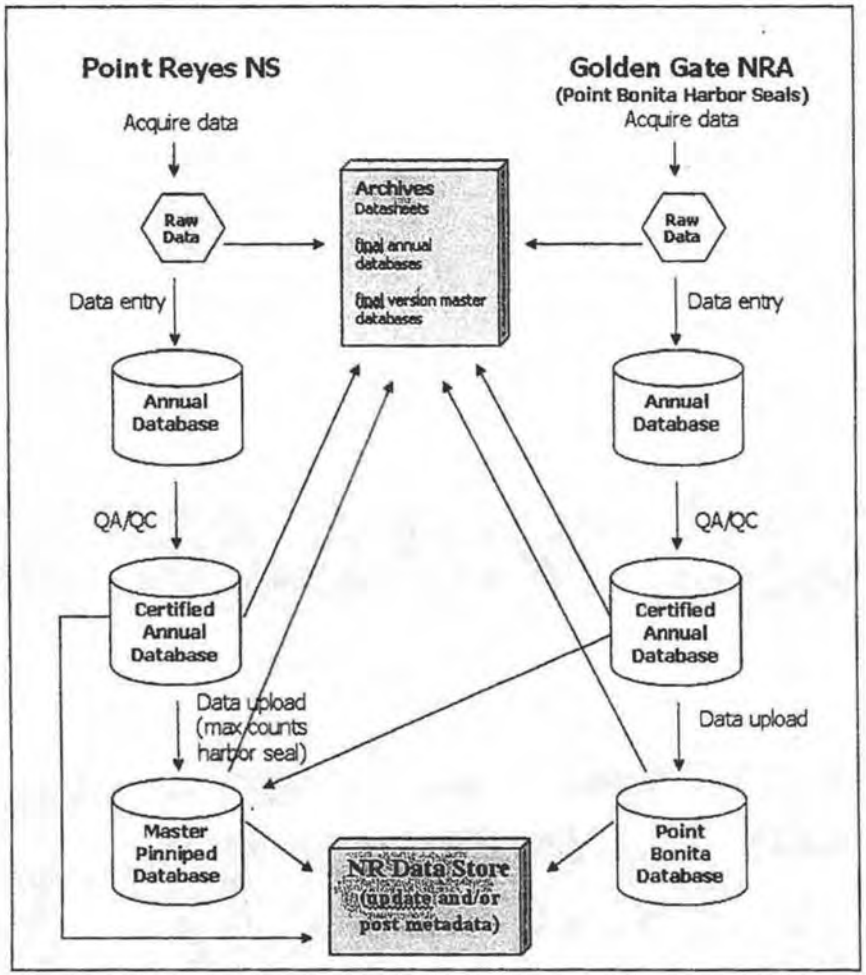
Data Work Flow



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Data Work Flow

- Annual Database – August to July of next year; all raw data entered
- Count data ranked as high vs. poor quality data.
- All data sheets error-checked against digital records
- 10% of data records randomly selected for additional error-checking by Data Manager
- Series of queries designed to check data for "logic" errors

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Data Work Flow

- Merge annual dataset with master database.
- Harbor seal count data condensed to maximum count per survey.
- Disturbance data transferred as is.
- Archive data sets.
- Update database log - tracks significant database updates and data edits

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Data Reporting

- Annual monitoring report completed as soon as possible.
- Provides general overview of monitoring year. No subsite data.
- Maximum counts by location, comparisons with other monitoring years, disturbance counts by source, disturbance rates.
- Summaries based on maximum total count per location for breeding and molting seasons.
- Poor quality count data excluded from summaries
- Disturbance data not filtered for quality.

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Data Reporting: Poor Quality Counts

- observer quality
- visibility
- other weather conditions (ie. wind, glare)
- incomplete survey

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Data Reporting: Disturbance Data

- Only "actual" disturbances included – head alert, flush, flush into water responses
- Disturbance data not filtered for quality based on observer experience, weather, tide, etc.

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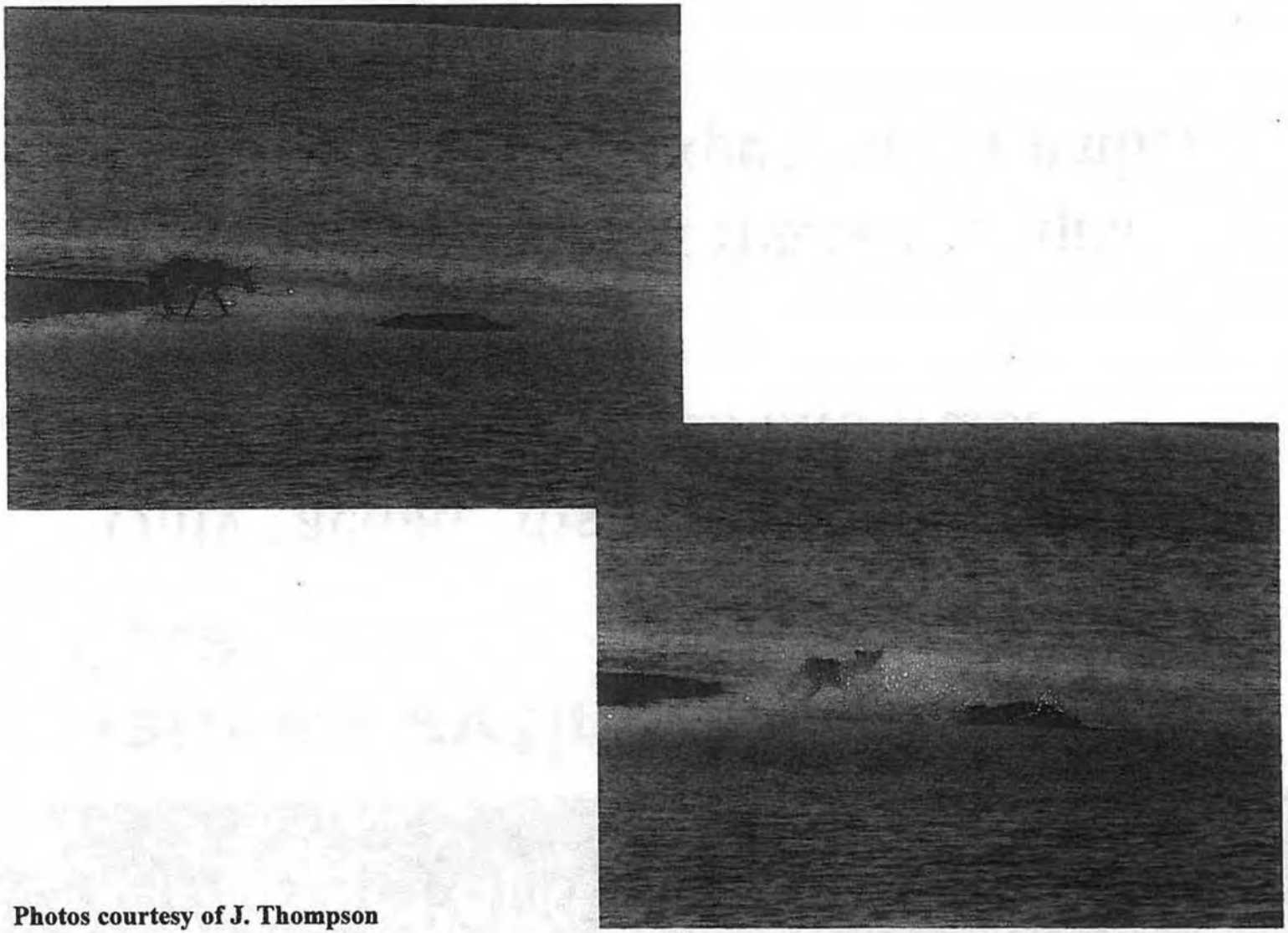

Photos courtesy of J. Thompson

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Data Reporting

- Annual report peer-review internal and external
- Reports approved by NPS Key Official
- Report posted to SFAN I&M website following approval

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NPS: Nature & Science » Networks: San Francisco Bay Area Network » Pinnipeds - Windows Internet Explorer

http://science.nature.nps.gov/im/units/sfan/vital_signs/pinnipeds/HarborSeals.cfm

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NPS: Nature & Science » Networks: San Francisco Bay... Page Tools

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Reports & Publications
Network Contacts
Data Liability Statement
SFAN Intranet (NPS only)

Vital Signs
Air Quality
Amphibians and Reptiles
Butterflies - T & E
Fish
Landbirds
Landscape Dynamics
Pinnipeds
Plants - Communities
Plants - Invasives
Plants - Rare
Raptors
Riparian Habitat
Snowy Plover, Western
Spotted Owl, Northern
Stream Flow
Water Quality
Weather and Climate
Wetland Habitat

Parks: Nature & Science

National Park Service Networks

NPS » Nature & Science » I & M » Networks » San Francisco Bay Area » Vital Signs » Harbor Seals

San Francisco Bay Area Network
Harbor Seals

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped in the San Francisco Bay Area, California. Within the San Francisco Bay Area, the population at Point Reyes represents the largest concentration of harbor seals in the State of California, other than the Channel Islands. Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal. Long-term monitoring studies of harbor seals have been conducted at selected colonies for 30 years, and are currently conducted at 7 locations along the Point Reyes seashore and at Point Bonita in the Golden Gate National Recreation Area.

Field Surveys

- Surveys are conducted weekly at 12 sites during the breeding season (March - June) of each year.
- Bi-monthly surveys are conducted for all pinnipeds year-round.
  For more information on becoming a volunteer, contact the Harbor Seal Coordinator

Project Updates 2009

Harbor Seal Update and Summary Graphs - 8/3/2009
Harbor Seal Update and Summary Graphs - 7/8/2009

Annual Reports

Annual Report 2008

Annual Report 2007

Annual Report 2006

Local intranet 100%

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80% decline at OB in 2007

- Sheltered Wilderness, public testimony
- 80% estimate of decline in use of OB in 2007 compared to 2004 was based on best professional judgment from previous years of study
- Peak pup count date at DE in 2007 was similar to other years but at OB it was later
- Count of April 23 used although actual peak later discovered to be May 4
- Actual decline at OB from 2004-2007 based on May 4 peak was 53% for adults, 65% for pups and 56% overall.

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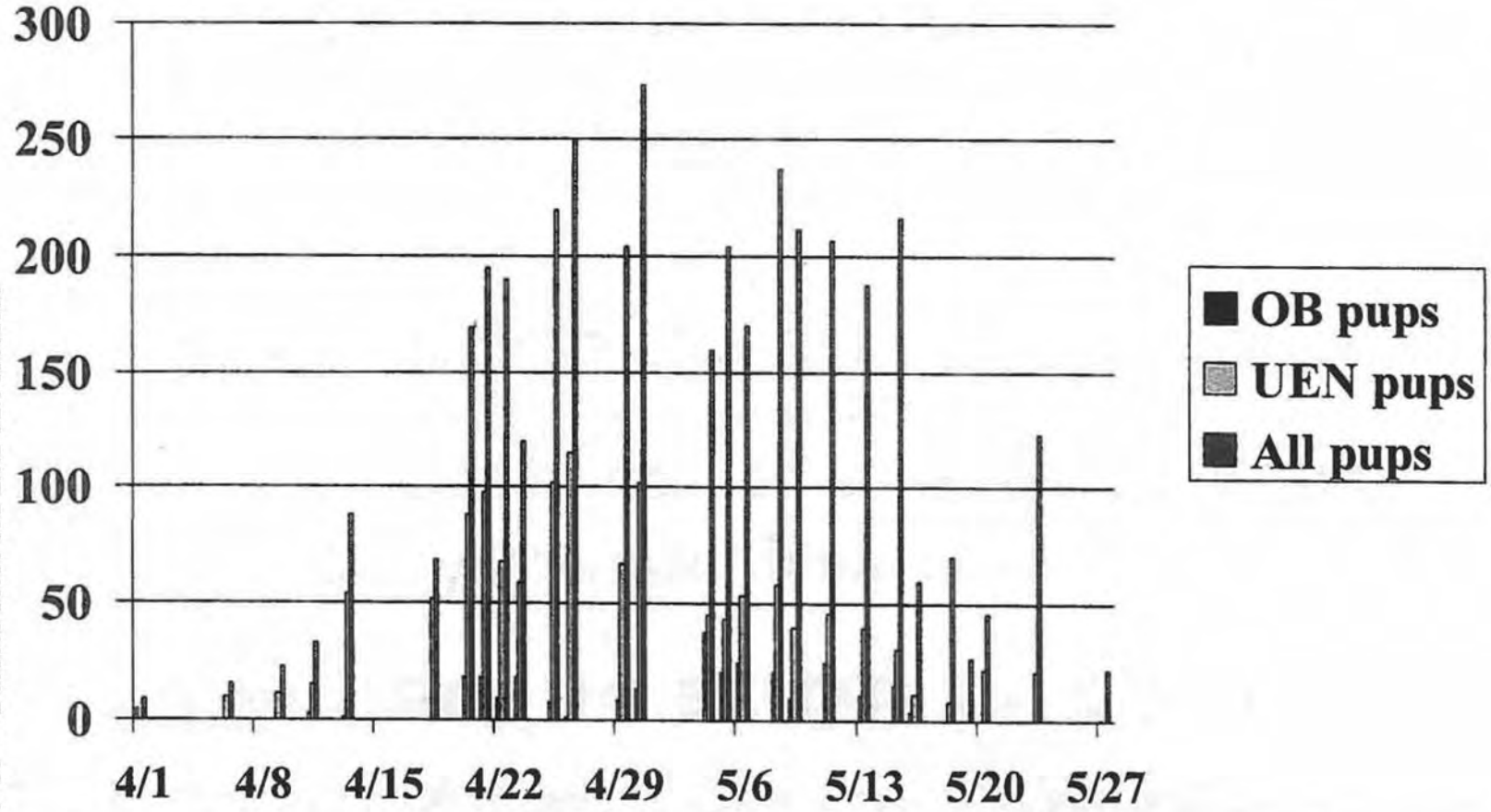

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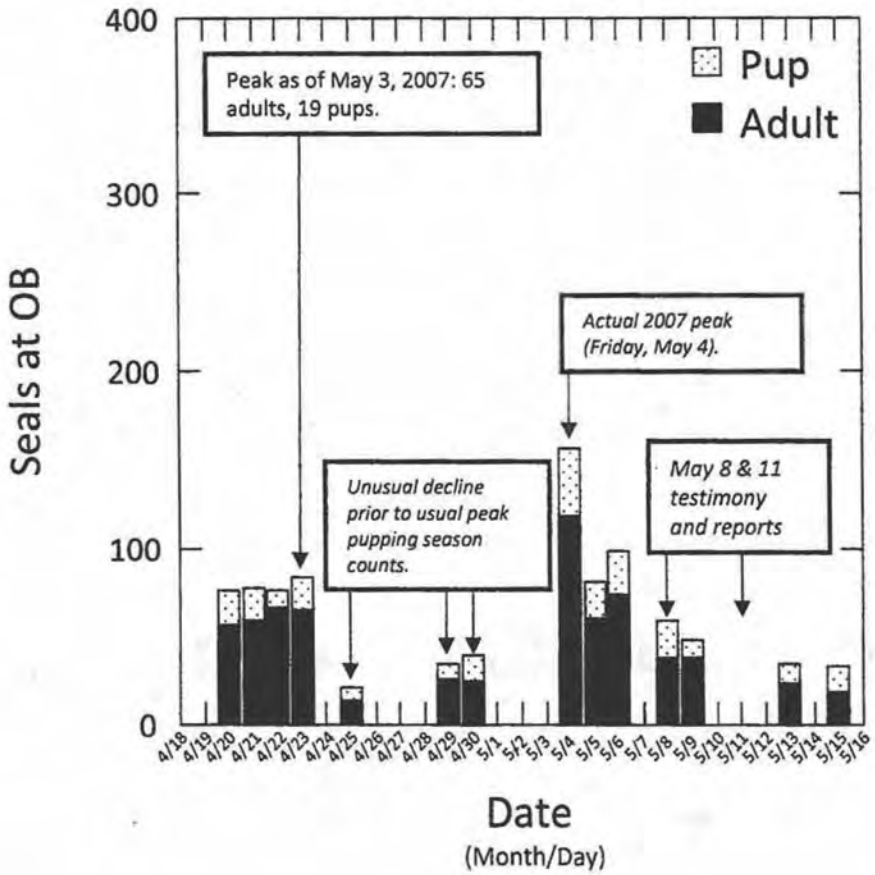

Figure 1. Harbor seal counts at Drakes Estero subsite OB in 2007. NPS used data available through May 3 to prepare May 8 and 11 testimony and reports. This is why the 80% decline was presented.

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DBOC Disturbance Data

- Only DBOC may operate motorboats in Drakes Estero
- Harbor seal use sandbars at higher tides

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Sandbar OB on falling tide. 3 hours and 35 min prior to low tide of 0.89 ft (Golden Gate).

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Sandbar OB on falling tide. 2 hours and 45 min prior to low tide of 1.68 ft (Golden Gate).

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DBOC Disturbance Data

- Only DBOC may operate motorboats in Drakes Estero
- Harbor seal use sandbars at higher tides
- Observer quality not related to disturbance data
- Sound travels
- Multiple subsites grouped under one disturbance source/time

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National Park Service

EXPERIENCE
YOUR
AMERICA

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EXPERIENCE YOUR AMERICA

DBOC Disturbance Data

- Only DBOC may operate motorboats in Drakes Estero
- Harbor seal use sandbars at higher tides
- Observer quality not related to disturbance data
- Sound travels
- Multiple subsites grouped under one disturbance source/time
- Data edits, additions
- Program organization, transition from PORE to I&M

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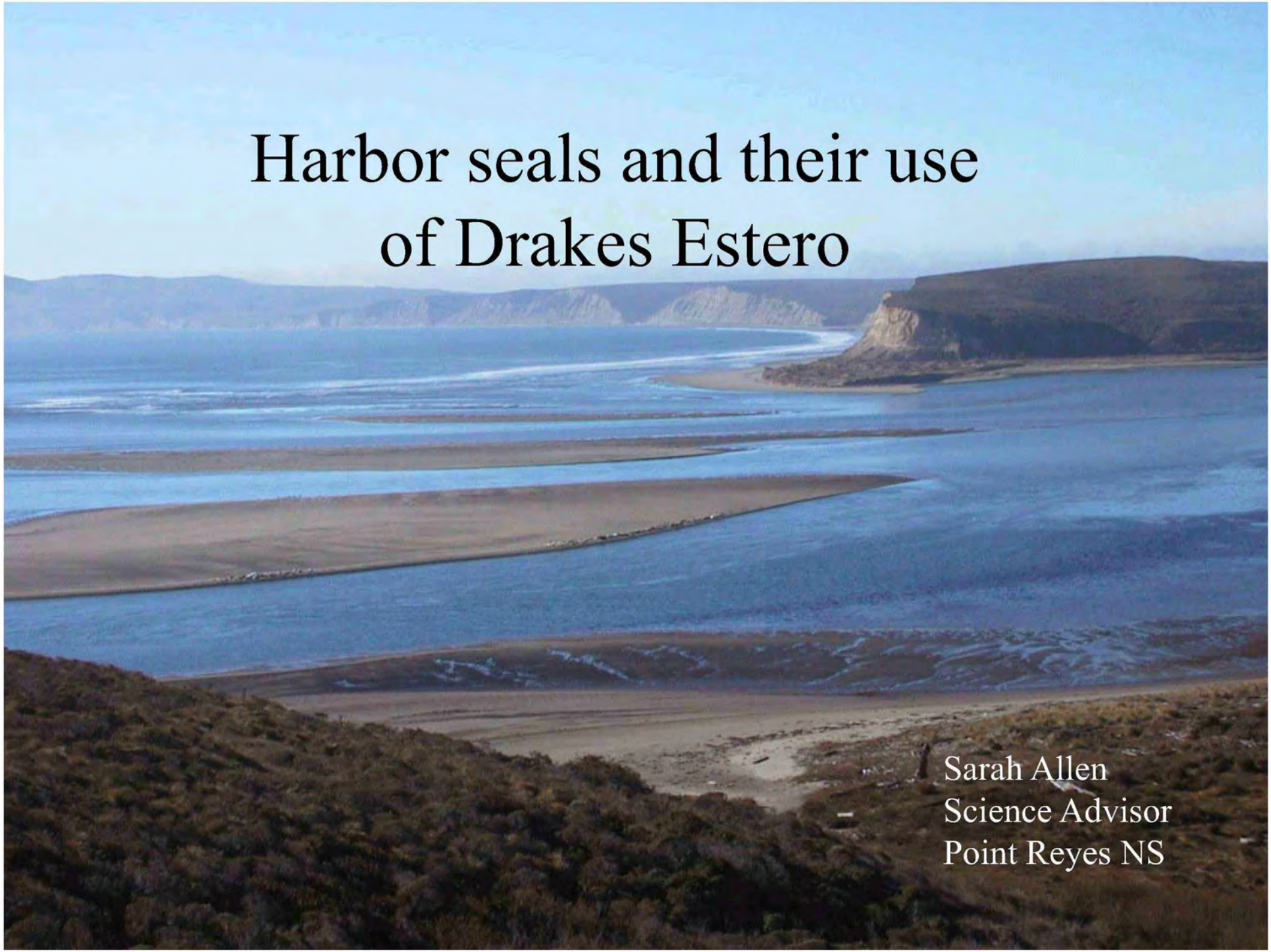
Harbor seals and their use of Drakes Estero



Sarah Allen
Science Advisor
Point Reyes NS

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Outline

- Regional significance
- Daily activity patterns
- Seasonal patterns
- Spatial use
- Population trend
- Disturbance

Sources of information on Drakes Estero

- Baseline study of all haul outs in Point Reyes

  Allen and Huber 1982-83 and 1983-84

- Human interactions

  Allen and Huber 1983-84

- Movement and activity pattern study 1985-88

  Allen Miller 1988

- Monitoring 1996-2009

  NPS pinniped monitoring database

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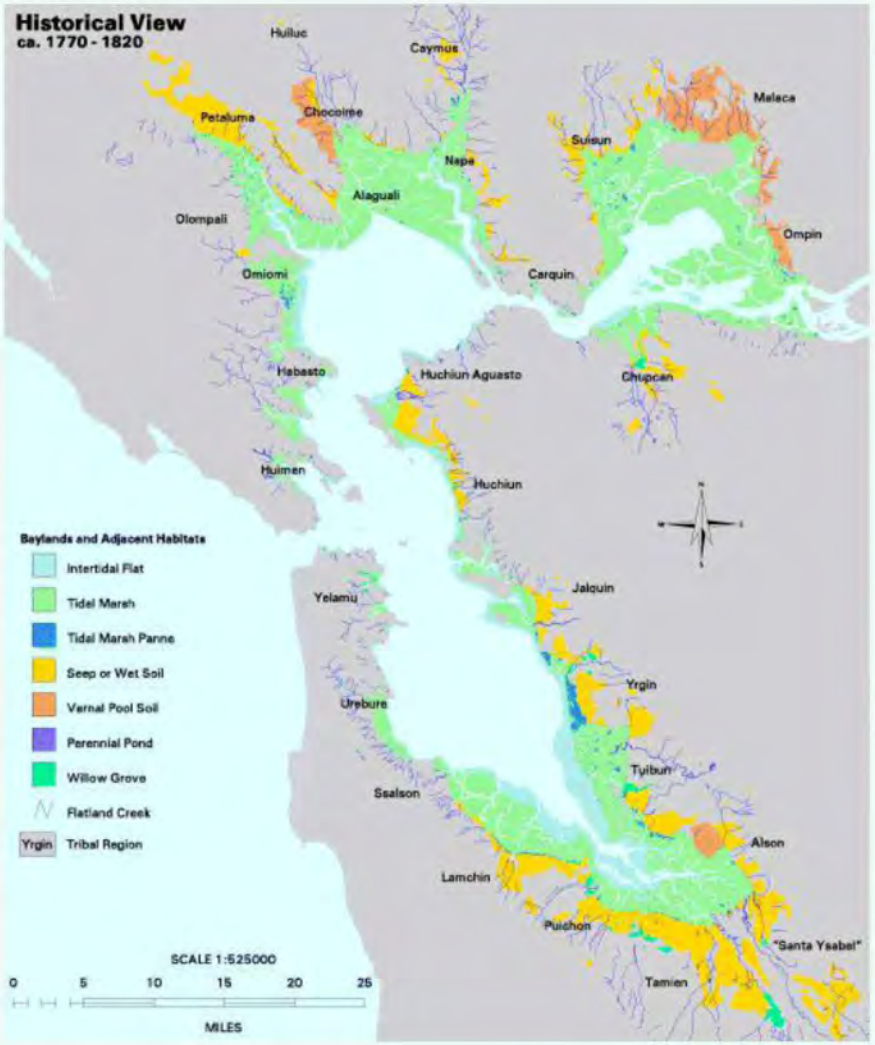
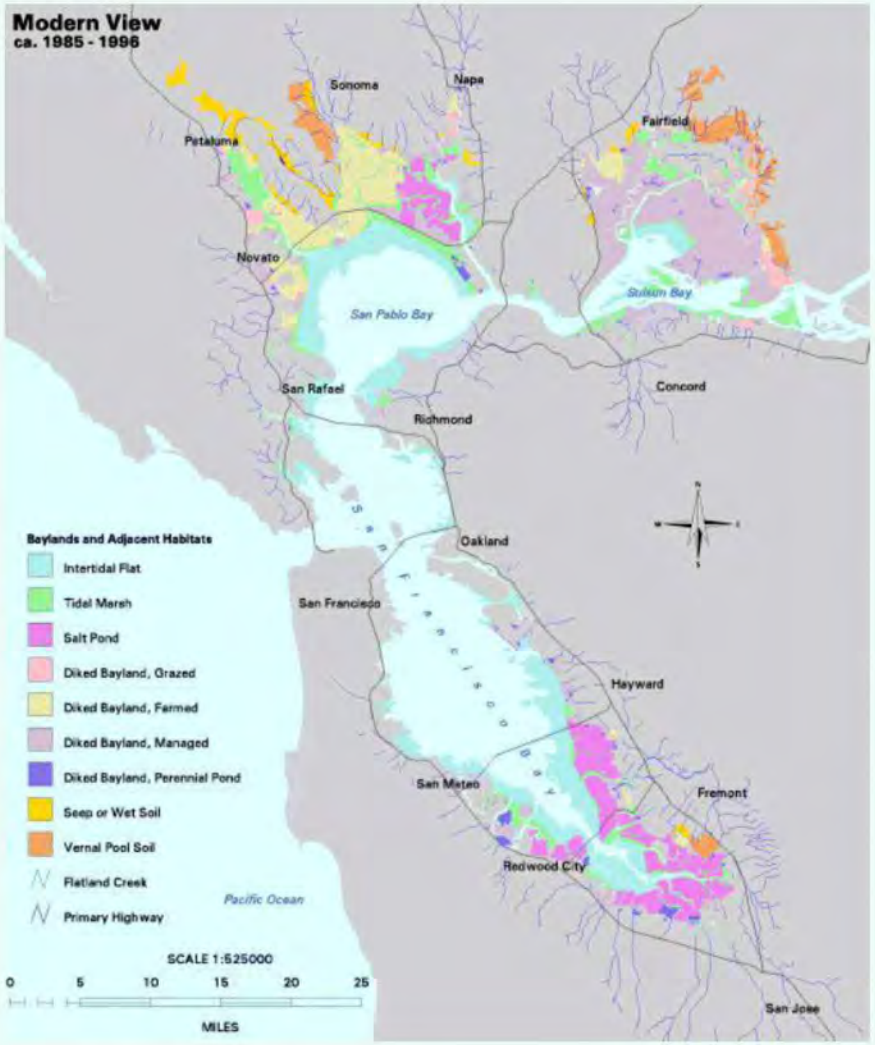
Urbanization of San Francisco Bay





Maps from the San Francisco Estuary Institute

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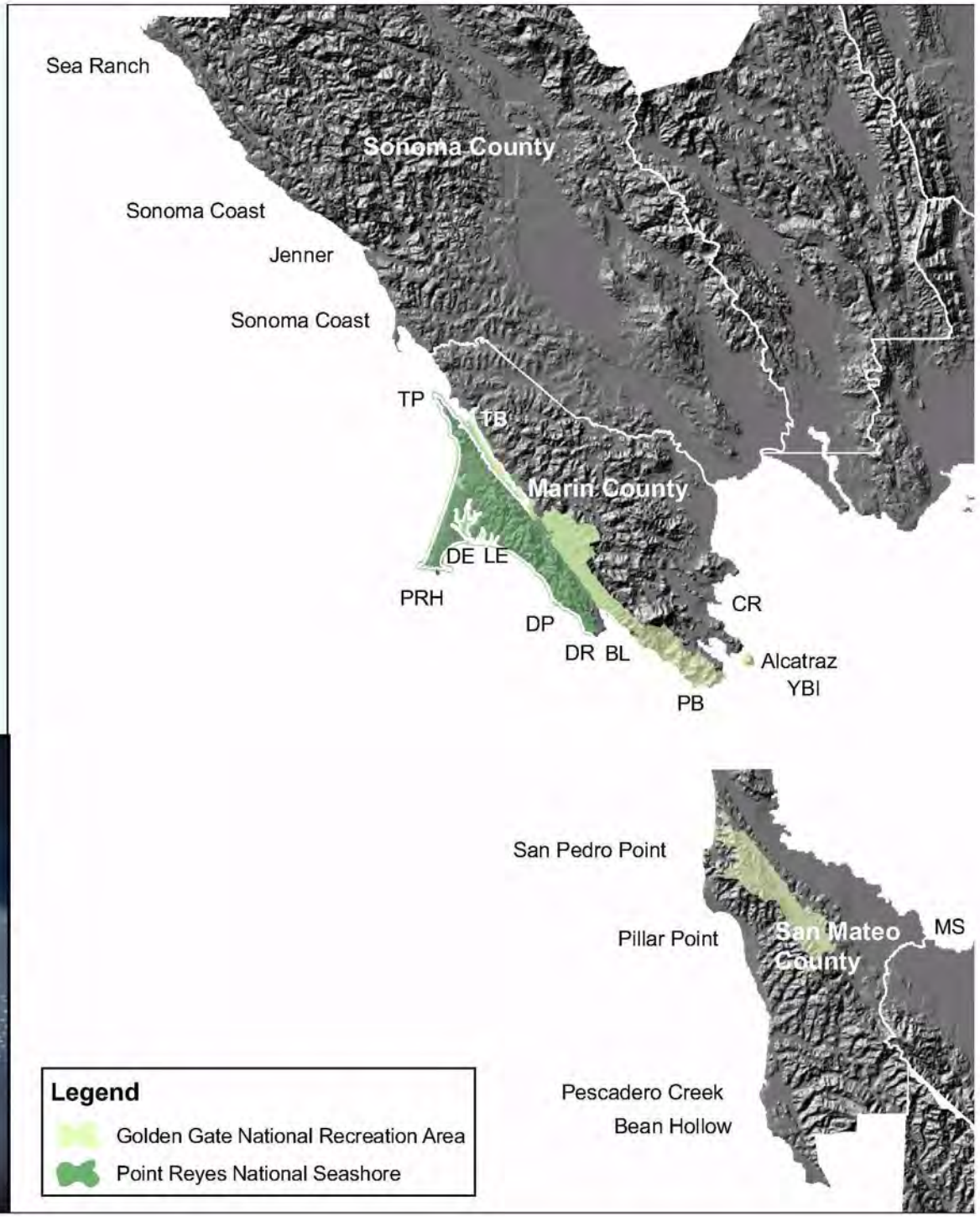
Regional harbor seal haul out sites

Marin County colonies = @ 20% of California mainland population (Lowry et al. 2005)



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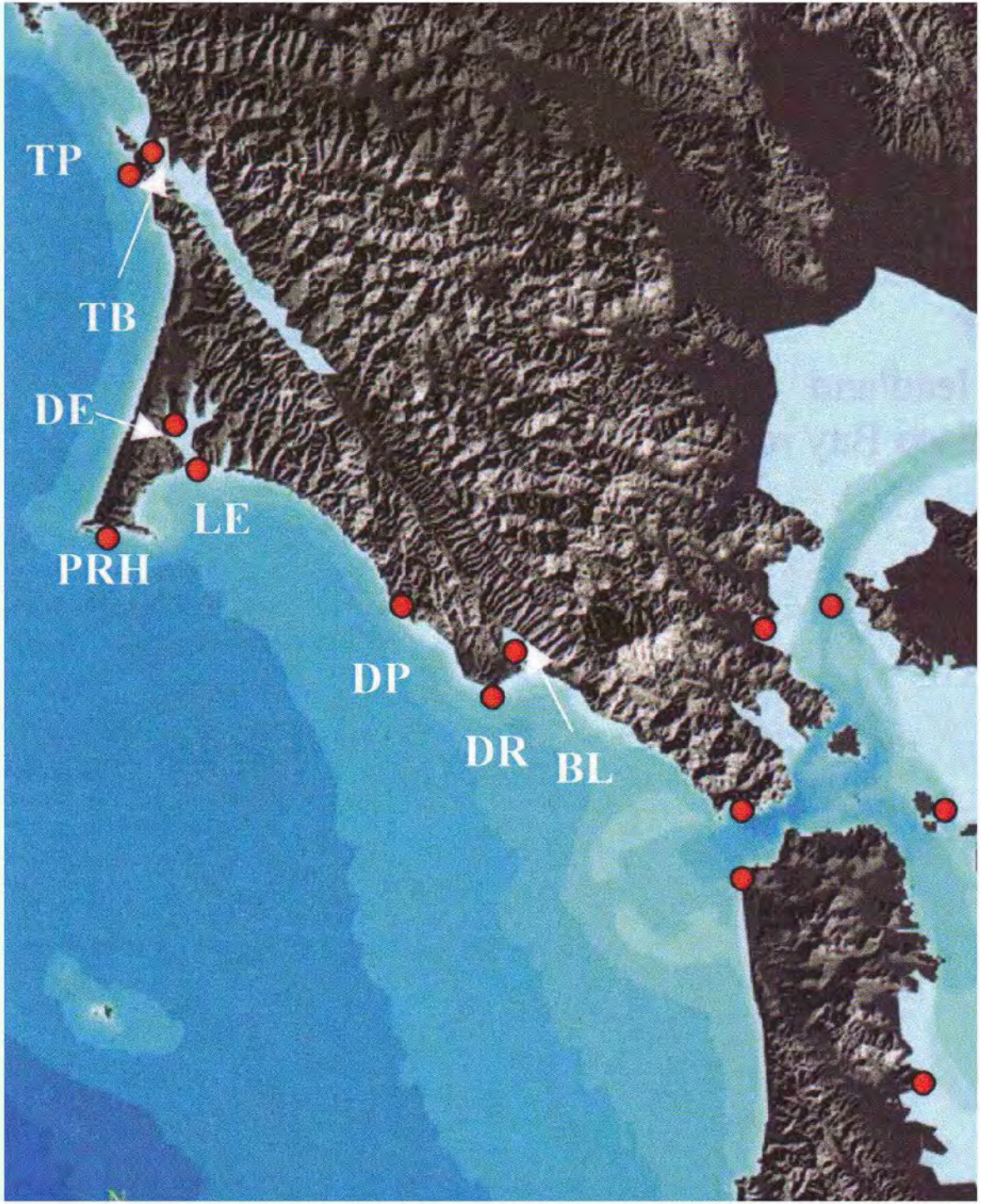
Marin County Colonies

DE accounts for
24-30% of total seals
29-33% of total pups

(from NPS annual reports)



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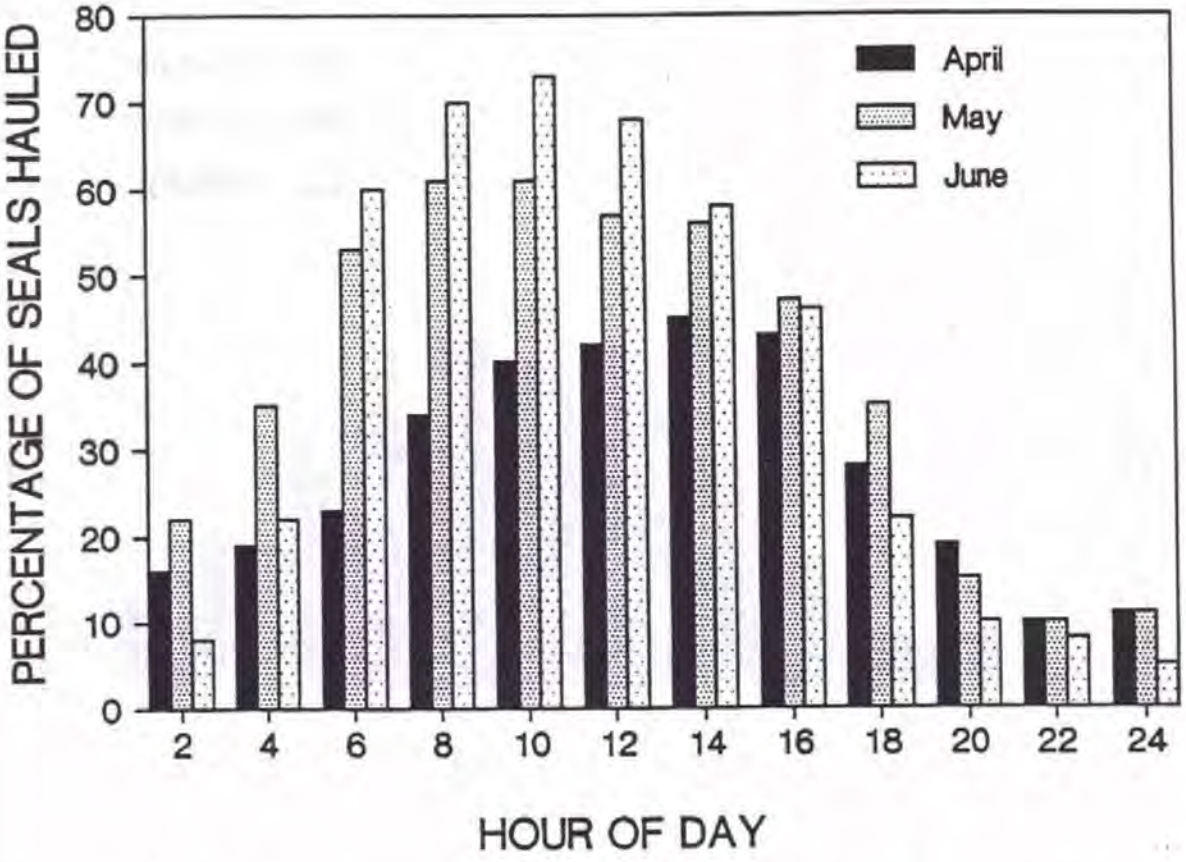
Harbor seal activity patterns in Drakes Estero

Many factors influence seal haul out patterns elsewhere: Loughlin 1978, Newby 1973, Slater and Markowitz 1983, Yochem et al. 1987, Jeffries 1986, Harvey 1987, Watts 1996, Thompson et al. 1997, Grigg et al. 2002, Lowry et al. 2005.

Daily Pattern
- Time of day
- Tide
- Hours per day

Seasonal Pattern
- Breeding (March-June)
- Molt (July-August)
- Non-breeding (Sept-Feb)

Daily patterns



Percentage of radio-tagged seals hauled out by hour of day for the months April –June. Regardless of season, the largest number of seals hauled out from 0500-1600 hr. Similar patterns seen by Yochem et al 1987, Harvey 1987.

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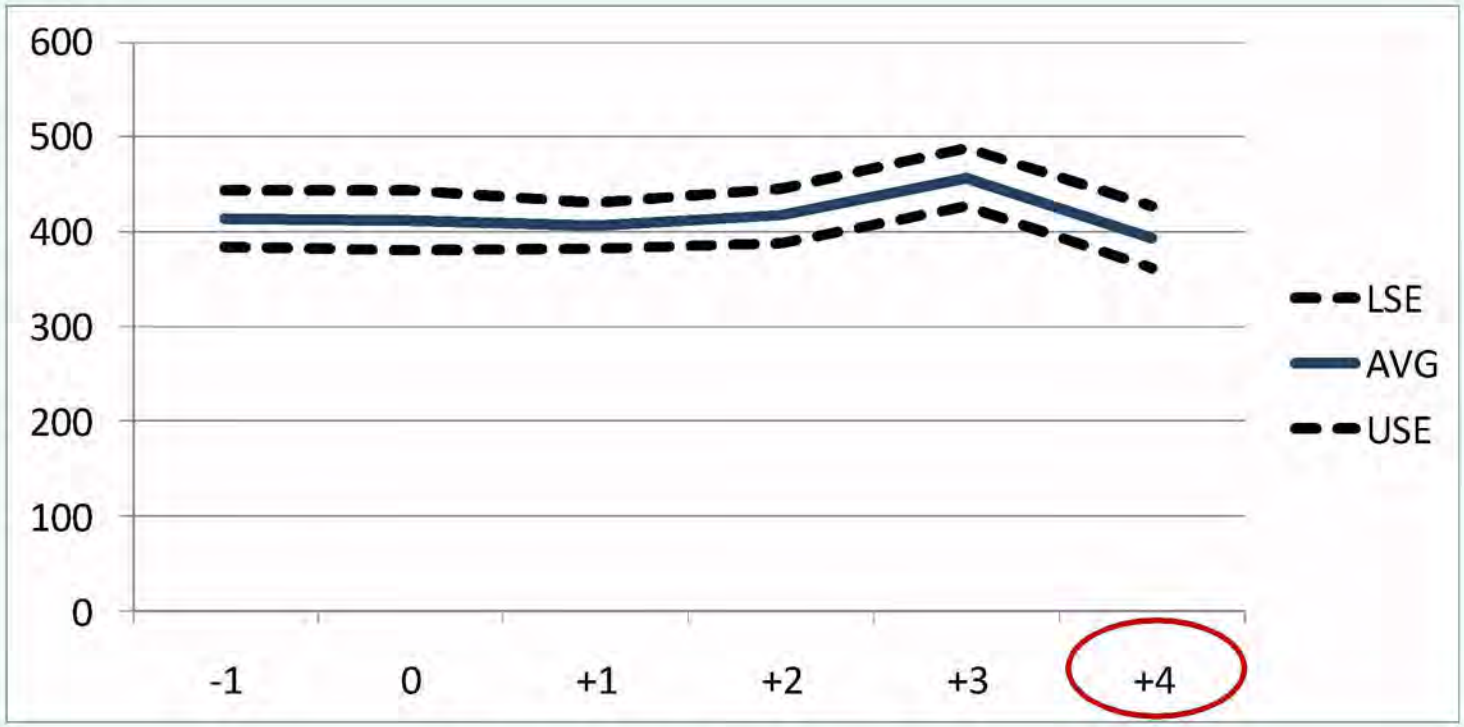
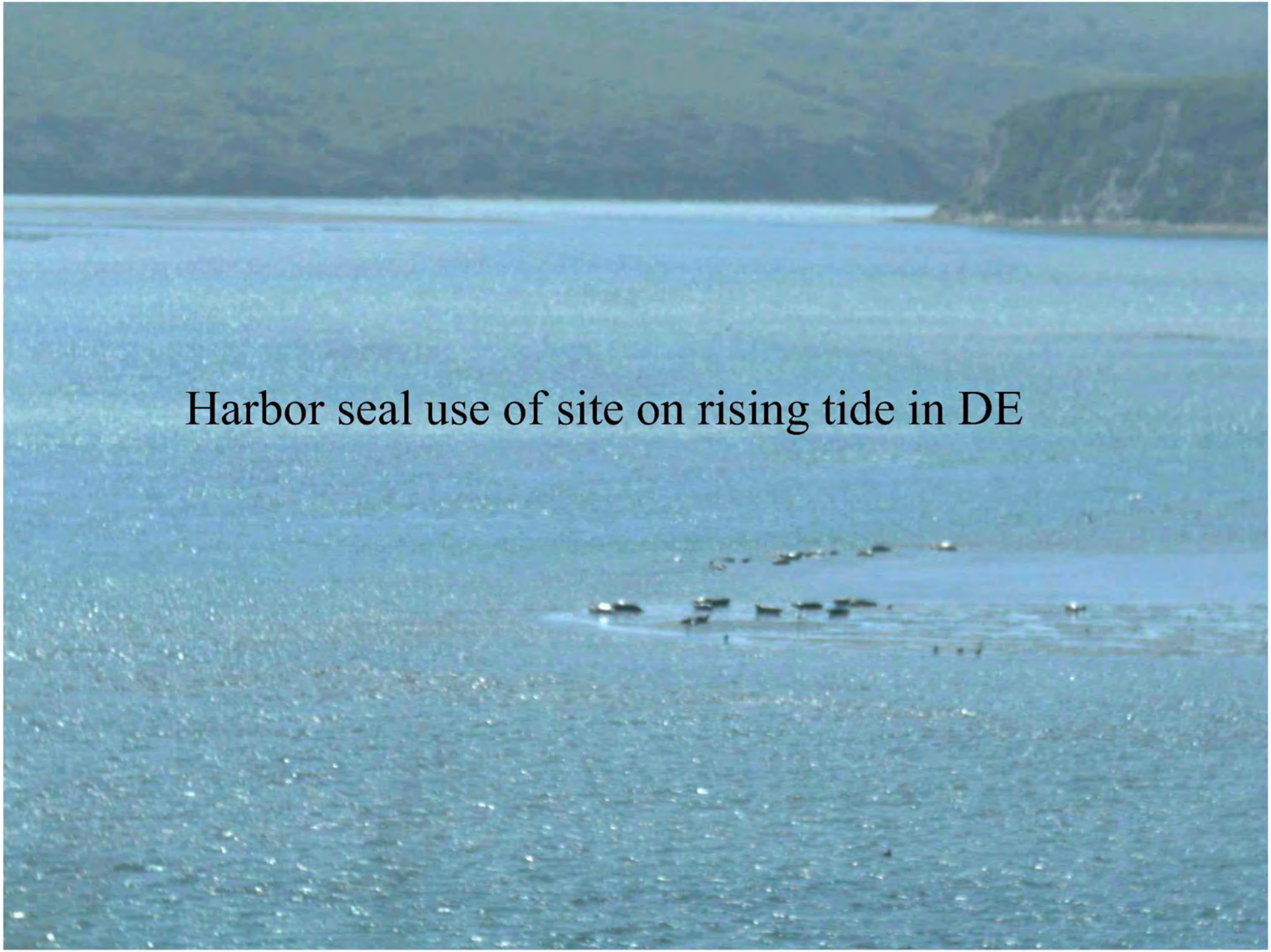
Daily patterns

More seals hauled out relative to tide from -1 hr before to +4 hours after low tide. After +4 hours, numbers drop off. Similar pattern seen by Stein 1989, Harvey 1987.





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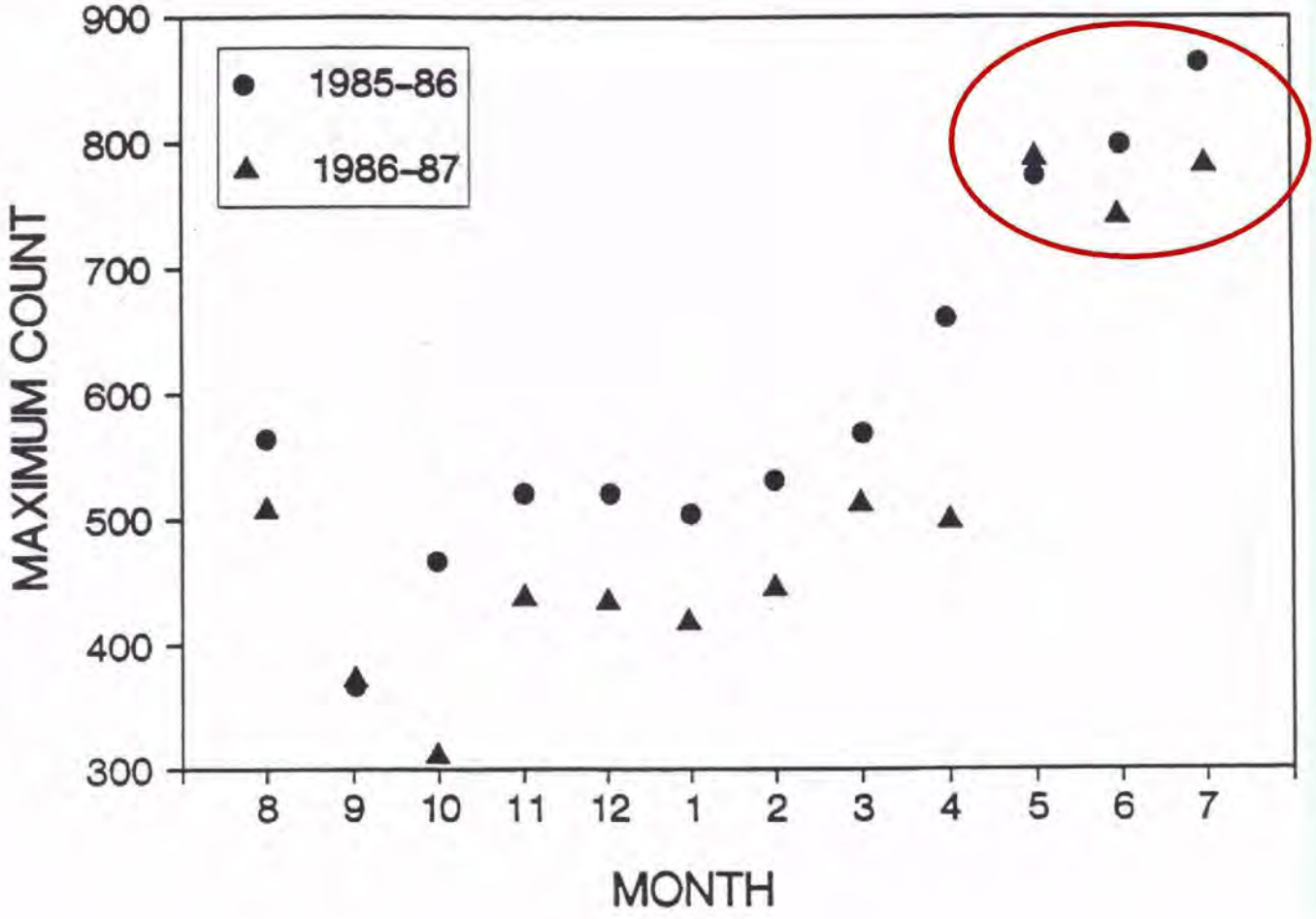
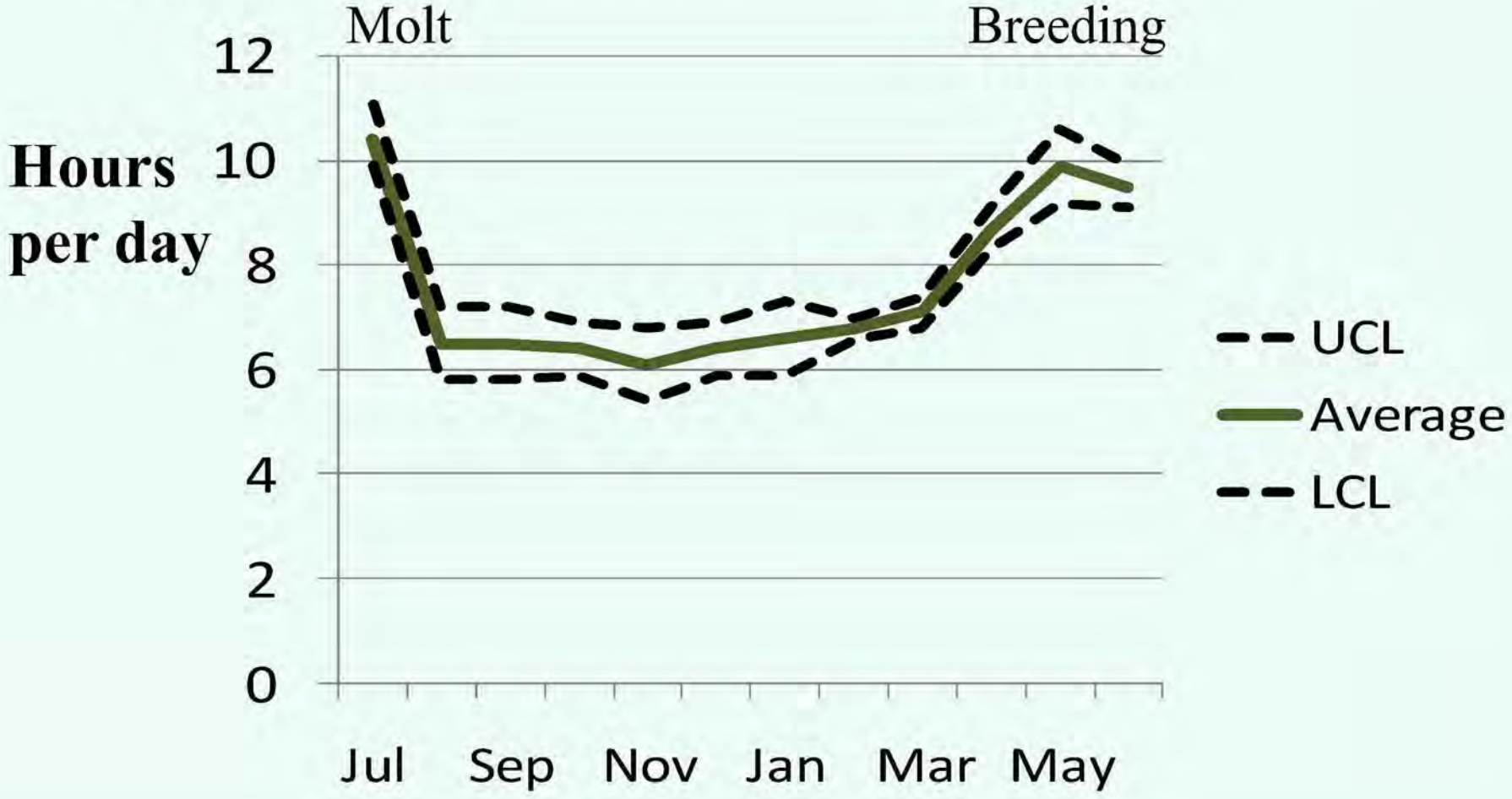
Seasonal Patterns

Monthly maximum number of seals counted between August 1985 and July 1987. Similar to Yochem et al. 1987, Harvey 1987, Suryan and Harvey 1999)



Seasonal Patterns

Average hours per day that radio-tagged female seals hauled out at Drakes Estero. Similar results to Stein 1989, Harvey 1987, Huber et al 2001.



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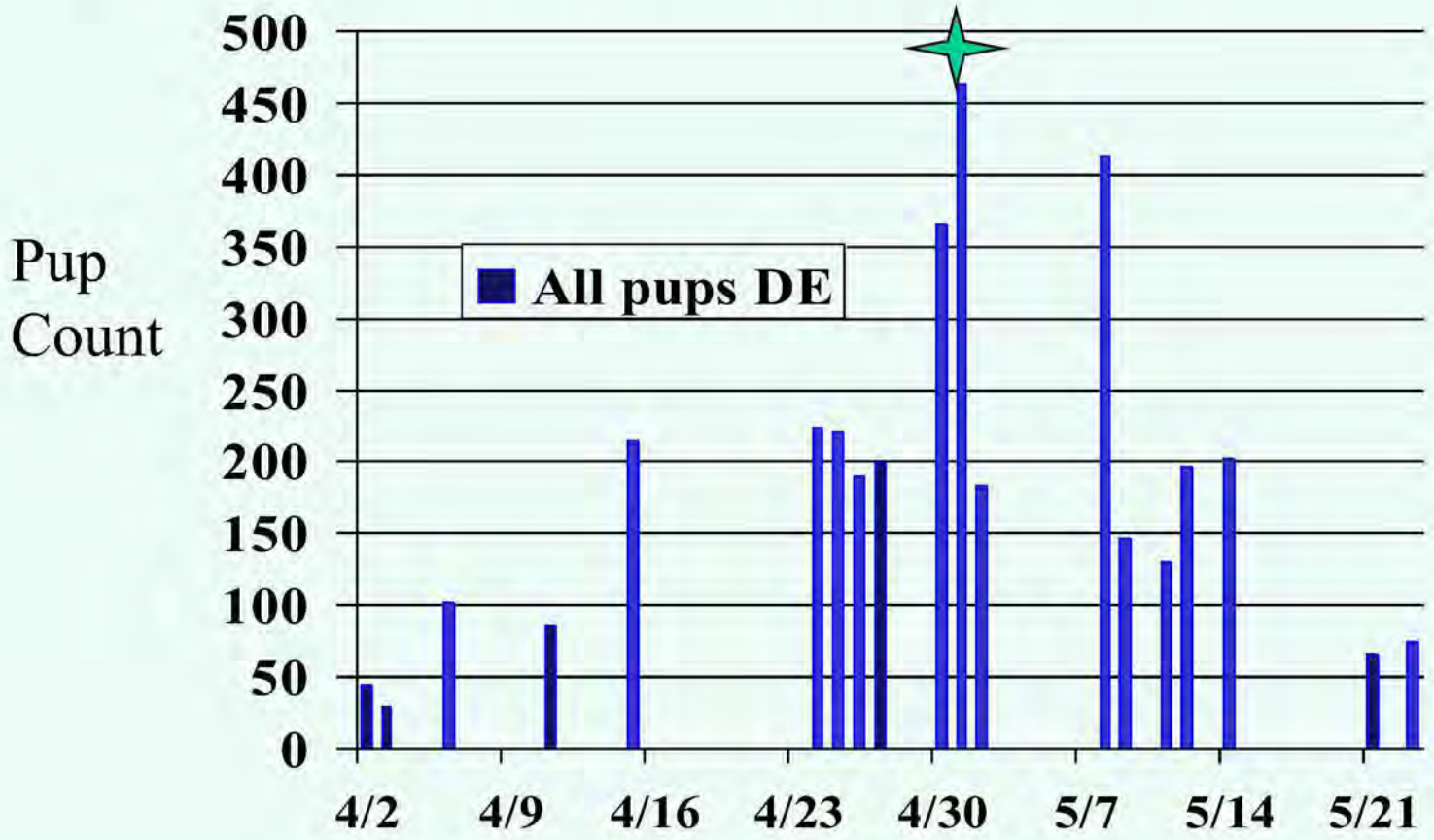
First Pups

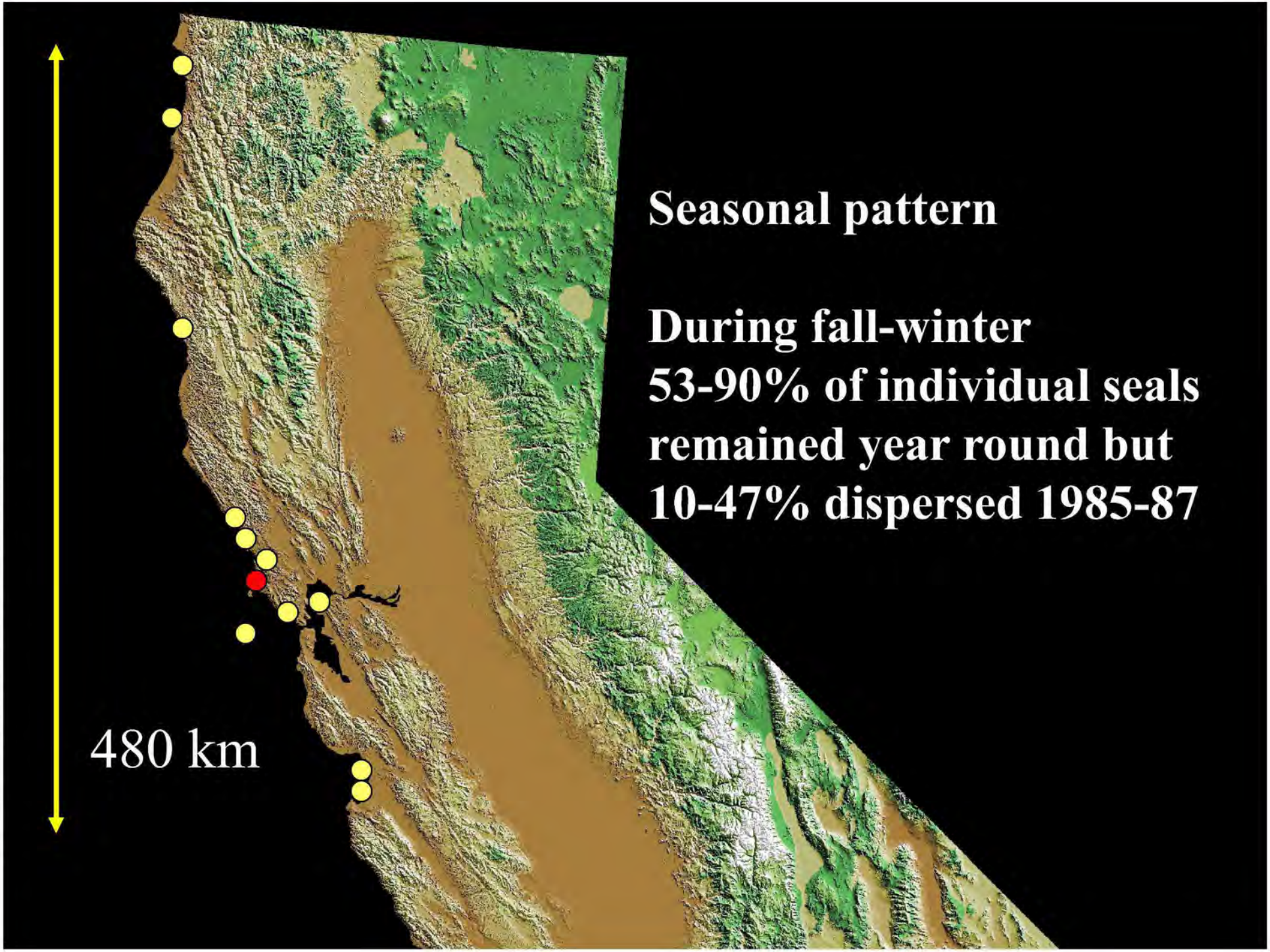
Date of first pup observed in the season by location, 2000–2008. (From NPS Annual Report 2009).

Year	Date	Location
2000	March 14	Point Reyes Headland
2001	March 16	Tomales Bay
2002	March 3	Drakes Estero
2003	March 27	Bolinas Lagoon
2004	March 20	Double Point
2005	March 6	Drakes Estero
2006	March 9	Double Point
2007	March 2	Double Point
2008	March 16	Bolinas Lagoon

Pupping Season

Regardless of year, peak pup count for DE and region is between last week of April and first week of May. Proportion of pups is @ 0.3 regardless of year. (Example from 2004 NPS database).





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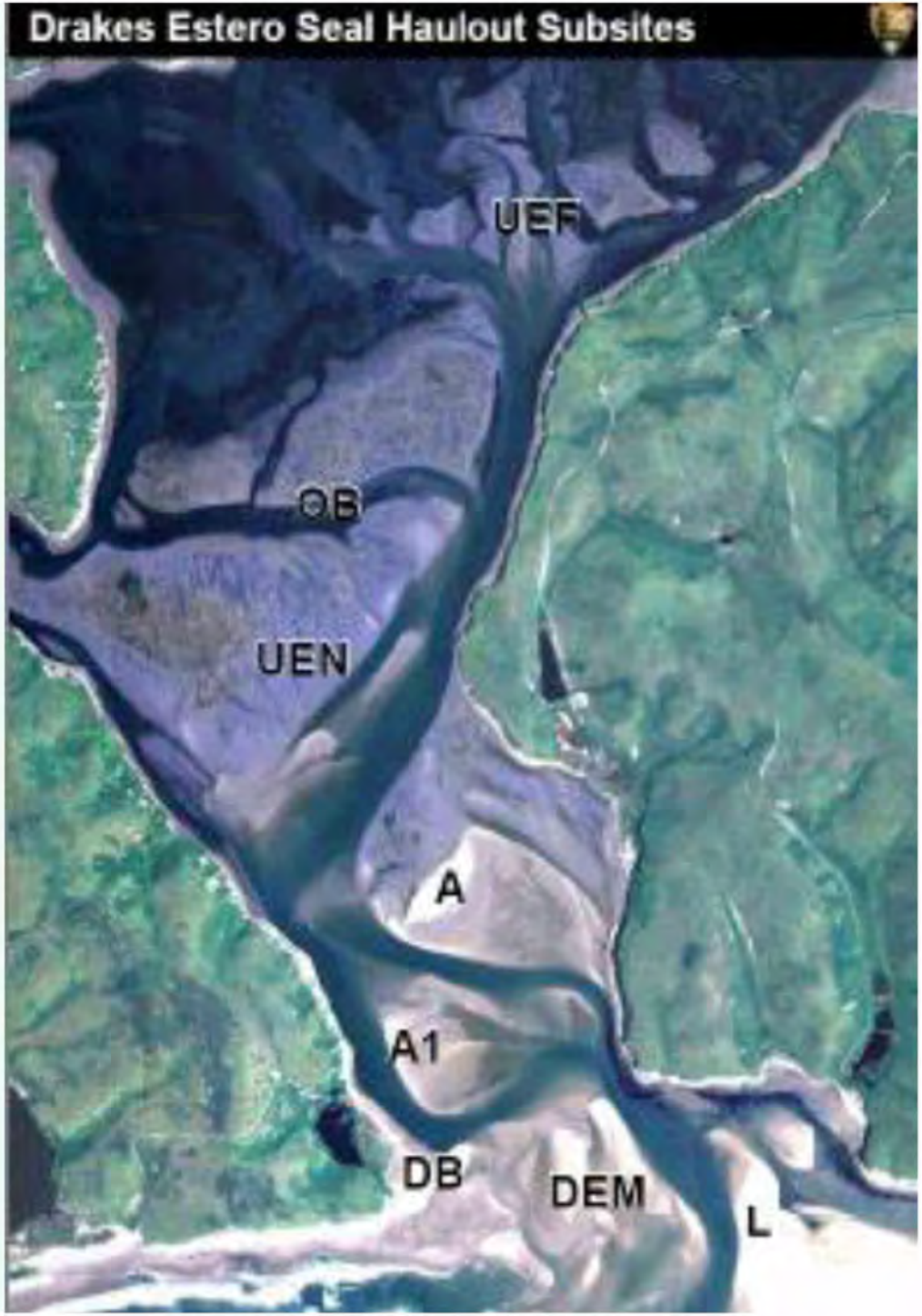
Spatial Patterns

Upper - UEN, OB, UEF
Middle -A, A1
Lower – DB, DEM, L

Isolated sandbars
A before 2003,
A1, UEN, OB, UEF, DEM

Attached to mainland
L, DB, A later after 2003



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Spatial Patterns

Females preferred isolated sand bars (A, A1 and U (includes UEF, OB and UEN) significantly more than sites attached to mainland (L). Segregation of sexes only occurred during the breeding season. This pattern persists to the present. Segregation seen at other sites by Knudtson 1977, Stein 1989, Slater and Markowitz 1983.

	Breeding Location			
Sex	A	A1	L	U
Female	55	76	14	52
Male	20	9	21	14

$X^2 = 33.55$

$p < 0.0001$

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Spatial Patterns

Individual seals, particularly females, displayed strong within-site fidelity during the breeding season and remained entirely within DE for the first 2 weeks after birth. Similar to other sites seen by Stein 1989, Thompson et al. 1994).

Photo Judy Bourke

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Habitat change over time

Channel

Channel absent

1986

2009

californiacoastline.org

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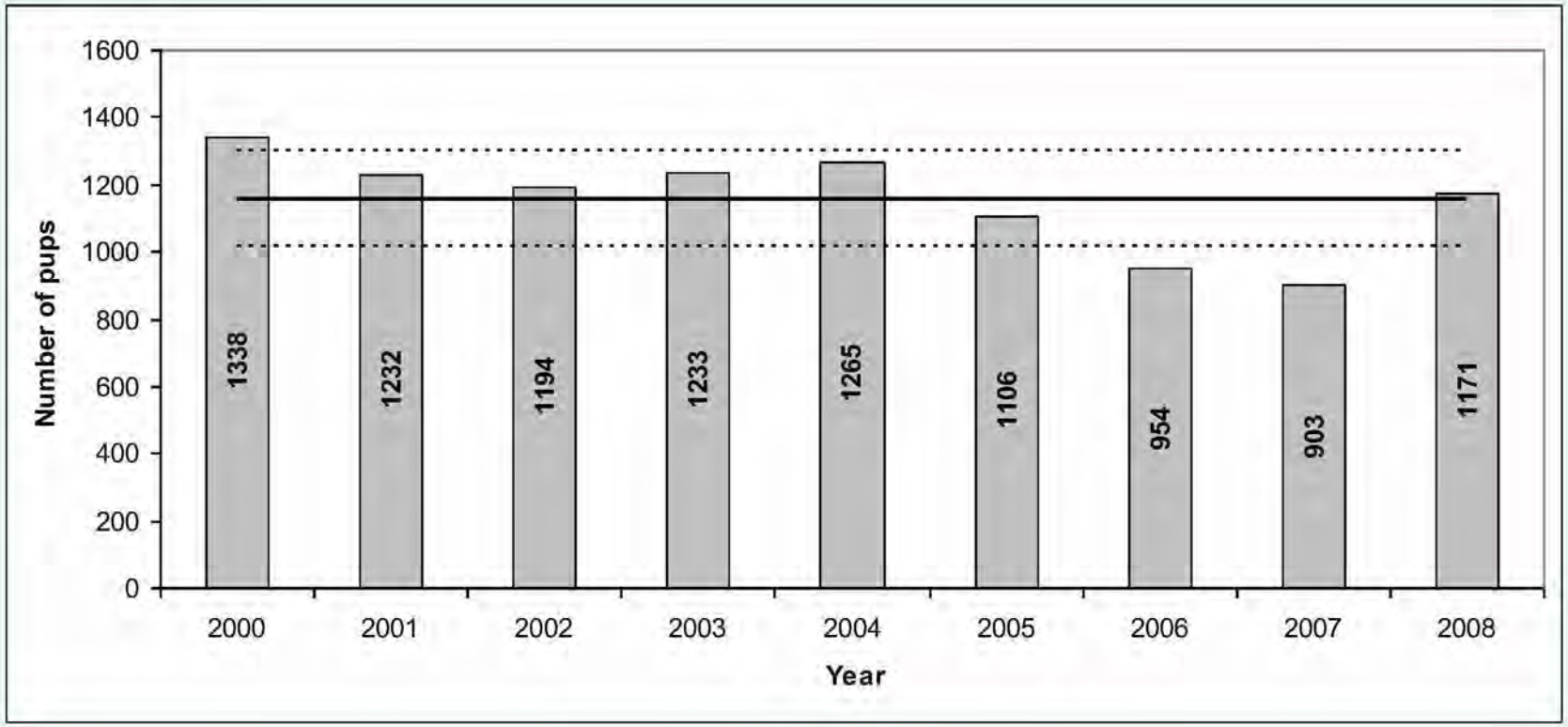
Population Trend

Maximum harbor seal pup counts for 2000–2008 at Marin County locations. The solid line on the graph represents the mean of the maximum pup counts from 2000-08 (mean = 1,155.1) and dashed lines represent one standard deviation from the mean (SD = 143.9; from NPS annual report 2009).



Disturbance

Defined by MMPA

The term " harassment" means any act of pursuit, torment, or annoyance which—

(i) has the potential to injure a marine mammal or marine mammal stock in the wild. Level A Harassment

(ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Level B Harassment

NMFS prohibits

The negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in disturbing or molesting a marine mammal.

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Disturbance potential effects on pinnipeds

Short-term – direct

- Disturb resting period by visual, sound or smell cues from human actions (Newby 1971, Johnson 1977, Allen et al. 1984, Suryan and Harvey 1999)
- Disrupt seals in water foraging or mating (NAS 2009)
- Pup separation and potential mortality (Johnson 1977, Kenyon 1972, Lawson&Renouf 1987, Jansen et al. 2003)
- Temporary displacement to subprime habitat (Ragen 1999, Stevens and Boness 2003)

Long-term – indirect

- Reduced usage/abandonment (Bartholomew 1949, Newby 1971, Kenyon 1972, Schulmeister 1981, Allen&King 1991, Richardson 1995)
- Shift to nocturnal haul out (Paulbitski 1975, Grigg et al. 2002)
- Lower pup production (Slater&Markowitz 1983, Allen&Huber 1984, Ragen 1999)
- Reduced fitness from displacement from foraging areas, chronic stress, reduced nursing or resting of pups
- Permanent shift to subprime habitat leading to changes in demography and reduced population (Gerrodette and Gilmartin 1990)

Seal responses to disturbance on land

- Head alert
- Flush to water
- Enter water

Pinniped Response to Disturbance

Head alerts – vigilance time in search of a predator

- Varies with sex, age, location (Sullivan 1979)
- Females with pups scan more often than other seals (Suryan & Harvey1999)
- Tomales Bay seals were disturbed more often and alerted significantly more times than other sites in Marin (Allen and Huber 1984)

Distances triggering response on land

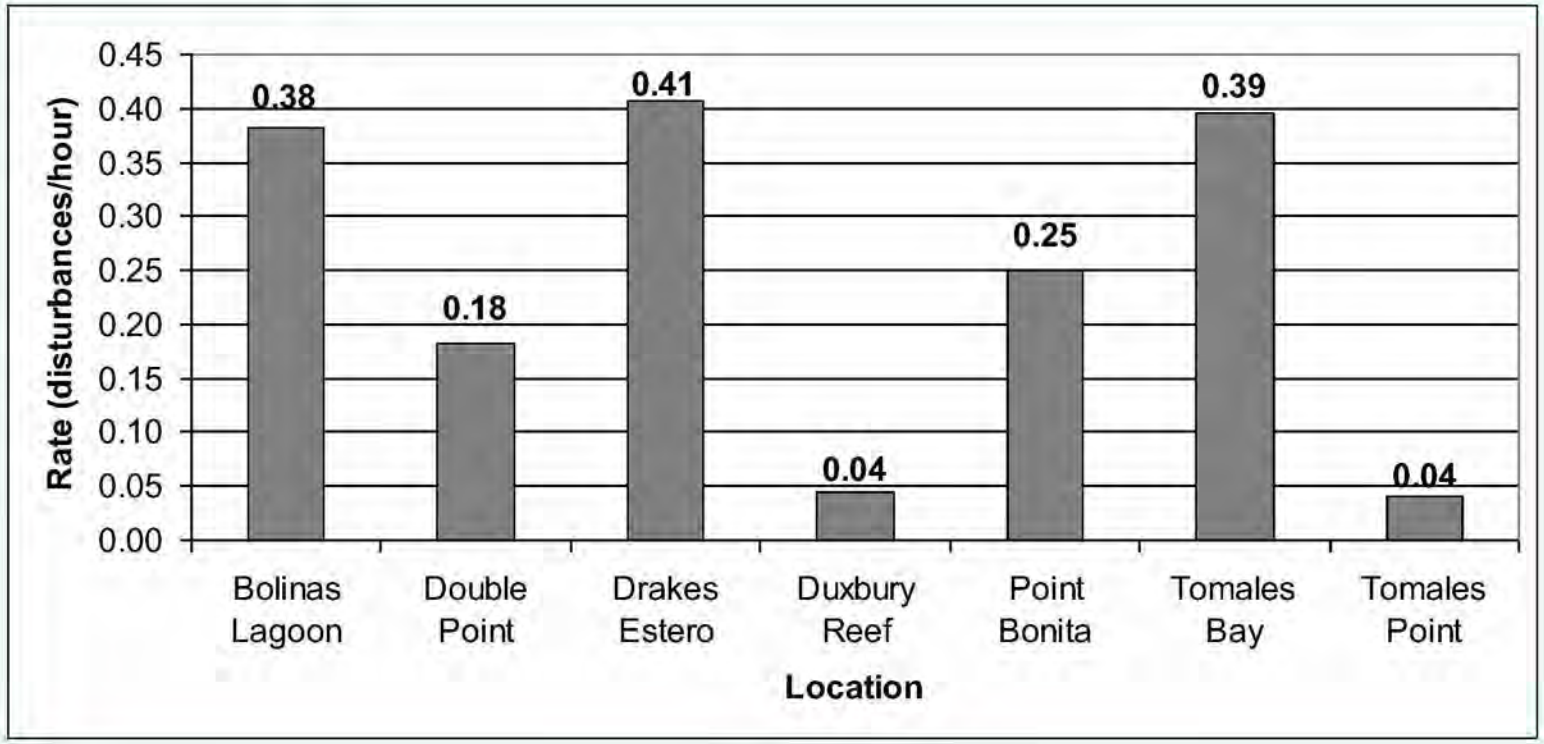
- Varies with species and population, and source
- NMFS guidelines = 300 ft (90 m)
- 50-600 ft (15-183 m) SF Bay (Alcorn and Fancher 1980)
- 80-500 m for small boats (Johnson and Acevedo-Gutierrez 2007)
- Within 200 m 75% of seals flushed (Jansen et al. 2003)
- 28-260 m seals flushed (Suryan and Harvey 1999)

Recovery time

- Varies with species and location
- @ 28 min +/-21 for seals to rehaul in Bolinas (Allen et al. 1984)
- Counts typically do not return to pre-disturbance levels within the same tidal cycle – (Suryan and Harvey 1999)

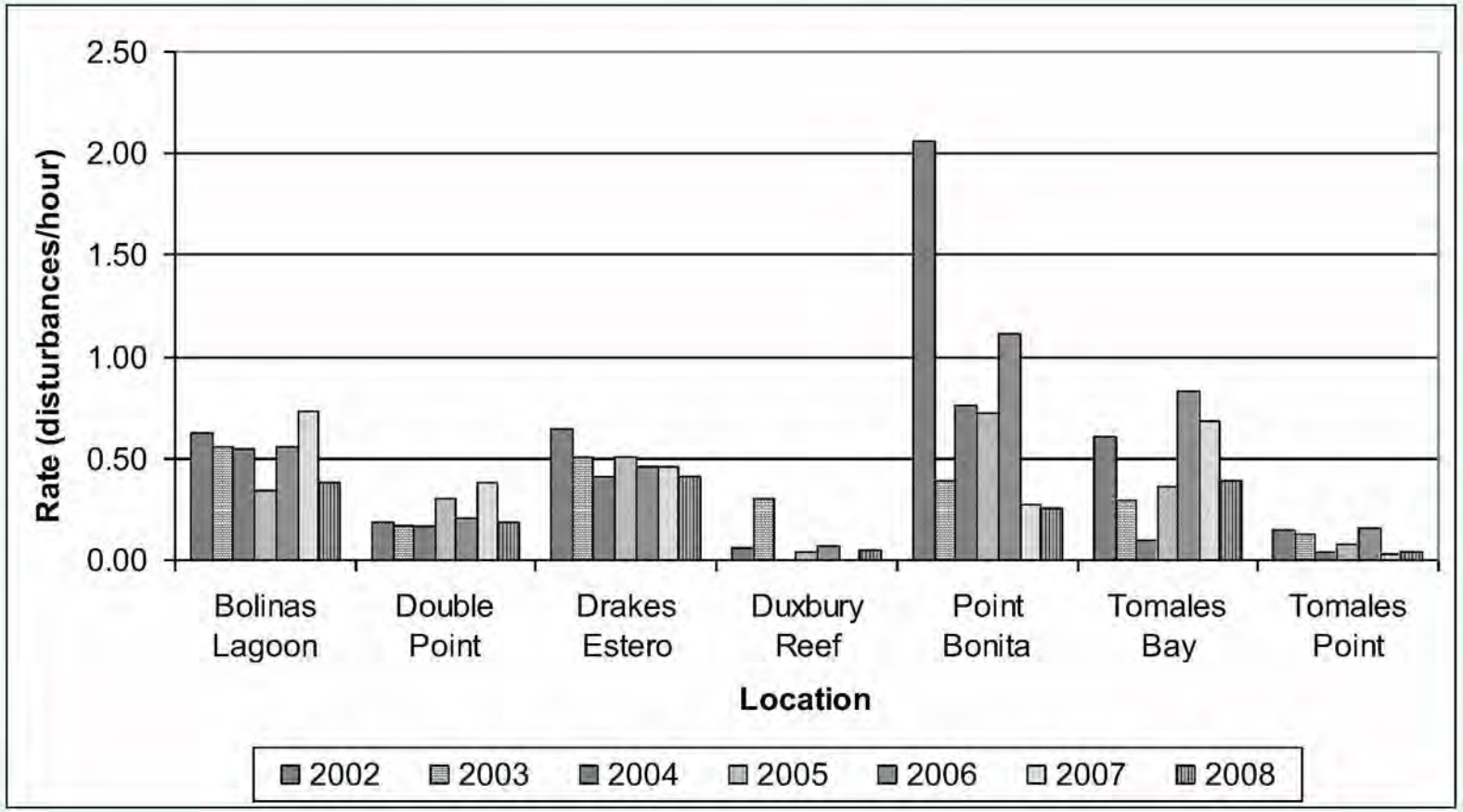
Disturbance Rate

Rates of disturbances per hour at Marin County locations from March through July 2008. Only actual disturbances (head alert, flush, flush water) were used and survey time was based on observation time for all complete surveys (with or without disturbances). (From NPS Annual Report 2008).



Disturbance Rate

Rates of disturbances per hour at Marin County locations 2002–2008. Only actual disturbances (head alert, flush, flush water) were used, and survey time was based on observation time for all complete surveys (with or without disturbances). (From NPS Annual Report 2008).



Predators disturb seals

Human activities at Point Reyes disturb seals

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Mariculture activities that disturb seals in DE

- Bags/equipment on or adjacent to haul outs
- Boat traffic
- People adjacent to haul outs tending equipment for extended periods

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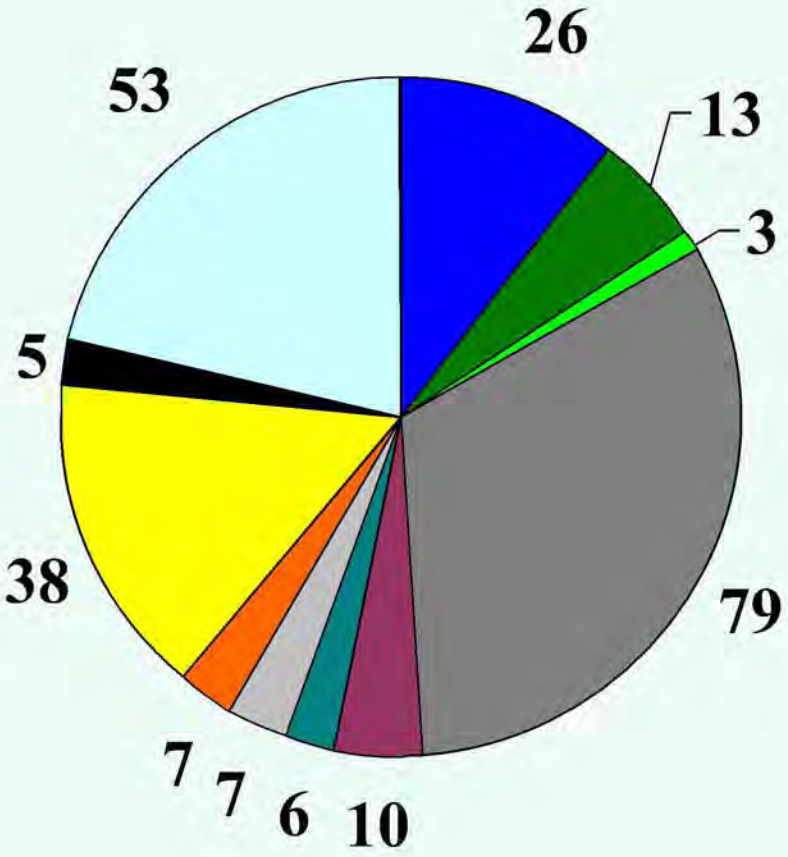
Number of disturbances by source at Drakes Estero
Breeding seasons 2000-2009



- aircraft
- clammer
- fisherman
- human
- motorboat
- non-motorboat
- researcher
- coyote
- bird
- other
- unknown

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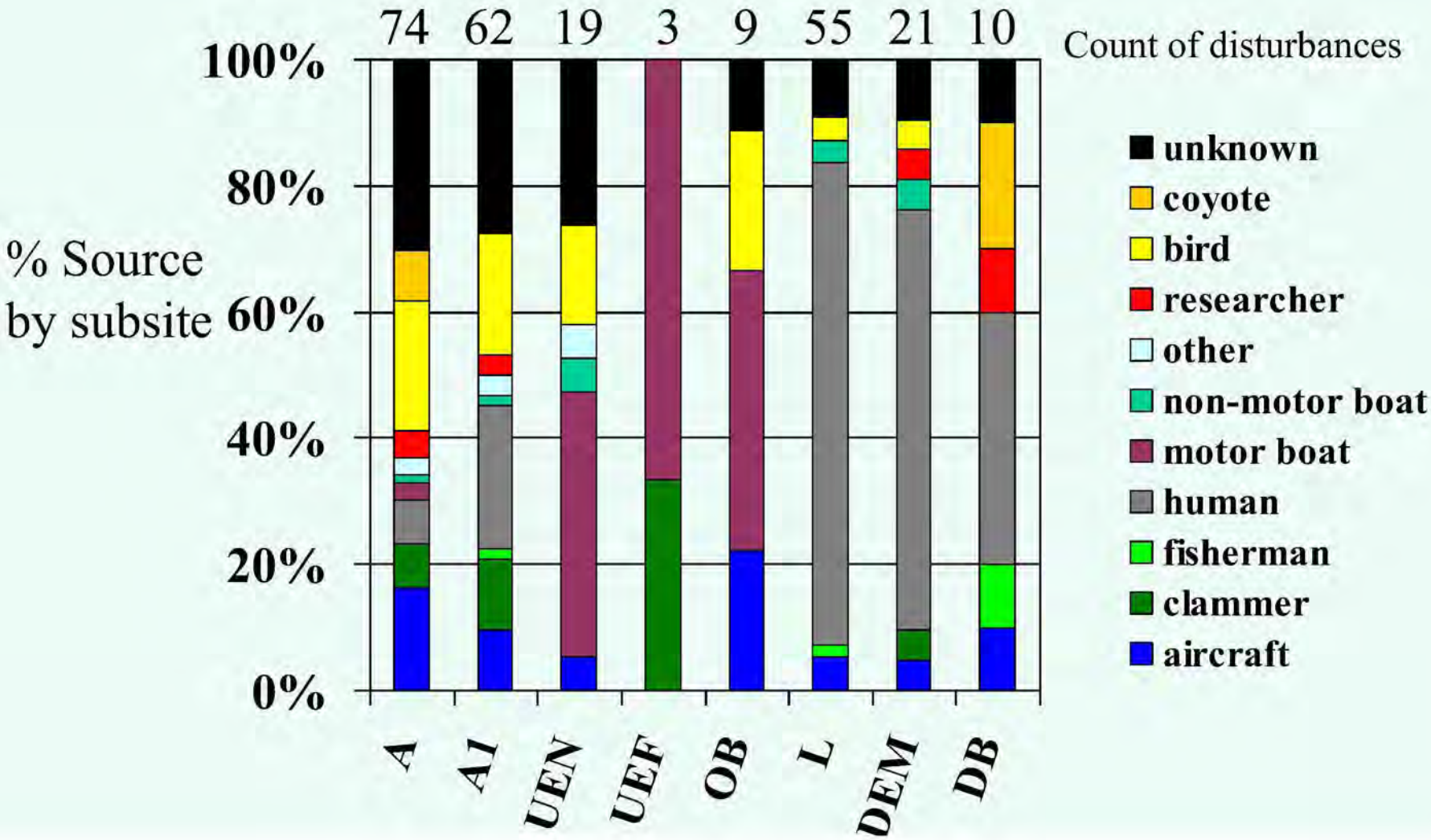
Sources for disturbance by subsite for breeding seasons 2000-2009



Summary

- DE is a significant colony in the state, largest in Marin County
- More seals are present during breeding season
- Seals haul out more hours per day during the breeding
- Peak pupping occurs the last week of April, first week of May
- Females prefer isolated sandbars for breeding
- Disturbance displaces seals
- More disturbances occur at Limantour – short duration
- Disturbances from mariculture at isolated sandbars – longer duration

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Acknowledgments

Farallones Marine Sanctuary Association
NOAA Fisheries
Gulf of Farallones National Marine Sanctuary
San Francisco State University students
Stewards of Coast and Redwoods
The Marine Mammal Center
Volunteers of Point Reyes Pinniped Monitoring

UEF
QB
UEN
A
A1
DB
DEM
L

Inclusion of 2008 harbor seal data into the analysis presented in Becker et al. 2009
Ben Becker, Dave Press, and Sarah Allen

Introduction
The National Research Council (NRC 2009) concluded that the data analysis for 1997-2007 presented in Becker et al. 2009 may "serve as indicators of potential negative interactions between oyster harvest and seal attendance at these subsites" (NRC, p. 32). However, the NRC suggested that inclusion of the 2008 data could "call into question" the continued significance of the results. Here, we include the 2008 data in the model using more robust methods than those found in Becker et al. 2009, and show that the new data are fully consistent and supportive of the previously reported model with essentially no changes in model coefficients or significance. We extend the analysis to use an extension of Generalized Linear Models known as Generalized Estimating Equations (GEE) (Venables and Ripley 2002, Faraway 2006, Zuur et al. 2009) that explicitly model the temporal autocorrelation of multiple harbor seal counts taken during the breeding season within each year. The GEEs also allow flexible distributions for the entire dataset (which was overdispersed) and for the within year counts. GEEs are therefore a form of mixed-effects modeling.

Dataset
Same as that used in Becker et al. 2009, with the addition of:

1. Oyster harvest for 2008 was 437,000 lbs (NRC 2009, p. 49).
2. Breeding/pupping season subsite counts at OB and for the entire lower estero (subsites A, A1, L, DBS, and DEM) for 2008 were included. These underwent the same QA/QC described in Becker et al. 2009 and are derived from the NPS harbor seal monitoring database (Table 1).
3. We modeled years since ENSO as a "log(years since ENSO+1)" because observational and theoretical evidence suggest that the ENSO effect should taper off and not be linear.
4. GEEs were run in R 2.9.0 using the "geeglm" function in the "geepack" library with year as the grouping variable to account for within year autocorrelation of counts at the same subsite (id = "fYear") and the correlation structure set as autoregressive ("ar1") since the counts were during a one month period and counts closer together should have higher correlation since the counts generally rise, peak, and fall during the April 15 – May 15 period. We used an initial data distribution of poisson, but the GEE is non-parametric and only uses this as a starting point.
5. Since the GEE functions in R do not allow for a negative binomial distribution, to control overdispersion we modeled the rounded square root of total counts at OB with a poisson distribution.

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Table 1. Dates of 2008 surveys included in the new analysis and total counts (adults+pups) at subsite OB and for the Lower Estero (density-dependence control).

Date	OB_Total	LowerTot
4/15/2008	71	469
4/21/2008	98	372
4/25/2008	121	458
4/29/2008	86	456
4/30/2008	107	480
5/2/2008	97	616
5/9/2008	0	508
5/10/2008	81	434
5/13/2008	65	477

Results

Residual plots versus model predictions showed no issues with the model (Fig. 1). Overall, the results are similar to Becker et al. 2009, with both ENSO and Oyster harvest best explaining seal use at OB (Table 2). Lower estero total (density dependence) was not important and the P value ranged from ~ 0.26 - 0.42, depending on whether daily or annual density dependence was used. Overdispersion was 1.85, and 1-step within-year temporal autocorrelation was 0.43. Both of these parameters are incorporated into the model and used to correct the standard errors and P values. If an interaction between ENSO and oyster harvest is included, it is also highly significant (and oyster alone remains significant), but we do not report it here. The negative coefficient for oyster harvest of -0.45 is in this case a marginal estimate, meaning that the effects of multiple samples within each year have been removed. It therefore differs from the coefficient in Becker et al. 2009, which was conditional on all the samples within each year (Zuur et al. 2009). Further, the estimate is for the effect on the square root of OB counts, so for comparison with Becker et al. 2009, a fair comparison would be -2.10 (which is $-(1.45^2)$) for this conditional analysis versus -2.4 in the previous analysis.

Running the GEE without a transformation of counts at OB still results in similar significance of coefficients ($P < 0.03$ for oyster harvest), but overdispersion is quite large without the transform, and we therefore preferred the square root transform. See the Appendices for alternative forms of analysis that arrive at similar conclusions.

Table 2: Output from geeglm function in R. ENSO and Oyster harvest are both significant. Density dependence was not important and is therefore not presented in this model.

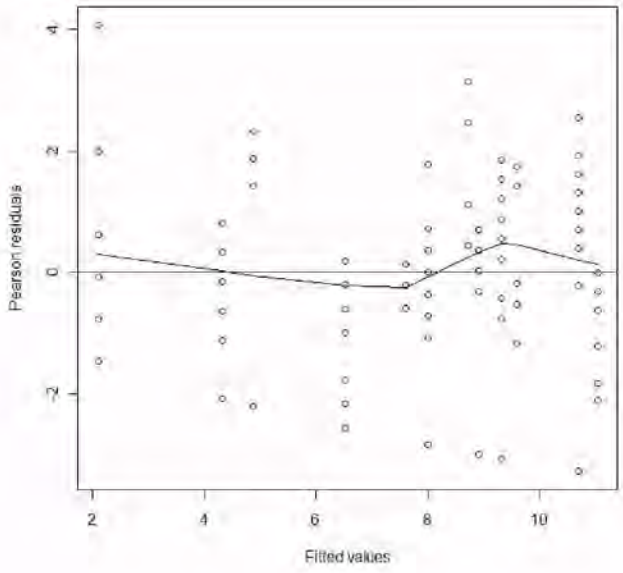
```
Call:
geeglm(formula = round(sqrt(OB.Total)) ~ log1p(ENSO.YRS) +
Oyster.new, family = poisson, data = may.08, subset = Year
< "2009", id = fYear, corstr = "ar1")

 Coefficients:
                 Estimate   Std.err  Wald Pr(>|W|)
(Intercept)      1.17e+00  2.36e-01 24.37  8.0e-07 ***
log1p(ENSO.YRS)  6.92e-01  1.42e-01 23.63  1.2e-06 ***
Oyster.new      -1.45e-06  4.99e-07  8.49   0.0036 **
---
Estimated Scale Parameters:
            Estimate Std.err
(Intercept)     1.85   0.239

Correlation: Structure = ar1  Link = identity

Estimated Correlation Parameters:
      Estimate Std.err
alpha    0.433  0.0984
Number of clusters:   12   Maximum cluster size: 15
```

Figure 1. Plot of residuals against model predictions for final GEE model. The model shows no structural issues with changes in variance or heteroscedasticity. Note that points are not jittered and thus many overlap, so actual n = 113.



Discussion

The additional year of data (2008) closely matches the patterns observed in the previously analyzed 1997 – 2007 dataset. In Becker et al. 2009, we suggested that a small increase in subsite use at OB in 2008 may have been associated with reduced disturbance at the subsite. However, it is now clear that in addition to fewer documented disturbances in 2008, harvest was also reduced in 2008 as well. The early oyster harvest predictions provided to us and used in the Becker et al 2009 paper estimated that the oyster harvest was increasing to ~497,000 lbs. in 2008). The reduction in actual harvest could conceivably be associated with less harvest activity near subsite OB. The updated model suggests that the 2008 seal count pattern at OB is similar to the 1997, and 2005-2007 years of higher oyster harvest levels (Table 2). This continued negative relationship in the model appears to be partially due to the fact that oyster harvest actually dropped slightly (by about 30,000 lbs) from 2007 to 2008 (NRC 2009).

Although the oyster harvest metric is certainly not fully representative of actual temporal and spatial mariculture activities in the Estero (NRC 2009), it nonetheless far improves the models presented in this report over ENSO and/or density dependence alone, suggesting a potential link between harvest activities and seal displacement at OB. As the NRC concluded for the data analysis for 1997- 2007 presented in Becker et al 2009, these models may "serve as indicators of potential negative interactions between oyster harvest and seal attendance at these subsites" (NRC, p. 32).

These results should be considered in light of the NRC's (2009) emphasis of Wursig and Gailey (2002) that there is a "need to consider potential loss of feeding and breeding habitat from shellfish and finfish farms, particularly given predicted increases in these facilities in nearshore environments."

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Acknowledgements

We thank the dedicated harbor seal monitoring volunteers and program managers.

APPENDIX I: Comparison of Generalized Estimating Equations (GEE) results with generalized linear mixed model (GLMM) and generalized linear model (GLM).

For comparison with the GEE presented above, we also used a generalized linear mixed model (GLMM), poisson distribution, with year as the grouping variable. The GLMM is less desirable than the GEE for this dataset, since the GLMM assumes within year count data are normal, and the within year autocorrelation is not autoregressive through the breeding season, but rather lumped together without regard for survey order. Nonetheless, it is useful to see if the conclusions from the GLMM and GEE generally agree. We used the glmmML package in R 2.9 for these calculations. We also show results from a simple negative binomial GLM which was used in Becker et al. 2009.

GLMM MODEL 1: Our first GLMM model looked at density dependence, ENSO, and Oyster harvest. Note that oyster harvest coefficient has a $P \sim 0.05$, while density dependence (LowerTot) has a $P < 0.14$.

```
Call:  glmmML(formula = round(sqrt(OB.Total)) ~
LowerTot + log1p(ENSO.YRS) + Oyster.new, family =
poisson, data = may.08, cluster = fYear, subset = Year
< "2009")

                    coef  se(coef)      z Pr(>|z|)
(Intercept)     9.943e-01 2.404e-01  4.136 3.53e-05
LowerTot        3.702e-04 2.495e-04  1.484 1.38e-01
log1p(ENSO.YRS) 6.082e-01 1.186e-01  5.127 2.94e-07
Oyster.new     -9.127e-07 4.725e-07 -1.932 5.34e-02

Scale parameter in mixing distribution:  0.2082
gaussian
Std. Error:                              0.05745

Residual deviance: 232.1 on 108 degrees of freedom
AIC: 242.1
```

GLMM MODEL 2: Dropping the Density Dependence (LowerTot) variable increases the significance of oyster harvest (to P ~ 0.04), while only penalizing AIC by 0.1, thus we would likely prefer this model over Model 1.

```
Call:  glmmML(formula = round(sqrt(OB.Total)) ~
log1p(ENSO.YRS) + Oyster.new,  family = poisson, data =
may.08, cluster = fYear, subset = Year < "2009")

                    coef  se(coef)      z Pr(>|z|)
(Intercept)     1.185e+00 2.093e-01  5.660 1.51e-08
log1p(ENSO.YRS) 6.295e-01 1.224e-01  5.142 2.72e-07
Oyster.new     -9.997e-07 4.897e-07 -2.041 4.12e-02

Scale parameter in mixing distribution:  0.2211
gaussian
Std. Error:                              0.06027

Residual deviance: 234.2 on 109 degrees of freedom
AIC: 242.2
```

GLMM MODEL 3: For completeness, we also remove oyster harvest from the model, leaving density dependence and ENSO. Density dependence is P < 0.12, and the AIC increases to 243.1, suggesting that Model 2 (which contains oyster harvest) is a better fit.

```
Call:  glmmML(formula = round(sqrt(OB.Total)) ~
LowerTot + log1p(ENSO.YRS), family = poisson, data =
may.08, cluster = fYear, subset = Year < "2009")


                   coef  se(coef)     z Pr(>|z|)
(Intercept)     0.8921362 0.2584712 3.452 5.57e-04
LowerTot        0.0004023 0.0002528 1.592 1.11e-01
log1p(ENSO.YRS) 0.5366083 0.1278604 4.197 2.71e-05

Scale parameter in mixing distribution:  0.2563
gaussian
Std. Error:                              0.06289

Residual deviance: 235.1 on 109 degrees of freedom
AIC: 243.1
```

We conclude that the GLMM and GEE provide similar results, but since the GEE better handles overdispersion, autoregressive within year correlation of counts, and non-normal within year counts, it is therefore the preferable analysis.

Direct comparison to methods in Becker et al. 2009 (GLM).
The final model presented in Becker et al. 2009 did not account for within year autocorrelation of counts (although random effects models were investigated in the paper). For comparison, we show these model results when including the 2008 count data. If we include density dependence on an annual rather than daily basis, the P value is <0.09, rather than >0.99 as shown below. The results indicate the same patterns as those reported for the 1997 – 2007 dataset in Becker et al. 2009. Note that the significance for oyster harvest is overestimated here (when compared with the GLMM or GEE) since we did not account for within year autocorrelation in the basic GLM model.

```
glm(formula = OB.Total ~ LowerTot + log1p(ENSO.YRS) +
Oyster.new, family = negative.binomial(1), data = may.08,
subset = Year < "2009")

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-3.1153  -0.7763  -0.2103   0.3253   2.4951

Coefficients:
                 Estimate Std. Error t value Pr(>|t|)
(Intercept)      2.943e+00  3.544e-01   8.305 3.00e-13 ***
LowerTot        -3.940e-06  5.344e-04  -0.007 0.994130
log1p(ENSO.YRS)  1.079e+00  1.324e-01   8.150 6.66e-13 ***
Oyster.new      -2.035e-06  5.641e-07  -3.607 0.000468 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '
' 1

(Dispersion parameter for Negative Binomial(1) family
taken to be 0.782268)

    Null deviance: 184.74  on 112  degrees of freedom
Residual deviance: 139.05  on 109  degrees of freedom
AIC: 1189.2

Number of Fisher Scoring iterations: 12
```

APPENDIX II: Comment on decision not to use a multinomial model and presentation of model using proportions instead of counts.

It was informally suggested to us by an NRC affiliated statistician that an alternative method might be to use a multinomial model (rather than the GLM, GLMM, or GEE) to ascertain proportion of seals using all 8 Drakes Estero subsites and testing if oyster harvest still explains the declines at upper estero sites (OB, UEN, UEF). At first glance, this could theoretically remove any confounding effects of ENSO and density dependence, isolating the oyster harvest effect (if any). However, we feel that the multinomial approach modeling proportions is not appropriate in this situation for several reasons:

1. Multinomial models do *not* account for random effects, in this case multiple counts within a year (that we are aware of).
2. Multinomial models do *not* allow for temporal autocorrelation in counts (that we are aware of).
3. Using proportion of seals (rather than counts) at each subsite without taking into account density dependence would obfuscate an important ecological mechanism. Directly modeling this is more statistically and ecologically sound.
4. Similarly, ENSO is an exogenous effect. If ENSO or density dependence explained all of the patterns, then failing to model these might result in simple oyster harvest-seal proportion correlations in a multinomial model with 8 subsites and one explanatory variable (oyster harvest).

Nonetheless, in an attempt to satisfy any concerns that using proportions is more appropriate than counts, while still using robust mixed-modeling methods with autoregression, we demonstrate below that a GEE model only using the proportion of seals in Drakes Estero that use subsite OB as a function of ENSO and Oyster harvest has similar results to the previous models relying on counts. Here we model ENSO with a diminishing x/x^2 function, but log(ENSO+1) provides similar results. Oyster harvest is significant at $P < 0.04$. Note that the data are underdispersed, but that using the square root of the proportion of seals approaches normality (although normality is not in any way required for a GEE).

```
Call:
geeglm(formula = sqrt(OB.pr) ~ ENSO.YRS/(ENSO.YRS *
ENSO.YRS) + Oyster.new, data = may.08.prop, subset =
Year < "2009", id = fYear, corstr = "ar1")

 Coefficients:
             Estimate   Std.err  Wald Pr(>|W|)
(Intercept)  2.03e-01  4.10e-02 24.47  7.6e-07 ***
ENSO.YRS     2.56e-02  6.08e-03 17.76  2.5e-05 ***
Oyster.new  -3.06e-07  1.45e-07  4.46    0.035 *
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1
' ' 1

Estimated Scale Parameters:
            Estimate Std.err
(Intercept)   0.0163 0.00253

Correlation: Structure = ar1  Link = identity

Estimated Correlation Parameters:
      Estimate Std.err
alpha    0.404   0.086
Number of clusters:   12   Maximum cluster size: 15
```

Thus, similar to the count data, we show that both ENSO and Oyster harvest explain the variation in the *proportion* of seals in Drakes Estero that use Subsite OB.

Here we have shown that there is broad agreement in the results whether using GEE, GLMM, and GLM on counts at subsite OB, as well as a GEE analyzing proportion of seals using the subsite. Further, similar patterns are seen regardless of transformations or interactions.

Modeling the effects of El Niño, density dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997–2007

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MARINE MAMMAL SCIENCE, **(*): ***–*** (*** 2008)
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DOI: 10.1111/j.1748-7692.2008.00234.x

Modeling the effects of El Niño, density dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997–2007

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ABSTRACT

Harbor seal (*Phoca vitulina*) haul-out site presence may be affected by natural or anthropogenic factors. Here, we use an 11-yr (1997–2007) study of a seal colony located near an oyster mariculture operation in Drakes Estero, California, to test for natural (El Niño-Southern Oscillation (ENSO), density dependence, long-term trends) and anthropogenic (disturbance related to oyster production activities) factors that may influence the use of haul-out subsites. During the study period there was a strong ENSO in 1998, a U-shaped pattern of oyster production, and increasing levels of disturbance related to oyster operations. Using generalized linear models

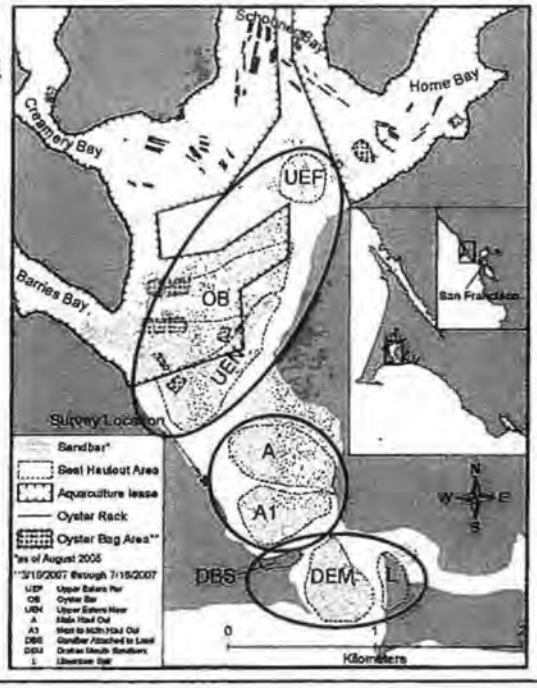
Analysis Objectives

1. Determine if mariculture-related disturbance events are changing over time

2. Test competing hypotheses (natural and anthropogenic) that may be driving harbor seal counts during the peak pupping season (April 15 – May 15) at sandbars in upper Drakes Estero

Harbor seal subsites in Drakes Estero

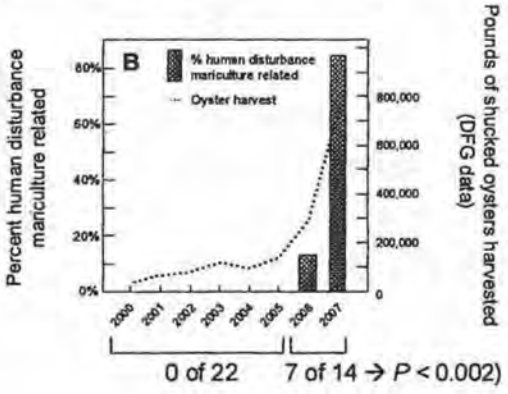
- Upper:
  - Primarily pupping/breeding
  - Islands
- Middle & Lower
  - Generally year-round
  - Human, predator access



Dataset – NPS Pinniped Database

- Disturbance surveys year round: 2000 – 2007
- Seal counts from peak pupping season: April 15 – May 15, 1997 – 2007. *(Full pupping season March-June.)*
- 9.5 ± 2.9 surveys/yr during peak pupping season. n = 104
- Removed count data with:
  - Tide > +2ft
  - First year observers
  - Wind, rain, fog, glare

Increase in percentage of human-related disturbance in upper estero (OB, UEN, UEF) due to mariculture: 2000 - 2007



- High statistical power ($1-\beta > 0.91$ at $\alpha = 0.05$)
- No mariculture related disturbances in middle-lower estero
- Human disturbance is less frequent in upper estero (~1-2/subsite/yr) than the middle-lower estero (~5 subsite/yr)

Analysis Objectives

1. Determine if mariculture-related human disturbance events are changing over time – *yes, increase*

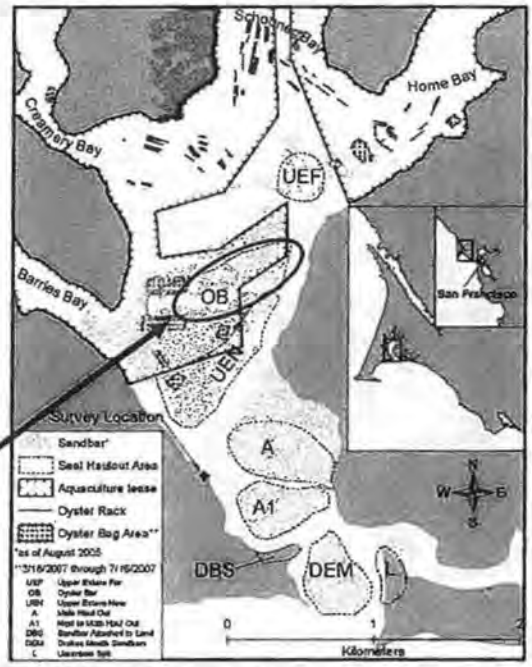
2. Test competing hypotheses (natural and anthropogenic) that may be driving harbor seal counts during the peak pupping season (April 15 – May 15) at sandbars in upper Drakes Estero

a priori hypotheses to best explain seal counts in upper Drakes Estero

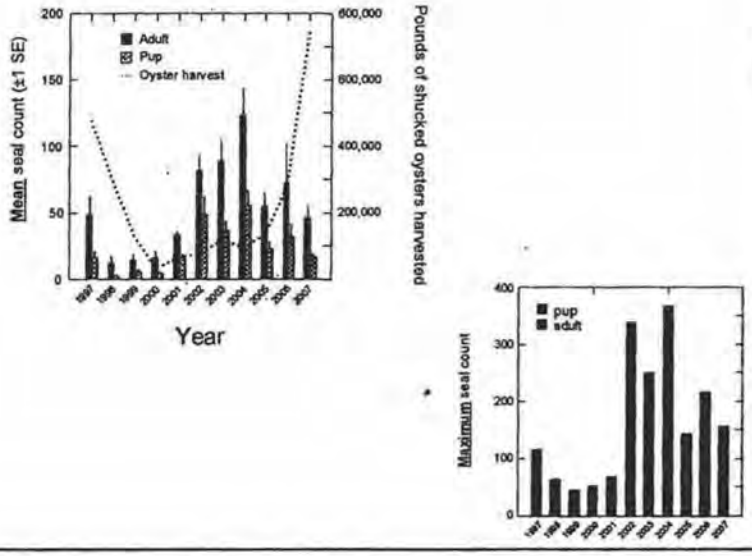
- Year as a linear trend
- Density-dependence
  - *"seals" in the rest of estero* (Brown et al. 2005, Jeffries et al. 2005)
- El Niño (ENSO)
  - *'91-'92 & '97-'98* (Trillmich and Ono 1991, Sydeman and Allen 1999)
- Oyster harvest (Proxy for disturbance impacts: Suryan and Harvey 1999, Seuront and Prinzivalli 2005, Johnson and Acevedo-Gutierrez 2007).
  - *DFG Data*
- Null model
  - *random*

Analyses

- Generalized linear models in *S-plus* and *R* software. Mixed models also tested.
- Seal counts at OB and UEN modeled with a negative binomial distribution
- Competing models (*a priori* hypotheses) ranked by AIC_c and r^2
- Validate models with independent subsite counts (UEF)
- First Model: OB



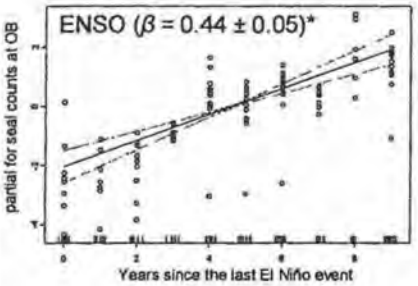
Mean peak pupping season (April 15 – May 15) seal counts at subsite **OB**

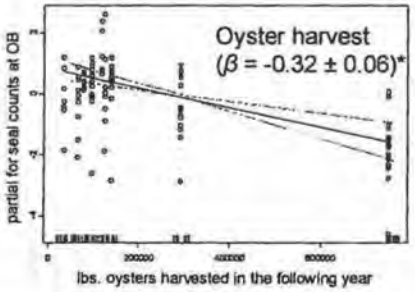


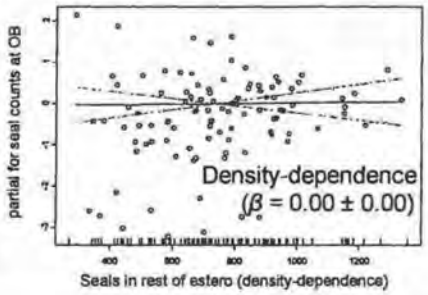
ENSO and Oyster harvest best explain seal counts at **OB**

Model	AIC_c	Δ_i	w_i	pseudo r^2
Subsite OB				
ENSO+Oyst	321.84	0.00	0.75	0.48

Best model at OB: *ENSO+Oyster* (r^2 = 0.48)





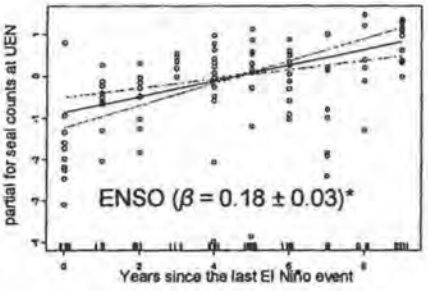


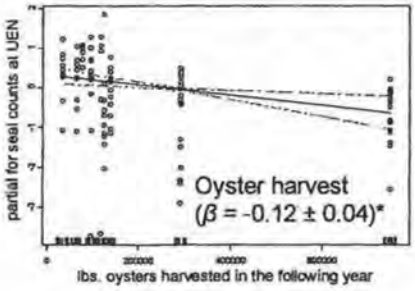
*$P << 0.05$

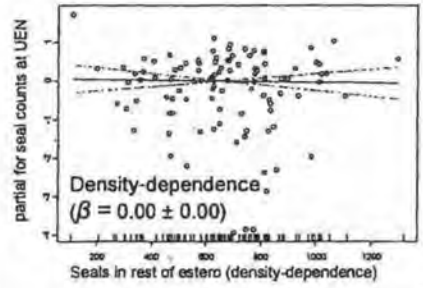
ENSO and Oyster harvest also best explain seal counts at UEN

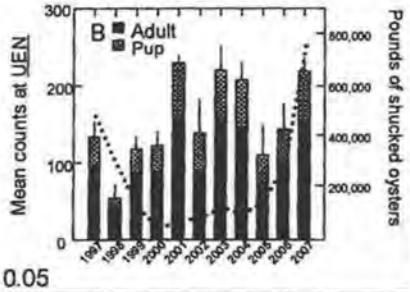
Model	AIC_c	Δ_i	w_i	pseudo r^2
Subsite UEN				
ENSO+Oyst	318.77	0.00	0.41	0.18

Best model at UEN: *ENSO+Oyster* (r^2 = 0.18)



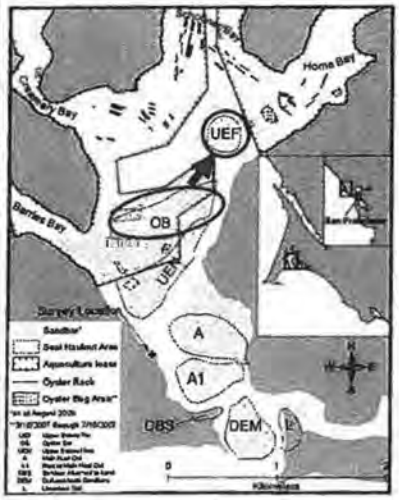


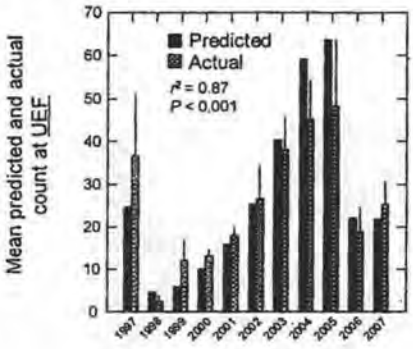




*P << 0.05

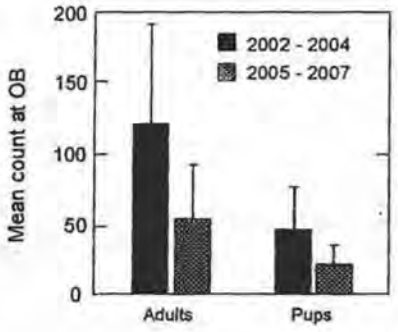
Best model at OB (ENSO+Oyst) has high predictive power for subsite UEF





Regression tree analysis illustrates and confirms GLM models. ENSO and Oyster harvest affects counts at **OB** (and therefore **UEF**)

Both adult and pup counts (during peak pupping season) at **OB** declined after ENSO effects tapered off and oyster harvest effects kicked in. Error bars indicate ±1SD



($t_{58} = 4.2$, $P < 0.001$)

Conclusions:

- Significant increase in mariculture related disturbance in the upper estero during 2006 - 2007.
- ***+ENSO*** and ***–Oyster harvest*** explain seal counts very well at OB and UEF, and marginally at UEN.
- Ability of OB model to predict UEF indicates high confidence in modeling.
- Counts of adults (-57%) and pups (-54%) significantly declined at OB after 2004, and at UEF after 2005.

Final notes on data quality

- Disturbance trends are minimally sensitive to sample size
  (7 of 14 mariculture related in upper estero)
  IF 4 of 11 → P < 0.01
  3 of 10 → P < 0.05
  2 of 9 → P < 0.07

- Seal count data by volunteers
  - Training, screening
  - If errors, they would likely result in a more variable (noisier) count dataset, making it less likely to detect a signal from ENSO and oysters *(Type II error – low power)*

Acknowledgements

- Statistical review and advice
  - J. Laake (NOAA – National Marine Mammal Lab)
  - J. Barlow (NOAA - Southwest Fisheries Science Center)
  - M.Z. Peery (Moss Landing Marine Labs / U. Wisc. – Madison)
- Peer Review
  - Three anonymous reviewers and an associate editor at *Marine Mammal Science*
- D. Roberts (NPS) for data management
- Biological technicians
- Harbor seal monitoring program volunteers

"Kevin Lunny" <kevin@drakesbayoyster.com>

07/20/2010 10:26 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>

cc

bcc

Subject

History: This message has been forwarded.

Dear Cicely,

The week before last, I was in San Diego attending a conference on ocean acidification (more on it later, we should discuss what was presented -- implications for Point Reyes NS) and directed David Weiman to submit our first round of questions on our behalf regarding the NPS "Sunday Project." Appended to this letter is a second round of questions. Additional rounds of questions are pending and will be submitted shortly.

The May 1, 2009 document is troubling by itself. The NPS remote camera program requires considerable explanation and we're trying to understand NPS actions that directly impact our farm, our workers and our family.

I am aware that some of the questions overlap and may even be duplicative. NPS, in the past, has not been forthcoming. After learning that NPS reissued its report, "*Drakes Estero, A Sheltered Wilderness Estuary* , several times, we wrote and asked NPS to tell us how many times it was published and why? NPS wrote back, through Rep. Lynn Woolsey, and said that they (NPS) didn't know what we meant by "published." NPS did not want to reveal that the report was republished several times, or that they ignored the requirements of Director's Order #11B, which required NPS to post the changes with explanations for each. We sincerely hope that, with your becoming Superintendent, those days are over.

As you are undoubtedly aware, Ben Becker contacted me to discuss how the harbor seal inventory and monitoring database can be used. I am happy to meet with him -- and will do so, but believe the issues involving the disputed NPS Harbor Seal Disturbance Data need to be resolved first, as it directly affects the database.

As indicated in the letter, we are obligated to submit additional documentation and analysis to the MMC and therefore request that responses to these requests be expedited.

We thank you for coming out to the oyster farm. In 2004, a key factor in deciding to purchase Johnson's Oyster Company -- was -- and is -- that this little oyster farm is the crown jewel of Point Reyes. We believed then and still believe now that we can improve it, make it better and establish it as a "place of great pride" in collaboration with NPS. We believe that we can accomplish this by working with you.

Sincerely,

Kevin Lunny

20100720 DBOC to Cicely Muldoon.pdf

Drakes Bay Oyster Company

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nancy@drakesbayoyster.com

July 20, 2010

Cicely Muldoon
Superintendent
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94937

Dear Cicely,

The letter and questions are submitted to further understand the NPS, *Briefing Statement, National Park Service Response to Goodman's January 18, 2009 Letter to NRC, May 1, 2009* (NPS Briefing Statement), a document that we first learned of in early June 2010, and other information from NPS made available only after the June 7, 2010 Marine Mammal Commission (MMC) meeting. This NPS report and information recently made available for the first time raises a number of questions. We seek your assistance to fully understand NPS objectives, purposes, and programmatic accomplishments of what NPS called a "remote camera."

As recently reported to you, DBOC did not know about these undisclosed cameras or the NPS remote camera program. DBOC obtained a copy of the NPS Briefing Statement on the eve of the MMC meeting on June 7, 2010 and learned about the hidden camera only the day before.

The 33-page NPS Briefing Statement discusses the camera and its use in two instances. The first, according to this NPS (Page 1 – second page of the document) stated:

> *NPS has time stamped images of seals on the sandbars...during the 2008 breeding season in Drakes Estero.*

The second reference is found in Appendix A, "*NPS Review of Tidal Patterns and Harbor Seal Behavior in Drakes Estero*" and stated:

For the six dates selected by NPS for review (Table 2), the NPS examined date and time stamped photographs taken of Drakes Estero by remote camera. The remote camera was on-site at Drakes Estero for the majority of the of 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM. The camera view encompassed the "lateral" channel with sandbar OB in the foreground.

At the June 7, 2010 MMC meeting, NPS officials acknowledged the camera's existence and explained, at the time, that it was used for wildlife management purposes. Several days later, on June 10, 2010, an article in the West Marin Citizen, based on interviews with Dave Graber, NPS Pacific West Regional Scientist and David Press, PRNS Data Manager disclosed that (a) there were two, not one, cameras; (b) the purpose of the camera involved not just monitoring wildlife but documenting harbor seal disturbances; (c) the *"images were used as a way to improve seal observations and reduce disturbances*"; and, (d) the installation of the cameras "*was an experiment to collect data for both harbor seals and disturbances.*"

The two key paragraphs in the Citizen's story state:

David Graber, Chief Scientist for the Pacific West Region of the National Park Service spoke of one camera installed by Seashore officials and said the images were used as a way to improve seal observations and reduce disturbances at the different sites. The camera, he said, was not used to observe the oyster operation. 'Have we used the photos against [oyster company owner] Kevin Lunny?" asked Graber in response to the question if Seashore officials were using the camera as a way to monitor oyster operation. The answer was no, he said.

David Press, the data manager for the Seashore said the camera was set up in an experiment to collect data for both harbor seals and disturbances. 'The camera was an experimental approach to see if we could add to our understanding of harbor seals and harbor seal disturbances in general within the upper part of the Estero,' Press said.

A June 22, 2010 email from you then revealed, for the first time, that a camera was installed and active in Drakes Estero prior to 2008. Later, on June 30, in another communication, you provided additional detail and stated that the camera was first installed and operational on May 5, 2007.

We have been reviewing the limited photographic data and other information you provided and are still confused by the remote camera program. Therefore, in addition to the questions submitted on July 8, the following questions and requests for information (and where appropriate, documentation and source materials) are submitted so that DBOC can understand the NPS remote camera program.

(1) **NPS Experimental Program - Plan and Approval, Acquisitions and Installations**

(a) Please provide the Work Plan for the proposed experiment.

(b) Who directed, approved, or concurred in the establishment of this experiment and/or program?

(c) Provide copies of all documents, including but not limited to reports, papers, emails, communications, summaries, directives or and/or other documents related to this experiment and/or program.

(d) Provide all justification documents related to this proposed experimental program.

(2) **NPS Experimental Program – Progress Reports**

(a) Please tell us how often, per the NPS Experiment's Work Plan, were Progress Reports required prepared. Weekly? Quarterly? Seasonally? Annually?

(b) Provide copies of the regular progress reports.

(3) **NPS and DFG 1992 Multi-Agency Harbor Seal Protocols**. NPS, NMFS and California Department of Fish and Game executed Harbor Seal Protocols for Drakes Estero in 1992, which remain current and operational today.

(a) Did NPS communicate with its multi-agency partners about this experiment?

(b) Did NPS ask these agencies to review or comment on the experiment? If so,

provide copies of their comments and/or responses.

(4) **NPS Annual Harbor Seal Reports – Failure to Reference Experiment**

(a) NPS, at Point Reyes, published annual harbor seal reports in 2007, 2008 and 2009 (among others). Why is the remote camera experiment and/or program not mentioned, referenced or discussed?

(5) **NPS, San Francisco Bay Area Network Pinniped Monitoring Protocol, Version 3.02, December 2009.** NPS issued, after a five-year process, a new updated and revised harbor seal monitoring protocol in December 2009. According to the updated protocol, "*protocols document standardized objectives, methods and data management to enable high quality evaluation of pinniped population status for the region.*"

(a) When the updated protocols were being finalized, NPS at Point Reyes had three years experience with the remote camera program, yet the new protocols are silent about it. Why?

(b) How was the remote camera program evaluated for inclusion in the protocols?

(c) Did the remote camera program meet the "high quality evaluation" test set forth in the protocols?

(6) **NPS and DBOC Statement of Principles.** In March 2008, NPS and DBOC executed a Statement of Principles Regarding Environmental Evaluations at Drakes Estero which, among other things, required NPS to "*advise DBOC of any scientific, technical, or other information...*" to be used in future environmental reviews and "consult with DBOC in good faith in the design of any further scientific or technical studies..."

(a) Based on this agreement, NPS should have notified DBOC of the decision to install the camera. Why did NPS fail to inform or notify DBOC of the existence and use of the camera in 2007, 2008, 2009 and 2010?

(b) Why did NPS fail to consult in good faith with DBOC regarding this new experimental program as specified by this Agreement?

(7) **Experiment Site Selection – Statistical and Experimental Justifications.** As we understand the NPS harbor seal observation program, NPS monitors at least eight sandbars or subsites within Drakes Estero for counts, observation and disturbance.

According to your recent email to us, this remote camera program has been in place for four years.

(a) What was the statistical and experimental justification criteria used to choose the lateral channel between OB and UEN as the target of one camera and to choose UEF as the target of the second?

(b) NPS records (2005–2007) indicate there were approximately 3,000 seal flushes from several hundred disturbances events. These were attributed to various sources (hikers, clammers, airplanes, kayaks, etc.). According to NPS disturbance records, only a handful of these flushes occurred at the three subsites monitored by the remote cameras. Why did NPS select subsites with such few disturbances for the experiment?

(c) Why did NPS select three subsites for this experiment that excluded virtually all disturbances -- except those allegedly from or associated with oyster activities?

(8) **Establishing Baselines and Parameters for Experiment.** The vast majority of federally funded research requires a Quality Assurance Protocol and Plan (QAPP) or equivalent be completed that defines all factors concerning data gathering, testing procedures , statistical analysis, interpretation of data, maintenance of records, etc. Even the most informal project requires a full work/study plan.

(a) Please provide us with the QAPP or equivalent work study plan that shows the protocols for the photographic collection of disturbance, especially the means of evaluating the identity of vessels associated with the disturbance.

(b) What information, advice and/or instructions regarding boat identification did NPS provide to those participating in the experiment and/or reviewing photographic data? Provide copies of the documents in which NPS instructs those managing or participating on the difference between a DBOC boat and other motorized boats and a DBOC boat and kayaks and/or canoes.

(9) **NPS Objective – Improving Observations and Reducing Disturbances.** According to the Regional Chief Scientist Graber, the purpose of the remote camera program was to improve observations and reduce disturbances.

(a) How did this experimental program measure progress for "improved observations?"

(b) Please identify the "improvements" achieved. What was the starting point and how much as been accomplished? Provide annual progress reports (or other supporting documentation).

(c) How did this experimental program measure progress for reduction of disturbances? What was the starting point and how much has been accomplished during the study period?

(10) **NPS Map, undated, entitled, "Drakes Estero Camera Angles."** This map shows the approximate placement of two cameras and the approximate camera angles in Drakes Estero.

(a) The map displays the camera angles for 2008 to 2010. The year, 2007, was not included. Please provide a map showing the location, placement and angle of view for 2007.

(b) For the lower of the two cameras (camera closer to the bottom of the page) it displays a label that reads "long and short views." Can you please explain how this worked? Were both used in each of the years – 2008, 2009, and 2010? What was the purpose of each?

(c) This map displays, in a yellow line, a category labeled, "Maximum Harbor Seal Use Areas (OB and UEF only)," a designation or description never previously seen. Explain this designation and describe what it includes and excludes.

(d) Based on our five-years of experience Drakes Estero, harbor seals haul out in very large numbers along the main channel, outside your selected camera angle. Why would NPS exclude the vast majority of harbor seals and their haulout sites from the remote camera program – a program ostensibly designed to improve harbor seal observations?

(e) NPS, at various times during the past five years, has produced at least six different maps highlighting harbor seal haulouts. Which map, according to NPS, is correct?

(11) **Four-Year Remote Camera Experiment Excludes High Disturbance Areas**. The

remote camera program, throughout the four-year experimental program is directed at three subsites (and only small portions of those subsites).

(a) The remote cameras are not moved to and directed at other subsites, trails, or areas where NPS Harbor Seal Database records show high incidences of disturbance. Why?

As you are aware, Point Reyes National Seashore did not disclose the existence of this program. We are, therefore, now compelled to submit detailed questions and request information for what, we believe, should have been disclosed some time ago.

We want to express our thanks and appreciation for your response to our requests for maps, photographic data and other information. We recognize that these are difficult issues. We look forward to continuing and improving communication and information sharing with your office. We know that reconciling these issues will serve all of us and our community the long run.

Again, we request that responses be expedited. We are very sensitive to the MMC's need to finalize their report. It's essential that this information be available to us – and them – in a timely manner.

We thank you for your cooperation and assistance.

Sincerely,

Kevin Lunny Nancy Lunny

Cicely Muldoon/PORE/NPS
07/20/2010 09:33 AM

To "Kevin Lunny" <kevin@drakesbayoyster.com>, "'Nancy Lunny'" <nancy@drakesbayoyster.com>
cc tragen@mmc.gov, agresources@erols.com
bcc Ann Nelson/PORE/NPS
Subject Re: NPS 06/28/10 Letter to Fish and Game

Dear Kevin and Nancy:

First, let me thank you for spending the time to give me a tour of the oyster operation last Wednesday. It was good to meet one on one. It is clear that your passion for and knowledge of the oyster farm runs deep.

A few thoughts in response to your letter from this Sunday. I am copying Tim, as the Marine Mammal Commission is referenced, and as we all share a hope for improved communications. David, I'm copying you as well, as your signature block appears at the bottom of the letter signed by Kevin and Nancy.

I regret that you find our letter to CDFG so objectionable, it was certainly not intended to be, and I welcome further discussion on this. Although the park was not copied on your proposal, I thought as a matter of courtesy I should cc you on our response. We spoke last week of the complexity of permitting operations within the Estero. I would welcome a way to at least synchronize our approaches and to ensure we all understand where we are in the process.

In spite of your assertion, I fully support Tim Ragen's efforts to change the tone of this discussion, respect one another's viewpoints, stand down from independent courses of action, and pursue an adaptive management approach. Defining a collaborative approach among Estero stakeholders seems like a good place to start. We all care deeply about this extraordinary public resource, and share, I firmly believe, a commitment to its health. As I mentioned last Wednesday, a clear path to resolving the future of the Estero is in everybody's interest.

My sincere hope is that we can forge a positive working relationship, in spite of any differences we may have about the issues that surround the Estero. We have to start from a place of respecting one another's outlook on this very complex issue, finding those places on which we can agree, and defining how we can work together. Long after the current issues are behind us, and the lawyers and lobbyists have left the discussion, we will still be neighbors. Kevin, I thought you said it eloquently early on in our discussion last Wednesday, when you spoke of well intended people on both sides of this issue trying to do the right thing. I couldn't agree more. To me, this seems like a fundamental basis for a more positive discussion.

Sincerely,

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
07/17/2010 06:34 PM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc "'Nancy Lunny'" <nancy@drakesbayoyster.com>
Subject NPS 06/28/10 Letter to Fish and Game

Cicely,

The NPS letter of June 28 to California Department of Fish and Game was received earlier today.

By this letter, you accomplish two things. First, you ratify Don Neubacher's approach to business here at Point Reyes -- needlessly impose delays, drive up costs and maximize conflict. Second, you unilaterally reject the efforts of Tim Ragen and the Marine Mammal Commission to improve the way business has been conducted and to improve relations.

Remarkably, you have now positioned NPS to oppose efforts to enhance the native oyster here in Drakes Estero.

The errors and distortions contained in the NPS letter will be addressed next week.

On Wednesday at the oyster farm, you offered words of cooperation. By this letter, you withdrew them.

Deeply saddened,

Kevin Lunny Nancy Lunny

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

"Kevin Lunny" <kevin@drakesbayoyster.com>

07/13/2010 06:30 PM

To <Ben_Becker@nps.gov>

cc "Cicely Muldoon" <Cicely_Muldoon@nps.gov>, "'David M Weiman'" <agresources@erols.com>, "'Nancy Lunny'" <nancy@drakesbayoyster.com>, "'Tim Ragen'"

bcc

Subject Meeting Schedule

History: This message has been replied to.

Ben,

I would like to reschedule our meeting to discuss DBOC disturbances in Drakes Estero. I am happy to meet with you, but we have recently received new information regarding the oyster boat disturbances. I believe the issues involving the disputed NPS harbor seal disturbance data need to be resolved before we discuss how to move forward with analyzing those data.

Thank you,

Kevin

Ben Becker/PORE/NPS
07/13/2010 08:51 PM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc "'David M Weiman'" <agresources@erols.com>, Ben_Becker@nps.gov, "Cicely Muldoon" <Cicely_Muldoon@nps.gov>, "'Nancy Lunny'"
bcc
Subject Re: Meeting Schedule

Hi Kevin,

I think we should still meet on Wednesday. Our meeting was not to discuss disturbances or how to analyze them. Rather, the meeting was to think about new ideas for measures of mariculture activity that you feel might be more appropriate than the annual DFG harvest metric.

So, please consider coming out. The meeting can be as short or long as you like, but I think it is important to move forward and discuss your perspective on these data sets and ways to potentially improve them.

You can let me know by email or leave me a message at 415-464-5247.

Thanks,

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 19 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

· Facilitating the use of parks for scientific inquiry
· Supporting science-informed decision making
· Communicating relevance and providing access to research knowledge
· Promoting resource stewardship through partnerships

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Thank you,

Kevin

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File No. 502976-0000

July 6, 2010

The Honorable Ken Salazar
Secretary
Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

Re: Special Use Permit for Drakes Bay Oyster Company

Dear Secretary Salazar:

I am writing to you on behalf of Kevin and Nancy Lunny ("the Lunnys"), owners of the Drakes Bay Oyster Company ("DBOC"), to request that you enable DBOC to continue to occupy and utilize the buildings and lands on the shores of Drakes Estero, located within Point Reyes National Seashore ("PRNS"), a unit of the National Park Service ("NPS").

DBOC is a family business operated by the Lunny family, fourth and fifth generation farmers and long-term Point Reyes residents who have lived at the historic "G" Ranch, overlooking Drakes Estero. Since acquiring the business in 2004, the Lunnys have been operating a sustainable, environmentally-friendly local business that provides jobs for the community and gives visitors to PRNS a valuable cultural and historic experience.

We were encouraged to hear of your recent statement at the Great Outdoors Conference that DBOC would continue to operate within PRNS. As you acknowledged, the oyster farm has existed in PRNS for many years. In fact, commercial oyster production has taken place within Drakes Estero for over seventy years—since the early 1930s, approximately three decades before Congress established PRNS in 1962. DBOC now produces both oysters and clams as part of its operations and is the last operating oyster cannery in the State of California.

As background, and as discussed in more detail below, DBOC operates under both State and Federal permits. With respect to the former, DBOC cultivates shellfish on the bottomlands in Drakes Estero pursuant to leases from the California Department of Fish and Game, which were renewed for 25 years in 2004, and thus expire in 2029. As to the latter, DBOC operates under a Reservation of Use and Occupancy ("RUO") executed in 1972 between NPS and the previous owners of the oyster farm and under several ancillary special use permits issued by NPS. The RUO and the other permits expire in 2012; however, the RUO contains a renewal

clause, which provides for the issuance of a special use permit that would "run concurrently with and...terminate upon expiration of the State water bottom allotments...."

Questions have been raised regarding the legal authority of NPS to issue a special use permit that would allow DBOC to continue operating past 2012, given that Drakes Estero was designated "potential wilderness" in 1976, pursuant to the Point Reyes Wilderness Act, Public Law 95-544. Notably though, the designation of Drakes Estero as "potential wilderness" was never meant to preclude the continued operations of DBOC. As is evident from relevant legislative history and environmental reviews, Drakes Estero was designated as "potential wilderness" rather than wilderness because of the understanding that oyster cultivation would continue, in light of California's retained interest in leasing the bottomlands for shellfish cultivation.

Moreover, and importantly, in October of 2009 Congress expressly authorized the Department of the Interior to issue DBOC a special use permit to continue its operations past 2012. As this letter describes, and given Congress's recent directive, there are multiple important reasons to issue such a permit, including the rich history of oyster farming in Drakes Estero and the myriad cultural, recreational, educational and ecological benefits DBOC provides.

I. RICH HISTORY OF MARICULTURAL OPERATIONS IN DRAKES ESTERO

Oyster farming has enjoyed a long history in Drakes Estero. The Miwok Indians were the original "oyster-farm operators," with their harvesting of native shellfish beginning thousands of years ago. In fact, their ancient oyster middens are still present in the estero. Commercial oyster farming began in the estero in the 1930s, with the original allotment recorded in the name of David C. Drier on January 18, 1934 for the purpose of growing oysters.[1] Although several transfers occurred during those early years, for most of its commercial history, the estero was farmed by Johnson's Oyster Company. In 2004, the Lunny family purchased the farm from Johnson's Oyster Company and have sought to adopt many of the same sustainable practices used by the Miwoks in order to conserve the important natural resources of the area.

This long history of maricultural operations has been routinely recognized as a valid and important use of Drakes Estero. The legislative history of the Point Reyes National Seashore Act, for example, is replete with references to both the history and legacy of oyster farming and the important benefits it provides to PRNS. For instance, during congressional hearings on the establishment of PRNS, former NPS Director Conrad Wirth explained that the "[e]xisting commercial oyster beds and an oyster cannery at Drakes Estero...should continue under national seashore status because of their public values. The culture of oysters is an interesting and unique industry which presents exceptional educational opportunities for introducing the public, especially students, to the field of marine biology."[2] Comments made during the Senate hearings

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[1] *See* NPS, Environmental Assessment/Initial Study Joint Document, Johnson Oyster Company, Marin County, Point Reyes National Seashore, at 8 (May 1998).

[2] NPS, Conrad L. Wirth, Director, Report on the Economic Feasibility of the Proposed Point Reyes National Seashore at 20 (1961), included in the Hearings Before the Subcommittee on Public Lands of the Committee on

on the proposed PRNS legislation echoed this view: "[t]his proposed legislation provides a balanced use between the public and private interests concerned [because] the oyster and commercial fisheries would be able to continue operation and provide both recreation and economic value to the seashore."[3]

In the early 1970s, when Congress began considering designating wilderness areas within PRNS, the importance of the oyster operations was affirmed. Senator John Tunney, who introduced the PRNS wilderness legislation, reiterated that "[e]stablished private rights of landowners and leaseholders will continue to be respected and protected. The existing agriculture and aquaculture uses can continue."[4] Similarly, Representative John Burton underscored that the legislation's intent was to "preserve the present diverse uses of the Seashore," including the commercial oyster operations in Drakes Estero.[5] The Department of Interior itself recommended that an express wilderness designation would be inappropriate: "Commercial oyster farming operations take place in this estuary and the reserved rights by the State on tidelands in this area make this acreage inconsistent with wilderness."[6]

Until very recently, NPS consistently agreed with these conclusions and appeared supportive of the continued use of Drakes Estero for maricultural operations. The RUO itself, for example, contains a renewal clause, which provides that "[u]pon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property...."[7]

Additionally, in the Final Environmental Impact Statement prepared by NPS evaluating the potential impacts associated with designating certain PRNS lands as wilderness, NPS discussed the "oyster-farm operation" and noted that while removing the oyster farm might remove human activities from the estero, there would be a "loss of some compensating values. Besides its economic benefits to the community, the farm has decided interpretive importance as a popular 'living exhibit,' where visitors have the unique opportunity to observe the operation

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Interior and Insular Affairs, U.S. Senate, 87th Congress, First Session on S.486, A Bill to Establish The Point Reyes National Seashore in the State of California and for Other Purposes (Mar. 28, 29, and 31, 1961).

3 Hearings Before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs, U.S. Senate, 87th Congress, First Session on S.476, A Bill to Establish The Point Reyes National Seashore in the State of California and for Other Purposes at 17 (Mar. 28, 29, and 31, 1961).

4 Hearings on S.1093 and S.2472 Before the Subcommittee on Parks and Recreation of the Committee on Interior and Insular Affairs, 94th Cong. 271 (1976).

5 *Id.* at 272-73.

6 Letter dated September 8, 1976, from John Kyl, Assistant Secretary of the Interior, to U.S. Representative James A. Haley, Chairman, Committee on Interior and Insular Affairs, House of Representatives, U.S. House Report No. 94-1680, 94 U.S. Code and Congressional News 5593.

7 JOC Grant Deed to the United States, Exh. C, § 11 (Nov. 9, 1972). The clause, in fact, only requires that the special use permit "run concurrently with and will terminate upon the expiration of the State water bottom allotments...." Those "State water bottom allotments" refer to a renewable lease issued by the California Department of Fish and Game, which has granted DBOC the right to cultivate oysters in Drakes Estero through 2029. California Department of Fish & Game Amendment No. 2 to Indenture of Lease, M-438-01 (Dec. 2, 2005). Accordingly, issuance of a SUP that would "run concurrently with" the State water bottom allotments would be consistent with the state authorizations and would allow the oyster farm to continue operating through 2029.

and to purchase freshly grown oysters. These are appropriate purposes at Point Reyes, a recreational-category park."[8]

NPS continued to recognize the value of the oyster operations in its 1980 PRNS General Management Plan (still in effect), which includes the following management objectives: "[t]o monitor and improve maricultural operations, in particular the oyster farm operation in Drakes Estero," and "[t]o monitor and support productive land uses and activities [including maricultural activities] which are consistent with historic patterns."[9] As recently as 1998, NPS conducted an environmental assessment pursuant to the National Environmental Policy Act ("NEPA") of the potential impacts of improving and substantially expanding the oyster farm operations. Although the planned expansion did not take place because of funding shortfalls, NPS' support of the project demonstrates the agency's recognition that oyster farm operations are a valid use of PRNS land.[10]

II. DBOC IS A BENEFICIAL USE OF PRNS

Recently, some questions have been raised regarding the types of environmental impacts oyster farming may be having on Drakes Estero. In 2006 and 2007, for example, PRNS staff prepared and released several versions of a report entitled *Drakes Estero: A Sheltered Wilderness Estuary* that purported to evaluate the impacts of DBOC on Drakes Estero and erroneously concluded that oyster farming is having an adverse ecological impact on PRNS resources. This effort to portray DBOC as having detrimental impacts appeared to be part of an attempt to "eliminate" DBOC as a "non conforming use" so that Drakes Estero and the surrounding tract of land could be converted to wilderness status. Indeed, PRNS staff took the position that they were legally precluded from issuing a special use permit to DBOC to extend operations past 2012 because of the "potential wilderness" designation.[11] However, there is no such restriction on NPS' authority.[12] Moreover, NPS has allowed non conforming uses in other potential wilderness areas.[13]

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[8] *See* NPS, Final Environmental Statement FES 74-18, Proposed Wilderness; Point Reyes National Seashore, California, at 56 (Apr. 23, 1974).

[9] NPS, General Management Plan: Point Reyes National Seashore, at 2-3 (Sept. 1980).

[10] *See, e.g.*, Letter from Don Neubacher, Superintendent, PRNS, to Bank of Oakland (Nov. 22, 1996) (explaining the relationship between the oyster farm and NPS and noting that NPS is "genuinely excited about the planned changes" to the oyster farm and "pledge[s] to work with the Johnsons and the Bank of Oakland to make the project successful"); *see also* Thomas Yeatts, Point Reyes Light, *Park Planned Big New Oyster Plant* (Aug. 2, 2008) (documents obtained by the newspaper indicate that, beginning in 1996, "Point Reyes National Seashore (PRNS) staff developed a plan to renovate the Johnson Oyster Company's rickety buildings and septic system, and proposed new two-story development").

[11] *See, e.g.*, Field Solicitor Opinion Re: Point Reyes Wilderness Act (Feb. 26, 2004) (concluding that the Wilderness Act, the Point Reyes Wilderness Act, and NPS Management Policies mandate that NPS convert potential wilderness, such as Drakes Estero, to wilderness status "as soon as the non conforming use can be eliminated").

[13] For clarification, we disagree with NPS' legal interpretation that any law precludes the agency from allowing DBOC to continue operating past 2012. There is no mandate found in any applicable law or guidance that

From the outset it should be noted that since purchasing the farm in 2004, the Lunnys have dedicated significant time and resources to cleaning up the oyster farm and resolving past violations of law that had occurred during their predecessor's operations. *See, e.g.*, Peter Jamison, Point Reyes Light, *Park Service to Close Historic Oyster Farm* (June 15, 2007) (discussing DBOC's cleanup and quoting PRNS spokesman John Dell'Osso, "Kevin [Lunny] has done a fantastic job of cleaning up. Everything we've asked him to do, he's done."). The Lunnys remain committed to continuing those cleanup efforts and ensuring that DBOC is operated in a sustainable, environmentally-friendly manner.[14] As such, the family—along with their many supporters in western Marin County environmental and agricultural circles—was disheartened by the NPS report, which appeared to, among other things, overlook the many beneficial effects of oyster culture operations on the environment.[15]

In order to help resolve the debate regarding the scope of impacts of DBOC and the availability of scientific analysis, the National Academy of Sciences ("NAS") agreed to help clarify the scientific issues regarding maricultural activities and produced two reports. The first report, which was released in May of 2009, assessed the adequacy of the claimed scientific bases for NPS staff's preliminary conclusions in their Drakes Estero reports, and evaluated the

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would require NPS to convert "potential wilderness" to wilderness on a particular timetable. The Wilderness Act, for example, does not use the phrase "potential wilderness," much less define when "potential wilderness" must become actual wilderness, if ever. NPS management policies, director's orders, and reference manuals are all silent with respect to a specific timetable for conversion and only provide that, once "non conforming uses" have ceased, NPS will publish a Federal Register notice to change the designation from potential wilderness to wilderness. *See* NPS Reference Manual #41 at Appendix H, Wilderness Preservation and Management (1999). There is no requirement, however, mandating that NPS ensure that such operations cease by a certain date, and there has been no environmental review of the impact of removing the oyster cultivation operation in Drakes Estero.

[13] Examples of non conforming uses that NPS has allowed in other potential wilderness areas include: i) operation of motorized boats in potential wilderness areas of Grand Canyon National Park; ii) public use of Five High Sierra camps and the Ostrander ski hut in potential wilderness areas of Yosemite Valley; iii) operation by Southern California Edison of hydroelectric dams in potential wilderness areas of Sequoia-Kings Canyon National Park; and iv) use of roads in Cumberland National Seashore located in potential wilderness. As discussed below, the oyster farm provides greater cultural, recreational, educational and ecological benefits than these examples of non conforming uses.

[14] Prior to the Lunny family's ownership, the oyster farm had suffered from a degree of deterioration that led to a number of violations of law, including the Coastal Development Act, and enforcement actions by the California Coastal Commission ("CCC"). The Lunnys are working with the CCC to resolve those violations and ensure that DBOC's operations fully comply with all applicable local, state, and federal regulations. Additionally, an incident recently occurred at the farm in which clam-growing equipment was inadvertently placed into a Harbor Seal Protection Area. The Lunnys immediately took steps to rectify this mistake and are implementing processes to ensure that such mistakes do not occur in the future. Moreover, many of NPS' allegations that the oyster farm adversely impacts harbor seals have since been retracted at very recent Marine Mammal Commission ("MMC") hearings. Like the NAS, the MMC has become involved specifically to resolve the debate surrounding the oyster farm's impact on harbor seals. The MMC has held a series of panel hearings, and is working on a report that is due out in the near future.

[15] The Department of Interior's Inspector General investigated the various versions of the NPS Report and found that scientific inaccuracies undermined NPS' conclusions regarding the oyster farm's ecological impact on Drakes Estero.

available data specifically regarding the impact of DBOC's maricultural activities.[16] The second report, which was released in February of 2010, broadly addresses best management practices and performance standards to enhance the overall benefits of shellfish mariculture and minimize any negative ecological effects.[17]

The first NAS report reasonably concluded that "there is a lack of strong scientific evidence that shellfish farming has major adverse ecological effects on Drakes Estero at the current (2008-2009) levels of production and under current (2008-2009) operational practices, including compliance with restrictions to protect eelgrass, seals, water-birds, and other natural resources." NAS 2009 Report at 6. The report goes on to discuss some of the over-looked beneficial effects that DBOC is having on the estero, including: (i) the potential that oyster culture in Drakes Estero is replacing the important "filtering capacity and biogeochemical processing that was lost in the mid-19th century and subsequent decades with the overharvest and functional elimination of the native Olympia oyster" (*id.* at 68); (ii) the possible beneficial effects on eelgrass in the area, given that eelgrass has approximately doubled in Drakes Estero from 1991 to 2007 (*id.*); (iii) the positive economic impact for the region—including employment, tax revenue, and local food production (*id.* at 64); and (iv) the positive visitor experience, given that DBOC "preserves a piece of local and regional culture and history" (*id.* at 65).

As noted above, the oyster farm provides significant ecological benefits to Drakes Estero. DBOC's oysters are helping to "restor[e] an historic baseline ecosystem" by acting as a proxy for native oysters. *Id.* at 22; *see also* NAS 2010 Report at 13-14. The oysters are also known as "ecosystem engineers" and "foundation species" (NAS 2009 Report at 18) that bolster the ecosystem's resilience against abnormal events like phytoplankton blooms or sedimentation from storm water run-off (*id.* at 22, 23).[18]

In addition to the work done by the oysters, the Lunnys themselves are committed to conserving and protecting PRNS. For example, DBOC is the only oyster farm in California to produce and hatch its own seeds on site, greatly reducing the risk of introducing contaminants and invasive species. And it employs an environmentally-friendly off-bottom "hanging culture" method, used by less than 5% of U.S. oyster farmers due to the labor-intensive hand harvesting required. The Lunnys are also dedicated to educating others about conservation and the environment. The oyster farm offers free tours to the public to inform them about the history of oyster farming in PRNS, oysters' value as a beneficial source of protein, coastal ecosystems, and the nature and efficacy of organic sustainable farming. Similarly, the oyster farm offers its

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16 *See* National Academy of Sciences, National Research Council, Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California (2009) ("NAS 2009 Report").

17 *See* National Academy of Sciences, National Research Council, Ecosystem Concepts for Sustainable Bivalve Mariculture (2010) ("NAS 2010 Report").

18 The second NAS report provides further detailed discussion of the general ecosystem services that bivalves perform. NAS 2010 Report at 10-11. In fact, these ecosystem services are so significant that the report recommends quantifying their economic value, as well as developing policies to encourage restoration of bivalves in more ecosystems so they can improve and benefit from these services. *See id.*

facilities to researchers and participates in research on native oysters, estuarine biodiversity, and human health protection.

For all these reasons, many of PRNS' 2.5 million annual visitors flock to DBOC, which carries on the long-standing tradition of oyster farming in Drakes Estero and remains as the last operating oyster cannery in the State. With its cultural, recreational, educational and ecological benefits, the oyster farm undoubtedly "enhances visitors' experience in the estero." *Id.* at 65.

By contrast, should the oyster farm be shut down, the community would be adversely impacted in significant ways. Not only would PRNS lose the numerous visitors for whom DBOC is a destination, but the oyster farm employees who have specialized skills would lose their livelihood, and the low-income housing that DBOC provides for their employees would be demolished. This in turn would effect the local ranches, where many of DBOC's employees' family members work. Furthermore, removing the oysters could have an adverse effect on the Drakes Estero ecology, including its water quality.

Both NAS reports ultimately affirm that there is no ecological justification to deny DBOC a special use permit. And given that Congress has expressly authorized NPS to issue a special use permit, there is no legal justification either. NPS should issue DBOC a special use permit to continue its operations past 2012.[19]

III. NPS AUTHORITY TO ISSUE A SPECIAL USE PERMIT FOR CONTINUED OPERATIONS PAST 2012

In October of 2009, Congress provided a definitive answer to the legal question of whether NPS has the authority to issue a special use permit to DBOC to continue operating past 2012. The answer was a resounding yes.

Specifically, Congress directed that:

> Prior to the expiration on November 30, 2012 of the Drake's Bay Oyster Company's Reservation of Use and Occupancy and associated special use permit ('existing authorization') within Drake's Estero at Point Reyes National Seashore, notwithstanding any other provision of law, the Secretary of the Interior *is authorized to issue a special use permit with the same terms and conditions as the existing authorization*, except as provided herein, for a period of 10 years from November 30, 2012: Provided, That such extended authorization is subject to annual payments to the United States based on the fair market value of the use of the Federal property for the duration of such renewal. The Secretary shall take

---

[19] As you know, Senator Dianne Feinstein contacted you when the first NAS report was issued and expressed her concern that NPS had "exaggerated the effects of the oyster population on the Estero's ecosystem" and appeared to be continuing to ignore the potential beneficial impacts of maricultural operations. *See* Letter from Dianne Feinstein to the Honorable Ken Salazar (May 5, 2009). We agree with Sen. Feinstein's conclusion that the NAS report "does not present any compelling ecological reason for refusing to renew the Drakes Bay Oyster Company lease in 2012."

into consideration recommendations of the National Academy of Sciences Report pertaining to shellfish mariculture in Point Reyes National Seashore before modifying any terms and conditions of the extended authorization.

Department of the Interior, Environment, and Related Agencies Appropriations Act, 2010, Pub. L. No. 111-88 § 124 (2009) (emphasis added).

As such, now that the second NAS report has been issued, DBOC respectfully requests that NPS provide a proposed special use permit to DBOC incorporating the same terms and conditions under which DBOC currently operates, including an appropriate annual fee.

Thank you very much for your attention to this matter. We understand that Will Shafroth, Deputy Assistant Secretary for Fish, Wildlife and Parks, recently visited DBOC on February 4, 2010. The Lunnys would be happy to host you, Secretary Salazar, and any other interested Department of Interior officials on a tour of the oyster farm, and/or provide any follow-up information requested. We look forward to meeting with you and your staff to discuss this matter in further detail, and will be in touch to set this up. If you have any questions or would like additional information, please do not hesitate to reach me at (415) 395-8136.

Best regards,

Karl Lytz M.B.

Karl S. Lytz
of LATHAM & WATKINS LLP

cc: The Honorable Dianne Feinstein
Will Shafroth, Deputy Assistant Secretary for Fish, Wildlife and Parks
Jonathan Jarvis, Director, National Park Service
George Turnbull, Acting Regional Director, Pacific West Region, National Park Service
Cicely Muldoon, Superintendent, Point Reyes National Seashore

SF\755222.5

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1209
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

COPY

July 1, 2010

Dear Secretary Salazar,

We were heartened and gratified to hear your recent statement at the Great Outdoors Conference about our family being able to continue to operate the Drakes Bay Oyster Farm. We can relate to your story about growing upon a ranch, working the fields, tending cattle, and believing in the stewardship and conservation values that have been passed on by American farmers. We feel the same way.

When Kevin was growing up on a ranch overlooking Drakes Estero, the oyster farm was a fixture in the West Marin and Point Reyes Station communities. As an animal science major in college, Kevin took a course in aquaculture. Years later, our family was privileged to acquire the oyster farm. The oyster farm is compatible with our commitment to practicing sustainable agriculture. For example, we were the first Point Reyes National Seashore ranch to raise certified grass fed and organic beef, and our land management practices are certified by Salmon Safe.

We have poured our time, money and hearts into turning the oyster farm around, correcting at great expense a number of environmental problems that had developed during the years prior to our involvement. Working with others in the field and the California Department of Fish and Game, we have developed new methods for raising spat (young oysters) at the facility to reduce the likelihood of harmful nonnative species infiltrating Drakes Estero. We've also donated oyster shells to aid in restoration of San Francisco Bay.

This year's appropriation bill for the Department of the Interior states that you are authorized to extend our use of the shoreside facilities needed to support the offshore cultivation of shellfish, which is done pursuant to leases with the California Department of Fish and Game that expire in 2029. People who value mariculture are rallying around the oyster farm in support of realizing the "Drakes Estero Mariculture Interpretive Center" suggested in National Research Council study of the impact of our farm on the Estero. Your extending our lease is pivotal to making this vision a reality.

You are in our thoughts and have our heartfelt sympathy as you deal with the tragic environmental disaster in the Gulf of Mexico. While we would like to meet with you personally to discuss the future of the oyster farm, we understand that may not be realistic at this moment. In the alternative, our attorneys at Latham & Watkins LLP and we would appreciate an early opportunity to sit down with a senior member of your staff to discuss the future of the oyster farm in Drakes Estero.

Sincerely,

Kevin Lunny

Nancy Lunny

"Kevin Lunny" <kevin@drakesbayoyster.com>

04/02/2010 12:30 MST

To: <Dave_Press@nps.gov>
cc: <Sarah_Allen@nps.gov>, <John_A_Dell'Osso@nps.gov>, <Natalie_Gates@nps.gov>, <David_Graber@nps.gov>, <George_Turnbull@nps.gov>, "'Cassidy Teufel'"
Subject: RE: Drakes Estero Seal Protection Areas

Dave,

Thank you for the reply. I was hoping to work with a NPS GIS person, but we will hire a private GIS consultant to help us with this. We are planning to do some survey work next week. Perhaps the same people can help us with this work.

I certainly understand that you would not want to make any changes at this point. I was really making the point that we still need to have access past these areas. I know that the CCC created them knowing that we would still operate around them - there may be no adjustment required at all. I agree that we should get all of the information together first and then take a look.

I will contact you when we have the GIS work completed.

Thank you,

Kevin

-----Original Message-----
From: Dave_Press@nps.gov [mailto:Dave_Press@nps.gov]
Sent: Friday, April 02, 2010 11:26 AM
To: Kevin Lunny
Cc: Sarah_Allen@nps.gov; John_A_Dell'Osso@nps.gov; Natalie_Gates@nps.gov; David_Graber@nps.gov; George_Turnbull@nps.gov
Subject: Re: Drakes Estero Seal Protection Areas

Hi Kevin,

Thanks for your inquiry. Neither Sarah nor I are able to assist you with any changes to the harbor seal protection areas. Any amendments will have to be discussed with the California Coastal Commission and NPS representatives out of the regional office. Any changes prior to the final report from the Marine Mammal Commission would of course be premature.

As for GIS assistance, I do think it is important for you to have the most accurate information possible. I am not comfortable providing this support. However, I can consult with the regional office to see what help we can provide and when.

Lastly, I strongly encourage you to seek professional assistance from a GIS consultant on these matters. I recognize that the boundaries that you need to be aware of while in the field are not easy to recognize. I think your best option is to use GPS units with all relevant data layers loaded in so that your staff can literally see on the screen where they are in relation to your lease boundary, harbor seal protection zones, etc. A GIS consultant can help you set something like this up, and we would be able to assist with providing some of the data layers.

Best regards, Dave

David Press
Ecologist / Data Manager

San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

"Kevin Lunny" <kevin@drakesbayoyster.com>
04/01/2010 08:01 MST

To: <Sarah_Allen@nps.gov>, <Dave_Press@nps.gov>
cc:
Subject: Drakes Estero Seal Protection Areas

Good morning Sarah and Dave,

I think we have figured out how to get the prohibited areas to show up on our GPS screens. As we discussed, this would offer another level of security - the boat operators would "know" if they're getting close to a protected area. I have attached a map showing the two prohibited areas. In that map, I have given each angle point a number. Would you please provide us with the coordinates for each of these points? We don't have the capability of determining the coordinates.

I have a couple of questions / observations:

1. Line 2-3 should be placed so that the channel is outside the protection area so that oyster boats may use the channel.
2. Line 8-9-10 should be placed so that the channel is outside the protection area so that oyster boats may use the channel.
3. Line 13-14 should be directly on top of the southernmost aquaculture lease line.
4. Move point 4 north east, towards point 5, enough so that the channel from Bull Point to the main channel can be used by oyster boats.

Is this something you could help us with?

Thank you,

Kevin

[attachment "20100401 Prohibited Area Coordinate Request.pdf" deleted by Dave Press/GOGA/NPS]

Sarah Allen/PORE/NPS
04/02/2010 10:57 AM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc "'Diane Windham'" <Diane.Windham@NOAA.GOV>, John_A_Dell'Osso@nps.gov, "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>, Natalie_Gates@nps.gov, "'Tim
bcc Sarah Allen/PORE/NPS
Subject RE: Drakes Estero Work Group

Hi Kevin:

Yes, small is good - I also think that the Coastal Commission might want to be involved.
Thanks

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
04/02/2010 09:48 AM

To <Sarah_Allen@nps.gov>
cc "'Diane Windham'" <Diane.Windham@NOAA.GOV>, "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>, "'Tim Ragen'" <tragen@mmc.gov>, <Natalie_Gates@nps.gov>, <John_A_Dell'Osso@nps.gov>
Subject RE: Drakes Estero Work Group

Sarah,

No problem - I'm happy to help. These are the same agencies that were involved to create the 1992 seal protection protocols. It seems reasonable to include these same agencies to improve upon the management practices. It also seems as though the work group should be kept as small as possible - for a number of reasons.

I look forward to working with Natalie as well.

Thank you,

Kevin

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Thursday, April 01, 2010 4:46 PM
To: Kevin Lunny
Cc: 'Diane Windham'; 'Kirsten Ramey'; 'Tim Ragen'; Natalie_Gates@nps.gov; John_A_Dell'Osso@nps.gov

Subject: Re: Drakes Estero Work Group

Hi kevin:

I am pleased to see that you have pulled these other agencies into the working group. For the NPS representative, though, Natalie Gates is likely the better representative. She is the new Chief of Natural Resources and handles all of the natural resource management issues. You can be assured, though, that I will continue to be involved and advise on harbor seal biology.

Thanks for helping this move forward.

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>
04/01/2010 08:46 AM

To <Sarah_Allen@nps.gov>, "'Diane Windham'" <Diane.Windham@NOAA.GOV>, "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>

cc "'Tim Ragen'" <tragen@mmc.gov>

Subject Drakes Estero Work Group

Hi Sarah,

I spoke with Diane Windham about the small work group that we agreed upon during the Marine Mammal Commission meeting. Diane has agreed to work with the group as the NOAA contact. Kirsten Ramey has agreed to represent CDFG.

I think that we (NPS and DBOF) can make some more progress before engaging the larger group. We can work together to plan how to structure the larger group meetings. Tim Ragen has also offered his assistance if you think it would be helpful.

Thank you,

Kevin

(See attached file: Diane_Windham.vcf)(See attached file: Kirsten Ramey.vcf)

"Kevin Lunny"
<kevin@drakesbayoyster.com>
04/02/2010 09:48 AM

To <Sarah_Allen@nps.gov>
cc "'Diane Windham'" <Diane.Windham@NOAA.GOV>, "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>, "'Tim Ragen'" <tragen@mmc.gov>, <Natalie_Gates@nps.gov>,
bcc
Subject RE: Drakes Estero Work Group

History: This message has been replied to.

Sarah,

No problem - I'm happy to help. These are the same agencies that were involved to create the 1992 seal protection protocols. It seems reasonable to include these same agencies to improve upon the management practices. It also seems as though the work group should be kept as small as possible - for a number of reasons.

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-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Thursday, April 01, 2010 4:46 PM
To: Kevin Lunny
Cc: 'Diane Windham'; 'Kirsten Ramey'; 'Tim Ragen'; Natalie_Gates@nps.gov; John_A_Dell'Osso@nps.gov
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Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny"
<kevin@drakesbay
oyster.com>

To

04/01/2010 08:46 AM

<Sarah_Allen@nps.gov>, "'Diane Windham'" <Diane.Windham@NOAA.GOV>, "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>

cc

"'Tim Ragen'" <tragen@mmc.gov>

Subject

Drakes Estero Work Group

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Thank you,

Kevin

(See attached file: Diane_Windham.vcf)(See attached file: Kirsten Ramey.vcf)

"Kevin Lunny"
<kevin@drakesbayoyster.com>

04/01/2010 08:46 AM

To <Sarah_Allen@nps.gov>, "'Diane Windham'" <Diane.Windham@NOAA.GOV>, "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>

cc "'Tim Ragen'" <tragen@mmc.gov>

bcc

Subject Drakes Estero Work Group

History: This message has been replied to.

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I think that we (NPS and DBOF) can make some more progress before engaging the larger group. We can work together to plan how to structure the larger group meetings. Tim Ragen has also offered his assistance if you think it would be helpful.

Thank you,

Kevin

Diane_Windham.vcf Kirsten Ramey.vcf

"Kevin Lunny"
<kevin@drakesbayoyster.com>

04/01/2010 08:01 AM

To <Sarah_Allen@nps.gov>, <Dave_Press@nps.gov>
cc
bcc
Subject Drakes Estero Seal Protection Areas

History: This message has been forwarded.

Good morning Sarah and Dave,

I think we have figured out how to get the prohibited areas to show up on our GPS screens. As we discussed, this would offer another level of security – the boat operators would "know" if they're getting close to a protected area. I have attached a map showing the two prohibited areas. In that map, I have given each angle point a number. Would you please provide us with the coordinates for each of these points? We don't have the capability of determining the coordinates.

I have a couple of questions / observations:

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3. Line 13-14 should be directly on top of the southernmost aquaculture lease line.
4. Move point 4 north east, towards point 5, enough so that the channel from Bull Point to the main channel can be used by oyster boats.

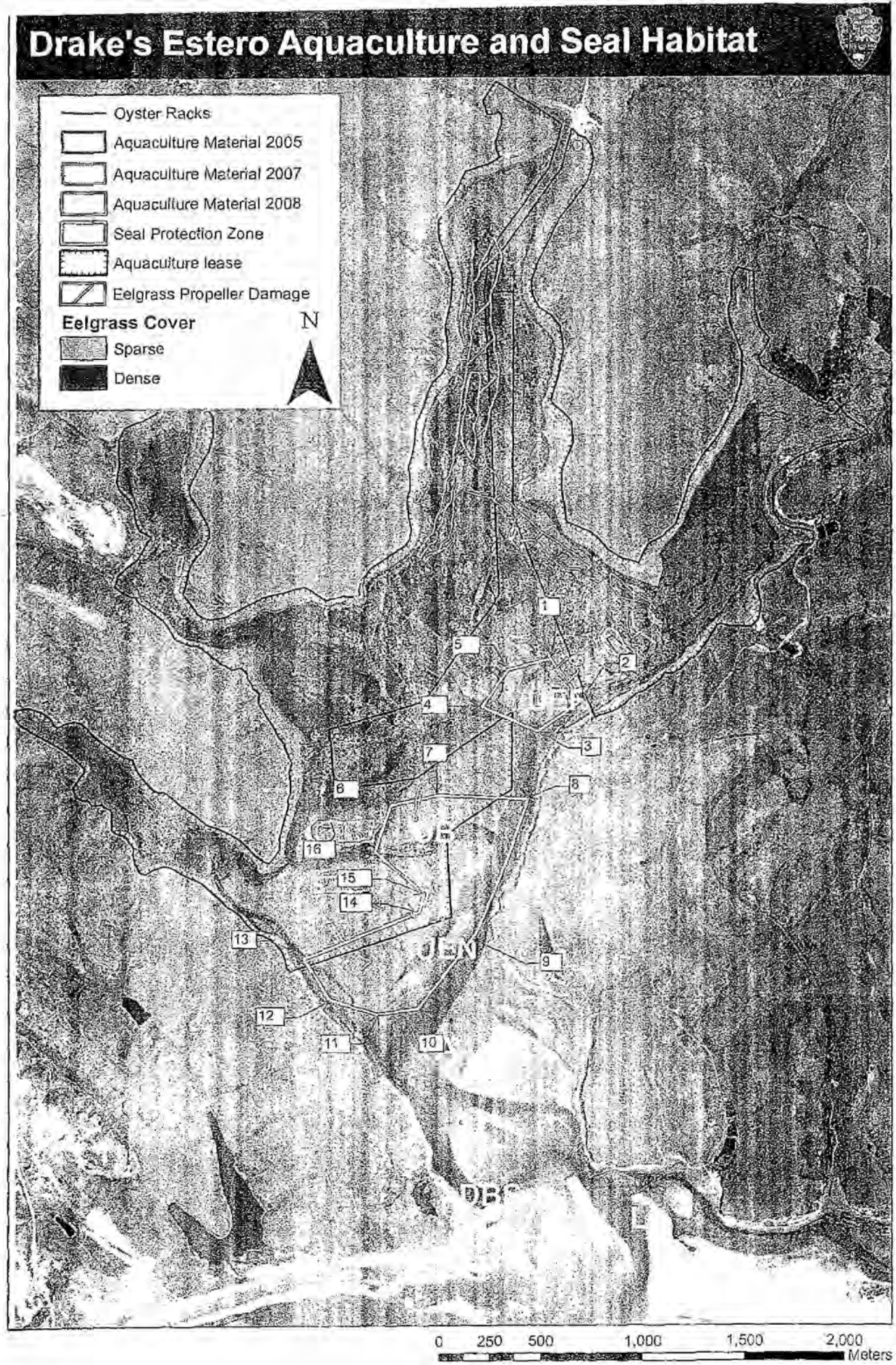
Is this something you could help us with?

Thank you,

Kevin

20100401 Prohibited Area Coordinate Request.pdf

Drake's Estero Aquaculture and Seal Habitat



"Kevin Lunny" <kevin@drakesbayoyster.com>
03/29/2010 01:59 PM

To "John A Dell'Osso" <John_A_Dell'Osso@nps.gov>
cc <Sarah_Allen@nps.gov>
bcc
Subject FW: "A Growing Relationship: Parks and Aquaculture"

I forgot to copy Sarah...

-----Original Message-----
From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Monday, March 29, 2010 1:56 PM
To: John A Dell'Osso (John_A_Dell'Osso@nps.gov)
Subject: FW: "A Growing Relationship: Parks and Aquaculture"

John,

Are you aware of this webinar? I have registered and will be participating. Will anyone from PRNS be joining?

Kevin

-----Original Message-----
From: Laura Hoberecht [mailto:Laura.Hoberecht@noaa.gov]
Sent: Friday, March 26, 2010 5:57 PM
To: robindowney@pcsga.org
Cc: T Diane Windham
Subject: "A Growing Relationship: Parks and Aquaculture"

Hi Robin,

Curious if PCSGA is involved with this event?

https://www2.gotomeeting.com/register/697859435

Your input is appreciated!

Have a great weekend,

Laura

--
><> ><> ><> ><> ><> ><> ><> ><> ><> ><> ><> <><
Laura Hoberecht, PhD
Fishery Biologist
Habitat Conservation Division
National Marine Fisheries Service
777 Sonoma Ave, Rm 325
Santa Rosa, CA 95404
phone: 707-575-6056
fax: 707-578-3435
email: Laura.Hoberecht@noaa.gov

"Kevin Lunny" <kevin@drakesbayoyster.com>

03/24/2010 10:04 AM

To <Sarah_Allen@nps.gov>

cc <David_Schifsky@nps.gov>

bcc

Subject RE: FW: Kayakers are still coming to the farm

Thank you.

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Wednesday, March 24, 2010 9:49 AM
To: Kevin Lunny
Cc: David_Schifsky@nps.gov
Subject: Re: FW: Kayakers are still coming to the farm

Hi Kevin:

I am passing along your email to David Schifsky who is the new Chief Ranger and he can address your questions. He is the person you can contact in the future about any of these sorts of questions. Thanks for bringing this to our attention.

Best regards,

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>

03/23/2010 03:16 PM

To <Sarah_Allen@nps.gov>

cc "'Ginny Cummings'" <ginny@drakesbayoyster.com>

Subject FW: Kayakers are still coming to the farm

Hi Sarah,

We are often telling people with kayaks during pupping season that they are not allowed in Drakes Estero during this season. This situation (below) is common: didn't know about the closure and didn't see the sign. We don't mind telling people about the closure, but occasionally they make it into the estero before we spot them.

Do you think that a bigger sign at the launching site would be helpful? Maybe even a rope across the opening from the parking lot to the water's edge as an extra reminder?

My sister Ginny and my daughter Brigid are willing to keep up the watch, but it is sometime hard to deliver the bad news to a visitor that has their heart set on a kayak trip into the estero.

Kevin

From: Ginny Cummings [mailto:ginny@drakesbayoyster.com]
Sent: Tuesday, March 23, 2010 12:46 PM
To: 'Kevin Lunny'
Subject: Kiyakers are still coming to the farm

Hey Kev:
Brig and I just went out to inform another couple of kayakers who traveled from Trinity to kayak today and they shared that they saw no where on the NPS website the closure dates. The signage here is pretty poor and these two guys did not even see it until we pointed it out. What do you think.should I call someone at headquarters and suggest better, more obvious signage or let these occurrences happen? The only sign is a page-size note indicating closure dates and cites the federal law and that a fine will be levied..what's your thought? It's the unfortunate visitor I feel badly about.

Ginny

Sarah Allen/PORE/NPS
03/24/2010 09:48 AM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc David Schifsky/PORE/NPS@NPS
bcc Sarah Allen/PORE/NPS
Subject Re: FW: Kayakers are still coming to the farm

Hi Kevin:

I am passing along your email to David Schifsky who is the new Chief Ranger and he can address your questions. He is the person you can contact in the future about any of these sorts of questions. Thanks for bringing this to our attention.

Best regards,

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
03/23/2010 03:16 PM

To <Sarah_Allen@nps.gov>
cc "'Ginny Cummings'" <ginny@drakesbayoyster.com>
Subject FW: Kayakers are still coming to the farm

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Kevin

From: Ginny Cummings [mailto:ginny@drakesbayoyster.com]
Sent: Tuesday, March 23, 2010 12:46 PM
To: 'Kevin Lunny'
Subject: Kiyakers are still coming to the farm

Hey Kev:
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Ginny

"Kevin Lunny" <kevin@drakesbayoyster.com>

03/23/2010 03:16 PM

To <Sarah_Allen@nps.gov>

cc "'Ginny Cummings'" <ginny@drakesbayoyster.com>

bcc

Subject FW: Kayakers are still coming to the farm

History: This message has been replied to.

Hi Sarah,

We are often telling people with kayaks during pupping season that they are not allowed in Drakes Estero during this season. This situation (below) is common: didn't know about the closure and didn't see the sign. We don't mind telling people about the closure, but occasionally they make it into the estero before we spot them.

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My sister Ginny and my daughter Brigid are willing to keep up the watch, but it is sometime hard to deliver the bad news to a visitor that has their heart set on a kayak trip into the estero.

Kevin

From: Ginny Cummings [mailto:ginny@drakesbayoyster.com]
Sent: Tuesday, March 23, 2010 12:46 PM
To: 'Kevin Lunny'
Subject: Kiyakers are still coming to the farm

Hey Kev:
Brig and I just went out to inform another couple of kayakers who traveled from Trinity to kayak today...and they shared that they saw no where on the NPS website the closure dates. The signage here is pretty poor and these two guys did not even see it until we pointed it out. What do you think...should I call someone at headquarters and suggest better, more obvious signage or let these occurrences happen? The only sign is a page-size note indicating closure dates and cites the federal law and that a fine will be levied....what's your thought? It's the unfortunate visitor I feel badly about.

Ginny

"Kevin Lunny" <kevin@drakesbayoyster.com>
03/01/2010 11:02 AM

To <Sarah_Allen@nps.gov>
cc
bcc
Subject RE: Meeting

History: This message has been replied to.

Your office is fine. Where exactly are you located?

Kevin

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Monday, March 01, 2010 8:36 AM
To: Kevin Lunny
Subject: RE: Meeting

Hi:

My office is fine if that is not too much driving for you. I gladlycan meet you part way at Priscilla's if that is easier. My cellphone is (b) (6) .

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>
02/28/2010 11:30 AM

To <Sarah_Allen@nps.gov>
cc
Subject RE: Meeting

Sarah,

Thank you for making the time - we can keep it short. Lunch on Monday is perfect. Where should we meet? I'm happy to come to your office if it is

easier for you.

Kevin

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Friday, February 26, 2010 9:48 AM
To: Kevin Lunny
Subject: RE: Meeting

Hi Kevin:

I just am getting to my email now and so am sorry not to respond sooner. I am here all day today but likely will leave before 4PM because I am coming back tomorrow. If you would like to come in today, we can sit down for a few minutes. Saturday,we are giving the class, I will forward the agenda to you for your interest. Monday is taken up with many meetings, although we could talk over lunch at @ 12:00. I have a meting at 1PM. Would that work? I appreciate your persistence.

Here is my cellphone if you wish to connect sooner (b) (6))

Best regards,

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>
02/25/2010 06:44 PM

To <Sarah_Allen@nps.gov>
cc
Subject RE: Meeting

Sarah,

I would really like to meet with you, even if only for a few minutes, either
tomorrow or Monday. I would like to call Tim Ragen on Monday to tell him that you and I have already had our first meeting. There is no agenda necessary for this first preliminary meeting. I would just like to touch

base with you. To save time, I am happy to stop by your office.

I can meet before 10:00AM tomorrow (Friday) or anytime before 1:00PM or after 2:30PM on Monday.

Thank you,

Kevin

Home: (b) (6)
Office: 662-9848
Farm: 669-1149

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Thursday, February 25, 2010 3:25 PM
To: Kevin Lunny
Subject: RE: Meeting

Hi:

I am not sure monday would work either because I have a couple of meetings that will likely take alot of time. Wed and thurs I am gone most of the days but friday in the morning might work.

How does that work with your schedule? After that I will be away for a couple of weeks. What would you like to discuss? Perhaps we can do so on the phone?

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>
02/28/2010 11:30 AM

To <Sarah_Allen@nps.gov>
cc
bcc
Subject RE: Meeting

History: This message has been replied to.

Sarah,

Thank you for making the time - we can keep it short. Lunch on Monday is perfect. Where should we meet? I'm happy to come to your office if it is easier for you.

Kevin

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Friday, February 26, 2010 9:48 AM
To: Kevin Lunny
Subject: RE: Meeting

Hi Kevin:

I just am getting to my email now and so am sorry not to respond sooner. I am here all day today but likely will leave before 4PM because I am coming back tomorrow. If you would like to come in today, we can sit down for a few minutes. Saturday,we are giving the class, I will forward the agenda to you for your interest. Monday is taken up with many meetings, although we could talk over lunch at @ 12:00. I have a meting at 1PM. Would that work? I appreciate your persistence.

Here is my cellphone if you wish to connect sooner ((b) (6))

Best regards,

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>
02/25/2010 06:44 PM

To <Sarah_Allen@nps.gov>
cc
Subject RE: Meeting

Sarah,

I would really like to meet with you, even if only for a few minutes, either
tomorrow or Monday. I would like to call Tim Ragen on Monday to tell him that you and I have already had our first meeting. There is no agenda necessary for this first preliminary meeting. I would just like to touch base with you. To save time, I am happy to stop by your office.

I can meet before 10:00AM tomorrow (Friday) or anytime before 1:00PM or after 2:30PM on Monday.

Thank you,

Kevin

Home: (b) (6)
Office: 662-9848
Farm: 669-1149

-----Original Message-----
From: Sarah_Allen@nps.gov [mailto:Sarah_Allen@nps.gov]
Sent: Thursday, February 25, 2010 3:25 PM
To: Kevin Lunny
Subject: RE: Meeting

Hi:

I am not sure monday would work either because I have a couple of meetings that will likely take alot of time. Wed and thurs I am gone most of the days but friday in the morning might work.

How does that work with your schedule? After that I will be away for a couple of weeks. What would you like to discuss? Perhaps we can do so on the phone?

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Nancy Lunny" <nancy@drakesbayoyster.com>

02/25/2010 06:09 PM

To <sarah_allen@nps.gov>

cc

bcc

Subject Seal observer training

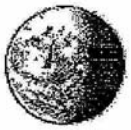
History: This message has been replied to.

Good evening, Sarah,

I am very much looking forward to being a part of the volunteer seal observer training program. You had mentioned that there is a training planned for this coming Saturday, February 27th. Due to a previous committment, I am unable to attend this training. I would very much appreciate it if you would advise me of the next opportunity for training.

My best,

Nancy Lunny



Sarah Allen/PORE/NPS
02/25/2010 12:22 PM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc
bcc Sarah Allen/PORE/NPS
Subject Re: Meeting

Hi Kevin:

Thank you very much for the offer to meet. I would like to meet next week instead on monday pm or tuesday, because I have a lot to do to prepare for the training this saturday.

Would either of those days work for your schedule?

I am looking forward to moving forward with you!

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
02/25/2010 11:45 AM

To <Sarah_Allen@nps.gov>
cc
Subject Meeting

Hi Sarah,

Do you have any time today for a half hour chat? Over lunch or coffee?

If today can't work, I also have some times that could work tomorrow.

Thank you,

Kevin

"Kevin Lunny" <kevin@drakesbayoyster.com>

01/30/2010 10:09 AM

To "Don Neubacher" <Don_Neubacher@nps.gov>

cc

bcc

Subject Drakes Bay Oyster Farm Driveway

History: This message has been replied to and forwarded.

Don,

Normally you would have the oyster farm road graded immediately before a dignitary visits the farm. We request that you not grade the road until after Mr. Shafroth's visit on Thursday, February 4th.

Thank you,

Kevin and Nancy Lunny

"Kevin Lunny" <kevin@drakesbayoyster.com>

12/29/2009 03:30 PM

To "Don Neubacher" <Don_Neubacher@nps.gov>

cc "'Kirsten Ramey'" <KRAMEY@dfg.ca.gov>, "'Sonke Mastrup'" <SMastrup@dfg.ca.gov>, "'Jon Fischer'" <JFischer@fgc.ca.gov>, "Cassidy Teufel"

bcc

Subject Drakes Estero Shellfish Leases

History: This message has been forwarded.

20091229 DBOC to Don Neubacher re clams.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

December 29, 2009

Don Neubacher
Superintendent
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956

Dear Mr. Neubacher.

We are in receipt of your letter dated 12/23/09. The characterization that cultivating clams on lease M-438-01 is a change that requires review is without merit. You have personal knowledge that the California Fish and Game Commission (FGC) approved the cultivation of clams on lease M-438-01 in 1993. The FGC recently reaffirmed this when it corrected a typographical error incorrectly indicating the clams were to be cultivated on lease M-438-02, which has never been the case. Your letter incorrectly states that the FGC granted permission to cultivate clams at its 12/10/09 hearing. The agenda and staff report are unambiguous that this approval was granted 16 years ago. As the cultivation of clams on lease M-438-01 has been authorized since 1993, no further approvals from NPS to cultivate clams are necessary. Please direct any questions you may have about this to the FGC. To avoid further unnecessary confusion, the SUP should be conformed to reflect the corrected lease.

Sincerely,

Kevin Lunny Nancy Lunny

cc: California Department of Fish and Game
Fish and Game Commission
California Coastal Commission

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L1425
02-106

December 22, 2009

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

We want to acknowledge receipt of your development request and site drawing on October 15, 2009. We subsequently received a copy of revised versions, along with development costs and a project description, submitted to the California Coastal Commission on October 30, 2009.

Article 6 of your Special Use Permit sets forth requirements regarding requests for Improvements and Alterations. Improvements and Alterations require prior written approval of the National Park Service. As a prerequisite, the Permittee is to submit design plans and other relevant data to the National Park Service.

Accordingly, we will consider your October 15 and October 30 correspondence as a request under Article 6 of your Special Use Permit. We will be reviewing your requests through our standard environmental compliance process as required by the National Environmental Policy Act. This project review process has already been initiated and should be completed in 30-45 days. The objective of this initial review is to determine what level of environmental compliance is required for the proposed project and whether an Environmental Assessment or Environmental Impact Statement will be needed. We will notify you once this initial process is complete. Regardless of the compliance pathway necessary, it is likely that more information on the project will be requested of you.

In addition, we acknowledge you have received permission from the California Fish and Game Commission to place Manila clams in Lease M-438-01. As stated in your permit (Article 4bvi),

you may not implement any modifications to CDFG leases without prior written approval from the National Park Service.

Article 4bvi states:

Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

At this time, we would like to request additional information on Manila clam production. Please provide a proposal that includes location and size of growing area, approximate number of bags and clams, seed origin, history of production, and other details on the production of Manila clams. With this information, we will use our standard process to meet our environmental compliance responsibilities.

Thanks for your attention to these matters.

Sincerely,

Don L. Neubacher
Superintendent

"Kevin Lunny" <kevin@drakesbayoyster.com>

12/21/2009 07:17 PM

To "George Turnbull" <George_Turnbull@nps.gov>, "Don Neubacher" <Don_Neubacher@nps.gov>, "Gregg Langlois" <Gregg.Langlois@cdph.ca.gov>, "Cassidy Teufel"

cc

bcc

Subject Drakes Estero Manila Clams

History: This message has been forwarded.

Attached is a response to the CCC enforcement action letter dated December 7, 2009.

20091221 DBOC to CCC re Clam Violation.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

December 21, 2009

Jo Ginsberg
California Coastal Commission
45 Fremont St., Suite 2000
San Francisco, CA94105-2219

Re: CCC-07-CD-11 Drakes Bay Oyster Company

Dear Ms. Ginsberg,

Manila clams have been cultured on M-438-01 since 1993 when Johnson Oyster Company (JOC) asked that they be added to M-438-01 as a cultured species, and the California Fish and Game Commission (FGC) approved the request. Inadvertently, however, through a FGC clerical error, the FGC added the Manila clams to the farm's other lease (M-438-02) that was created by the FGC in 1979 for the purpose of culturing native rock scallops. Pursuant to the actual FGC approval, JOC clam culture began on M-438-01. Since 2007, Drakes Bay Oyster Company (DBOC) and the California Department of Fish and Game (CDFG) have been working toward correcting the error.

DBOC brought the FGC clerical error to the attention of the California Coastal Commission (CCC) in its Coastal Development Permit (CDP) application 2-06-003, on August 20, 2008. In so doing, DBOC made the CCC aware that the FGC error was to be corrected.

The CCC 2007 Consent Cease and Desist Order CCC-07-CD-11 (CDO) reflected the clerical error. The approved cultured species included in the CDO was taken from the FGC lease language that contained the 1993 FGC error. A correction to both the FGC lease and the CCC Consent CDO was necessary, so that the clams could stay on M-438-01 where they had been officially permitted.

Prior to the correction by the FGC, DBOC received an enforcement letter from CCC dated September 16, 2009. The letter stated that DBOC was out of compliance with the Consent CDO because Manila clams were located outside of M-438-02. DBOC contacted CDFG about this matter. Devin Bartley, State Aquaculture Coordinator, told

DBOC that the matter was submitted to the FGC for the correction, and would be placed on an upcoming agenda.

On October 2, 2009, DBOC submitted a letter to CCC noting that the FGC would be acting on the issue soon and that CDFG would be in contact with CCC regarding the clam location.

On October 15, 2009, I asked Cassidy Teufel and Allison Dettmer if the clams could remain where they had always been, on M-438-01, until the upcoming FGC meeting that would address the clerical error issue. At the time, Allison and Cassidy recommended that DBOC move the clams for two reasons: first, Peter Douglas was considering an enforcement action against DBOC because of the clam location and second, the Coastal Commissioners were not likely to approve a CDP if DBOC was out of compliance with clams. Given this CCC position, DBOC agreed to move the clams from M-438-01 to M-438-02.

In response to the CCC directive, DBOC initiated a process to move the clams. Step one was to contact the CDFG to obtain coordinates for the new location. Even though M-438-02 was an eligible area to grow shellfish, as a practical matter, DBOC had not used it previously, thus were unfamiliar with it. CDFG provided the latitude/longitude coordinates in "minutes/seconds." Step two; convert the coordinates to decimals so they could be entered into a hand-held GPS. In making these calculations, an error was made.

On October 29, 2009, DBOC notified the agencies that the clams had been moved to M-438-02 as directed by CCC.

On November 25, 2009, CDFG provided the December 9-10 FGC meeting agenda to the CCC. On the Consent Calendar for that meeting, included as item 15, was the correction of the 1993 Manila clam error.

On November 30, 2009, I receive a copy of an email from CDFG to NPS scientist Ben Becker with the coordinates of M-438-02. Various other agencies were copied, as was DBOC.

On December 03, 2009, I sent an email to Ben Becker and said: "DFG forwarded me a copy of the email of November 30, 2009. Apparently, you have questions about our lease with the State. Would you please detail your concerns to us? Why didn't you ask us, or copy us with copy of your inquiry. We would be happy to work with you." NPS did not respond.

On December 8, 2009, DBOC first learned of the clam placement error. I received a call from US Senator Dianne Feinstein's office with questions about clams having been placed in a prohibited area. I told them that I did not know what they were talking about. I explained that we had moved the clams onto M-438-02 as directed by the CCC. While on the call, the Senator's staff sent me an aerial photo and map prepared by the NPS describing where the clams were. I was astonished at what I saw. I explained to them

that this had not been brought to our attention and we would address the problem immediately. During the same day, the CCC and the NPS called to also notify DBOC of the problem. The message was clear – get the clams out of the prohibited area.

DBOC has worked very hard to develop a good rapport with CCC and was moving steadily towards the CDP. The call from Cassidy clearly revealed that CCC perceived an unintentional mistake as intentional, resulting in a loss of trust for DBOC. The calls I had received on December 8, 2009, included a call from a US Senator's office, a call from the NPS Pacific West Regional Director's office and the Point Reyes National Seashore Superintendent, a call from the California Coastal Commission informing me of a $61,250.00 fine and a loss of trust. NPS directed us to move the clams. We moved the clams the next day.

In the process of retrieving the clam bags, DBOC kept the boat in deep water and outside of the seal protection area so that there would be no damage to eelgrass or other resources. It was not seal pupping season and there were no seals around during the placement or recovery of the clam bags. Removing the bags was a simple three hour task of lifting the bags up off the sandbar and hand carrying them to the two barges that were attached to the boat. The bags were in an area devoid of eelgrass and the bags left no marks on the sand. (To give you a sense of volume, the clams in question would have fit in the back of a pickup truck.) It is important to note, according to NPS data, the largest causes of seal disturbances in Drakes Estero---kayaks and seashore visitors---, are allowed to use and enjoy the very areas prohibited to DBOC.

In 1992 NOAA, CDFG and NPS created harbor seal protection protocols. NOAA and NPS records show that the protocols have worked. Moreover, recent reports from both agencies reveal that harbor seals along the California coast are at carrying capacity. Today, at the request of the Sierra Club and National Parks Conservation Association, the Marine Mammal Commission is undertaking a new review and DBOC is working closely with them in that review.

I had a conversation with Cassidy Teufel about the clam placement error. From this conversation, I learned that it appeared to CCC that DBOC must not "know" where the boundaries of the protected areas are, if they placed clams within the prohibited area. DBOC is aware of the locations of these areas. DBOC uses established routes to each and every shellfish bed. Those well known routes do not interfere or cross either protected area. DBOC boats will continue to use the established routes. There is no reason to expect that boat traffic is entering the prohibited areas or that boat traffic will enter these areas in the future. This is an unusual situation which resulted in an isolated error. Cassidy and I agreed that it would be a good idea to mark the boundaries of the seal protected areas with buoys so that there would be no inadvertent boat traffic within these areas. This would make it clear to all parties concerned.

CCC has expressed the concern that this mistake was intentional. <u>It was not.</u>

DBOC understands that an error occurred while undertaking a very unusual task and DBOC takes responsibility for that error.

Locating a growing area is not a normal task and does not suggest that a similar error could occur in the future. DBOC staff is fully aware of the locations of all of the historic oyster beds. The well established oyster beds do not move and are well known to the staff. The staff never looks for "new areas" to place shellfish.

At the December 10, 2009 FGC meeting, the Commission formally acknowledged, by a unanimous vote, that in 1993, the commission approved Manila Clams as a cultured species on M-438-01. The FGC corrected the clerical error that erroneously indicated Manila clams on M-438-02. Manila clams are legal and approved on M-438-01 with FGC, CDFG and NPS. In light of the FGC determination, we respectfully request that the CCC conform all applicable records and documents. When the record is conformed there will be consistency between all agencies and the clams will remain in the same location that they have historically been grown.

As previously stated, the placement of clams in a prohibited area was unintentional. Harbor seals were not present and eel grass was not disturbed. DFG informed CCC of the FGC error and the movement of clams should not have been required. We therefore respectfully request that the $61,250.00 penalty be withdrawn. Please confirm that our CDP application and all applicable records have been changed to reflect the action taken by the FGC.

Enclosed, please find a check in the amount of $8,500.00. This represents the balance due for the DBOC CDP application. We look forward to working with CCC staff through the completion of the CDP process.

Sincerely,

Kevin Lunny Nancy Lunny

Cc: George Turnbull, Deputy Regional Director, National Park Service
Don Neubacher, Superintendent, Point Reyes National Seashore
John McCamman, Director, California Department of Fish and Game
John Carlson, Executive Director, California Fish and Game Commission
Gregg Langlois, Senior Environmental Scientist, California Department of Public Health, Environmental Management Branch
Allison Dettmer, CCC, Deputy Director, Energy, Ocean Resources, and Federal Consistency Division
Cassidy Teufel, CCC, Coastal Program Analyst
Lisa Hagge, CCC, Chief of Enforcement
Zachary Walton, Esq., Paul, Hastings, Janofsky & Walker LLP

Ann Nelson/PORE/NPS
12/14/2009 08:05 AM

To agresources@erols.com
cc kevin@drakesbayoyster.com, nancy@drakesbayoyster.com
bcc
Subject Fw: Fish and Game Commission

Dear Mr. Weiman:

Per your request, we're hereby forwarding you a copy of the requested letter (in Word and PDF); we're also sending copies to Mr. and Mrs. Lunny.

Fish&GameCommission Letter 120909.doc

Fish&GameCommission Letter 120909.pdf

"David M Weiman" <agresources@erols.com>
12/10/2009 02:51 PM

To "Neubacher, Don" <Don_Neubacher@nps.gov>
cc "Lunny, Kevin" <kevin@drakesbayoyster.com>, "Lunny, Nancy" <nancy@drakesbayoyster.com>
Subject Fish and Game Commission

Don.

According to the Fish and Game Commission, you submitted a letter regarding the DBOC lease issue that was before the Commission today.

Would you please provide us with a copy of that letter?

Thank you.

dave w.

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

L1425

December 8, 2009

California Fish and Game Commission
1416 Ninth Street
Sacramento, California 95814

Re: Consent Item #15 for the December 9, 2009 Fish and Game Commission Meeting regarding expansion of Manila Clams to Drakes Estero Aquaculture Lease M-438-01.

Dear Commissioners:

Drakes Bay Oyster Company (DBOC) has proposed to expand the mariculture use in Drakes Estero Lease No. M-438-01 (the "Lease"), as reported on the Consent Calendar Agenda Item No. 15 for December10, 2009 for the meeting of the Fish and Game Commission. We do want to acknowledge that DBOC does have the right under our permit to "seek to conform and/or modify these leases with CDFG."

Point Reyes National Seashore, a unit of the National Park Service (NPS) has several concerns regarding Manila clam cultivation that is within the park's boundary. The NPS has not had the opportunity to fully discuss with DBOC or the California Department of Fish and Game (CDFG) the proposed expansion of mariculture by DBOC.

Our specific concerns follow:

- Changes in the current CDFG lease are subject to environmental review and analysis under the National Environmental Policy Act (NEPA), along with the California Environmental Quality Act (CEQA). We believe the expansion of the area from one acre to the entire lease of over 1,000 acres where manila clams can be cultivated is an important change to the current lease and requires environmental review. We also believe that consultation regarding this expansion is required with NOAA Fisheries, California Coastal Commission, Army Corps of Engineers, and the US Fish and Wildlife Service. We are concerned about the potential ecological risks that this species may bring to Drakes Estero and native species there. No risk analysis for this species to be introduced has been conducted.

- Potential expansion of Manila clams as an invasive species is a major concern. While Manila clams have been introduced and have spread in other estuaries of California, there is currently no evidence to our knowledge that they escaped or invaded Drakes or Limantour Esteros. The National Academy of Sciences noted in their report *Shellfish Mariculture in Drakes Estero* (NAS 2009) that "The oysters and clams cultured in Drakes Estero are nonnative species that have some risk of establishing self-sustaining populations (p 5)" and further noted that "continued culture of

nonnative oysters and clams poses some risk of their eventual naturalization in Drakes Estero and larval spread to other coastal lagoons, a risk that could be minimized but not entirely eliminated by culturing triploids (NRC, 2004a) (p 22)". Finally, they reported that "If the Manila clam successfully reproduces and establishes populations in Drakes Estero, it may compete with native infaunal suspension-feeding bivalves" (p 52).

- Before any expansion of the cultivation of this non-native species, a thorough survey should be conducted to confirm its absence or presence throughout the estero. Dr. James Carlton, a leading authority on invasive species, communicated to us by letter that "a survey of Drakes Estero to determine if the Manila clam *Venerupis philippinarum* is established there would be of interest." He noted that "As of 1979, I could find no published or museum records of the Manila clam in Drakes Estero. I may have overlooked previous records, however, and I also did not personally do any surveys there." National Park Service biologists have conducted informal surveys, and not seen this clam naturalized within Drakes Estero. A systematic survey would verify the presence or absence of this potentially invasive non-native species in Drakes Estero.

- Potential changes in the intensity of cultivation. The addition of bag culture for cultivating manila clams throughout the estero has the added concern of providing a substrate for the highly invasive non-native tunicate, *Didemnum* species A or *Didemnum* sp., which is already present in the estero attached to oyster racks, and more recently on natural habitat at Bull Point. The NAS in their report noted that "Any culture bags used to contain Manila clams would provide additional solid surfaces for epibionts (species that attach to other living organisms)" (p 52), and that "It is now a very evident epibiont covering a substantial fraction (up to about half, judging from the committee's observations made during its September 2008 visit) of subtidal surface space on shell surfaces of living Pacific oysters and on associated oyster-rearing gear in Drakes Estero" (p. 52). They noted that "Research on control of abundance and risk of spread of the invasive tunicate, *Didemnum vexillum*, is urgently needed, not just in Drakes Estero, but worldwide." (p 8). The potential to expand substrate material throughout the estero has the potential to expand the presence of this highly invasive species in Drakes Estero and to the adjacent Estero de Limantour (a newly designated state Marine Reserve) where it presently does not occur.

We request you postpone any action on this issue at this time and we appreciate your attention to these concerns.

Sincerely,

Don L. Neubacher
Superintendent

"Kevin Lunny" <kevin@drakesbayoyster.com>

12/09/2009 02:24 PM

To <Don_Neubacher@nps.gov>

cc "'Cassidy Teufel'" <cteufel@coastal.ca.gov>, "Tim Ragen" <tragen@mmc.gov>, "'Tom Moore'" <TMOORE@dfg.ca.gov>, "Kirsten Ramey"

bcc

Subject Manila Clam Relocation

20091209 DBOC to Don Neubacher.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

December 9, 2009

Don Neubacher
Superintendent
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956

Dear Mr. Neubacher.

This will acknowledge your letter and directive of December 4, received yesterday December 8, and your 1:30 pm telephone call, with George Trumbull.

As of 1:00 pm today, all clams were moved, as you directed and returned to their original location in the Estero.

This matter could have been addressed far more expeditiously had you or your staff simply picked up the telephone and called us. In less than 24 hours of learning about this matter, the clams were moved as directed and this matter is fully resolved.

As you are aware, clam placement on our state lease became an issue because an inadvertent clerical – *paperwork* – error that occurred in1993, sixteen years ago and a dozen years before we acquired the oyster farm. The clams were there prior to 1993 – and have been there since. The Estero is the same. The resource is the same. The production is the same. After acquiring the farm we began correcting a series of clerical issues (NPS, for instance, had not issued a SUP to Johnson Oyster Company for the decade prior to our acquisition of the oyster farm). One of the last remaining administrative items to be addressed – correcting the administrative list of shellfish to be grown pursuant to the state lease We have been trying to get this clerical error corrected – and, as you know, it is now on the Calendar for the Fish and Game Commission tomorrow.

Even though DBOC's shellfish lease is issued by the California Department of Fish and Game (CDFG), they were not informed of the concern, but only asked by Dr. Ben Becker of your staff for technical GPS coordinates. In the CDFG response to Becker, we were copied. Upon receipt, we immediately contacted Dr. Becker and asked:

"CDFG forwarded me a copy of the email of November 30, 2009. Apparently, you have questions about our lease with the State. Would you please detail your concerns to us? Why didn't you ask us, or copy us with copy of your inquiry. We would be happy to work with you."

Becker did not acknowledge or respond to our request for information. Had he done so, this could have been handled more responsibly – and far more quickly.

Your letter raised additional issues which we will address in a subsequent communication.

Thank you.

Kevin Lunny

Nancy Lunny

cc: California Department of Fish and Game
Fish and Game Commission
California Coastal Commission
Marine Mammal Commission
Senator Dianne Feinstein
Senator Barbara Boxer
Rep. Lynn Woolsey
Marin County Board of Supervisors

George Turnbull/OAKLAND/NPS
12/08/2009 10:43 AM

To kevin@drakesbayoyster.com
cc "Don Neubacher" <Don_Neubacher@nps.gov>
bcc
Subject Re: Phone Call

Kevin,

Don and I will call you at the number below at 1:30 pm.

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
12/08/2009 10:30 AM
Please respond to kevin@drakesbayoyster.com

To "George Turnbull" <George_Turnbull@nps.gov>, "Don Neubacher" <Don_Neubacher@nps.gov>
cc
Subject Phone Call

George and Don,

I will be in my office today from 11:00 AM until 5:00 PM. I will be unavailable from 2:00 to 2:30. Feel free to call me, or let me know if you would like me to call you.

(b) [redacted]

Kevin
Sent via BlackBerry by AT&T

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:
L1425 (PWR-RD)
02-106

George,

DEC 0 4 2009

COPY FOR YOUR INFORMATION

Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Mr. Lunny:

We have tried to reach you several times about bags with clams and/or oysters and other materials which have been placed in the Harbor Seal Protection Area of Drakes Estero and outside the permitted area. We have attached relevant maps from the Special Use Permit as well as a geographic referenced photograph regarding the violation (see attachments).

This letter serves as a notice of violation by Drakes Bay Oyster Company (DBOC). The situation as described below is a violation of the terms and conditions of DBOC's Special Use Permit (MISC-8530-6000-8002) with the National Park Service, and is therefore a violation of Title 36 Code of Federal Regulations (CFR).

Using areas outside of the permitted area described as the "Premises" on page 1 of the Special Use Permit is a permit violation. This is also a violation of section 4(b)(vii) and Exhibit C of the Special Use Permit. Section 4(b)(vii) states:

> Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from hauled out seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel is authorized during the pupping harbor seal closure period.

TAKE PRIDE® IN AMERICA

The DBOC Special Use Permit's Exhibit C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol (Item 3) states:

> Throughout the year, all of Permittee's boats, personnel, and any structures and materials owned or used by Permitttee shall be prohibited from the harbor seal protection areas identified on the Protocol Map. In addition, all of the Permittee's boats and personnel shall be prohibited from coming within 100 yards of hauled out seals.

Violating the terms and conditions of the Special Use Permit also violates Title 36 CFR section 1.6(g)(2) which states: "Violating a term or condition of a permit issued pursuant to this section is prohibited." Furthermore, Title 36 CFR section 1.6(h) states: "Violating a term or condition of a permit issued pursuant to this section may also result in the suspension or revocation of the permit by the superintendent."

DBOC has thirty days from the date of this letter to remedy this permit violation. Please provide formal notice when the bags and other materials are removed. Thank you for your prompt attention to this matter.

Sincerely,

George D. Turnbull

FOR Rory D. Westberg
Acting Regional Director, Pacific West Region

Attachment 1: Special Use Permit Exhibit C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol: Protocol Map

Attachment 2. Special Use Permit Exhibit A: Drake's Estero Aquaculture & CDFG Leases

Attachment 3. Geographic Referenced Photo of oyster activity in Harbor Seal Protection Area

cc: Peter Douglas, California Coastal Commission 45 Fremont St., Suite 2000 San Francisco, Ca 94105

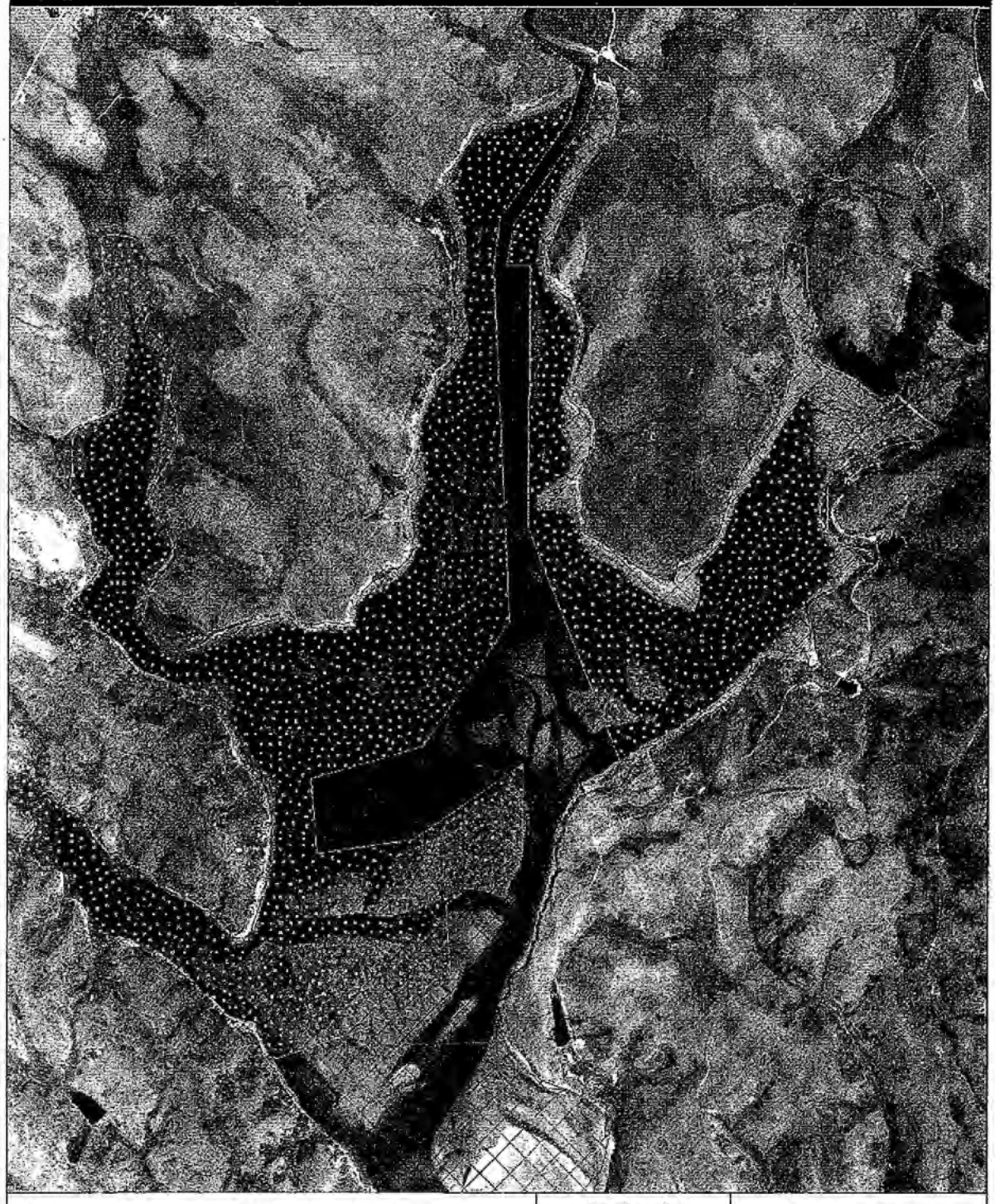
Director McCamman, California Department of Fish and Game,1416 9th Street, Sacramento, Ca 95814-5515

FIGURE 2:HARBOR SEAL PROTECTION AREA

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior



Permit Type

- ROP
- SUP

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

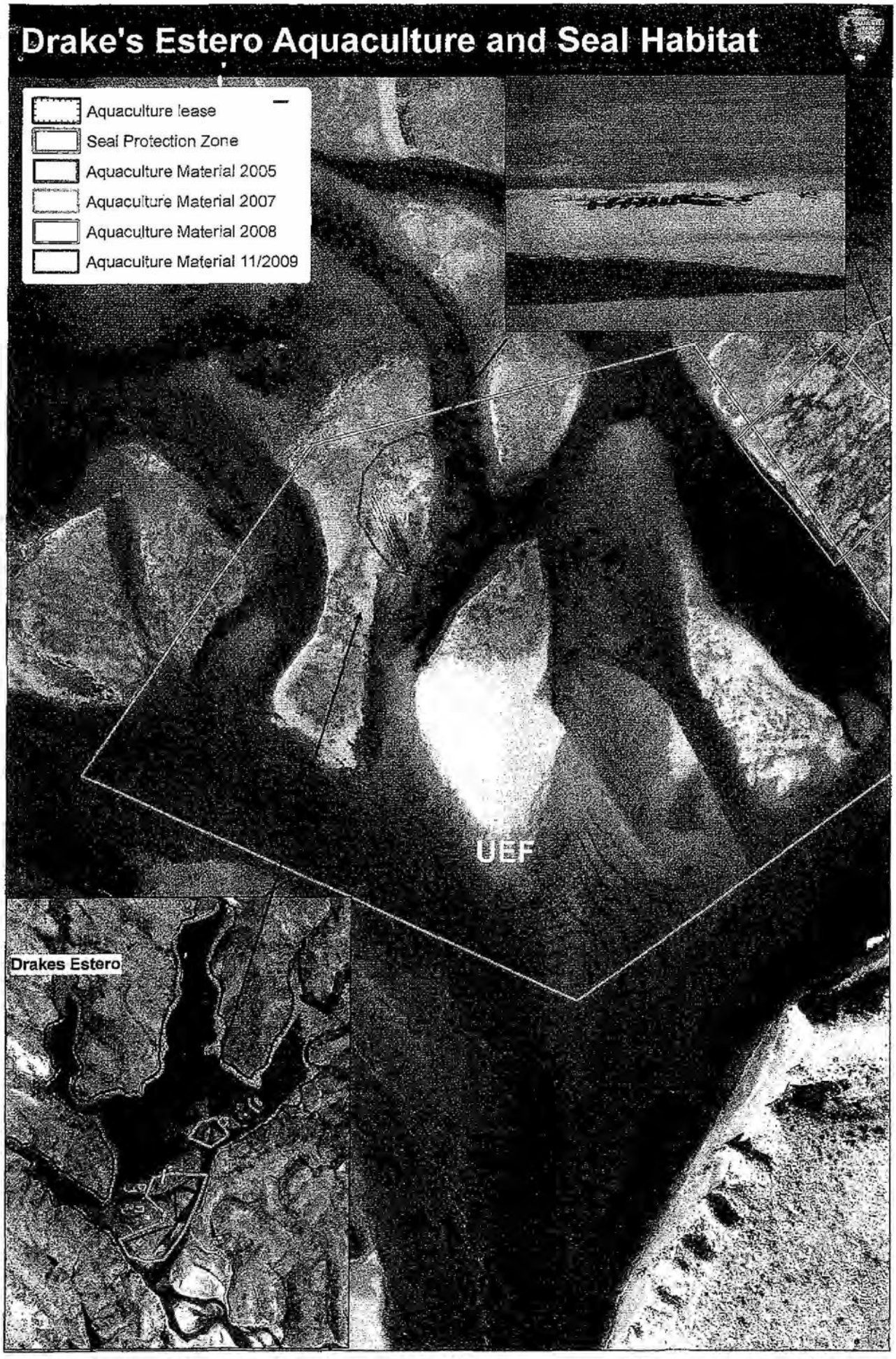
Oyster Racks

- Active
- Dilapidated

Map Location

N
W E
S

0 0.5 Miles


Drake's Estero Aquaculture and Seal Habitat
Aquaculture lease
Seal Protection Zone
Aquaculture Material 2005
Aquaculture Material 2007
Aquaculture Material 2008
Aquaculture Material 11/2009
UEF
Drakes Estero
0
50
100
200
300
400
Meters

"Kevin Lunny" <kevin@drakesbayoyster.com>

12/04/2009 07:53 AM

Please respond to kevin@drakesbayoyster.com

To "George Turnbull" <George_Turnbull@nps.gov>, "Don Neubacher" <Don_Neubacher@nps.gov>

cc

bcc

Subject Phone Call

History: This message has been replied to.

Dear George and Don,

I got the message that you called yesterday. I was out and about and will be again today. Would you please give me a couple times that I could call you either today or Monday? Also, would you please send me an agenda for the call?

Thank you,

Kevin
Sent via BlackBerry by AT&T

"Kevin Lunny" <kevin@drakesbayoyster.com>
12/03/2009 12:25 PM

To <Ben_Becker@nps.gov>
cc
bcc
Subject RE: M-438-02 and lat longs for corners from ArcGIS

Hi Ben,

DFG forwarded me a copy of the email of November 30, 2009. Apparently, you have questions about our lease with the State.

Would you please detail your concerns to us?

Why didn't you ask us, or copy us with copy of your inquiry. We would be happy to work with you.

Thank you.

Kevin Lunny

-----Original Message-----
From: Tom Moore [mailto:tmoore@dfg.ca.gov]
Sent: Monday, November 30, 2009 1:20 PM
To: Ben_Becker@nps.gov
Cc: Gregg.Langlois@cdph.ca.gov; Cassidy Teufel; Kirsten Ramey
Subject: Fwd: M-438-02 and lat longs for corners from ArcGIS

Hi Ben,

As per our phone conversation, I am forwarding my email to Kevin Lunny regarding locating (lat-long) the corners of lease M-438-02. These coordinates should not be considered as a legal description of the corners of lease M-438-02 and are a rough approximation only.

This lease was a deep-water lease for scallop culture using lantern nets, it was never intended for clam culture which takes place on the bottom in intertidal mudflats. Clam culture was mistakenly authorized for this lease, not M-438-01 as requested by JOC and the Department, through clerical error on part of the Fish and Game Commission back in the 1990s.

The mapped location of lease M-438-02 (DPH management plan Fig 2.) is consistent with the conditionally approved harvest guidelines for lease M-438-02. Further information on DPH management of shellfish harvest from Drakes Estero can be obtained from Gregg Langlios at DPH (CC'd here).

I will be retiring on Dec. 16, 2009, my replacement and point-of -contact after that date will be Kirsten Ramey. Her contact inforamtion is as follows:

Email Addresse
KRAMEY@dfg.ca.gov.

Phone Numbers
Office: (707) 445-5365
Mobile: (707) 761-1755
Fax: (707) 445-7883

If you have any questions or need clarification on this topic, please let me know.

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator,
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 688-3192 cell
(707) 875-4269 FAX
tmoore@dfg.ca.gov
Due to the Governor's Executive Order, I will be off on Furlough the 1st, 2nd & 3rd Friday of each month

You will never find time for anything. If you want time you must make it. C. Buxton

>>> TMOORE 10/19/2009 11:33 AM >>>
Kevin,

I used Fig 2. DPH Management Plan for DE 2006 location for M-438-02 (see attached) and created a polygon of one-acre area. This is my best approximation of: 1) the location and, 2) the lat long coordinates for the corners (see attached print-out).

I used DPH location for the lease since they control harvest and have water quality info based on this mapped location. Robert Reese should be able to provide the most accurate location, based on the lease description, however we may wish to use the DPH location and provide an accurate description and amend the lease description.

Take a look and let me know your thoughts.

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator,
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 688-3192 cell
(707) 875-4269 FAX
tmoore@dfg.ca.gov
Due to the Governor's Executive Order, I will be off on Furlough the 1st, 2nd & 3rd Friday of each month

You will never find time for anything. If you want time you must make it. C. Buxton

Don Neubacher/PORE/NPS
11/04/2009 08:26 AM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject Fw: Drakes Bay Oyster CDP Application

FYI--files

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
---- Forwarded by Don Neubacher/PORE/NPS on 11/04/2009 08:26 AM ----

Kevin McKay/PORE/NPS
11/04/2009 07:49 AM

To Don Neubacher/PORE/NPS@NPS
cc
Subject Fw: Drakes Bay Oyster CDP Application

FYI

Kevin E. McKay
Special Park Uses/Concessions
National Park Service
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5111
Fax (415) 464-5182

EXPERIENCE YOUR AMERICA
The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Kevin McKay/PORE/NPS on 11/04/2009 07:48 AM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
11/04/2009 12:38 AM PST

To: "'Kevin McKay'" <Kevin_McKay@nps.gov>
cc:
Subject: FW: Drakes Bay Oyster CDP Application

Hi Kevin,

This is the latest info sent to the Coastal Commission.

Kevin

From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Friday, October 30, 2009 4:47 PM
To: 'Cassidy Teufel'
Subject: Drakes Bay Oyster CDP Application

Hi Cassidy,

Here's the latest information for the CDP. Please let me know if I can get you any more information.

I look forward to talking to you about the application fee... I'm a little nervous about how expensive it will be.

Thank you,

Kevin 20091030 CDP letter.pdf 20091030 Project Description.pdf 20091030 Development Costs.pdf

CDP Site Plan Revision 10.30.09.pdf

DRAKES BAY OYSTER COMPANY
17171 Sir Francis Drake Blvd., Inverness, CA 94937

California Coastal Commission
Attn: Cassidy Teufel
45 Fremont Street, Suite 2000
San Francisco, CA 94105

October 30, 2009

RE: Coastal Development Permit Application No: 2-06-003 – Response to CCC letter dated 10/15/09

Dear Mr. Teufel,

We have received your letter and understand what you have requested. Following our recent conversations and listening to your recommendations, we have further reduced the scope of the project. Also at you suggestion, we removed our requests for changes in our CDFG shellfish leases until approved by CDFG. At your suggestion, we may re-apply for another CDP in the near future. This letter will address each of your requests and a revised project description will be attached.

1. An itemized cost estimate for the project is attached.
2. Repairs.
    a. No new siding will be used on the stringing shed or the retail building.
    b. No equipment will be required to replace the siding on the stringing shed or the retail building.
    c. Repairs will not result in an expansion of building(s) footprint.
    d. Most of the repairs will take approximately one year to complete. The oyster racks will be repaired as needed on an ongoing basis.
    e. The materials used to make the repairs will include concrete for interior floor repairs, wood, sheet rock, interior plumbing, interior electrical, roofing materials and paint.
    f. The repairs will require the use of small tools. The temporary staging area for building materials will be behind the Ag worker housing trailers on the east end of the property. This will keep the public area free from construction material storage.
    g. Care will be taken during repairs so that no debris or construction materials enter the estero.
    h. The only structural repair required is to the roof of the processing building. This is necessary because a portion the roof framing is rotten and requires replacement.
3. Wooden oyster washing pier.
    a. The repair of the deck of the pier does not require removal or replacement of pilings.
    b. Approximately 100 square feet of replacement decking is required. The gangway will also be replaced. No change in the footprint will result from this project.
    c. There is no eelgrass near the oyster washing pier.
4. Floating dock

a. The replacement floating dock will be similar to the existing floating dock. It will be a wooden dock with Styrofoam floats.
b. The existing floating dock will be floated to the working beach near the stringing shed during high tide. During low tide, it will be fully dismantled by hand and hauled off site to an approved dump site. The new floating dock will be placed on the same beach at low tide and floated into place during high tide.
c. The new floating dock will be the same size as the existing dock (12' X 60') and will be anchored in the same position. It will occupy the same footprint.
d. There is no eelgrass near the floating dock.

5. Oyster washing/conveying/sediment retention system.
   a. The plastic or stainless steel sediment retention basket will be approximately 3' X 4'. The basket will be located on the oyster washing pier nest to the oyster washing conveyor.
   b. No concrete is required for the oyster wash / sediment retention system.
   c. The sediment retained in the sediment basket will be stored near the shell piles and periodically hauled to an approved composting facility.
   d. System will be equipped with sealed bearings that do not require periodic lubrication.
6. Seawater intake system.
   a. The seawater intake replacement is no longer a part of the current project description.
7. Project Description.
   a. The project description has been amended to include the 12" X 18" trench and the picnic tables in the "after the fact development" section. The seed setting tanks that were not removed when the buildings were removed are already in the "after the fact" list.
8. Restroom facility.
   a. Restroom repairs necessary to comply with ADA requirements will require indoor plumbing.
   b. Restroom repairs do not require any trenching or ground disturbance.
9. Fences
   a. Approximately 200' of split rail fence is included in this application. To wood treatment or paint will be used on the split rail fence.
   b. Approximately 25' of 8' solid wood fence will be placed in front of the storage and processing containers to screen them from view. The fence will be painted to match the adjacent retail building.
   c. Approximately 100' of 4' wood fence will be placed around processing area to separate seashore visitors from the work area. The 4' wood fence will not be treated or painted.
10. Outdoor display aquarium.
    a. The aquarium is no longer a part of the current project description.
11. Paved walkway.
    a. This walkway is to provide safe access to the bathrooms to meet ADA standards. The walkway is 6' wide by 30' long in front of the processing building.
    b. The paved walkway will be surfaced with asphaltic concrete (asphalt) to match existing paved surfaces.
    c. A thickness of 0" to 8" of structural fill under the path is required to meet ADA slope requirements. No cuts or excavation will be required for path placement.
12. South pier removal.
    a. None of the south pier exists within the intertidal portion of Drakes Estero.
    b. 4" X 4" posts will be removed as well as the remaining portions of the deck.

c. The pier will be removed by hand. If the 4" X 4" posts are too difficult to remove by hand, a chain will be attached to the post and pulled out by a front end loader. No equipment will need to enter the intertidal area to remove any portion of the pier.

13. Underground electric lines.
    a. New underground electric lines are no longer a part of the current project description.
14. Implement vessel transit plan.
    a. 1" Schedule 40 PVC pipe may be placed vertically, by hand, to mark channels.
15. Repairs to oyster racks.
    a. All oyster racks may be repaired. Different racks will be in use at different times. Racks are often vacant for a period of time following harvest and before planting. Rack repairs are made during times that they are not being used for oyster cultivation.
16. Harbor seals.
    a. DBOC continues to comply with the 1992 interagency standards. DBOC also complies with the current NPS and CCC harbor seal protection measures.
17. Water system.
    a. DBOC operates Public Water System #2110510 regulated by the California Department of Public Health, Drinking Water Unit. DBOC's responsibilities include regular sampling and bacteriological testing, monitoring and reporting. The pump in the well is the only equipment required to operate the water system.

Please feel free to give me a call if you need any additional information.

Thank you,

Kevin Lunny

Encls: Project Description
Project Cost Estimates
Project Site Plan

DRAKES BAY OYSTER COMPANY
17171 Sir Francis Drake Blvd., Inverness, CA 94937

Project Description
10/30/09

Proposed New Site Development

1. Construct and install required ADA compliant restroom facility.
2. Construct and install split rail and solid board fencing around proposed storage area and retail facility.
3. Construct and install paved walkway to the restrooms to meet ADA requirements.
4. Demolish and remove existing wooden pier (south pier).
5. Implement Vessel Transit Plan with mooring areas and access lanes clearly marked.

Ongoing Maintenance for Existing Operation

6. Continue to carry out regular repairs and maintenance to existing oyster racks using only CDFG, CCC and NPS approved materials.
7. Continue compliance with 1992 Harbor Seal Management Plan as well as final CCC and NPS harbor seal protection conditions.
8. Continue to carry out oyster and clam culture using 24" x 24" x 3" plastic or plastic coated wire containers or trays.
9. Continue to use established boat traffic lanes through Drakes Estero eelgrass beds for use during low tide.
10. Continue to operate the picnic area.
11. Continue Pacific and European oyster culture using hanging cluster method on racks located throughout DFG lease area number M-438-01 within Drakes Estero.
12. Continue Pacific and European oyster culture using anchored bottom bags within intertidal areas throughout DFG lease area number M-438-01 within Drakes Estero
13. Continue Pacific and European oyster culture using un-anchored bottom bags within intertidal areas throughout DFG lease area number M-438-01 within Drakes Estero
14. Continue Pacific and European oyster culture using anchored floating bags within intertidal areas throughout Department of Fish and Game lease area number M-438-01 within Drakes Estero
15. Continue Manila clam culture using bottom bags within areas throughout DFG one-acre lease area number M-438-02 within Drakes Estero
16. Continue to carry out marine biotoxin monitoring and water quality sampling within the estero.
17. Continue to import Pacific oyster larvae and seed; Manila clam larvae and seed and European oyster larvae and seed, only from CDFG approved sources with current CDFG import permits.
18. Continue to operate motor driven vessels within estero to plant and harvest approved shellfish species, for water quality monitoring, marine biotoxin monitoring, or any other farm related purpose.
19. Continue to operate non-motorized barges within estero to facilitate shellfish planting and harvesting.
20. Continue to operate retail sales facility.
21. Continue to operate the only state certified and FDA approved shellfish shucking and packing facility, pursuant to the requirements of the California Department of Public Health, Food and Drug Branch; the US Food and Drug Administration and the National Shellfish Sanitation Program.
22. Continue to operate onsite wastewater and septic systems.

23. Continue to store limited quantities of hazardous substances such as paints, gasoline, chlorine, detergents, solvents and cleaning products.
24. Continue to discharge wastewater from hatchery operations, wet storage, setting systems and oyster washing into estero (heated water to remain below 20 degrees above ambient water temperature)
25. Continue to carry out interpretive services to visiting public, conduct tours of onshore facilities for school groups, local non-profit organizations, private organizations, government agencies, etc.
26. Continue to provide onsite housing for employees and their families.
27. Continue to operate indoor hatchery/seed production facility and carry out remote setting activities both indoor and outdoor.
28. Continue to implement the Hazardous Materials Business Plan.
29. Continue to operate the state certified Drakes Bay Oyster Company non-transient, non-community, public water system, pursuant to the requirements of the California Department of Public Health, Drinking Water Unit and the National Shellfish Sanitation Program.

Repairs

30. Repair existing wooden oyster washing pier with similar materials.
31. Replace existing 12' X 60' floating dock at the end of the oyster washing dock.
32. Replace oyster washing / conveyor / sediment retention system.
33. Repairs to stringing shed.
34. Repairs to hatchery building.
35. Repairs to processing building.
36. Repairs to retail sales building.

After the Fact Development

37. Installation of one 8-foot by 40-foot storage container.
38. Removal and replacement of a porch at worker residence.
39. Installation of split rail fence along the edge of parking area.
40. Installation of asphalt pavement surrounding the processing facility.
41. Installation of a temporary construction trailer.
42. Installation of a temporary 8-foot by 40-foot container for oyster shucking and packing.
43. Use of five outdoor seed setting tanks and associated water intake, discharge and circulation infrastructure.
44. Construction and backfilling of a 12-inch by 18-inch by 80-foot long trench.
45. Replacement of six picnic tables and six additional picnic tables

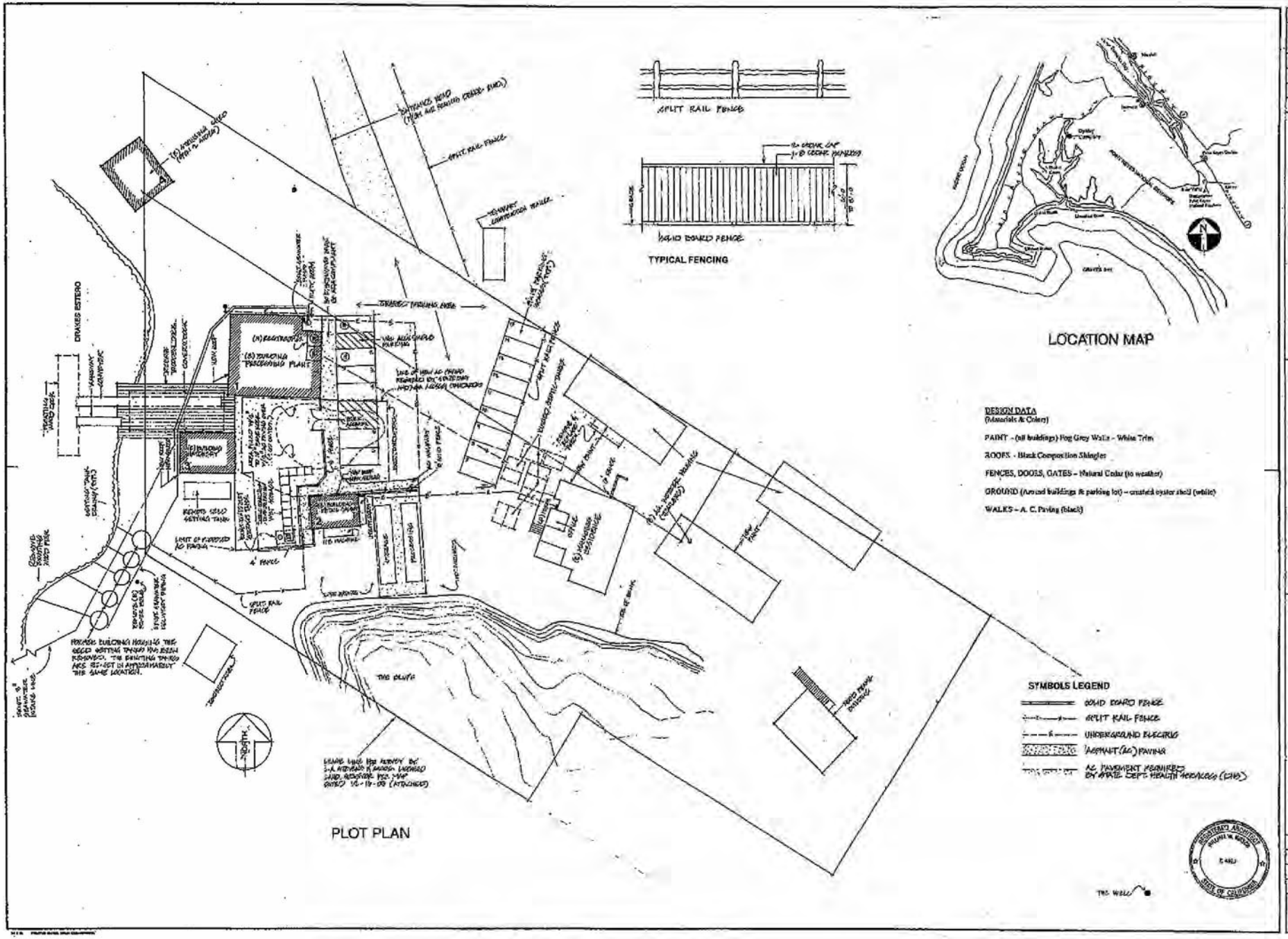
Cost Estimate	*Proposed New Site Development*
$20,000.00	1. Construct and install required ADA compliant restroom facility.
$2,500.00	2. Construct and install split rail and solid board fencing around proposed storage area and retail facility.
$600.00	3. Construct and install paved walkway to the restrooms to meet ADA requirements.
$400.00	4. Demolish and remove existing wooden pier (south pier).
$200.00	5. Implement Vessel Transit Plan with mooring areas and access lanes clearly marked.
$23,700.00	Total New Site Development

Ongoing Maintenance for Existing Operation

6. Continue to carry out regular repairs and maintenance to existing oyster racks using only CDFG, CCC and NPS a
7. Continue compliance with 1992 Harbor Seal Management Plan as well as final CCC and NPS harbor seal protecti
8. Continue to carry out oyster and clam culture using 24" x 24" x 3" plastic or plastic coated wire containers or tray
9. Continue to use established boat traffic lanes through Drakes Estero eelgrass beds for use during low tide.
10. Continue to operate the picnic area.
11. Continue Pacific and European oyster culture using hanging cluster method on racks located throughout DFG leas
12. Continue Pacific and European oyster culture using anchored bottom bags within intertidal areas throughout DFG
13. Continue Pacific and European oyster culture using un-anchored bottom bags within intertidal areas throughout D
14. Continue Pacific and European oyster culture using anchored floating bags within intertidal areas throughout Dep
15. Continue Manila clam culture using bottom bags within areas throughout DFG one-acre lease area number M-438
16. Continue to carry out marine biotoxin monitoring and water quality sampling within the estero.
17. Continue to import Pacific oyster larvae and seed; Manila clam larvae and seed and European oyster larvae and se
18. Continue to operate motor driven vessels within estero to plant and harvest approved shellfish species, for water q
19. Continue to operate non-motorized barges within estero to facilitate shellfish planting and harvesting.
20. Continue to operate retail sales facility.
21. Continue to operate the only state certified and FDA approved shellfish shucking and packing facility, pursuant to
22. Continue to operate onsite wastewater and septic systems.
23. Continue to store limited quantities of hazardous substances such as paints, gasoline, chlorine, detergents, solvent
24. Continue to discharge wastewater from hatchery operations, wet storage, setting systems and oyster washing into
25. Continue to carry out interpretive services to visiting public, conduct tours of onshore facilities for school groups,

	26. Continue to provide onsite housing for employees and their families.
	27. Continue to operate indoor hatchery/seed production facility and carry out remote setting activities both indoor an
	28. Continue to implement the Hazardous Materials Business Plan.
	29. Continue to operate the state certified Drakes Bay Oyster Company non-transient, non-community, public water s
	Repairs
$2,000.00	30. Repair existing wooden oyster washing pier with similar materials.
$5,000.00	31. Replace existing 12' X 60' floating dock at the end of the oyster washing dock.
$3,500.00	32. Replace oyster washing / conveyor / sediment retention system.
$500.00	33. Repairs to stringing shed.
$2,000.00	34. Repairs to hatchery building.
$5,000.00	35. Repairs to processing building.
$3,000.00	36. Repairs to retail sales building.
$21,000.00	Total Repairs
	After the Fact Development
$1,200.00	37. Installation of one 8-foot by 40-foot storage container.
$800.00	38. Removal and replacement of a porch at worker residence.
$400.00	39. Installation of split rail fence along the edge of parking area.
$1,500.00	40. Installation of asphalt pavement surrounding the processing facility.
$500.00	41. Installation of a temporary construction trailer.
$8,000.00	42. Installation of a temporary 8-foot by 40-foot container for oyster shucking and packing.
$300.00	43. Use of five outdoor seed setting tanks and associated water intake, discharge and circulation infrastructure.
$600.00	44. Construction and backfilling of a 12-inch by 18-inch by 80-foot long trench.
$900.00	45. Replacement of six picnic tables and six additional picnic tables
$14,200.00	Total After the Fact Development
$58,900.00	Total Cost of Project

00033002 NPS-PWR-B06-00006-000005 Page 81 of 534



REVISIONS	BY
4-4-06	JK
1-28-07	JK
1-22-07	JK
10-5-07	KL

WILLIAM W. KIRSCH
ARCHITECT (415)663-8867
P.O. BOX 1239 PT. REYES STA. CA. 94956

PLOT PLAN

RESTORATIONS FOR:
DRAKES BAY OYSTER CO.
17171 SIR FRANCIS DRAKE INVERNESS 94937

APN 109-030-17 &c

Date	1-27-06
Scale	1"=20'
Drawn	WWK
Job	LUNRY
Sheet	1

REGISTERED ARCHITECT WILLIAM W. KIRSCH C 4483 STATE OF CALIFORNIA

TRS WELL

00033002 NPS-PWR-B06-00006-000005 Page 82 of 534

Don Neubacher/PORE/NPS
10/29/2009 03:22 PM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject Fw: Clams in Drakes Estero

For files.

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

—— Forwarded by Don Neubacher/PORE/NPS on 10/29/2009 03:22 PM ——

Kevin McKay/PORE/NPS
10/29/2009 02:41 PM

To Don Neubacher/PORE/NPS@NPS
cc
Subject Fw: Clams in Drakes Estero

FYI

Kevin E. McKay
Special Park Uses/Concessions
National Park Service
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5111
Fax (415) 464-5182

EXPERIENCE YOUR AMERICA
The National Park Service cares for special places saved by the American people so that all may experience our heritage.

----- Forwarded by Kevin McKay/PORE/NPS on 10/29/2009 02:41 PM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
10/29/2009 02:36 PM MST

To: "'Tom Moore'" <tmoore@dfg.ca.gov>
cc: "'Cassidy Teufel'" <cteufel@coastal.ca.gov>, "'Kevin McKay'" <Kevin_McKay@nps.gov>
Subject: Clams in Drakes Estero

Dear Tom,

We have transferred all Manila clams that were not previously located on M-438-02 to M-438-02.

All Manila clams in Drakes Estero are located on M-438-02.

Thank you for your help,

Kevin Lunny
Drakes Bay Oyster Company

L1425
02-106

October 20, 2009

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

We are writing concerning the "Eighth Annual Slurp 'n Burp" commercial event at the Drakes Bay Oyster Company facility on September 13, 2009. We understand from the website regarding the event (see enclosed information), that it involved dinner and beverages for $55-$80 per person - $25 of which constituted a tax deductible donation to the American Institute of Wine and Food.

All activities which occur on National Park Service lands must be consistent with laws, NPS policies, and the park's enabling legislation and policies. We have attached a copy (Attachment 1) of the Code of Federal Regulations 36 CFR Chapter 1, Part 2, Section 2.50 which concerns Special Events. It specifies that all "entertainments, ceremonies and similar events" require a park permit.

The aquaculture permit for Drakes Bay Oyster Company (#MISC-8530-6000-8002) authorizes use of the permitted area for the "purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public and residential purposes incidental thereto." Any other commercial activities, such as fundraising dinners, therefore, constitute a Special Park Use and require a permit. We realize that you may be unaware of this requirement.

We commonly issue permits, with conditions to protect park resources, for special events in the Seashore. In the future, please contact Kevin McKay, Special Park Uses Coordinator, at 415-464-5111, to apply for a Special Use Permit prior to any such activities occurring or refer the event coordinator to him.

Thank you for your assistance.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure

DLNeubacher/NGates:an 10/20/09

Attachment 1:

TITLE 36--PARKS, FORESTS, AND PUBLIC PROPERTY

DEPARTMENT OF THE INTERIOR

PART 2--RESOURCE PROTECTION, PUBLIC USE AND RECREATION--Table of Contents

Sec. 2.50 Special events.

(a) Sports events, pageants, regattas, public spectator attractions, entertainments, ceremonies, and similar events are allowed: Provided, however, There is a meaningful association between the park area and the events, and the observance contributes to visitor understanding of the significance of the park area, and a permit therefore has been issued by the superintendent. A permit shall be denied if such activities would:

(1) Cause injury or damage to park resources; or

(2) Be contrary to the purposes for which the natural, historic, development and special use zones were established; or unreasonably impair the atmosphere of peace and tranquility maintained in wilderness, natural, historic, or commemorative zones.

(3) Unreasonably interfere with interpretive, visitor service, or other program activities, or with the administrative activities of the National Park Service; or

(4) Substantially impair the operation of public use facilities or services of National Park Service concessioners or contractors; or

(5) Present a clear and present danger to the public health and safety; or

(6) Result in significant conflict with other existing uses.

(b) An application for such a permit shall set forth the name of the applicant, the date, time, duration, nature and place of the proposed event, an estimate of the number of persons expected to attend, a statement of equipment and facilities to be used, and any other information required by the superintendent. The application shall be submitted so as to reach the superintendent at least 72 hours in advance of the proposed event.

(c) As a condition of permit issuance, the superintendent may require:

(1) The filing of a bond payable to the Director, in an amount adequate to cover costs such as restoration, rehabilitation, and cleanup of the area used, and other costs resulting from the special event. In lieu of a bond, a permittee may elect to deposit cash equal to the amount of the required bond.

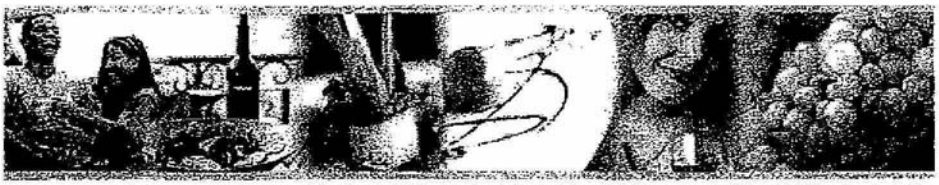
(2) In addition to the requirements of paragraph (c)(1) of this section, the acquisition of liability insurance in which the United States is named as co-insured in an amount sufficient to protect the

United States.

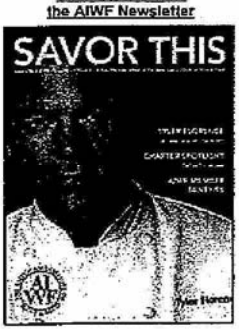
(d) The permit may contain such conditions as are reasonably consistent with protection and use of the park area for the purposes for which it is established. It may also contain reasonable limitations on the equipment used and the time and area within which the event is allowed.

(e) Violation of the terms and conditions of a permit issued in accordance with this section is prohibited and may result in the suspension or revocation of the permit.

[48 FR 30282, June 30, 1983; 48 FR 31847, July 11, 1983]



Click here to view the AIWF Newsletter



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831.250.7739 - main
831.622.7783 - facsimile

AIWF National Address:
26364 Carmel Rancho Lane,
Suite 201
Carmel, CA 93923

info@aiwf.org or Click here

8TH ANNUAL SLURP N' BURP- OYSTERS ON DRAKES BAY

Sunday, September 13, 2009 - AIWF NorCal (CA)
Time: 12:00 am to 04:00 pm
Member Price: $55.00
Guest Price: $80.00
Venue: Drakes Bay Family Oyster Farm
Address: 17171 Sir Francis Drake Blvd, Inverness, CA 94937

AIWF-NORCAL

Invites you to

The Eighth Annual Slurp n' Burp

at

Drakes Bay Oyster Farm, Inverness CA

Sunday, September 13, 2009

Noon to 4:00 p.m.

$55 for members/$80 for guests*

Guests who join that day can apply the $25 towards AIWF membership

Yes, it's that time again! This year, join us at Drakes Bay Oyster Farm http://drakesbayfamilyfarms.com/ on September 13 for all-you-can-eat Drakes Estero oysters. A deep-water upwelling just off the coast of Drakes Bay provides cool, pristine, nutrient-rich water year-round, producing what many recognize as some of the finest oysters in the world. You'll also have the opportunity to enjoy a tour of this rustic working oyster farm. DrakesBay is named for Sir Francis Drake because it has long been considered Drake's most likely landing spot on the west coast of North America during his circumnavigation of the world by sea in 1579.

We'll also be serving Aidells sausages http://www.aidells.com/, salads, clams (if they're available) and other goodies, beer, compliments of Lagunitas IPA as well as wine donated and poured by Dee Vee Wines http://www.dvw.com/. Wines includeChâteau de l'Aulée Crémant de Loire Brut, 2006 Solter Rheingau Riesling Brut Sekt, 2008 Domaine des Lauriers Picpoul de Pinet, 2008 Château Gaillard AOC Touraine Sauvignon Blanc, 2008 Domaine de Villargeau Côteaux du Giennois Blanc. If people are interested they will have order forms and special discounts available! For a special treat, Redwood Hill Farm & Creamery http://www.redwoodhill.com/ will be there to offer their exquisite artisan goat cheeses. Join in the fun by preparing your food the way you like it, learn to shuck oysters, or just sit back and relax, make new friends and catch up with old ones, while you enjoy the wonderful view of Drakes Estero. Bring some cash --- to make it even more fun, we're having a raffle!

To pay by credit card (no additional fees), go to:
http://www.ticketweb.com/t3/sale/SaleEventDetail?dispatch=loadSelectionData&eventId=2409004

To pay by check, please leave a message on the AIWF hotline at 415-508-6790 and then send a check (payable to AIWF) to: AIWF, PO Box 2207, Sausalito, CA 94966-2207 along with your name, address, telephone number, email address, number of places desired, and names of others in your party.

New: Add $25 to your payment to support AIWF's signature program, Days of Taste®. The program brings chefs and farmers into fourth and fifth grade classrooms to teach students in an engaging way about the importance of fresh food and how these ingredients weave their way through daily life, from farm to table. AIWF is a 501(c)(3) charitable organization making this fully tax deductible.

Generous donations from these fine local purveyors help make this event memorable

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Purveyors of Fine & Rare Wines

DELLA FATTORIA

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The AIWF would like to thank the following corporate sponsors:

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Privacy Policy

The AIWF acknowledges web designer, CAMALEO, for their generous in-kind contribution to the AIWF website, perennial good humor, and endless patience. Thank you!

CAMALEO
web intelligence

Kevin McKay/PORE/NPS
10/15/2009 02:30 PM

To Don Neubacher/PORE/NPS@NPS
cc Ann Nelson/PORE/NPS@NPS
bcc
Subject Fw: DBOC Clam Issue

FYI

Kevin E. McKay
Special Park Uses/Concessions
National Park Service
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5111
Fax (415) 464-5182

EXPERIENCE YOUR AMERICA
The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Kevin McKay/PORE/NPS on 10/15/2009 02:29 PM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
10/15/2009 02:09 PM MST

To: "'Cassidy Teufel'" <cteufel@coastal.ca.gov>
cc: "'Tom Moore'" <tmoore@dfg.ca.gov>, "'Kevin McKay'" <Kevin_McKay@nps.gov>
Subject: RE: DBOC Clam Issue

No problem. I will keep everyone informed.

Kevin

From: Cassidy Teufel [mailto:cteufel@coastal.ca.gov]
Sent: Thursday, October 15, 2009 2:05 PM
To: Kevin Lunny
Cc: Tom Moore; Kevin McKay
Subject: RE: DBOC Clam Issue

Kevin –
Thank you for passing along this information and I support your efforts to bring DBOC into compliance with the existing terms and conditions of your DFG lease, NPS Special Use Permit and Coastal Commission Consent Order. I would appreciate it if you could notify me when you have completed relocating the clams to shellfish lease M-438-02.

Thanks,

Cassidy Teufel

California Coastal Commission
Energy, Ocean Resources and
Federal Consistency Division
45 Fremont St., Suite 2000
San Francisco, Ca 94105

T: (415) 904-5502
F: (415) 904-5400

-----Original Message-----
From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Thursday, October 15, 2009 1:37 PM
To: Kevin McKay
Cc: Cassidy Teufel; 'Tom Moore'
Subject: DBOC Clam Issue

Hi Kevin,

Drakes Bay Oyster Company is pursuing CDFG approval for adding Manila clams to its main shellfish lease, M-438-01. Currently, M-438-02 includes Manila clam culture. This permission was asked for by the Johnson Oyster Company in 1993 and was approved. Inadvertently... were not sure why, the Manila clams were added to M-438-02 instead of M-438-01 (see attached). We are simply making the effort to correct what seems to be a clerical error. We are told that this issue will be included in the November California Fish and Game Commission meeting.

Our SUP states:

4 B)

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

Our SUP also states:

i) Production of all shellfish species shall be capped at the "current production level" as determined under the California Coastal Commission Consent Order No. CCC-07-CD-04.

The production cap includes all species of shellfish. Adding Manila clams to M-438-01 will not allow any expansion in overall production. The Manila clams are bivalves as are oysters. Manila clams are grown using the same methods as oysters. They will simply use space that would otherwise be used for oyster production and will replace some of the oysters with clams in the overall production. This is basically a request to substitute species.

Both the Johnson Oyster Company and the Drakes Bay Oyster Company have historically grown Manila clams on M-438-01. Currently there are still some clams on M-438-01. To bring the oyster farm into full compliance with the NPS SUP and CDFG leases, DBOC will, within one week from today, 10/22/09, move any Manila clams not currently on M-438-02 to M-438-02.

We wanted to let you know about our plan. Please feel free to give me a call if you have any questions. When we have a confirmed agenda at the F&G Commission, I will send it to you.

Thank you,

Kevin Lunny

415-669-1149 (oyster farm)
415-662-9800 (office)

Don Neubacher/PORE/NPS
10/15/2009 02:38 PM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject Fw: DBOC Clam Issue

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Don Neubacher/PORE/NPS on 10/15/2009 02:38 PM -----

Kevin McKay/PORE/NPS
10/15/2009 01:54 PM

To Don Neubacher/PORE/NPS@NPS
cc
Subject Fw: DBOC Clam Issue

FYI

Kevin E. McKay
Special Park Uses/Concessions
National Park Service
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5111
Fax (415) 464-5182

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----- Forwarded by Kevin McKay/PORE/NPS on 10/15/2009 01:54 PM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
10/15/2009 01:37 PM MST

To: "Kevin McKay" <Kevin_McKay@nps.gov>
cc: "'Cassidy Teufel'" <cteufel@coastal.ca.gov>, "'Tom Moore'" <tmoore@dfg.ca.gov>
Subject: DBOC Clam Issue

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Thank you,

Kevin Lunny

415-669-1149 (oyster farm)
415-662-9800 (office)

DFG and FGC docs relating to Manila clam request.pdf

From:	Tom Moore
To:	Devin Bartley; kevin@drakesbayoyster.com;
cc:	Kirsten Ramey;
Subject:	DFG and FGC docs relating to Manila clam request
Date:	Wednesday, September 02, 2009 12:41:52 PM
Attachments:	JOC Manila clam request 08-06-93 correspondance.pdf

Devin, Kevin,

See attached docs pertaining to the original Manila clam request for M-438-01 which shows FGC mistakenly placed on M-438-02

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator,
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 688-3192 cell
(707) 875-4269 FAX
tmoore@dfg.ca.gov
Due to the Governor's Executive Order, I will be off on Furlough the 1st, 2nd & 3rd Friday of each month

You will never find time for anything. If you want time you must make it. C. Buxton

F. ROBERT STUDDERT
ATTORNEY AT LAW

RECEIVED
CALIFORNIA
FISH AND GAME
COMMISSION
9 Aug 93 11 50

REPLY TO NORTHGATE OFFICE

August 6, 1993

Robert R. Treanor
CALIFORNIA FISH & GAME
1416 Ninth Street, RM 1207-5
Sacramento, CA 94244

Re: Water Bottom Allotment Lease No. M-438-01
Johnson Oyster Company

Dear Bob:

Johnson Oyster Company would like to start culturing Manila Clams on the captioned lease in Drakes Estero. Accordingly, please consider this a request to add that species, Manila clams *(Venerupis japonica)*, to the other species specified at page 4 of the captioned allotment at the top of the page.

If memory serves correctly, we had been able to change the species cultured on other leases by administrative change rather than having to go to a noticed procedure. I would hope that the foregoing request could be processed in the same manager. Thank you for your usual courtesy and cooperation in this matter.

Very truly yours,

F. Robert Studdert

cc: Tom Johnson,
Johnson Oyster Company
Bob Hulbrock

FRS/lcv
JOC1*1
JOC1/2

NORTHGATE OFFICE: 36 PROFESSIONAL CENTER PARKWAY • SAN RAFAEL, CA 94903 • (415) 499-1155
WEST MARIN OFFICE: P.O. BOX 6 • INVERNESS, CA 94937 • (415) 663-8235
FAX: (415) 479-8416

October 18, 1993

Mr. Tom Johnson
Johnson Oyster Company
c/o F. Robert Studdert, Esq.
Northgate Office
36 Professional Center Parkway
San Rafael, CA 94903

Dear Mr. Johnson:

The Commission, at its October 8, 1993 meeting in San Diego, approved your request to add Manila clams (Tapes japonica) to the list of species for mariculture purposes at your Drakes Estero Lease M-438-02. You should be receiving your amended lease from the Department shortly.

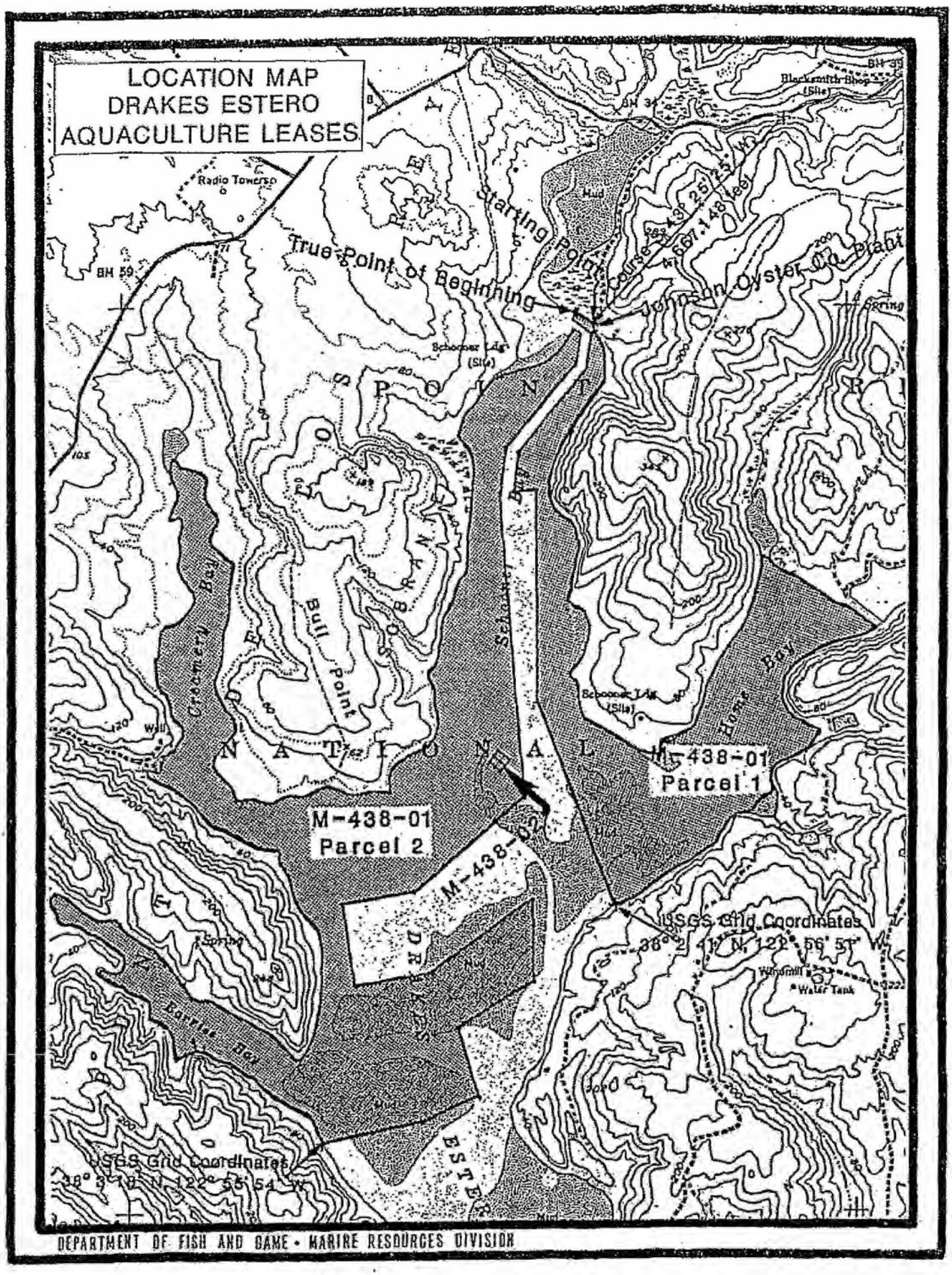
Sincerely,

COPY ORIGINAL SIGNED BY ROBERT R TREANOR

Robert R. Treanor
Executive Director

cc: Marine Resources Division
Region 3
Bob Hulbrock, Aquaculture Coordinator

OCT 19 1993


LOCATION MAP
DRAKES ESTERO
AQUACULTURE LEASES
Radio Towers
BM 59
BM 39
Blacksmith Shop (Site)
Starting Point
True Point of Beginning
Course 431° 25' 25" W
667.14 feet
Johnson Oyster Co. Plant
Schooner Jim (Site)
POINT REYES
Creamery Bay
Bull Point
Schooner Jim (Site)
Home Bay
M-438-01
Parcel 1
M-438-01
Parcel 2
M-438-02
USGS Grid Coordinates
38° 3' 18" N. 122° 56' 54" W.
USGS Grid Coordinates
38° 2' 41" N. 122° 56' 51" W.
Windmill
Water Tank
Coastal Trail
Mud
Spring
DRAKES ESTERO
DEPARTMENT OF FISH AND GAME • MARINE RESOURCES DIVISION

Don Neubacher/PORE/NPS
10/15/2009 02:37 PM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject Fw: Additional CDP information

For files

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

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----- Forwarded by Don Neubacher/PORE/NPS on 10/15/2009 02:36 PM -----

Kevin McKay/PORE/NPS
10/15/2009 01:53 PM

To Don Neubacher/PORE/NPS@NPS
cc
Subject Fw: Additional CDP information

FYI

Kevin E. McKay
Special Park Uses/Concessions
National Park Service
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5111
Fax (415) 464-5182

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----- Forwarded by Kevin McKay/PORE/NPS on 10/15/2009 01:52 PM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
10/15/2009 01:37 PM MST

To: "Kevin McKay" <Kevin_McKay@nps.gov>
cc:
Subject: FW: Additional CDP information

Kevin

This is to keep you current with the CCC CDP process.

Kevin

From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Monday, October 05, 2009 1:59 PM
To: 'Cassidy Teufel'
Subject: Additional CDP information

Hi Cassidy,

We will send the revised site plan separately.

Kevin 20091005 CDP letter.pdf

DRAKES BAY OYSTER COMPANY
17171 Sir Francis Drake Blvd., Inverness, CA 94937

California Coastal Commission
Attn: Cassidy Teufel
45 Fremont Street, Suite 2000
San Francisco, CA 94105

October 5, 2009

RE: Coastal Development Permit Application No: 2-06-003

Dear Mr. Teufel,

Enclosed please find the additional documentation requested in your June 10, 2009 letter for permit application Number 2-06-003 for development at the Drakes Bay Oyster Farm; APN 109-130-17, located in Inverness, California. The operations at the Drakes Bay Oyster Farm are pursuant to vested rights but Drakes Bay Oyster Company agrees to submit to the commission's jurisdiction under reasonable terms.

Drakes Bay Oyster Company (DBOC) has reduced the scope of development proposed for the site. The new project description is broken into four categories:

Proposed New Site Development

1. Install one 8-foot by 20-foot refrigeration unit/container at the onshore site.
2. Construct and install required ADA compliant restroom facility.
3. Construct and install split rail and solid board fencing around proposed storage area and retail facility.
4. Install outdoor display aquarium for interpretive purposes.
5. Construct and install paved walkway to the restrooms to meet ADA requirements.
6. Remove existing power pole near setting tanks.
7. Remove existing power pole near processing building.
8. Demolish and remove existing wooden pier (south pier).
9. Install electricity lines below ground.
10. Implement Vessel Transit Plan with mooring areas and access lanes clearly marked.
11. Construction and backfilling of a 12-inch by 18-inch by 80-foot long trench.

Proposed changes in CDFG lease and shellfish culture operations

12. Amend list of cultured species permitted within DFG lease area number M-438-01 to include purple-hinged rock scallops (*Crassodoma gigantean* formerly *Hinnities multirugosus*) – contingent on DFG approval.
13. Amend list of cultured species permitted within DFG lease area number M-438-01 to include Manila clams (*Venerupis phillipinarum* formerly *Tapes japonica*) – contingent on DFG approval.
14. Collect wild purple hinged rock scallops for future use as broodstock with CDFG approval and CDFG Broodstock Collection Permit.
15. Development of hatchery process to spawn purple hinged rock scallops onsite and produce scallop "seed" with CDFG approval.
16. Modify boundaries of DFG lease area number M-438-01 to include oyster racks currently outside of lease area – contingent on DFG approval.

Ongoing Maintenance for Existing Operation

17. Continue to carry out regular repairs and maintenance to existing oyster racks using only CDFG, CCC and NPS approved materials.
18. Continue compliance with 1992 Harbor Seal Management Plan.
19. Continue to carry out oyster and clam culture using 24" x 24" x 3" plastic or plastic coated wire containers or trays.
20. Continue to use established boat traffic lanes through Drakes Estero eelgrass beds for use during low tide.
21. Continue to operate the picnic area.
22. Continue Pacific and European oyster culture using hanging cluster method on racks located throughout DFG lease area number M-438-01 within Drakes Estero.
23. Continue Pacific and European oyster culture using anchored bottom bags within intertidal areas throughout DFG lease area number M-438-01 within Drakes Estero
24. Continue Pacific and European oyster culture using un-anchored bottom bags within intertidal areas throughout DFG lease area number M-438-01 within Drakes Estero
25. Continue Pacific and European oyster culture using anchored floating bags within intertidal areas throughout Department of Fish and Game lease area number M-438-01 within Drakes Estero
26. Continue Manila clam culture using bottom bags within areas throughout DFG one-acre lease area number M-438-02 within Drakes Estero
27. Continue to carry out marine biotoxin monitoring and water quality sampling within the estero.
28. Continue to import Pacific oyster larvae and seed; Manila clam larvae and seed and European oyster larvae and seed, only from CDFG approved sources with current CDFG import permits.
29. Continue to operate motor driven vessels within estero to plant and harvest approved shellfish species, for water quality monitoring, marine biotoxin monitoring, or any other farm related purpose.
30. Continue to operate non-motorized barges within estero to facilitate shellfish planting and harvesting.
31. Continue to operate retail sales facility.
32. Continue to operate the only state certified and FDA approved shellfish shucking and packing facility, pursuant to the requirements of the California Department of Public Health, Food and Drug Branch; the US Food and Drug Administration and the National Shellfish Sanitation Program.
33. Continue to operate onsite wastewater and septic systems.
34. Continue to store limited quantities of hazardous substances such as paints, gasoline, chlorine, detergents, solvents and cleaning products.
35. Continue to discharge wastewater from hatchery operations, wet storage, setting systems and oyster washing into estero (heated water to remain below 20 degrees above ambient water temperature)
36. Continue to carry out interpretive services to visiting public, conduct tours of onshore facilities for school groups, local non-profit organizations, private organizations, government agencies, etc.
37. Continue to provide onsite housing for employees and their families.
38. Continue to operate indoor hatchery/seed production facility and carry out remote setting activities both indoor and outdoor.
39. Continue to implement the Hazardous Materials Business Plan.
40. Continue to operate the state certified Drakes Bay Oyster Company non-transient, non-community, public water system, pursuant to the requirements of the California

Department of Public Health, Drinking Water Unit and the National Shellfish Sanitation Program.

Repairs

41. Repair existing wooden oyster washing pier with similar materials.
42. Replace existing 12' X 60' floating dock at the end of the oyster washing dock.
43. Replace oyster washing / conveyor / sediment retention system.
44. Replace existing seawater intake system with two four-inch high-density-polyethylene pipes extending 1050-feet into the estero from shore and terminating in a 16 square foot screened intake structure.
45. Repairs to stringing shed.
46. Repairs to hatchery building.
47. Repairs to processing building.
48. Repairs to retail sales building.

After the Fact Development

49. Installation of one 8-foot by 40-foot storage container.
50. Removal and replacement of a porch at worker residence.
51. Installation of split rail fence along the edge of parking area.
52. Installation of asphalt pavement surrounding the processing facility.
53. Installation of a temporary construction trailer.
54. Installation of a temporary 8-foot by 40-foot container for oyster shucking and packing.
55. Use of five outdoor seed setting tanks and associated water intake, discharge and circulation infrastructure.

Seed Setting Tanks:
The five existing seed setting tanks were previously covered by a non-permitted open structure with no floor. CCC -03-CD-12 required that the open building be removed. To comply with the order, DBOC removed the cover structure, but did not remove the tanks. The tanks are currently in basically the same location. The setting tanks have been integral to the oyster operation for at least three decades and are still used almost continuously. For the business to continue, the tanks had to remain in operation. There was no reason to move the five tanks to a different location so DBOC did not substantially move the tanks. DBOC repaired or replaced some of the piping at the tanks and buried the bottom 2 feet of the light weight fiberglass tanks so that the wind would not blow them away. The underground pipe location is shown on the project drawings.

The seawater for the setting tanks is delivered by a 2" Schedule 40 PVC plastic pipe that is connected to the seawater intake and pump system. Each tank has the capacity of around 4500 gallons. During the setting season, each tank is used for oyster larvae setting approximately every two weeks. The tanks are filled once, heated to approximately 75 to 80 degrees Fahrenheit, and held at that temperature for approximately 4 days. On the 4th day, the heaters are turned off, allowing the water in the tanks to cool. On about the 5th day, raw seawater is pumped into the tanks at a rate of approximately 3 gallons per minute. At the end of the cycle, around 7 days, the fully cooled seawater is allowed to discharge from the tanks.

Proposed Boat Ramp Improvements:
No boat ramp exists at the DBOC facility and there are no plans to build a boat ramp.

Septic System:
At one time, DBOC was concerned that an existing gravity sewer pipeline, located in the existing parking area, did not have adequate slope to function properly. There has been no problem with the operation of this pipeline. Quarterly monitoring and annual on-site inspections are conducted by Marin County Environmental Health Services and a registered Sanitarian. The septic systems operated by DBOC are operating correctly and no repairs are required.

Existing Asphalt Pavement:
Most of the existing asphalt paving was an overlay of pre-existing asphalt paving. This paving was installed as required by the California Department of Public Health, Food and Drug Branch, to protect human health while transporting oysters between the walk-in refrigeration and the 8 X 40 shucking and packing facility. The NPS specified where the 8 X 40 processing container would be located and approved the requisite asphalt paving at a meeting on-site when the demand was given by the Health Department. At the time, DBOC was unaware of any requirement to obtain a CDP for this work. No one, including the several NPS officials present at the joint regulatory agency meeting, mentioned anything about a CDP requirement for the work.

The asphalt paving consists of 2" compacted thickness, ½" aggregate asphalt. In a small section, to conform to ADA regulations, up to 10" of class 2 aggregate base rock was used between the original surface and the new surface to reduce the slope of the top surface.

DBOC will remove existing (and pre-existing) paved surfaces as shown on project drawings. A portion of the parking area has been paved with asphalt since before DBOC began operations in 2005. None of the parking area will be paved with asphalt. It will be an oyster shell surface to match the existing, surrounding parking lot surfaces. Only work areas requiring impervious, hard surfaces will be paved. The final asphalt area to remain on site, as shown on plans, is less overall paved surface area than was covered in asphalt when DBOC took over operations in January, 2005.

Asphalt removal will be performed by saw cutting the existing asphalt at locations shown on the construction drawings. The pavement will be removed from site by a licensed carrier and will be delivered to an asphalt and concrete recycling facility.

South Pier Removal:
The South Pier was historically used by the oyster farm to load cultch bags from the setting tanks onto barges. The Pier was damaged by storms and would need repairs prior to continuing its traditional use. DBOC will remove the South Pier and limit the oyster farm to only one pier. The south pier will be demolished by hand and removed from site. All debris from the pier demolition will be transported to an approved landfill.

We understand that the CDFG issues need to be resolved as soon as possible. It is my understanding that these issues may be included on the November Fish and Game Commission meeting agenda. Hopefully, all of the outstanding issues will be resolved at that meeting.

Please feel free to give me a call if you need any additional information.

Thank you,

Kevin Lunny
Drakes Bay Oyster Company

Don Neubacher/PORE/NPS
10/15/2009 02:37 PM

To Ann Nelson/PORE/NPS@NPS
cc
bcc
Subject Fw: Coastal Development Permit site plan

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Don Neubacher/PORE/NPS on 10/15/2009 02:37 PM -----

Kevin McKay/PORE/NPS
10/15/2009 01:53 PM

To Don Neubacher/PORE/NPS@NPS
cc
Subject Fw: Coastal Development Permit site plan

FYI

Kevin E. McKay
Special Park Uses/Concessions
National Park Service
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5111
Fax (415) 464-5182

EXPERIENCE YOUR AMERICA
The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Kevin McKay/PORE/NPS on 10/15/2009 01:53 PM -----

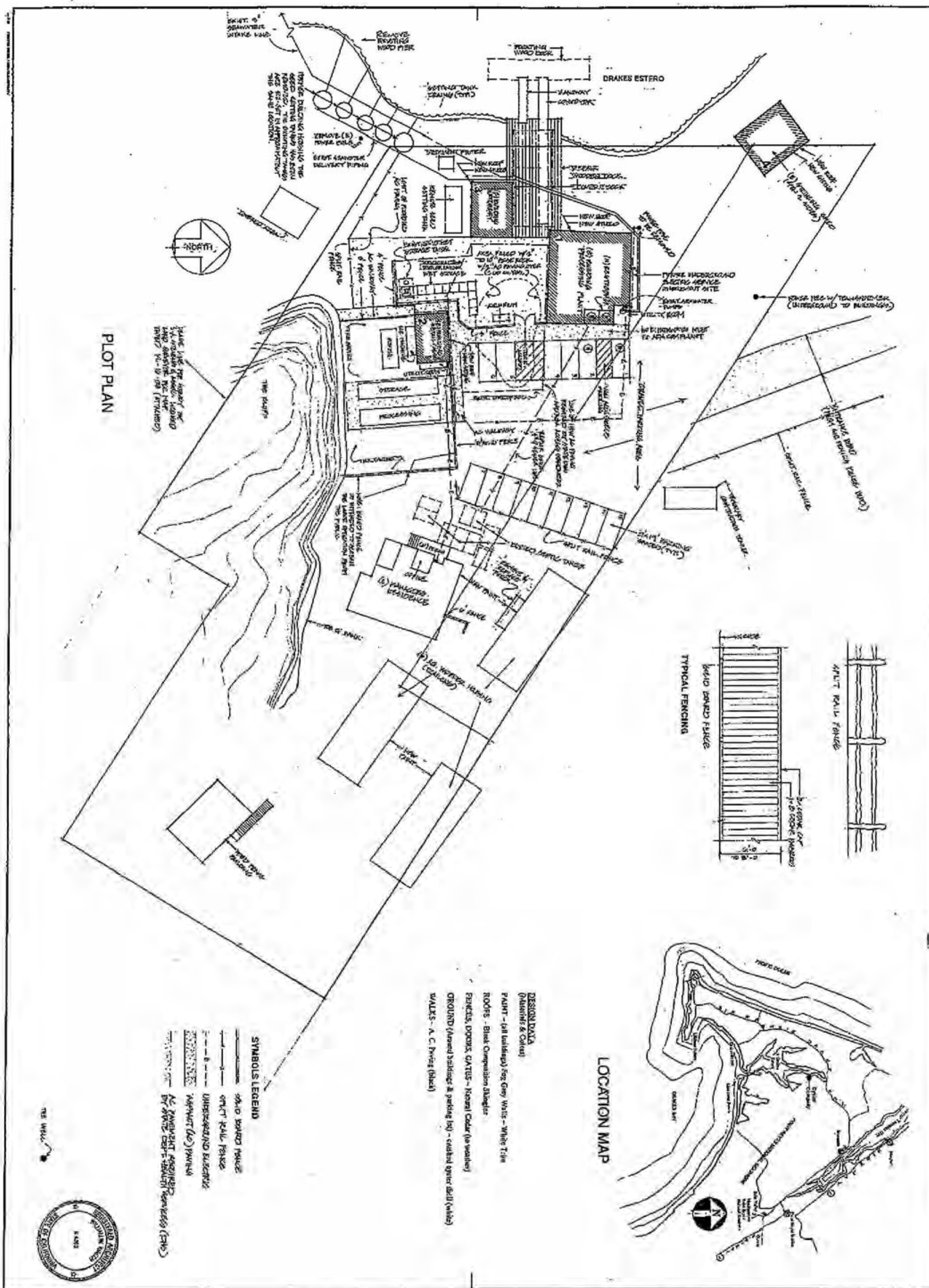
"Kevin Lunny" <kevin@drakesbayoyster.com>
10/15/2009 01:37 PM MST

To: "Kevin McKay" <Kevin_McKay@nps.gov>
cc:
Subject: Coastal Development Permit site plan

Kevin,

This is the revised site plan that we submitted to the CCC on 10/05/09.

Kevin CDP Site Plan Revision 10.05.09.pdf



RESTORATIONS FOR: APN 100-030-17 DRAKES BAY OYSTER CO. 17171 SIR FRANCIS DRAKE INVERNESS 94937	PLOT PLAN	WILLIAM W. KIRSCH ARCHITECT (415)663-8867 P.O. BOX 1239 PT. REYES STA. CA. 94956

"Kevin Lunny" <kevin@drakesbayoyster.com>

06/15/2009 06:29 PM

To <jon_jarvis@nps.gov>

cc "'Lunny, Nancy'" <nancy@drakesbayoyster.com>

bcc

Subject NRC Drakes Estero Report

History: This message has been forwarded.

Dear Mr. Jarvis,

Please review and respond to the attached letters. I have attached the letter that we sent to you on 05/11/09 for your convenience.

Thank you,

Kevin Lunny

DBOC to Jon Jarvis 06.15.09.pdf

DBOC to Jon Jarvis 05.11.09.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

June 15, 2009

John Jarvis
Regional Director
National Park Service
1111 Jackson Street, Suite 700
Oakland, CA 94607

Dear Mr. Jarvis.

On May 11, we submitted a letter asking for an explanation of your public statements on behalf of the National Park Service in response to the release of the National Academy of Sciences' final report on NPS Science at Drakes Estero.

It has been more than a month.

Given your request to the National Academy of Sciences to change or modify their final report, which violates their rules, withholding responses while behind-the-door discussions take place is deeply disturbing.

May we have the courtesy of a response?

Sincerely,

Kevin Lunny Nancy Lunny

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

May 11, 2009

Jon Jarvis
Regional Director
National Park Service
1111 Jackson Street, Suite 700
Oakland, CA 94607

Dear Mr. Jarvis.

On May 5, 2009, in response to National Academy of Sciences Report on NPS science at Drakes Estero, the Pacific West Region of the National Park Service issued a press release entitled, *"Park Service to Use National Academy of Sciences Report to Improve Management of Drakes Estero."* You were also interviewed by the media on May 5 and over the subsequent few days and made several additional statements.

We acknowledge the Park Service apology and express our appreciation for it. That said, we are confused by certain statements that have been made and, by this letter, ask for clarifications.

(1) **NPS Rejects Unspecified NAS Conclusions**. According to an article in the Marin Independent Journal, *"Report: Point Reyes Oyster Farm Poses No Danger to the Estero,"* you said: *"we (NPS) agree with some conclusions, disagree with some and say we need more research too."*

(A) Please itemize the NAS conclusions in which NPS concurs.

(B) Please itemize the NAS conclusions in which NPS "disagrees."

(C) Please provide a detailed explanation for those instances in which NPS disagrees and provide supporting data and documentation.

(2) **NPS Contradicts NAS, Renews Claims that Oysters in Drakes Estero Harming Environment**. According to an AP story published in the San Jose Mercury News,

entitled "Report Criticizes Feds Over Marin Oyster Farm:"

> *National Park Service officials said the non-native Pacific oysters raised by the farm are damaging the ecosystem.*
>
> *But the National Academy of Sciences says in its report that it found no major negative environmental impact. The panel also suggests that park officials misrepresented some of the facts to support their position. Park Service Director Jon Jarvis says he disagrees with some of those findings.*

(A) Please explain and detail how and why the National Academy is wrong.

(B) Notwithstanding NAS conclusions of no environmental harm, NPS still claims that non-native Pacific oysters are harming the environment at Drakes Estero. Please detail the harm. Provide the data that supports and substantiates that harm.

(3) **NPS Plan to Correct the Record with Marin County Board of Supervisors, Federal and State Agencies, the Citizens of Marin and the Public at Large**. According to an article published in the Point Reyes Light, "Park Service Abuses Data, Apologizes:"

> *In a press release, Jarvis wrote that the Academy affirmed [NPS's Science Advisor Sarah] Allen's conclusions [in the NPS Report, "Drakes Estero, A Sheltered Wilderness Estuary], but over the phone contradicted himself. "It's the conclusions that are debated," he said, "but not the raw data..."*
>
> *Still its determination that the park, "in some instances selectively presented, over interpreted, or misrepresented the available scientific information" approximates the definition of scientific misconduct as written in the federal register.*
>
> *"The allegations of scientific misconduct is based on there being intentional falsification of data," he (Jarvis) said. "Neither the IG nor the Academy found that. What they did find in both cases was overreaching."*
>
> *Jarvis declined to describe his plan for correcting the public record.*

(A) NPS testified, published, hand-delivered and otherwise disseminated information, reports, documents, data and reports that, according to the NAS "*in some instances selectively presented, over-interpreted, or misrepresented the available scientific information on DBOC operations by exaggerating the negative and*

overlooking potentially beneficial effects..." These reports, information, documents and data were provided to the Marin County Board of Supervisors, Congresswoman Woolsey, Senators Feinstein and Boxer, other locally elected officials, California Costal Commission, Marin Mammal Commission, California State Resources Agency, MLPA Task Force, California Department of Fish and Game, NOAA among others. Please detail your plan and timetable for correcting the public record with all parties and interests.

(B) According to the Inspector General's Report, NPS also provided the same flawed reports, information, documents and data to certain environmental groups including the Sierra Club, National Parks and Conservation Association (NPCA) and the Environmental Action Committee (EAC). These groups, today, are actively publishing, disseminating and/or are circulating this flawed and tainted scientific information. Please detail your plan and timetable for correcting the public record with these and other environmental groups.

(C) Please provide copies of the letters and documents in which the corrections are made.

(4) According to the NPS Pacific West Region News Release on May 5, 2009:

"Certainly, we apologize for the errors in our original document [Drakes Estero, A Sheltered Wilderness Estuary] and already have taken steps to correct them," Park Service Regional Director Jon Jarvis said. "We appreciate the thoroughness of the academy's report and especially that academy concurred with many of our conclusions in the final, corrected version of the report"

(A) Identify each of the specific "*errors*" in the original document being referenced.

(B) Explain the "*steps being taken to correct them.*"

(C) You state, "*we appreciate...that the academy concurred with many of our conclusions in the final, corrected version of the report.*" To which "*conclusions*" are you referring? Itemize and detail.

(D) Your statement references the "*final, corrected version of the report.*" We are unfamiliar with such a document. Immediately after the NAS Report was published, we asked the NAS panel for this document and they were unable to provide it. Will you please provide us with a copy of the final, corrected version of the Drakes Estero report.

This has been an agonizing ordeal for our family. NPS, since we purchased the oyster farm in January 2005, has been making a sustained series of accusations, claims, and charges – ranging from environmental criminality to environmental harm. Now, it appears as if a "new generation"

of charges is emerging.

This is painfully unacceptable.

We were heartened by the NPS apology. But a few words in a press release, unfortunately, will not restore our good name -- and neither will it absolve NPS of its responsibility to take responsibility for the damage it has done to us and to itself. NPS must clean up the situation it has created for our family and our community, starting with correcting the record of false NPS claims.

We ask that you, in good faith, please clarify this immediately and provide detailed and complete answers to the questions set forth in this letter.

Sincerely,

Kevin Lunny Nancy Lunny

"Kevin Lunny" <kevin@drakesbayoyster.com>

02/19/2009 01:18 PM

To "'Banks, Gina \(Feinstein\)'" <Gina_Banks@feinstein.senate.gov>, <jon_jarvis@nps.gov>, <kerry@alcnet.org>

cc "'Watts, John \(Feinstein\)'" <John_Watts@feinstein.senate.gov>, "'Molinari, Jim \(Feinstein\)'" <Jim_Molinari@feinstein.senate.gov>

bcc

Subject RE: draft agenda for tomorrow

Thank you, Gina,

Please send us any updates, changes or proposed amendments to the January 9th NPS/ALC relocation proposal. We will need this to prepare for tomorrow's meeting.

Kevin

From: Banks, Gina (Feinstein) [mailto:Gina_Banks@feinstein.senate.gov]
Sent: Thursday, February 19, 2009 12:46 PM
To: jon_jarvis@nps.gov; Kevin Lunny; kerry@alcnet.org
Cc: Watts, John (Feinstein); Molinari, Jim (Feinstein)
Subject: draft agenda for tomorrow

Hi everyone,

Attached is a draft agenda for tomorrow's meeting. There may be some additional changes. Please let me know if you have any questions.

Best,

Gina Banks
Director of Field Services
Office of U.S. Senator Dianne Feinstein
One Post Street, Suite 2450
San Francisco, CA 94104

Phone: (415) 393-0707
Fax: (415) 393-0710

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

L3019
Tract 02-106 PORE

February 13, 2009

Mr. Kevin Lunny
dba. Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Enclosed is a copy of an appraisal completed by Yovino-Young Incorporated that determines the rental valuation for the well and septic system utilized by the Drakes Bay Oyster Company. The appraised value of $761.00 will be billed semi-annually in combination with the current $2,800.00 annual rent due under Special Use Permit MISC-8530-6000-8002, (SUP). The billing schedule contained in the SUP will commence this April with one half of the total annual $3,561.00 rent due on or before April and the remaining half due on or before November.

The first year billing will include catch up charges for rent beginning in April 2008. Please let us know if there is a particular way you would like to structure these initial payments. Kevin McKay, Special Park Uses Coordinator, can be contacted at (415) 464-5111 if you have any questions.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 2/13/09

Jon Jarvis/OAKLAND/NPS
01/07/2009 06:43 PM

To "George Turnbull" <George_Turnbull@nps.gov>, "Holly Bundock" <Holly_Bundock@nps.gov>, "Don Neubacher" <Don_Neubacher@nps.gov>
cc
bcc
Subject Fw: Drakes Bay Oyster Co.

Fyi

Sent from my BlackBerry Wireless Handheld
Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland
206-220-4010 Seattle

----- Original Message -----
From: "Kevin Lunny" [kevin@drakesbayoyster.com]
Sent: 01/07/2009 04:25 PM PST
To: "'Devin Bartley'" <DBARTLEY@dfg.ca.gov>; "'Tom Moore'" <TMOORE@dfg.ca.gov>; <jim_molinari@feinstein.senate.gov>; David Graber; Jon Jarvis
Subject: RE: Drakes Bay Oyster Co.

Devin,

This will acknowledge your email and suggestion.

It appears that you were provided some information about what's unfolding, but not all of it.

On December 16, the Senator's office contacted me advising that they inserted an amendment into pending legislation that would codify my renewable permits with the NPS. The next day, December, 17, several members of Feinstein's staff, including her State Director, Jim Molinari, contacted me and said the Park Service knew about the pending amendment, and apparently in response, went to Senator Feinstein and announced that they had a comprehensive Tomales Bay Relocation Proposal and wanted me to consider it. I was informed that the Senator recommended that it be considered as well, but if it wasn't as good as or better than what we had in Drakes Estero, she would proceed with the amendment.

Given the Senator's request, I agreed to evaluate the proposal and was told to expect it shortly after the call. It did not arrive.

On Friday, December 19, I contacted the Senator's office and said, "hey folks, haven't heard anything." That generated another call from Feinstein staff in California and Washington. This time, I was informed that an unnamed NGO, not NPS, would be contacting me. Sure enough, Kerry O'Toole, President, American Lands Conservancy, called and asked to meet the following Tuesday, Christmas Eve and one of the busiest days of our work year. Notwithstanding the bad timing, I agreed to meet - conditionally, but insisted that I have the relocation proposal, have an opportunity to review it. O'Toole sent me a document - either later that day or Monday. It

detailed everything I would relinquish, but not a single detail about the relocation proposal. When I called her on Monday, she and I agreed to meet after the first of the year, with Kerry openly acknowledging that she was brand new to this, knew very little and needed time to put her arms around it. Within hours, I was accused of canceling the meeting and Jim Molinari strongly urged that the meeting occur. When we met, she had nothing to say about relocation.

Immediately after Christmas, Molinari called. He was startled when I told him that I didn't have a proposal. He assured me that I would have the proposal immediately. Further, he indicated that Senator Feinstein wanted to talk to me and we scheduled a telephone meeting the morning of December 30.

Senator Feinstein pushed me hard, and was almost critical for my failing to respond to the NPS proposal. She did not know that NPS had failed to produce the proposal - now 13 days after NPS said it would be sent to me within moments.

It is fair to say that the Senator was not pleased, surprised - and perhaps even stunned.

Based on earlier discussions with NPS, Senator Feinstein discussed with me the details of the pending proposal including leases for growing oysters, similar production, piers, on-shore facilities, a retail store, cannery and packing shed, worker housing. She also imposed an "equivalency standard," telling me that the NPS relocation proposal had to represent a situation that was as good as or better than what we have in Drakes Estero.

Senator Feinstein told me that the much-discussed relocation proposal would be in hand within hours, and directed her staff to make sure it happened.

It didn't happen. No proposal arrived on the 30th. As we were closing on New Year's Eve, I received an email, not with a relocation proposal, but a bare-bones multiple choice buy-out proposal. I was then expected to attend a meeting on January 2 to discuss it.

This week, I again explained to the Senator's office that the oft-discussed relocation proposal was nowhere to be seen.

Yesterday, Jim Molinari finally admitted to me that Jarvis had no proposal. Then, I get an invitation from you to attend another meeting to discuss the same thing.

It's January 7. It's been three weeks since a proposal was supposed to be "on-my-desk-within-the-hour." We have yet to see the NPS proposal and now learn it never existed.

Once NPS finalizes its proposal, based on the equivalency standard as represented, we will evaluate it. After that, and if appropriate, further discussions can then be scheduled. But to schedule a meeting in order to discuss a non-existent relocation proposal is inappropriate and premature.

In the meantime, CFDG needs to know that we have completed a review of a NPS presentation to the National Academy of Sciences and have now uncovered an entirely new generation of made-up science. NPS falsified key data upon which their report is based. We are finalizing our research now and it will be released shortly.

Devin, please don't misinterpret these comments. You and your agency are responding to Jarvis and others. I have no problem with that. The NPS

handling of this matter has been less than appropriate.

Kevin

-----Original Message-----
From: Devin Bartley [mailto:DBARTLEY@dfg.ca.gov]
Sent: Tuesday, January 06, 2009 2:33 PM
To: Tom Moore; kevin@drakesbayoyster.com; jim_molinari@feinstein.senate.gov; david_graber@nps.gov; jon_jarvis@nps.gov
Subject: Drakes Bay Oyster Co.

Dear colleagues,

We are trying to arrange a meeting where we can all sit together and discuss objectives, plans, options and constraints to resolving the issues surrounding DBOC. I understand time is tight and we should try to have a meeting as soon as possible. Tom and I are both available after 2 on Friday, 9 January. Would it be possible to meet somewhere in Marin county, Friday afternoon to avoid SF traffic. I regret I have no specific venue in mind, but there must be a convenient office of coffee shop. I know John is traveling, but I understand someone else from NPS would attend. If this time is inconvenient please let me know what would work for you all.
My available dates are:
Thurs 8 Jan 9-11;
Fri 9 Jan all day
Mon 12 Jan 1-5
Thurs 15 Jan 1-5;
Then I am gone until 9 Feb.
It may not be necessary for both Tom and I to be there if scheduling gets too difficult.
Please let me know asap what could work for you and if you have creative ideas for a venue.
Regards,
Devin

Devin M. Bartley, PhD
State Aquaculture Coordinator
Department of Fish and Game
1416 9th Street
12th Floor
Sacramento, CA 95814
Tel. Office: (916) 651 7824
Cell: (916) 202 0317
dbartley@dfg.ca.gov

Jon Jarvis/OAKLAND/NPS
12/31/2008 02:45 PM

To "Kerry O'Toole" <Kerry@alcnet.org>, Jim_Molinari@feinstein.senate.gov, [redacted]@drakesbayoyster.
cc
bcc Don Neubacher/PORE/NPS@NPS
Subject meeting on Friday location, 2:00 PM

Jim, Kerry and Kevin:

Our meeting location on Friday is NOT at Cavallo Point. On such as short notice, I could not get a room. Instead I have got a meeting room nearby out near Rodeo Beach at the Headlands Institute. We will stilll be on the Marin side of the Golden Gate Bridge.

For refresher on getting out to Rodeo Beach / Fort Cronkhite / Headlands Insitute Campus- it is at the very end of Bunker Road, which intersects with Alexander Avenue, the road into Sausalito just north of the GG Bridge. From the north, take the off-ramp just before getting onto the bridge, then curve to the right, back under 101 and one stop sign, then left at the signs for Cavallo Point, US Coast Guard. Go to the tunnel entrance, hope the light is green, and blitz on through.

From the south, once over the GG Bridge, take the first real exit (after the bridge vista point) - Alexander Avenue, and drop down hill to the left turn to the tunnel.

Through the one-way Baker-Barry tunnel and keep going on Bunker Road, turn up hill and to the right just as you get to the beach, and then an immediate left (Stennis, I think, if it's even signed) and park in the east parking lot, which is right next to the Marine Lab (Building 1111) where the Coast Room is the eastern-most end of the building and is marked on the map / photo with the square around it.

I have the room reserved for two hours and will get there early to wave everyone in.

My cell is 510-541-9288 but reception is weak out there. See you Friday.

Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland

Map to Coast Room, Headlands Institute.JPG

"Kevin Lunny" <kevin@drakesbayoyster.com>
11/17/2008 05:35 PM

To <Don_Neubacher@nps.gov>
cc
bcc
Subject RE: Saturday Morning 11/15/08 NPS visit

Don,

Thank you for the response. Our staff was sure that it was a NPS uniform. Our staff was either mistaken or the photographer was sent from somewhere in the NPS besides PRNS.

THANK YOU for taking care of the grading of the oyster farm driveway. Great improvement. If we were allowed to perform regular maintenance to the driveway as was customary in the past, the road would not reach this level of disrepair and it would be less burdensome to PRNS maintenance staff.

Kevin

-----Original Message-----
From: Don_Neubacher@nps.gov [mailto:Don_Neubacher@nps.gov]
Sent: Monday, November 17, 2008 1:24 PM
To: Kevin Lunny
Subject: Re: Saturday Morning 11/15/08 NPS visit

Kevin, I checked with law enforcement and other park staff this morning and discussed this issue at our staff meeting. No one knew of any park staff visiting the site on Saturday morning. Also, Point Reyes NS does not have a government black car. In addition, no senior staff member asked anyone to go to the oyster processing facilities.

We assume it was another agency visiting the area. On another subject, we bladed the entrance road on Friday to ensure it was in good shape for the warm weather.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

"Kevin Lunny" <kevin@drakesbayoyster.com>

To "'Don Neubacher \(E-mail\)'"

11/15/2008 02:30 PM <don_neubacher@nps.gov>

cc

Subject
Saturday Morning 11/15/08 NPS visit

Don,

This morning, a Saturday morning, at around 7:30 AM a NPS employee (in uniform) arrived at the oyster farm in an unmarked black car with US Govt. plates. The oyster farm staff was busy with regular duties - removing cultch with seed from the setting tanks. The NPS official began to photograph the oyster farm employees while they were working. The workers were very uncomfortable with the position that the NPS official put them in. They told me that they felt intimidated because the NPS official made no effort to introduce himself or state the purpose of the visit.

One would expect the NPS to use common decency and let our staff know why he was there and why he was photographing them at work.

What were the instructions given to the NPS employee that arrived at the oyster farm this morning?
Why was he there on a Saturday morning at 7:30?
What is the purpose of the photographs?
Why was no notification given to DBOC before the visit?

Sincerely,

Kevin Lunny

Don Neubacher/PORE/NPS
11/17/2008 01:24 PM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc
bcc Jon Jarvis/OAKLAND/NPS
Subject Re: Saturday Morning 11/15/08 NPS visit

Kevin, I checked with law enforcement and other park staff this morning and discussed this issue at our staff meeting. No one knew of any park staff visiting the site on Saturday morning. Also, Point Reyes NS does not have a government black car. In addition, no senior staff member asked anyone to go to the oyster processing facilities.

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Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny"
<kevin@drakesbayoyster.com>
11/15/2008 02:30 PM

To '"Don Neubacher \(E-mail\)" <don_neubacher@nps.gov>
cc
Subject Saturday Morning 11/15/08 NPS visit

Don,

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One would expect the NPS to use common decency and let our staff know why he was there and why he was photographing them at work.

What were the instructions given to the NPS employee that arrived at the oyster farm this morning?
Why was he there on a Saturday morning at 7:30?
What is the purpose of the photographs?

Why was no notification given to DBOC before the visit?

Sincerely,

Kevin Lunny

L1425
02-106

November 4, 2008

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Per your request, we are enclosing a copy of the paper "Modeling the effects of El Nino.. .Drakes Estero, California: 1997-2007".

Sincerely,

Don L. Neubacher
Superintendent

Enclosure

an 11/04/08

"Daryl Boness"
<mmsci@megalink.net>
10/16/2008 08:56 AM

To <Ben_Becker@nps.gov>
cc "Marine Mammal Science"
<marinemammalscience@gmail.com>
bcc
Subject Decision on "Modeling the effects of El Niño, density dependence,and disturbance on harbor seal counts..."

History: This message has been replied to.

Dear Dr. Becker:

I have now received input from some of the original reviewers and Associate Editor on your replies to the concerns and questions raised by Dr. Corey Goodman (and others with similar points being made) concerning your in press paper entitled "Modeling the effects of El Niño, density dependence, and disturbance on harbor seal counts in Drakes Estero, California: 19972007." I have also spoken (or emailed) with Dr. Susan Roberts of the NRC and Dr. Tom Moore of the California Fish & Game. I am satisfied that there is no basis for considering pulling your paper from Marine Mammal Science for ethical grounds (scientific misconduct). The reviews I received based on your responses to Dr. Goodman's questions and your new analyses suggest there is no need to even revise your manuscript before publication should be allowed. I concur with the reviewers that the paper should be allowed to move forward with publication, but I also believe it would be best to include the updated information and improved analyses that you have proposed in your emails to me. In the revised paper, you should acknowledge the questioned data point and at least note that the conclusions would not change whether this point is included or not. Since you have information available on the 2008 harbor seal and oyster harvest levels I would also like to see you include in the discussion a statement about how this might affect your conclusions. It would be helpful if you identified in the revised paper where you have made the substantive changes as you indicate you will in your email replies.

I will process your revised paper as quickly as possible once I receive it. I appreciate your cooperation in this unusual situation regarding your paper that was accepted for publication in Marine Mammal Science.

Sincerely,

Daryl J. Boness
Editor
Marine Mammal Science

"Daryl Boness"
<mmsci@megalink.net>
10/25/2008 08:23 AM

To <Ben_Becker@nps.gov>
cc "Marine Mammal Science"
<marinemammalscience@gmail.com>
bcc
Subject re: MMSCI-2668.R1/MMS 234(additional changes) - decision

History: This message has been replied to.

Dear Dr. Becker

I have made a couple of minor editorial corrections, but otherwise am satisfied with the changes you have made. I believe these revisions have improved your paper and appreciate the effort you have made to address the concerns. You can now consider the paper accepted once again.

I am pasting in below the standard letter following acceptance of a manuscript to be sure you know that you have to send Rick Henley a final revised manuscript in proper format. If you need the usual attached documents that go with this letter, email Rick to get them. In talking with Rick we have decided we will keep your acceptance date as that associated with the acceptance of MMSCI.R1 since that determines the order of publication. As long as you turn around the final submission reasonably quicly your paper should still appear in the next issue.

Sincerely,
Daryl J. Boness
Editor
Marine Mammal Science

Previous letter sent to you at the acceptance of MMSCI-2668.R1:

I am very pleased to inform you that your revised Article entitled "MODELING THE EFFECTS OF EL NIÑO, DENSITY-DEPENDENCE, AND DISTURBANCE ON HARBOR SEAL (PHOCA VITULINA) COUNTS IN DRAKES ESTERO, CALIFORNIA: 1997 - 2007" has been accepted for publication in Marine Mammal Science.

In order to proceed with publication we will need your final text file in Word with any tables and figure captions included in this Word file. Refer to the guidelines and checklist attached for assistance with style and formatting. Please save line artwork (vector graphics) as high resolution Encapsulated PostScript (EPS) or PDF files. The lines should still appear sharp when zoomed to 400% final size. Save bitmap files (halftones or photographic images) as Tagged Image Format (TIFF) files, with a resolution of at least 600 dpi at final size. Symbols and abbreviations must follow journal style. More detailed information on the preparation of electronic artwork can be found at http://www.blackwellpublishing.com/bauthor/illustration.asp.

Once the final manuscript and figures are prepared, please submit them by e-mail to marinemammalscience@gmail.com. Files that are formatted incorrectly will be returned for correction. Please seek assistance with the preparation of your figures if you cannot create high resolution files in the correct format. Submitting low resolution files will delay the publication of your manuscript.

Color figures must be specified and paid for in advance of publication. The

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LRH: MARINE MAMMAL SCIENCE, VOL. 00, NO. 0, 2009

RRH: BECKER *ET AL.*: MODELING HARBOR SEAL DISTURBANCE

Modeling the effects of El Niño, density-dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997--2007

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ABSTRACT

Harbor seal (*Phoca vitulina*) haul-out site use may be affected by natural or anthropogenic factors. Here, we use an 11-yr (1997--2007) study of a seal colony located near a mariculture operation in Drakes Estero, California, to test for natural (El Niño-Southern Oscillation (ENSO), density-dependence, long-term trends) and anthropogenic (disturbance or displacement related to oyster production activities) factors that may influence the use of haul out subsites. Annual mariculture related seal disturbance rates increased significantly with increases in oyster harvest (r_s = 0.55). Using generalized linear models ranked by best fit and Akaike's Information Criteria, ENSO and oyster production (as a proxy for disturbance/displacement) best explained the patterns of seal use at all three subsites near the mariculture operations, with effects being stronger at the two subsites closest to operations. Conversely, density-dependence and linear trend effects poorly explained the counts at these subsites. We conclude that a combination of ENSO and mariculture activities best explain the patterns of seal haul-out use during the

breeding/pupping season at the seal haul-out sites closest to oyster activities.

Key words: information-theoretic, AIC, *Phoca vitulina*, harbor seal, disturbance, Point Reyes, Drakes Estero, El Niño, density-dependence, mariculture.

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The Pacific harbor seal (*Phoca vitulina richardii*) ranges along the eastern Pacific from Baja California to Alaska, and in north-central coastal California, they are the dominant and only year-round resident pinniped (Sydeman and Allen 1999, Burns 2002). The population at Point Reyes, California represents the second largest concentration of harbor seals in the State of California, accounting for about 20% of the mainland breeding population, and the most seals per haul out site in the state occur between 37.5° and 38.0°N.[1] Much of the Point Reyes coastal zone remains relatively pristine within a national park, and provides diverse marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal, in contrast to urbanized locations nearby such as San Francisco Bay (Sydeman and Allen 1999, Grigg *et al.* 2004).

Harbor seals are unusual for a large marine predator because they occur almost exclusively in nearshore habitats, and as a pinniped, they come onshore at traditional terrestrial sites to breed and rest (Burns 2002). Typically, seals attend haul out sites year round and spend about 33%--55% of their time onshore (Yochem *et al.* 1987, Allen Miller 1988). The number of seals present at any given haul-out site is influenced by several factors including time of day, tide level, current

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The Point Reyes peninsula, along the north-central California Coast, extends from Tomales Bay (38°30'N) south to Bolinas Lagoon (37°30'N). The peninsula is located within the Point Reyes National Seashore and adjacent to the Gulf of the Farallones National Marine Sanctuary. The topographic diversity of this coastal zone provides a broad range of substrates for harbor seals to haul out of the water. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. A "haul-out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987). A colony site may be a collection of haul-out sites within a limited geographic area. Drakes Estero and Estero de Limantour encompass a complex of eight subsites where seals haul out (Fig. 1), which are referred to collectively as the Drakes Estero/Limantour colony. Seals use the subsites at various times of the year depending upon their reproductive status, molting condition, and the level of disturbance encountered (Allen Miller 1988). All subsites are used during the breeding and molt seasons, and some are used regularly year-round. Females with pups have disproportionately used the sand bars exposed at low tide in the upper and middle portions of the Estero that are isolated from the mainland, and

consequently from humans and predators. Limantour Spit was mostly used by non-breeding seals during the breeding season (Allen Miller 1988). Subsites in the middle-lower estero, which are generally closer or attached to the mainland, have historically suffered higher human disturbance rates when compared to the isolated island sandbars of the upper estero.

Human access to the seal haul-out sites within Drakes Estero was limited because it is part of a national park and a congressionally designated wilderness area. During the breeding season (1 March--1 July), no boats were allowed within the Estero except for the non-conforming (to congressionally designated wilderness) uses by a commercial oyster operation. Three of the subsites where seals haul out are proximate to this commercial oyster operation (UEF, OB, and UEN). Subsite OB is within the oyster lease but was not used much for oyster culture in the recent past (1999--2004), portions of subsite UEN were within or adjacent to the lease, and subsite UEF was in a navigational channel that bisects a gap in the oyster lease where oyster boats traversed Drakes Estero (Fig. 1).

Oyster production and oyster culture methods used within the estuary have varied over the past 50 yr. However, the primary methods included oyster racks (measuring approximately 3

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× 30 m each), stakes, and bags (each measuring 0.5 × 1 m). In 2007 most of the racks were distributed in the upper portion of the estuary and >1,000 oyster bags (estimated) were distributed along the margins of the estuary, on intertidal sandbars in the center of the bay and in Home and Creamery Bays (Fig. 1).[3] Oyster production levels were high between 1981 and 1998 (annual production ranged from 3 to 9 million oysters per year) and reduced between 1999 and 2005 (annual production <2 million oysters per year). Production then increased to about 3.5 million (~136,000 kg) oysters in 2006, and ~211,000 kg oysters for 2007 (Fig. 2A, B).[4, 5]

Surveys

The National Park Service (NPS) conducted surveys of harbor seals throughout the year from 1996 to 2007, but surveys were more frequent during breeding (1 March--30 May) and molting (1 June to 1 August) seasons (2--4 times per week, depending on weather). Trained volunteers and NPS staff conducted surveys at medium to low tides (below 2.5 ft [0.76 m]) during the day. Surveys were not conducted in heavy fog or rain because of poor visibility. NPS data collection began in 1996 but we were not able to completely discern all subsite count data in that first year since a few subsites were grouped on some surveys. We

therefore analyzed disturbance data from 1996--2008, and count data from 1997--2007.

Surveys were designed to capture the seasonal peak numbers at several of the Point Reyes seal colonies, including the Drakes Estero/Limantour colony, and to detect disturbances that might affect seasonal peak numbers at each colony. Survey periods lasted at least two hours, with counts occurring every half-hour. Each subsite was surveyed separately, and added to other subsites to obtain a total count for the entire colony. All subsites were visible from one survey location. For each subsite, the observer recorded the total number of adult/immature seals, pups, and dead pups present. Because of the difficulty in distinguishing adult from immature seals, these two groups were combined. Pups were the young of the year and, after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only from 1 March to 1 June. Surveys were conducted with binoculars and a 40--50× monocular spotting scope from a bluff on the western edge of Drakes Estero (Fig. 1).

Disturbances of the seals were recorded during each survey, and within a survey, multiple disturbances could occur. We defined disturbance as any activity that elicited a reaction by

the seals; which was either a head alert, a flush towards water, or flush into water. Disturbance rate (# disturbance events / # surveys during March--July of each year) was analyzed from 1996--2008 for the upper estero subsites and we tested for a correlation in mariculture related disturbance rate in relation to annual oyster harvest using a 1-tailed Spearman ranks test. We also used a non-parametric Wilcoxon rank test to see if oyster harvest differed in years with or without mariculture related disturbances. To be conservative, if two or more activities (*e.g.*, oyster boat and a kayak) appeared to cause a seal disturbance, the event was categorized as "non-oyster" related.

Data Preparation

We selected count data from Drakes Estero within the historical peak of the pupping season (15 April--15 May) during 1997--2007. These data were then filtered to remove: (1) data from observers with less than one year of survey experience, (2) observations at tide levels above +2 ft (+0.61 m) (MLW) when fewer seals would be present because some subsites might be submerged (Allen Miller 1988, Grigg *et al.* 2004), and (3) observation dates where weather reduced visibility. Tide level and tide time were standardized to the Golden Gate Bridge, San

Francisco (PST). To ensure that variation in tide levels ≤2 ft (0.61 m) did not affect counts, we tested for correlations between tide level and counts at all of the eight subsites and found no relationships (Spearman ranks test, all $r_s < |0.24|$, $n = 104$). Temporal autocorrelation plots of means by year indicated no significant autocorrelations at any time lag (all $r < 0.5$). The data from all 104 surveys used in this analysis were checked for accuracy against the raw data forms and by comparing subsite data with the sum of counts from the full Estero. Between 6 and 15 surveys (mean = 9.5 ± 2.9) were completed in each year during this period. We also graphically compared pupping season counts with the five other primary local harbor seal colonies within 30 km of Drakes Estero from 2000 to 2007 to provide a regional context.

Analyses

We hypothesized that there could be four potential effects on counts at two of the subsites closest to the mariculture operation in the upper estero (OB and UEN): (1) year as a linear trend through time, (2) density-dependence, defined as total seal counts in the middle-lower Estero away from mariculture operations (L, A, A1, DEM, DBS), (3) years since the last ENSO event (1991--1992 and 1997--1998;

http://www.pmel.noaa.gov/tao/elnino/), and (4) mariculture activity measured as the weight of oysters harvested ($\times 10^5$ lbs) during the same year. We assumed that the oyster harvest variable represented the combined effects from boat traffic, human activity, and oyster bag placement that may displace or disturb seals. Candidate models included between one and three of the above factors; year and ENSO were not used in the same models since both represent time and they were correlated. Density-dependence data was limited to the middle-lower estero counts since the upper estero subsites were being modeled as dependent variables and including them would lead to lack of independence between independent and dependent variables. For example, if oyster harvest was impacting any of the upper estero subsite counts, then using those counts as independent variables in the model would lead to a lack of independence. This could result in using overlapping data in both the independent and dependent variables.

To investigate the robustness of the models to how density-dependence was calculated, we also investigated density-dependence effects on an annual (mean) basis (in addition to daily, as described above). Similarly, we also investigated modeling oyster harvest with a 1-yr time lag. Since time from

oyster planting to harvest is about 18 mo, any effects due to harvest levels could potentially begin to be expressed sometime during the 18 mo prior to harvest.[5, 6] However, in Drakes Estero, most oyster related activity occurs near seal haul-out sites OB and UEN for only 3--4 mo prior to harvest.[7] Consequently, we focus on *same* year oyster harvest effects in the analyses and results. Lastly, we considered lowest tide height during the survey as an additional covariate. Linear mixed-effects models were also tested using ENSO as a random effect.

For analyses of total counts at subsites OB and UEN, we built generalized linear models (GLM). Daily counts were overdispersed (*i.e.*, variance greater than the mean and increasing with the mean), and we therefore used a negative binomial distribution to model the data (Venables and Ripley 2002, Insightful Corp. 2003, Crawley 2005) and ranked each model using Akaike's Information Criterion corrected for small sample sizes (AIC_c) (Burnham and Anderson 2002). Lower AIC_c values indicate a more parsimonious model that better explains the pattern in the data while penalizing the addition of trivial parameters. For the negative binomial distribution, we used a maximum likelihood estimation of θ (shape parameter for the negative binomial distribution) for both UEN and OB using the

glm.nb function in S-Plus (GLM with negative binomial distribution) (Venables and Ripley 2002). These values (1.0 for OB and 1.6 for UEN) were subsequently used in all GLM models because θ must be kept constant to compare maximum likelihood (and hence AIC_c) between models using the same dataset (Venables and Ripley 2002). We report the ΔAIC_c value, Akaike weights (w_i), and pseudo r^2 (Maddalla 1983) to present the level of confidence in each model.

To validate the best model at OB, we used the best fitting GLM model parameters to predict counts at UEF using a scaling parameter that divided the mean counts at UEF from 1997--2007 (26.4) by the mean counts at OB (83.6) for the same period (ratio = 0.32). We then compared the predicted and actual counts at UEF for each year using a Pearson correlation. Lastly, we constructed a regression tree with the software program R to illustrate and test the interactions between independent variables (year, ENSO, density-dependence, and oyster harvest in the same year) on combined OB and UEF harbor seal counts. Statistical analyses were done with S-Plus 6.2 (Insightful Corp. 2003) or R 2.7.2 (R Development Core Team 2008) using the MASS library (Venables and Ripley 2002).

RESULTS

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Seal attendance varied at all three upper Drakes Estero subsites from 1997--2007; however, the amount of change varied amongst the subsites. At subsite OB, both the maximum and mean counts for seals and pups were lower from 1998--2001, higher from 2002--2004, and then lower for 2004--2007. Oyster harvesting showed a U-shaped pattern, declining in the early part of the study period and increasing in 2005 (Fig. 2A).

Disturbance rates in the upper estero (subsites OB, UEF, UEN) significantly increased with oyster harvest (r_s = 0.55, P < 0.03). This correlation is highly robust to sample size. For example, there was still a significant positive correlation (r_s = 0.53, P < 0.04) of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis. Similarly, oyster harvest levels in years with oyster related disturbances were significantly higher (U = 43, n = 13, $P_{1\text{-tail}}$ < 0.04). Only one mariculture related disturbance was recorded in the middle-lower estero during the study. This was at subsite A in 2003 and was likely due to a state mandated water quality testing trip.

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The best GLM model to explain seal counts at OB (w_i = 0.65) included years since ENSO and oyster harvest (Table 1). The coefficients indicated that seal counts had a positive relationship with years since ENSO and a negative relationship with oyster harvest (Table 2). The second ranked model (oyster + ENSO + Density-dependence) was similar to the first model with the inclusion of density-dependence as a non-significant variable (w_i = 0.32). Thus, the top two models had a total w_i of 0.97 and consisted primarily of years since ENSO and oyster harvest. Pseudo r^2 was moderate (0.37-0.38) for these two best models and declined rapidly thereafter to <0.29 for the remaining models.

Predicted counts at UEF using the scaled best fit/lowest AIC_c model from OB fit well (r = 0.66, P < 0.04), strongly suggesting that similar processes (ENSO and oyster harvest) were driving the counts at both OB and UEF (Fig. 3A). In fact, all years except the highest oyster harvest years (1997, 2006, 2007) fit extremely well. The only significantly correlated (P < 0.05) variables were year and ENSO (r_s = 0.89), and ENSO and subsite OB counts (r_s = 0.64). Daily density-dependence was not correlated with counts at OB (r_s = -0.12), but mean annual density-

dependence was using ranks tests (r_s = 0.65) but not Pearson tests (r_p = 0.43, P > 0.18).

Using density-dependence as an annual mean rather than a daily value and/or oyster harvest with a 1-year lag effect still resulted in oyster harvest (with a significant negative coefficient) being included in all of the best (lowest AIC_c / highest r^2) models at OB. For example, if considering density-dependence on an *annual* mean basis, (not shown in tables), the best model included density-dependence, ENSO and oyster harvest (same year) all as significant (P < 0.004) variables and oyster harvest still had a negative coefficient similar to that in Table 2. However, removing oyster harvest from the model increased AIC by ~6.7, indicating that failing to consider oyster harvest results in a model with much lower confidence (Burnham and Anderson 2002). Tide height effects were not important in any models and did not appear in the highest ranking models. Linear mixed-effects models (termed non-nested or crossed random effects) (Faraway 2006) using ENSO as a random factor also resulted in a significant negative oyster harvest coefficient. Model results were also not affected by including components for temporal autocorrelation. Residual plots for the

GLMs showed no issues with homoscedasticity or increasing variance.

Models for subsite UEN, which is farther from the oyster operations, all had poorer fit than OB (all pseudo $r^2 < 0.17$), but oyster harvest and ENSO were once again in the best (lowest AIC_c) model with an Akaike weight of 0.41 (Fig. 3B, Table 1). However, the model containing only year as an explanatory variable ranked second and had an Akaike weight of 0.20, which partially reduces our confidence in the top model.

The regression tree for counts at OB and UEF combined also confirmed the patterns found by the GLMs. ENSO explained much of the variation, and an increase in oyster harvest explained the significantly lower counts (from 255 ± 62 seals down to 118 ± 62) once ENSO effects had subsided (Fig. 4). The tree was grown until additional nodes had a negligible (<5%) additional reduction in model deviance. Residual plots of the regression tree model indicated that the model was sound.

Five other colonies in the region showed a different pattern than Drakes Estero subsites UEF, UEN, and OB, as well as Drakes Estero as a whole (Fig. 5). Bolinas Lagoon, Tomales Bay, and Duxbury Reef showed stable populations during the time series. The Double Point haul-out site suffered from an

aggressive male elephant seal (*Mirounga augustirostrus*) in 2003 that killed approximately 40 (mostly female) and chronically harassed 100s of harbor seals throughout the breeding season. Coincidentally, the Drakes Estero colony had an abrupt peak in 2003, possibly due to movement of some of the seals from Double Point. The Tomales Point colony showed a small increase over time. Finally, middle-lower Drakes Estero counts (used to analyze density-dependence in this paper: subsites A, A1, DEM, DBS, and L) were relatively stable from 2000 to 2006, and similar to the entire estero, had a one-year peak in 2003 that may have been related to the displaced seals from nearby Double Point, and then a small decline in 2007.

Discussion

Pinnipeds, and harbor seals in particular, are vulnerable to human disturbance at haul-out sites where they rest, molt and raise their young (Seuront and Prinzivalli 2005, Grigg *et al.* 2002, Perry *et al.* 2002, Suryan and Harvey 1999, Allen *et al.* 1984, Kenyon 1972). Determining the level of effect from human activities, though, is difficult because of confounding factors such as environmental variables and multiple disturbance sources. Additionally, many studies are of short duration, focusing on short-term issues and do not account for factors

such as density-dependence on long-term trends of populations (Johnson and Acevedo-Gutierrez 2007, Perry *et al.* 2002, Grigg *et al.* 2002).

This study illustrates the utility of concurrently modeling anthropogenic and environmental factors using *a priori* hypotheses and information-theoretic (i.e., AIC) model selection to explain observed patterns in wildlife counts. Here, we provide evidence that from 1997 to 2007 seal counts at Drakes Estero subsites OB and UEF increased after the last ENSO and then declined with an increase in mariculture activities around 2005. The strong ENSO in 1998 had widespread ramifications for many upper trophic level predators in the California current, and in harbor seals, who may forego breeding and pupping in years of low available forage while spending more time foraging (Lee *et al.* 2007, Grigg *et al.* 2004, Benson *et al.* 2002, Sydeman and Allen 1999, Trillmich and Ono 1991). The upper estero subsites were used mainly for pupping and molting because they are islands, and therefore generally have lower human and natural disturbance rates.

Mariculture operations likely began increasing by 2005 to generate the increases in harvesting seen in 2006 and 2007, as time from oyster planting to harvest is typically around 18 mo

in Drakes Estero, with the latter 3--4 months being in areas closer to seal haul out sites OB and UEF. This is consistent with observations that there was little or no oyster equipment (*e.g.*, bags) near the OB sandbars from the summer of 2002 to the summer of 2004 (DTP, unpublished data). Also, aerial imagery from August of 2005 shows oyster bags on the west end of sandbar OB. After April 2007, there were extensive oyster equipment arrays and bags in this area (Fig. 1). The disturbance data and oyster landings (Fig. 2B, Table 1) suggest that increasing mariculture activities resulted in some combination of increased disturbance from boat traffic, human presence on sand bars, and/or physical displacement of seals from the sandbars by oyster growing equipment. While disturbance would likely occur primarily at low tides when seals were hauled out, surveys that count seals and record disturbance events were only completed during a small fraction of the year (typically <50 d per year, each survey 2--4 h), so all types of disturbance were likely underestimated here. Studies from Washington found that disturbance events that flush seals into the water only resulted in a return to previous numbers 39% of the time (Suryan and Harvey 1999), and results from nearby Bolinas Lagoon were similar (Allen *et al.* 1984). Other studies have indicated that

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females with pups may be more vigilant and sensitive to disturbance, and this also may have contributed to the sharp decline of seals at the subsite (OB) in Drakes Estero where mostly females and pups occurred (Lucas and Stobo 2000, Suryan and Harvey 1999, Stein 1989). Such disturbance events in Drakes Estero at OB and UEF appear to have produced effects that were detectable during the entire pupping season via reduced seal counts. However, simple displacement due to mariculture activities or equipment without actual disturbance events may equally be driving the patterns observed at OB and UEF.

The similar count pattern and good model fit observed at subsite UEF (Fig. 3A) suggests that the same factors were driving counts at both OB and UEF. However, the predictive model also showed that the subsites appeared to decouple when oyster harvest was high (1997, 2006, 2007, and perhaps 2008). This suggests that UEF and OB covary strongly in the absence of high oyster harvest levels. Conversely, it appears that when oyster harvest was high, the subsites (OB and UEF) fell out of sync due to mariculture related disturbance or displacement events. Curiously, there is no consistent directionality in this decoupling pattern (Fig. 3A). Alternatively, this decoupling could be related to poorer model fit at the beginning and end of

the time series, but since time (year) was not a variable selected or used in the model, this seems unlikely.

Counts at subsite UEN, which is slightly further away from mariculture operations, nonetheless showed a significant, but muted response to ENSO and oyster harvesting. While several other subsites in the estero vary with changes in sandbar morphology, disturbance, predators, and other environmental factors, subsites OB and UEF (and UEN) suffered no such physical changes other than an increase in nearby mariculture use. The generally poor fit for all of the UEN models suggests that other unmodeled factors (including interactions among subsites) may affect counts there more than ENSO, density-dependence, or oyster harvest. Additional processes that might influence the seal counts at UEN include 1) seals are typically farther from oyster operations than those at OB and UEF and thus less susceptible to disturbance, and/or 2) some seals may have moved from OB or UEF to UEN upon being displaced by oyster operations. Distance from a disturbance source has often been documented as contributing to whether seals respond to a human activity (Johnson and Acevedo-Gutierrez 2007, Suryan and Harvey 1999, Allen *et al.* 1984). Furthermore, changes in sandbar morphology in the middle-lower Estero, might also have affected counts in

the upper estero because of redistribution of seals. For example, counts at subsite A in the middle estero (Fig. 1) declined dramatically from 2004--2007, due to a naturally shifting sandbar that allowed predator (coyote, *Canis latrans*) access to the site. The displaced seals appeared to move to other subsites in the estero (for example, subsite A1 increased dramatically as A declined), and this process may have also had a confounding impact on the counts at UEN. Clearly, the variation at UEN is not very well explained by our candidate models and unknown processes such as interactions among subsites in the Estero may be partially driving counts at UEN. Additionally, variation in tidal height should not affect the counts since all surveys were conducted at low tides, and multiple counts were conducted during each survey, with only the highest count recorded and analyzed here.

Modeling density-dependence should also control for larger scale regional impacts such as the poorly understood oceanographic anomalies in the California Current reported in 2005 and 2006 that depressed food for many seabirds (Barth *et al.* 2007). For example, if ocean conditions depressed seal density in Drakes Estero and this in turn caused less use of OB or UEF due to density-dependent effects, then density-dependence

should have presented a better (more parsimonious) explanation of the data than "ENSO" and "Oyster" (Table 1). This would similarly address any covariation of counts in Drakes Estero compared to other harbor seal haul-out sites in north-central California due to unexplained interannual variation (Fig. 5). While mean total harbor seal counts in all of Drakes Estero increased from 2000 to 2003 (from ~700 to 1,200 individuals), and then declined from 2003 to 2007 (back down to ~750 individuals), ENSO and oyster harvesting still explained the data much better than density-dependence (Tables 1 and 2). This is likely because the middle-lower estero counts were somewhat more stable (Fig. 5). The one year spike in 2003 was likely due to displaced seals from Double Point moving to Drakes Estero. There was also a small unexplained decline in 2007.

The significant decline in adults and pups at OB after 2004 suggests that oyster harvesting influenced these numbers; however, the GLM models were fit to actual data, so it would be inappropriate to predict if seals at OB would have continued to increase or asymptote after 2004 in the absence of increasing oyster harvesting. In fact, a square-root (diminishing effects) transformation for ENSO may have also been a reasonable *a priori* test. Nonetheless, while long-term studies in Washington and

Oregon noted density-dependence effects at harbor seal colonies (Brown *et al.* 2005, Jeffries *et al.* 2005), the data for subsite OB in Drakes Estero were most consistent with the hypothesis that a significant portion of the reduced seal count during 2005--2007 was related to the increase in oyster harvesting.

Further evidence for the negative effect of oyster harvest levels on counts at subsites OB and UEF comes from the limited data available for 1996. These counts were not used in the GLM or tree models due to incomplete data, however, five surveys during the peak pupping season showed a mean count for OB of only 47 ± 39 (similar to 1997, 2005, and 2007) during the highest oyster harvest year (587,000 lbs) and the highest disturbance rate during the study (Fig. 2B).

The 2008 pupping season presented an opportunity to investigate the immediate effect of a change in oyster operations. In 2008, the California Coastal Commission (CCC) imposed a seal protection zone which restricted some use of the lateral channel adjacent to OB by oyster boats during the pupping season. Thus, boat use in the lateral channel in 2008 was curtailed from use levels during 2005--2007, and concurrently, mean counts at OB increased from about 61 ± 10 (SE) in 2007 to 81 ± 12 in 2008 despite a nominal increase in

oyster harvest, from 466,000 lbs in 2007 to a projected 493,000 lbs in 2008. The restriction of oyster operations also coincided with only one mariculture related disturbance detected in the upper estero in 2008 (versus six in 2007) (Fig. 2B), suggesting that conditions that previously reduced pupping season seal counts may have partially abated due to CCC restrictions.

We therefore suggest that an adaptive management approach for oyster operations be investigated since reducing activity in the area close to seals may have had immediate positive effects. This also suggests that while oyster harvest was a good proxy for impacts on seal counts in the upper estero for 1997--2007, changes in operations such as those experienced in 2008 may make the oyster harvest proxy less useful in the future. For this reason, it is not appropriate to include the 2008 data in the models because of this large change in management.

In conclusion, patterns observed in Drakes Estero at upper estero subsites OB and UEF (and potentially UEN) are best explained by ENSO and increased disturbance from oyster harvest activities. The ability of the OB model to predict counts at subsite UEF suggests that similar processes are occurring at both subsites and that the modeling techniques are robust. The results of this study also contribute to a limited body of

literature on the potential negative effects of mariculture on marine mammals. Watson-Capps and Mann (2005) found that oyster farming in coastal waters off Australia reduced use by bottlenose dolphins (*Tursiops* sp.) even though the facility had open areas that presumably would allow dolphins to pass. Such conflicts may increase in the future if mariculture replaces wild ocean harvesting due to the worldwide decline in wild fish stocks (Worm *et al.* 2006).

This study illustrates the benefits of long-term studies for understanding multiple anthropogenic and environmental factors that can affect pinniped populations and productivity (Thompson *et al.* 2001, Richardson *et al.* 1995). It also demonstrates how chronic disturbance activities, in this case associated with a mariculture operation, can lead to displacement of seals at haul-out sites, resulting in animals either shifting to alternate subsites or leaving the area. Kenyon (1972) noted for the monk seal (*Monachus schauinslandi*) that such losses likely led to net population losses because of the lack of suitable breeding habitat. If harbor seals in the region are at environmental carrying capacity, then loss of pupping sites within Drakes Estero also might conceivably lead to population loss. Finally, our results suggest that an

important part of managing for protection of pinnipeds may be to provide a higher level of protection around breeding habitat which is not currently protected under the U.S. Marine Mammal Protection Act (www.nmfs.noaa.gov/pr/laws/mmpa).

ACKNOWLEDGMENTS

We gratefully acknowledge reviews of previous drafts of this paper by J. Laake, J. Barlow, M. Z. Peery, E. Grosholz, J. Harvey, H. Markowitz, E. Hines, G. Fellers, F. Gulland, C. Goodman and three anonymous reviewers. J. Laake and J. Barlow kindly provided statistical advice. We also benefitted from discussions with T. Regan and D. Graber. We thank the many dedicated volunteers and interns of Point Reyes National Seashore who helped collect data; S. Waber, W. Holter, J. Manna, M. Vanderhoof, and K. Truchinski for entering data; D. Adams for program oversight; D. Roberts for database management; and D. Brown for producing Figure 1.

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FIGURE LEGENDS

Figure 1. Oyster bag areas (mapped in spring of 2007), oyster racks, and the eight seal haul out subsites (*e.g.*, OB) in Drakes Estero. UEF, OB, and UEN are considered upper Estero. Subsites A, A1, DBS, DEM, and L are in the middle-lower Estero and not subject to disturbance from mariculture. All surveys were completed from the bluffs indicated by the "survey location" marker.

Figure 2. (A) Mean (±1 SE) counts of harbor seals at Drakes Estero subsite OB and oysters harvested from Drakes Estero during 1997--2007. 1998 was an El Niño year. (B) Relationship between annual oyster harvest and mariculture related disturbance rate from 1996--2008. Text adjacent to points indicates the year, the number of disturbances in that year, and the number of surveys. Between 37 and 50 surveys were conducted each year from 1997--2005. During 1997--1998, oyster harvest rate was rapidly declining which may have diminished some of the factors that lead to disturbance.

Figure 3. (A) Predicted and actual (from the best fitting generalized linear model at OB) mean counts of pups and adults from 1997--2007 at subsite UEF. The 2008 data point is not derived from the model (it is actual data) or used the

correlation test. It is only shown to illustrate that seals in 2008 appear to be returning to more normal covariation between OB and UEF. (B) Mean seal counts from 1997--2007 at subsite UEN during the 15 April--15 May pupping season. Error bars represent the standard error for the total count.

Figure 4. Regression tree illustrating how ENSO and oyster harvest interact to best explain seal counts at subsites UEF and OB. The number of seals for each survey is represented by a dot histogram along the x-axis in each box, with points at the origin indicating a zero count and points to the right of the box indicating larger counts. This model agrees closely with the GLM results in Table 1.

Figure 5. Mean (±1 SE) counts of pups and adults during the pupping season (15 April--15 May) from 2000 to 2007 at Drakes Estero and five regional sites within 30 km. Dark bars on the Drakes Estero panel represent only the middle-lower estero counts used for calculating density-dependence in the GLM and regression tree models.

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FOOTNOTES

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Table 1. Ranking of candidate models at subsites OB and UEN by AIC_c and Akaike weights (w_i). The dependent variable is the count of total seals at subsite OB and independent variables are year as linear trend (Year), Density-dependence (DenDep: daily sum of seals in the middle-lower estero), years since last El Niño event (ENSO), and lbs of oysters harvested in the same year (Oyst). Column headings are: small sample AIC (AIC_c), distance from best model (Δ_i), and Akaike weight (w_i); n = 104 for all models.

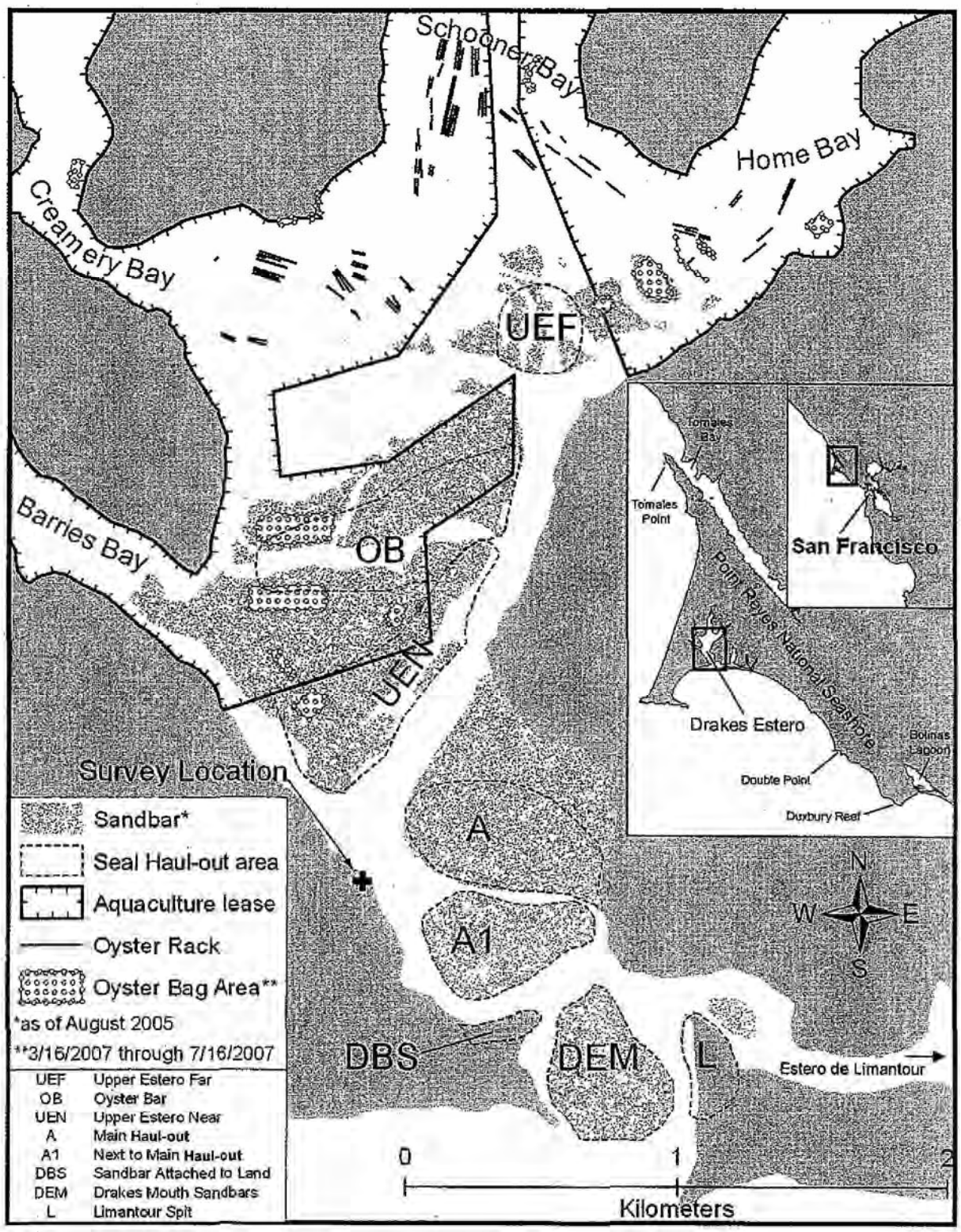
Model	AIC_c	Δ_i	w_i	r^2
Subsite OB				
Oyst + ENSO	332.96	0.00	0.65	0.37
Oyst + ENSO + DenDep	334.38	1.42	0.32	0.38
ENSO	340.36	7.40	0.02	0.25
ENSO + DenDep	340.70	7.74	0.01	0.28
Year	344.90	16.53	0.00	0.19
DenDep	353.16	20.20	0.00	0.07
Oyst	353.22	20.26	0.00	0.05
Oyst + DenDep	353.42	20.47	0.00	0.11
Null	353.68	20.72	0.00	0.05
Subsite UEN				
Oyst + ENSO	320.19	0.00	0.41	0.16
Year	321.68	1.49	0.20	0.10

Oyst + ENSO + DenDep	322.34	2.15	0.14	0.16
ENSO + DenDep	322.66	2.47	0.12	0.12
ENSO	323.20	3.01	0.09	0.11
Null	326.10	5.90	0.02	0.00
DenDep	327.66	7.47	0.01	0.01
Oyst	328.22	8.02	0.01	0.00
Oyst + DenDep	329.81	9.61	0.00	0.01

850

Table 2. Coefficients of the best two AIC_c ranked models for OB and UEN from Table 1. w_i is Akaike weight.

Subsite:Model	Coefficient	Standard Error	t	p<0.05
Subsite OB				
Model 1 (w_i = 0.65)				
Constant	3.530	0.185	19.099	*
Oyst	-0.240	0.063	-3.821	*
ENSO	0.261	0.035	7.563	*
Model 2 (w_i = 0.32)				
Constant	3.269	0.366	8.928	*
Oyst	-0.229	0.066	-3.447	*
ENSO	0.251	0.036	6.911	*
Density-dependence	0.001	0.001	0.914	
Subsite UEN				
Model 1 (w_i = 0.41)				
Constant	4.720	0.117	40.292	*
Oyst	-0.105	0.040	-2.631	*
ENSO	0.119	0.022	5.436	*
Model 2 (w_i = 0.20)				
Constant	-140.463	36.041	-3.897	*
Year	0.073	0.018	4.038	*


Schooner Bay
Home Bay
Creamery Bay
UEF
Barries Bay
OB
UEN
Survey Location
A
A1
DBS
DEM
L
Estero de Limantour
Tomales Bay
Tomales Point
San Francisco
Point Reyes National Seashore
Drakes Estero
Bolinas Lagoon
Double Point
Duxbury Reef
N
W
E
S
Sandbar*
Seal Haul-out area
Aquaculture lease
Oyster Rack
Oyster Bag Area**
*as of August 2005
**3/16/2007 through 7/16/2007
UEF Upper Estero Far
OB Oyster Bar
UEN Upper Estero Near
A Main Haul-out
A1 Next to Main Haul-out
DBS Sandbar Attached to Land
DEM Drakes Mouth Sandbars
L Limantour Spit
0
1
2
Kilometers

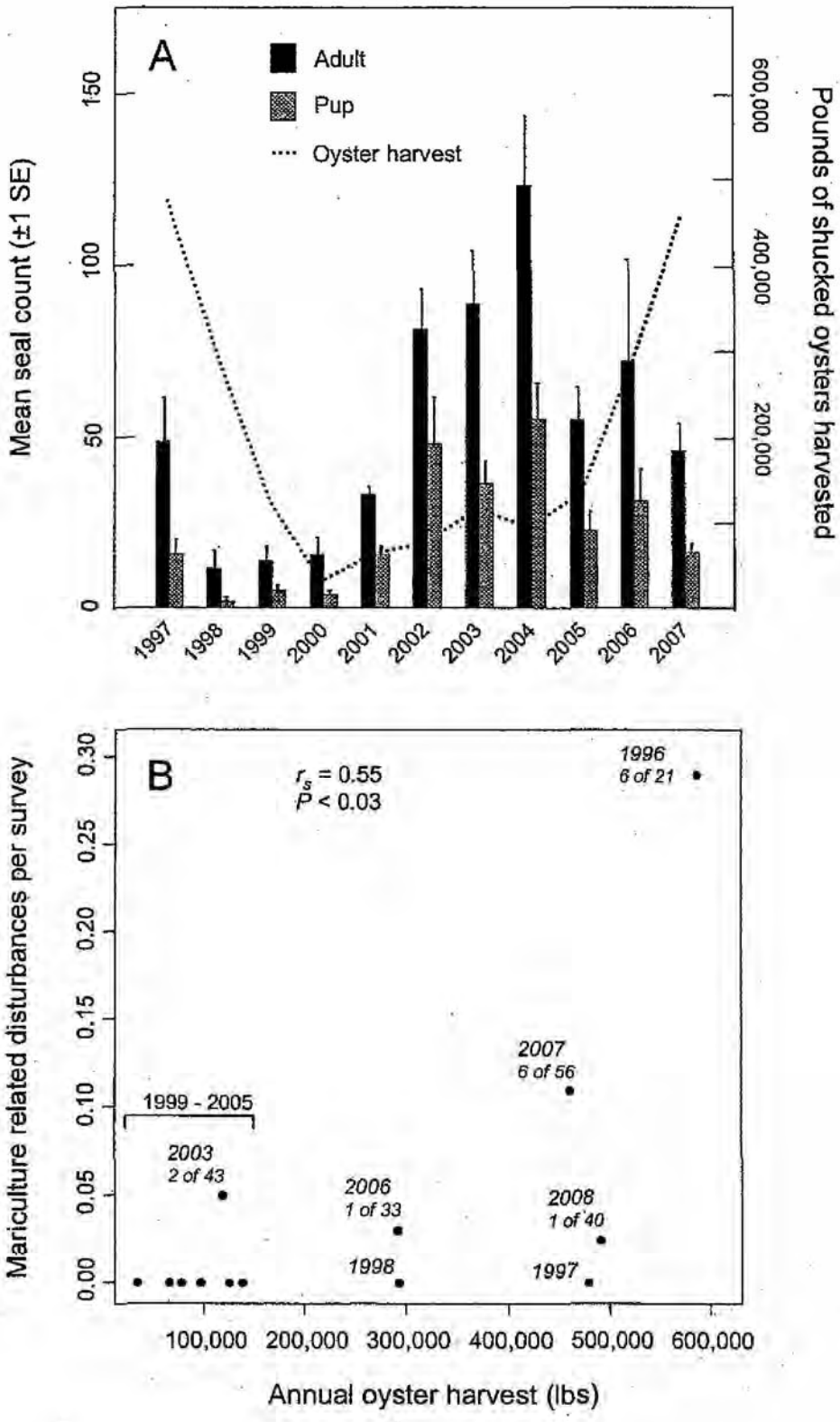
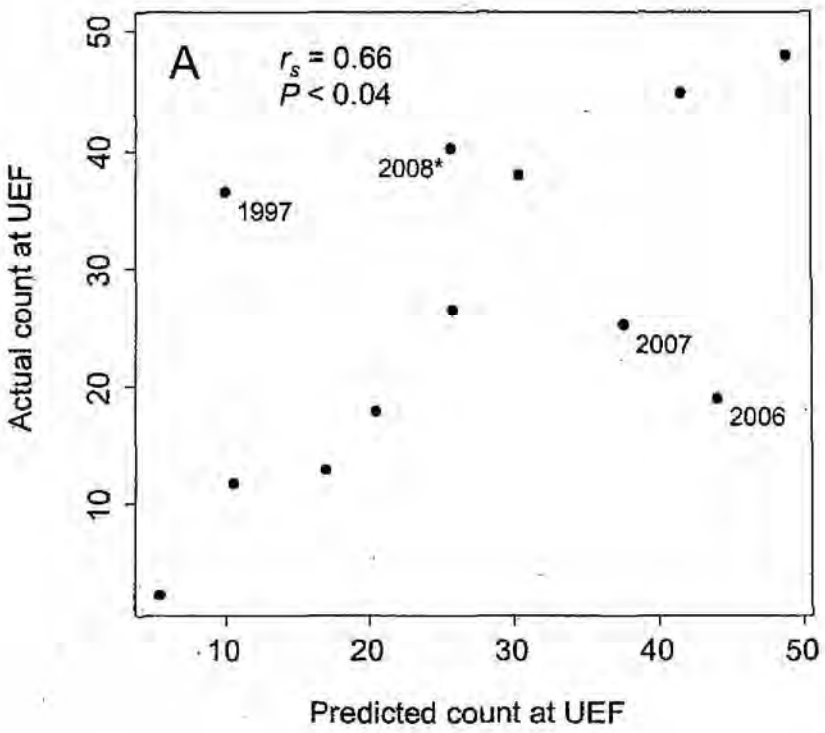

A
Adult
Pup
Oyster harvest
Mean seal count (±1 SE)
Pounds of shucked oysters harvested
0
50
100
150
200,000
400,000
600,000
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
B
r_s = 0.55
P < 0.03
1996
6 of 21
2007
6 of 56
1999 - 2005
2003
2 of 43
2006
1 of 33
2008
1 of 40
1998
1997
Mariculture related disturbances per survey
0.00
0.05
0.10
0.15
0.20
0.25
0.30
100,000
200,000
300,000
400,000
500,000
600,000
Annual oyster harvest (lbs)

Fig. 2


A
r_s = 0.66
P < 0.04
2008*
1997
2007
2006
Actual count at UEF
Predicted count at UEF
10
20
30
40
50

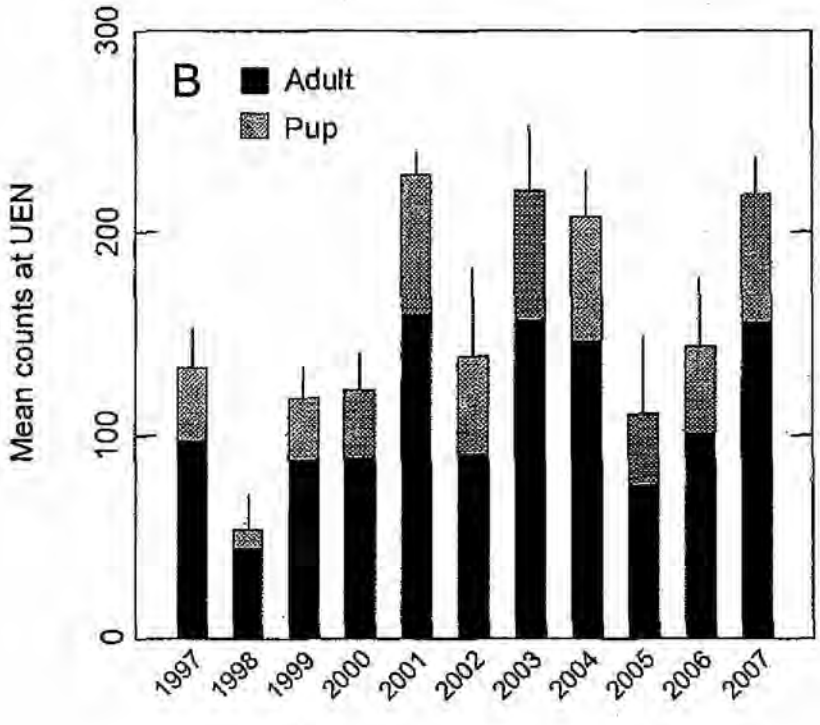

B
Adult
Pup
Mean counts at UEN
0
100
200
300
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007

Fig. 3

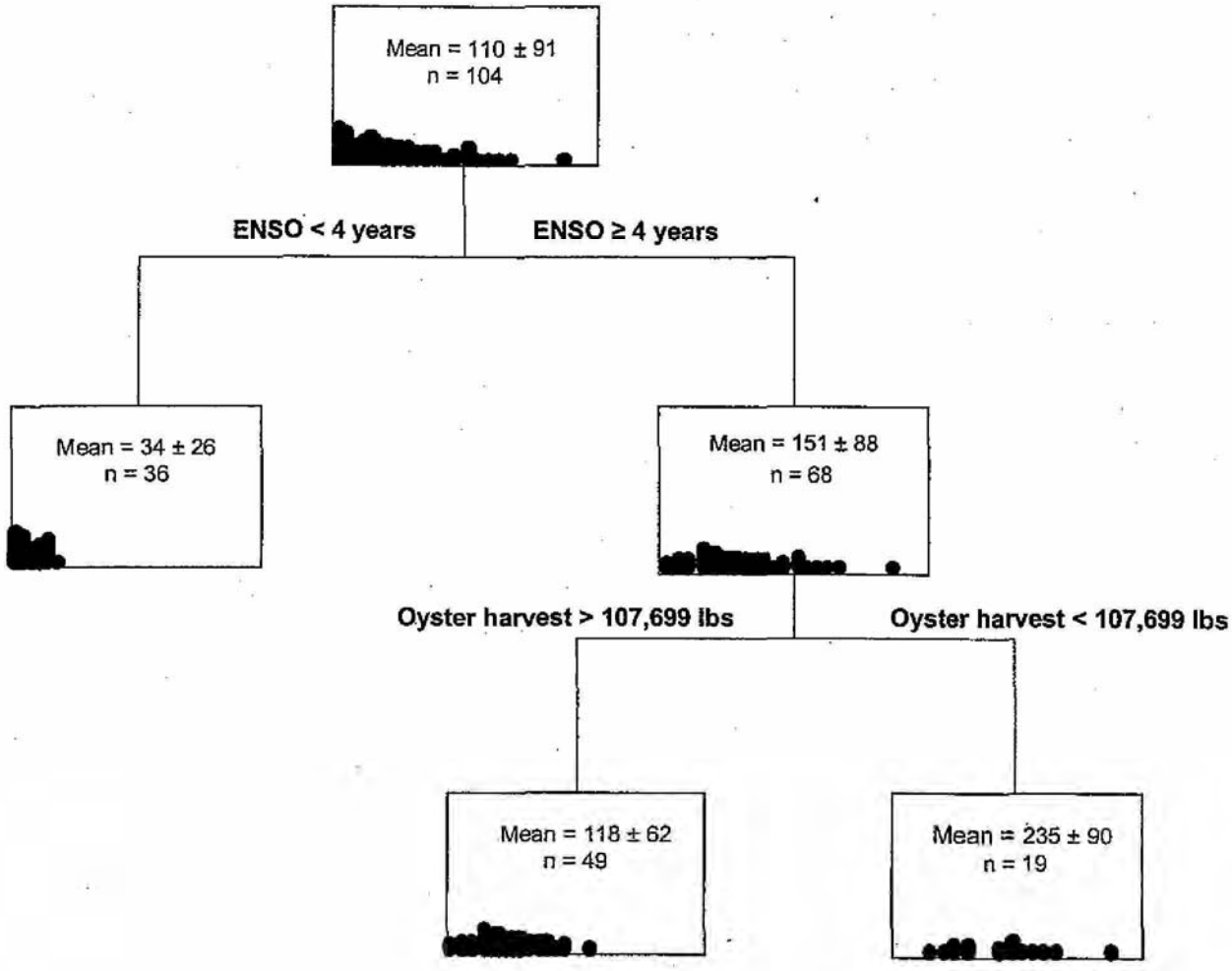

Mean = 110 ± 91
n = 104
ENSO < 4 years
ENSO ≥ 4 years
Mean = 34 ± 26
n = 36
Mean = 151 ± 88
n = 68
Oyster harvest > 107,699 lbs
Oyster harvest < 107,699 lbs
Mean = 118 ± 62
n = 49
Mean = 235 ± 90
n = 19

Fig. 4

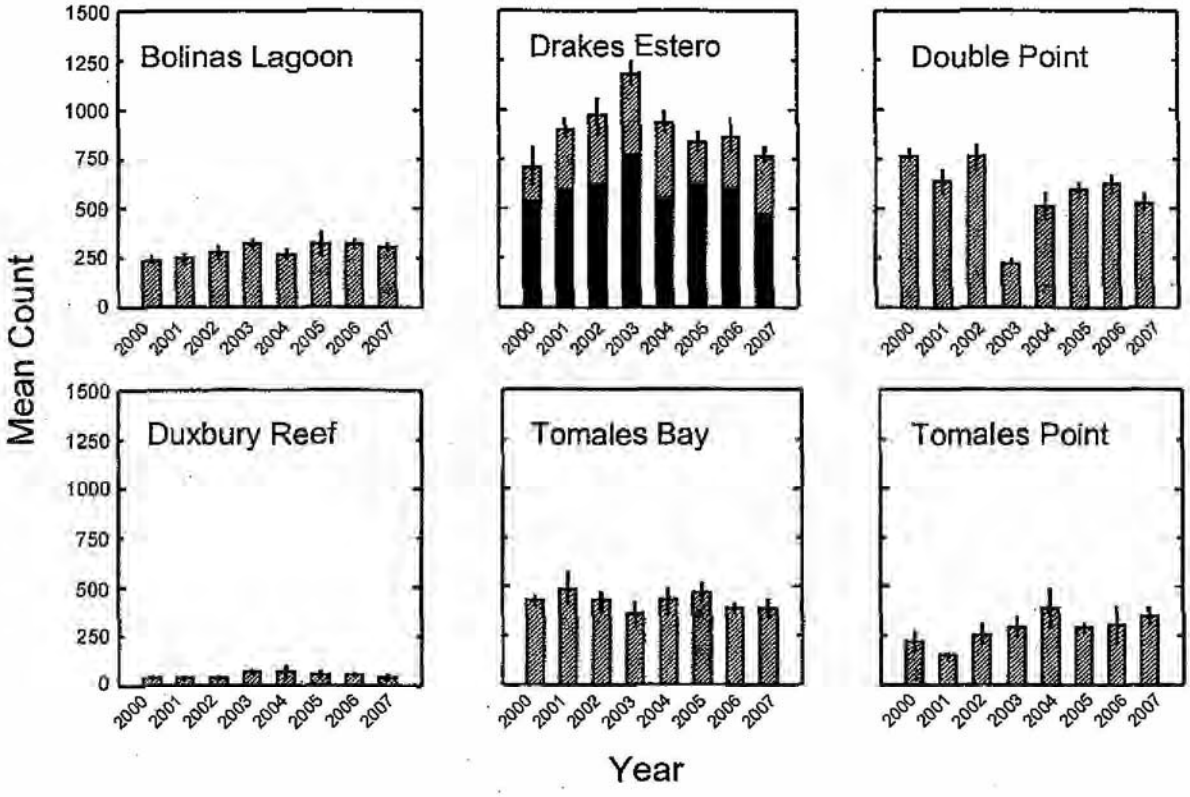

Bolinas Lagoon
Drakes Estero
Double Point
Duxbury Reef
Tomales Bay
Tomales Point
Mean Count
Year
1500
1250
1000
750
500
250
0
2000
2001
2002
2003
2004
2005
2006
2007

Fig. 5

L1425
02-106

November 4, 2008

Kevin and Nancy Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

Dear Kevin and Nancy:

We received your correspondence regarding the paper: Modeling the Effects of El Nino, Density-Dependence, and Disturbance on Harbor Seal (Phoca Vitulna) Counts in Drakes Estero." We appreciate your concerns and want to assure you that this scientific paper has received administrative National Park Service review, additional outside peer review, and anonymous peer review conducted by the Journal of Marine Mammal Science. With this full internal and independent external peer review, the paper meets the standards set in National Park Service policies and applicable laws. According to the *Interim Guidance Document Governing Code of Conduct, Peer Review, and Information Quality Correction for National Park Service Cultural and Natural Resource Disciplines (2008)*:, "Other information that does not require peer review under this guidance includes: B. Information published either in a peer-reviewed journal listed on the Thomson Scientific Master Journal List or in an official report of the National Academies of Science." Based on this statement, the NPS has clearly conducted more than is required. Because the paper was presented at the National Academy Panel meeting, we have taken into consideration comments received during and after the meeting.

You questioned the timing of the release of the paper in the letter; the release was predicated on the peer review process being completed and changes made. For your information, the two databases (harbor seal and oyster harvest) used by the researchers had been and were publicly available.

Regarding your special use permit, we are fully committed to the full term until 2012. This paper does not affect your basic operations in Drakes Estero until 2012. As we stated in a previous letter, we want to work with you on issues in the future and are committed to doing so. We too wish the relationship were more productive and hope you agree that you and the park should work more cooperatively. However, as we have stated many times, the National Park Service is committed to meet the terms of your Reservation of Use and Special Use permit.

Sincerely,

Don L. Neubacher
Superintendent

DLNeubacher:an 11/04/08

"Kevin Lunny" <kevin@drakesbayoyster.com>

10/22/2008 10:48 AM

To <mmsci@megalink.net>, <daryl_boness@umit.maine.edu>, <jon_jarvis@nps.gov>, <Don_Neubacher@nps.gov>, <Brian_O'Neill@nps.gov>, <Ben_Becker@nps.gov>,
cc "'Goodman, Corey'" <corey.goodman@pfizer.com>, "'John Hulls'" (b) (6) [redacted] >
bcc

Subject FW: 2007 Harbor Seal Report

History: This message has been forwarded.

Please review the attached letter and 2007 Annual Harbor Seal Report that were sent to Dr. Susan Roberts and the NAS Drakes Estero panel. If you have any questions, please feel free to contact me.

Thank you,

Kevin Lunny
Drakes Bay Oyster Company
415-669-1149

From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Monday, October 20, 2008 4:47 PM
To: Susan Roberts (sroberts@nas.edu)
Cc: 'David M. Weiman'; 'Melissa Cichantek'
Subject:

Susan,

Please distribute this to the panel members.

Thank you,

Kevin lunny.08.0892.pdf Harbor_Seal_2007_Annual_Report2 (WITH PROPERTIES).pdf

Drakes Bay Oyster Company

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kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

October 15, 2008

Dr. Susan Roberts
Executive Director
Ocean Studies Board
National Academy of Sciences
500 Fifth Street, NW
Washington, DC 20001

RE: **Undisclosed 2007 NPS Point Reyes Regional Harbor Seal Report**

Dear Dr. Roberts.

We just learned of a new NPS Report – the annual Point Reyes National Seashore/Golden Gate National Recreation Area Harbor Seal Report – a report that was not disclosed to your Board, not disclosed to us and that contradicts the Becker Report.

I am a third generation farmer and rancher on the Point Reyes Peninsula. I am a graduate of UC Davis with a degree in Animal Science. I was taught to respect science. What's unfolding here at Point Reyes National Seashore – and before your panel – is inconsistent with the scientific principles I was taught.

For the reasons described below, the National Park Service owes the Ocean Studies Board (OSB) an explanation.

In June, 2008, Point Reyes National Seashore staff completed work on two formal studies: "*Modeling the Effects of El Nino, Density-Dependence and Disturbance on Harbor Seal (Phoca Vitulina) Counts in Drakes Estero, California: 1997-2007*" (the Becker Report) and "*Pacific Harbor Seal (Phoca vitulina richardii) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2007 Annual Report*" (the 2007 PRNS Harbor Seal Report).

There are striking similarities to both Reports, including.

- Both involved harbor seals;

- Both involved harbor seals at Drakes Estero;
- Both involved the year 2007;
- Both studies were peer-reviewed; and,
- Both studies were authored or reviewed by some of the same Point Reyes National Seashore staff.

The Similarities End Here.

The Becker Report was submitted to the OSB panel on June 3, 2008 immediately after NPS was informed by Dr. Daryl Boness, Editor, Marine Mammal Science Journal that peer-review was completed and the Becker Report was approved for publication.

Three months later, on the eve of the September 4, 2008 OSB panel meeting in California, the agenda was modified to make the Becker Report the lead presentation.

Unlike the Becker Report, the 2007 Harbor Seal Report (dated June 2008) was NOT submitted to the OSB. As of September 4 (the day the OSB met in California) NPS had not submitted the 2007 Harbor Seal Report to the OSB Panel (Source: National Academy of Sciences, Public Records Office). As of September 23, three weeks after the panel first met, OSB updated the public documents file for this Board's work and the 2007 Harbor Seal Report was still not submitted.

The National Park Service did not submit their official 2007 Harbor Seal Report to your panel. We will. It is attached to this letter and we ask that you distribute it with this letter to the members of our panel and include it in your record.

The Irregularities Begin.

The 2007 PRNS Harbor Seal Report, according to Jon Jarvis, Regional Director National Park Service, was to be available by December 2007. In a June 13, 2007 letter to Dr. Goodman, Jarvis said the 2007 harbor seal documentation:

> *"...will be prepared as a final annual report by December 2007."*

The 2007 Harbor Seal Report focuses on the pupping season (March-June) and is typically released in December of the same year. NPS missed its self-imposed deadline of December 2007. The 2007 Harbor Seal Report is dated June 2008.

To prepare for the OSB's September meeting, Dr. Goodman sought to update harbor seal data, documentation and other information. Realizing that the 2007 Harbor Seal Report had neither

been posted nor sent to him, he filed a Freedom of Information Act (FOIA) request on July 31, 2008 to the Park Service seeking the 2007 report and related documents.

On August, 25, 2008, NPS sent Dr. Goodman a letter denying the FOIA request, declaring:

> *"the 2007 Harbor Seal Report is undergoing peer review and is, as a result, withheld..."*

There are two irregularities with this NPS rejection. First, NPS neglected to inform Dr. Goodman that the 2007 Seal Report was already dated June 2008, two months prior to his request. Second, the Park Service also did not tell Dr. Goodman that the 2007 Seal Report was already on the internet. Peer-review, it would appear, was completed when Dr. Goodman's request was denied. After peer-review and after uploading it to the web, NPS neither informed Dr. Goodman of its availability or nor sent it to him.

Perhaps more significantly, NPS made a decision not to submit this Report to the OSB.

The Trail of Irregularities Continues

From 2007, what is on the public record? What is known? And, does this now-published 2007 PRNS Harbor Seal Monitoring Report reflect that public record?

In early April 2007, in the middle of the 2007 harbor seal pupping season, the NPS told the Marin County Board of Supervisors that because of civil and criminal misconduct by DBOC against the federally-protected harbor seals, NPS was not proceeding with our pending permits.

On May 8, 2007, the Superintendent formally testified before the Marin County Board of Supervisors and declared the harm to harbor seals a "*national emergency.*" Said Neubacher:

> *...we believe because of recent actions, and I want to illustrate this, that the harbor seal pupping area in Drakes Estero is seriously threatened right now. Dr. Allen is going to discuss this, but we have some major problems because you can see on your map that pup [oyster] bags recently have been put in pupping areas. And Sarah will give you statistics, but it's amazing how many pups we have probably lost this year. So we've got a serious problem right now...*
>
> *I mean its that complex, because now you're talking about the Marine Mammal Commission, for example, wrote us a letter this morning, they're going to take it up. This is a national issue. They're going to take it up on a national level...*

Now, a year and a half later, the Becker Report was presented to the OSB. The Becker Report

was focused on modeling the relationship between oyster production at Drakes Estero and harbor seal populations. Becker and NPS colleagues concluded that as oyster production in Drakes Estero went up, harbor seals at subsite OB (one of eight in Drakes Estero) went down.

The 2007 Harbor Seal Monitoring Report defined its own objectives as follows:

> *The objectives of monitoring each site and the population as a whole are to i) detect changes in population size, ii) detect changes in reproductive success by way of pup production, and iii) identify anthropogenic or environmental factors that may affect the condition of the population. The monitoring objectives and protocol are described in detail in the draft San Francisco Bay Area Network Pinniped Monitoring Protocol, scheduled for completion in 2008.*

One would expect the concurrently published 2007 PRNS Harbor Seal Monitoring Report to detail the environmental harms caused by our oyster company, our boats, our workers and our presence. It did not.

The 2007 PRNS Harbor Seal Report referenced oyster production – in passing – and none of these references were consequential. None related to harm.

Put another way, the Becker Report and the 2007 PRNS Harbor Seal Monitoring Report are not consistent.

These two NPS studies – involving the same resource, harbor seals at Drakes Estero in the same time period, authored or reviewed by the same individuals at Point Reyes National Seashore – contradict one another. They are not consistent.

More Irregulatities.

Recently, we were informed that the 2007 PRNS Harbor Seal Monitoring Report was published on the internet.

We immediately Googled harbor seals Drakes Estero 2007. Nothing found.

Then we went to the U.S. Department of the Interior's web site, used their search feature and searched for "Harbor Seals, Drakes Estero, 2007." Nothing found.

We took another step. We went to the NPS web site and repeated the process. Nothing found.

Following that, we then went to the PRNS (PORE) web site and inserted the same. Nothing found.

Then we went to the NPS Inventory and Monitoring Program's web site. Nothing found.

Then we repeated the process using other names, reversing sequences and orders. Nothng found.

Yet, the NPS Inventory and Monitory Program's 2007 PRNS Harbor Seal Annual Report is on the web. It's on the internet. It is on a Park Service web site. (See: http://science.nature.nps.gov/im/units/sfan/vital_signs/pinnipeds/docs/Harbor_Seal_2007_Annual_Report2.pdf)

The web site, however, contained an instruction that prohibited the 2007 PRNS Harbor Seal Monitoring Report from being located and retrieved by Google, Yahoo or any other common search engine, including those of the Park Service or Interior Department.

It is hidden in plain sight.

It was withheld from Dr. Goodman. And, it was not provided to the OSB.

NPS Irregularities Violate NPS "Data Management Plan"

Several NPS units throughout the region developed a formal Data Management Plan (Version 2.0, September 2005) for what is called the San Francisco Bay Area Network, Inventory and Monitory Program. According to this plan:

> *The San Francisco Area Network (SFAN) Data Management Plan outlines how we intend to implement and maintain a system that will serve and data and information management needs of our Inventory and Management Program. This plan reflects our commitment to establishing and maintaining a robust system for data management and* ***to ensure the availability and usability*** *of high-quality natural resource information.* [highlight added]

According to the National Park Service Advisory Board, cited by the SFAN Plan, stated that the findings resulting from an I&M program, "*must be communicated to the public, for it is the broader public that will decide the fate of these resources.*" To that end, this NPS Data Management Plan is to "*provide data in a variety of formats and venues to reach all potential users*" and actually calls us "*information consumers.*"

The same NPS Plan provides a flow chart from "*data product*" to "*use*" in which the fifth of seven stations is labeled "*data discovery*" stating:

> *Allow for widespread, automated awareness of data products through websites and indexed clearinghouses.*

The next station is labeled "*distribution*" stating:

> *Share data products through internet download or direct mailing in response to specific requests.*

Another section of the Plan instructs NPS to make the data "*easily discoverable and obtainable.*"

These and other NPS requirements as set forth in their own regional plan were violated in numerous instances. Moreover, there is nothing in the NPS 2005 Data Management Plan that directed or recommended that the Park Service impose blocks on these reports. Nothing in this Plan says the NPS harbor seal reports, prepared as part of the Inventory and Monitoring Program may be hidden in blocked files.

The Two "Es" – Exclusions and Errors.

During the six weeks since the OSB met, the Becker Report was carefully reviewed. Based on letters and emails to NPS and the Journal of Marine Mammal Science, it can be concluded that the Becker Report, intended or not, is riddled with and based upon the Two "Es" – *Exclusions and Errors*. The Becker Report:

Exclusions

- excluded data and analysis from most of the study period's eleven years and limited their primary analysis to 2005-2007, coincidently, the precise time of the Lunny family's ownership of the oyster farm;
- excluded five of the eight subsites in Drakes Estero;
- excluded the overall harbor seal population in Drakes Estero;
- excluded the neighboring harbor seal populations of PRNS (PORE);
- excluded all non-oyster disturbances from the I&M Harbor Seal Data Base for 2005-2007;
- excluded all harbor seal disturbances from 1997-2004; and,
- excluded all but 2/10th of 1% of the recorded harbor seal disturbances (put another way, more than 99% of the total harbor seal disturbances were not included in the Becker Report)

Errors

- There is one over-arching error of significance. The oyster production (pounds of shucked oysters harvested) figure overstated DBOC production by 63% (267% when

compared to 2006).

In five communications since September 4 from Dr. Goodman and Mr. Hulls to the OSB, the Marine Mammal Science Journal and to the NPS, they separately detailed a lengthy list of other errors, omissions and misrepresentations.

What is striking about the 2007 PRNS Harbor Seal Report? It's similar to and consistent with the 2006 PRNS Harbor Seal Report. Both the 2006 and 2007 PRNS Harbor Seal Reports found no problems with the oyster farm.

Conclusions and Recommendations

Conclusions

(1) The National Park Service is engaging in deception with the Ocean Studies Board.

(2) On September 4 at the OSB meeting, Dr. Goodman already pointed out that the NPS Harbor Seal Database (1970's to the present) was not submitted to the OSB. Now, another key document, the most recent formal report on harbor seals at Point Reyes National Seashore (including Drakes Estero), was NOT submitted to the OSB.

(3) The 2007 PRNS Harbor Seal Report was placed on the web, and a manual instruction was inserted in the code to prevent the report from being searched and retrieved. It is only available if one knows its precise address (http://science.nature.nps.gov/im/units/sfan/vital_signs/pinnipeds/docs/Harbor_Seal_2007_Annual_Report2.pdf).

(4) Withholding and/or omitting this 2007 PRNS Harbor Seal Report prevents the Panel from a comparative review. It denies the panel the ability to see the obvious contradictions in Park Service reports.

What's emerged here is the "tale of two sciences." NPS/PRNS work done in the name of the I&M program appears to be professional and is consistent (see: 2006 and 2007 PRNS Annual Harbor Seal Reports). By contrast, science prepared and presented under the direction of the Superintendent ignores a lengthy list of laws and policies (see: the NPS Report, *"Drakes Estero, A Sheltered Wilderness Estuary, Versions"* I-V and now the Becker Report). These Reports are, it now appears, little more than a taxpayer-funded advocacy.

Recommendation for the Ocean Studies Board:

(1) Request that NPS formally submit the 2007 PRNS Harbor Seal Report to the OSB for inclusion in the OSB record and for consideration and evaluation by your panel.

(2) Request from NPS in writing, a full explanation as to why this 2007 PRNS Harbor Seal Report was denied Dr. Goodman in August when it was dated in June.

(3) Request from NPS a full and complete explanation for the contradictory conclusions between the 2007 PRNS Harbor Seal Report and the Becker Report.

(4) Require the NPS to explain why it insisted that Becker be the lead presentation before the OSB panel meeting on September 4, 2008.

(5) Require that all peer review comments -- from both the Becker Report AND the 2007 PRNS Harbor Seal Report -- be submitted to the OSB by NPS, and placed in the OSB public files so these comments can be reviewed by all parties.

In light of these revelations, we remind the OSB panel that the Federal Policy on Research Misconduct is defined, in part:

> *Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.*

And, we request that, when preparing your report and recommendations, the OSB recommend that all NPS science reports be fully accessible and searchable, consistent with Federal law and consistent with their Regional SFAN Inventory and Monitoring Data Management Plan. The NPS practice of blocking search access to these NPS reports should be halted.

Additionally, DBOC requests that the OSB hold another public hearing. We request an opportunity to present a statement to your panel about the Drakes Estero Report, the Becker Report and the underlying science – and explain how these NPS actions have interfered with our oyster farm. The numerous revelations and new information, available only after September 4 require it.

DBOC has written Dr. Goodman and Mr. Hulls. We have asked that they prepare a comparative analysis and submit it to you and to the Journal of Marine Mammal Science.

We close this letter with two thoughts. First, the Park Service tells farmers and ranchers at Point Reyes that they lack sufficient funds to repair fences, allowing a large elk herd to compete with cattle for grass during a severe drought. Yet, they spend tax payer dollars to fund incorrect and misleading studies, like the Becker Report and the five versions of the Drakes Estero Report, as well as underwrite this panel – and then attempt to shape and manipulate its work. Second, at DBOC we have tried to apply the lessons of science to improving our farm and our farming practices. We have pioneered methods of setting seed to all but eliminate the threat of invasives and we are exploring opportunities to reinstate native oysters in Drakes Estero.

We respectfully ask that your panel help us, our community, and the National Park Service wade through this situation in order to establish a sound, factual baseline upon which you could build the second, wider study. We fear that allowing this pattern of falsehoods and misrepresentations to go unacknowledged and uncorrected would send a chilling message.

There is so much good science that could be done with mariculture and the environment and we hope that we will be able to work with the panel on the second, and far more ecologically and scientifically significant part of your charter; to establish the best practices for coastal mariculture.

We also ask that this letter, and the accompanying report be circulated to your Panel members and be included in your Public Records database.

Sincerely,

Kevin Lunny

Nancy Lunny

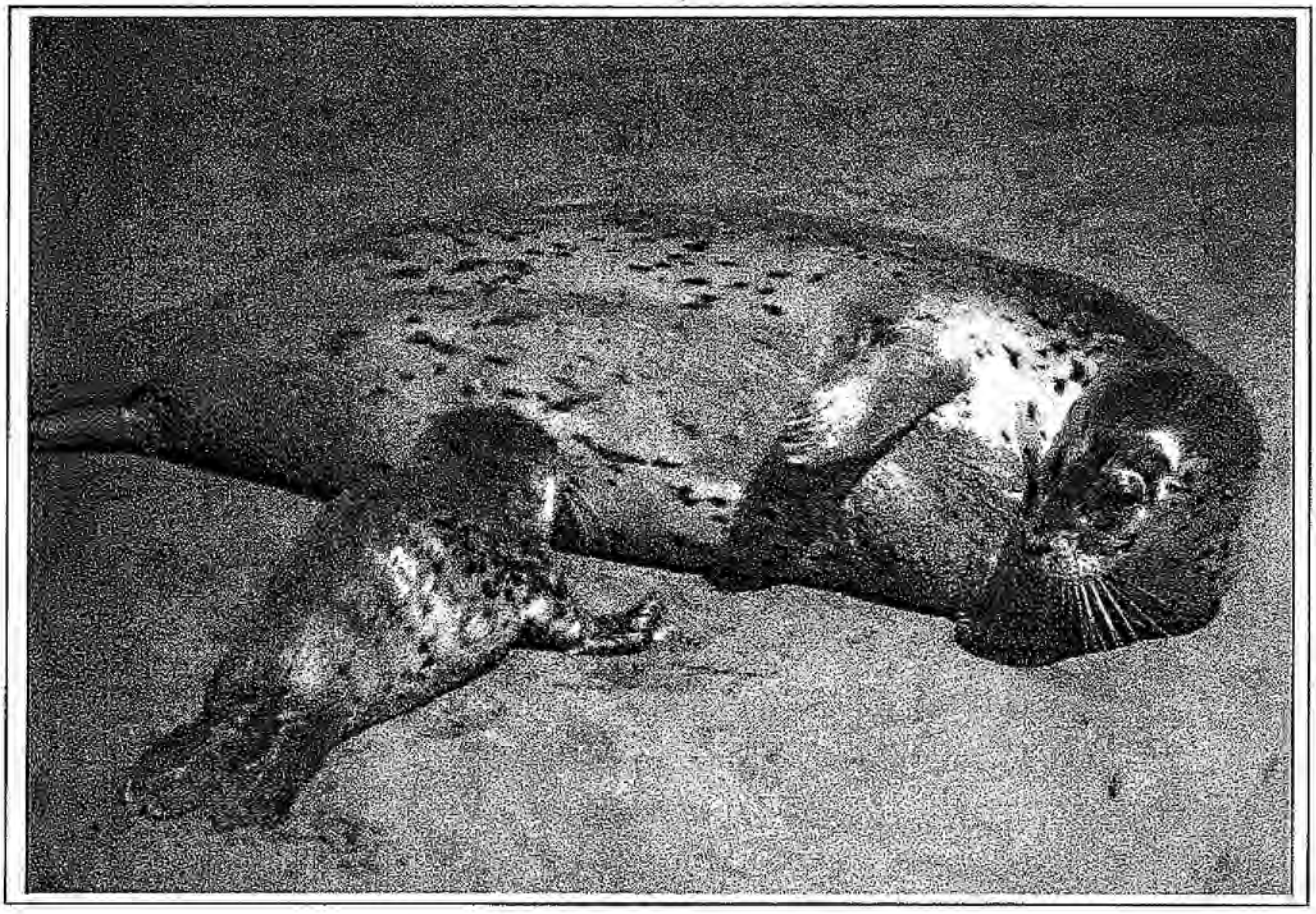
Enc: Pacific Harbor Seal (*Phoca vitulina richardii)* Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2007 Annual Report, National Park Service, US Department of the Interior; National Resources Program Center, Natural Resource Technical Report NPS/SFAN/NRTR – 2008/118

National Park Service
U.S. Department of the Interior

Natural Resource Program Center

Pacific Harbor Seal (*Phoca vitulina richardii*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2007 Annual Report

Natural Resource Technical Report NPS/SFAN/NRTR—2008/118



cc: Dr. Daryl Boness, Editor, Journal of Marine Mammal Science
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Dr. Corey Goodman
John Hulls

ON THE COVER
A Pacific harbor seal (*Phoca vitulina richardii*) nurses her pup in Point Reyes National Seashore
Photograph by: Judy Bourke

Pacific Harbor Seal (*Phoca vitulina richardii*) Monitoring at Point Reyes National Seashore and Golden Gate National Recreation Area: 2007 Annual Report

Natural Resource Technical Report NPS/SFAN/NRTR—2008/118

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June 2008

U.S. Department of the Interior
National Park Service
Natural Resource Program Center
Fort Collins, Colorado

The Natural Resource Publication series addresses natural resource topics that are of interest and applicability to a broad readership in the National Park Service and to others in the management of natural resources, including the scientific community, the public, and the NPS conservation and environmental constituencies. Manuscripts are peer-reviewed to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and is designed and published in a professional manner.

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NPS D-553, June 2008

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Abstract

Pacific harbor seals (*Phoca vitulina richardii*) are the dominant and only year-round resident pinniped in the San Francisco Bay Area, California. Long-term monitoring studies have been conducted at the largest harbor seal colonies in Point Reyes National Seashore and Golden Gate National Recreation Area since 1976. The objectives of monitoring each site and the population as a whole are to i) detect changes in population size, ii) detect changes in reproductive success by way of pup production, and iii) identify anthropogenic or environmental factors that may affect the condition of the population.

Harbor seal surveys were conducted throughout the 2007 breeding (March through May) and molting (June through July) seasons once to twice per week at the largest Point Reyes and Golden Gate harbor seal colonies, collectively referred to as Marin County locations. Members of the Harbor Seal Monitoring Volunteer Program completed 252 surveys at eight Marin County locations, contributing an estimated 2152 hours. During the breeding season, a maximum combined total of 2771 adults and immature seals and 903 seal pups were counted at all Marin County monitoring locations. Drakes Estero had the most adults (759), followed by Tomales Bay (481) and Double Point (469). Drakes Estero and Double Point accounted for 54% (488) of pups at Marin County haul outs. From June to July, 4218 animals molted at Marin locations. Disturbances to seals occurred, with 215 incidences recorded during surveys. The most frequent causes were human (35.3%), unknown (20.9%), and motor boat (14.4%). Regional surveys occurred 13 times throughout the season at locations in Sonoma, Marin, San Francisco, and San Mateo counties. Marin County locations accounted for 73.2% (2916/3979) of breeding adults and immatures, 84.4% (765/974) of pups, and 74.1% (3459/4787) of seals during the molting season.

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Finally, we are grateful for the generous contributions from the Point Reyes National Seashore Association, the David and Vicki Cox Family Foundation, the San Francisco Bay Area Inventory and Monitoring Program, and the Marin Conservation Corps/AmeriCorps Program.

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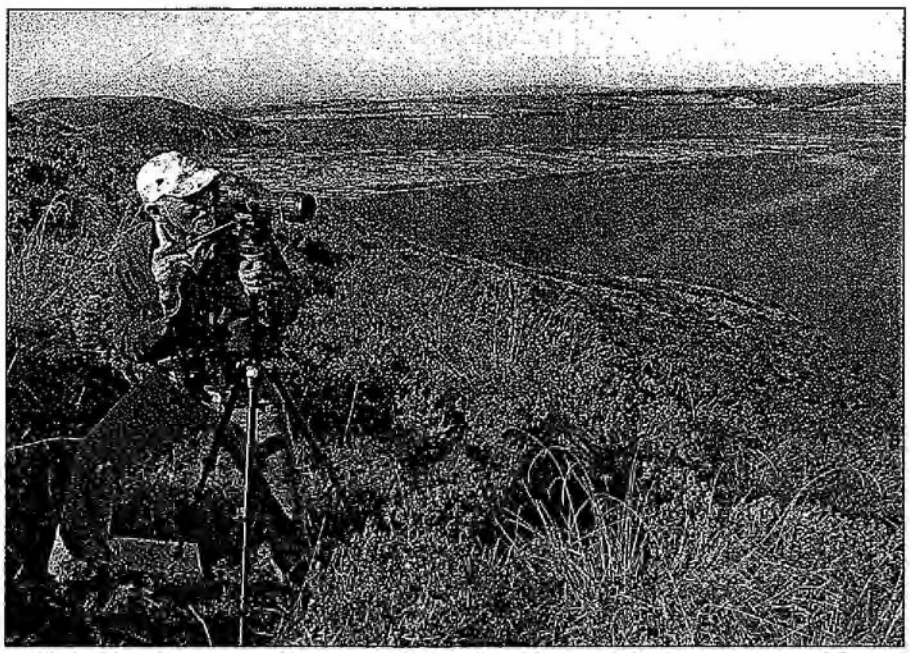

Volunteer Dick Lingelser counting seals at Drakes Estero (photo courtesy of Judy Bourke).

Introduction

The information presented in this report is a summary of the harbor seal data collected at Point Reyes National Seashore and Golden Gate National Recreation Area during the 2007 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort, including adjacent areas (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in conjunction with other agencies and organizations for 2007, are also presented. This report is not intended to analyze long-term trends in the harbor seal data set, which are more appropriately investigated at five year intervals (i.e. Allen et al. 2004). Furthermore, this document is not intended to report on or analyze data specific to NPS management issues related to harbor seals.

Background

Pacific harbor seals (*Phoca vitulina richardii*) are the dominant and only year-round resident pinniped in the San Francisco Bay Area, California. The population at Point Reyes National Seashore represents the largest concentration of harbor seals in the State of California, and accounts for approximately 20% of the mainland molting population (Lowry et al. 2005). Much of the Point Reyes coastal zone remains relatively pristine and provides good marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal. The inaccessibility of much of the area has historically afforded some protection from human disruption during the seals' terrestrial resting periods; however, some pinniped populations in California are still recovering from a long period of exploitation that did not end until the passage of the Marine Mammal Protection Act in 1972 (Carretta et al. 2005). Human disturbance of seals at colonies is of interest to the National Park Service (NPS) because nearly 2.4 million visitors visit Point Reyes annually (Statistical Report, PRNS, 2007) and several million more visit the Golden Gate National Recreation Area, many of whom visit the tidepools, beaches and estuaries of the parks. The parks may implement management actions to reduce disturbance to seals at colonies, if appropriate.

Objectives

Long-term monitoring studies of harbor seals have been conducted at the largest colonies in Point Reyes National Seashore and Golden Gate National Recreation Area since 1976 (Allen and Huber 1984, Allen et al. 1989; Sydeman and Allen 1999; Allen et al. 2004). The objectives of monitoring each site and the population as a whole are to i) detect changes in population size, ii) detect changes in reproductive success by way of pup production, and iii) identify anthropogenic or environmental factors that may affect the condition of the population. The monitoring objectives and protocol are described in detail in the draft *San Francisco Bay Area Network Pinniped Monitoring Protocol*, scheduled for completion in 2008.

Methods

Study Area

The study area extends from Tomales Point south to San Francisco Bay. The Point Reyes peninsula extends from the mouth of Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N). Point Bonita is located in the Marin Headlands, at the mouth of San Francisco Bay in the Golden Gate National Recreation Area. For this paper, the Point Reyes sites and Point Bonita are collectively referred to as Marin County locations. Point Reyes National Seashore, Golden Gate National Recreation Area, Gulf of the Farallones National Marine Sanctuary, the California State Parks, and the county parks share jurisdiction over segments of this coastline (Figure 1).

The topographic diversity of this coastal zone provides a broad range of substrates for harbor seals to come ashore. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. A "haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and nursing of young (Harvey 1987, Thompson 1987). Each site, or location, is comprised of several "subsites", or distinct areas of beach, rock outcrops, or sandbars where harbor seals haul out. Coastal embayment sites include Tomales Bay, Drakes Estero, Bolinas Lagoon, and San Francisco Bay. Coastal sites surveyed include Tomales Point, Point Reyes Headlands, Duxbury Reef, Double Point, and Point Bonita (Figure 1).

The sample design and methods for this program were developed so that the data could be integrated with other regional surveys, allowing for the results to be interpreted in a regional context. Annually, the National Park Service participates in regional harbor seal breeding season surveys sponsored by NOAA, with the Point Reyes National Seashore Science Advisor as the coordinator for the central coast breeding season survey.

Regional survey sites include colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark Slough), Sonoma County (Sea Ranch, South Sonoma sites, Fort Ross, and Jenner) and San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach (Figure 1)).

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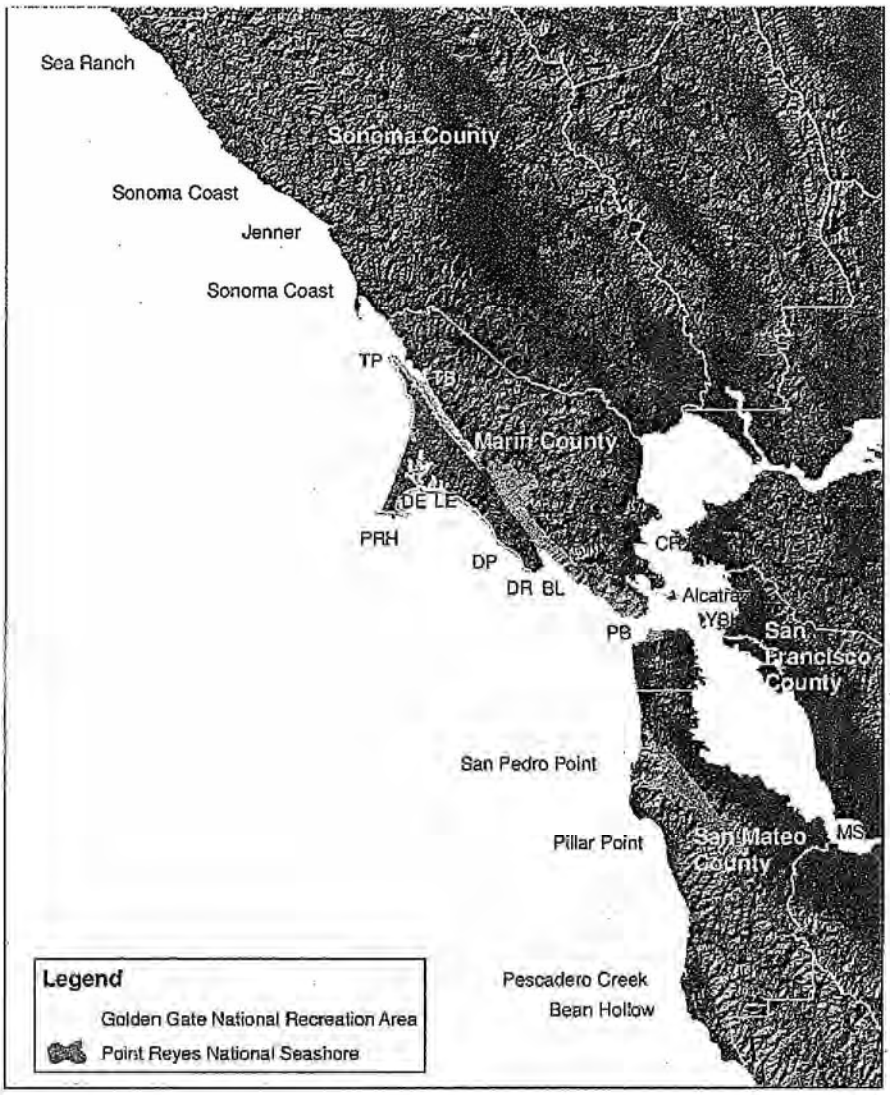

Figure 1. Regional survey sites in San Francisco Bay and Sonoma, Marin, and San Mateo counties, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Surveys

Volunteer observers were trained to monitor harbor seals at designated sites within Point Reyes and at Point Bonita during two classroom and three field sessions in March 2007. The majority of the volunteers had been previously trained and returned to the 2007 season with many years of experience. New volunteers were required to be mentored by returning volunteers at a site before they conducted a survey alone.

Harbor seal surveys were conducted throughout the breeding (March 1st through May 31st) and molting (June 1st through July 31st) seasons once to twice per week at each Marin County location. Surveys were conducted at medium to low tides (below 3ft) during the day. Surveys were not conducted in heavy fog because of poor visibility and they were not conducted in the rain because harbor seals haul out in lower numbers in the rain (Jemison and Pendelton 2001).

Volunteers surveyed for 2 hours from fixed observation points with all subsites counted approximately every 30 minutes for a total of 4 counts each survey. Subsites were counted and recorded separately on pre-formatted datasheets and then added for site totals every half hour. Three locations often had only two counts each survey due to hiking/traveling time between subsites: Tomales Point, Bolinas Lagoon, and Duxbury Reef.

For each subsite the observer recorded the time, number of adult and immature seals, pups, dead pups, red-pelaged seals, and fresh shark-bitten seals. Red pelage is easily identified and results from the deposition of iron oxide precipitates on the hair shaft; it usually extends from the head down to the shoulder and is of interest due to its rarity outside of the San Francisco Bay Area. (Allen et al. 1993). During the molting season (June-August) all animals were counted as adults and immature seals because of the difficulty in distinguishing large pups from immature seals.

Disturbances and potential disturbances were recorded as they occurred on a data form separate from seal numbers. Disturbances included any events that caused the seals to lift their head (head alert), flush, or flush into water, while potential disturbances were defined as any anthropogenic event within a defined haul out zone that had the potential to flush seals. Observers recorded the time, source, and effect of each disturbance. The information on the effect included the reaction of the seals, the numbers of seals that reacted, and when and where they re-hauled if they were flushed into the water. In some cases the disturbance was not directly observed, but surveyors recorded the number of animals affected with an "unknown" disturbance. Disturbances were recorded by fixed categories to assist with summary analyses. The categories were:

Source	Example
Motor-boat	Motorboat, Jet ski
Non Motor-boat	Canoe, Kayak, Sailboat, Wind surfer
Vehicle	Car, Bus, Motorcycle
Dog	Dog, Dog barking
Aircraft	Airplane, Helicopter, Hang glider, Ultralight
Human	Clammer, Researcher, Oyster Worker, Hiker, Horse rider
Bird	Turkey Vulture, Gull, Raven
Other	Coyote, Other Pinniped, Rock Slide, etc.

On alternating weekends, regional surveys were conducted at all sites included in regional counts (see Figure 1). Participants in the region-wide surveys included various organizations and volunteers. Regional counts could be conducted at anytime between Thursday and Monday over the selected regional survey weekends.

All count and disturbance datasheets completed during harbor seal surveys were entered into a relational Microsoft Access database during the course of the field season. At the end of the season, the database records were error-checked against the paper datasheets for accuracy. The records were further reviewed to ensure that only accurate and complete count data were used for analysis (see draft pinniped protocol for more details). For example, incomplete counts or counts that may have been hampered by poor weather conditions were noted in the database as poor quality surveys.

Data Management and Analysis

Although harbor seal data were collected according to subsites at each monitoring location, subsite data are not reported or analyzed within this report. By summing the subsite counts for each survey time interval, the maximum site total was identified for each survey and used for data summaries and analyses. The maximum total site count for each survey was then split into the adult/immature and pup age categories during the breeding months of March, April, and May.

The maximum number of seals counted at a site over the course of the entire season is often used for comparisons between years and sites. Because there is little to no movement of harbor seals between sites during the pupping and molting seasons, it was assumed that individual animals were not counted at more than one site (Harvey and Goley 2005). The maximum total count for each year within the study area was determined by taking the sum of the maximum count at each location. The maximum total count was determined separately for the breeding and molting seasons. Maximum counts at each location may have occurred on separate days (see Barlow et al. 2002). When compiling count summaries from the harbor seal data, only records noted as high quality counts were included. During the regional survey weekends, it was not uncommon for a site to be surveyed more than once. In these cases, the survey with the greater seal count was used for any regional summaries.

The total maximum count of breeding season adults/immatures, pups, and molting harbor seals were averaged separately across survey years 2000 to 2007 and compared to the 2007 data. Inclusion of all survey years in the average calculation accounts for the inherent inter-annual variability in the harbor seal population and reproductive output. Declines below one standard deviation from the mean, especially over the course of a few years, may merit further analysis of the data for statistical significance, additional research, or management actions.

When looking at disturbance events, only actual disturbances, those that elicited a head-alert or flush reaction from the seals, were used for analysis. Disturbance tallies were based on disturbance sources rather than the number of subsites or seals affected. Disturbance rates were calculated as the number of disturbance events that occurred during the time period from the first observation to the end of the final observation period. Because the disturbance data were not analyzed for effects on the seal count data in this report, all actual disturbance data were used for

analysis regardless of the quality of the associated seal count data. Potential disturbances (events that could potentially elicit a reaction from seals) were recorded by volunteers to quantify any given type of disturbance recurring at a particular site, but this information is not analyzed in this report. These data may be used to understand potential emerging disturbance issues at each location.

Please note that data quality standards and analysis procedures enacted in 2007 in preparation for this report have been applied to all data within the current monitoring database, which extends back to 2000. For this reason, summary data reported here for 2000 to 2006 may differ from data summaries published in previous harbor seal reports.

Results

Overall

In 2007, 36 volunteers completed 252 surveys at Marin County locations between March 1st and July 31st, completing an estimated 2152 hours. Each location was surveyed between 15 and 50 times, which includes 13 regional surveys. During the breeding season (March-May), a maximum of 2771 adults and 903 pups were observed in Marin locations, with the numbers growing to 4218 individuals during the molting season (June-July) (Table 1).

Table 1. Summary data of harbor seal colonies for the 2007 season. All reported numbers reflect the maximum number seen during a single census.

Location	Max # adults in breeding season[1]	Max # Pups in breeding season	Max # seals in molting season[2]	# Surveys		Max # Reds[3]	Max # Shark Bites[3]	Max # Dead Pups[3]
Bolinas Lagoon	262	126	448	Weekday:	30	12	3	1
				Weekend:	8			
Double Point	469	215	1190	Weekday:	20	5	5	18
				Weekend:	10			
Drakes Estero	759	273	1005	Weekday:	22	15	2	5
				Weekend:	18			
Duxbury Reef	81	7	56	Weekday:	25	0	1	0
				Weekend:	8			
Point Reyes Headlands	119	46	312	Weekday:	15	1	0	0
				Weekend:	1			
Tomales Bay	481	72	415	Weekday:	11	14	1	2
				Weekend:	12			
Tomales Point	374	158	626	Weekday:	13	7	3	2
				Weekend:	9			
Point Bonita	226	6	166	Weekday:	41	5	2	0
				Weekend:	9			
TOTAL	**2771**	**903**	**4218**		**252**	**59**	**17**	**28**

1. Max # Breed = adults and immatures during the breeding season, March 1 to May 31.
2. Max # Molt = all age classes during the molting season, June 1 to July 31.
3. The Max # Red, Shark Bites, and Dead Pups are the maximum number observed March 1 to July 31.

Adult and Pup Counts During the Breeding Season

Adults: The maximum number of adults hauling out during the 2007 breeding season was 2771 for 2007 (Table 1). This fell below but within one standard deviation of the mean number observed from 2000-07 (2954.8 ± 353.7, Figure 2). Drakes Estero had the most adults (759), followed by Tomales Bay (481) and Double Point (469).

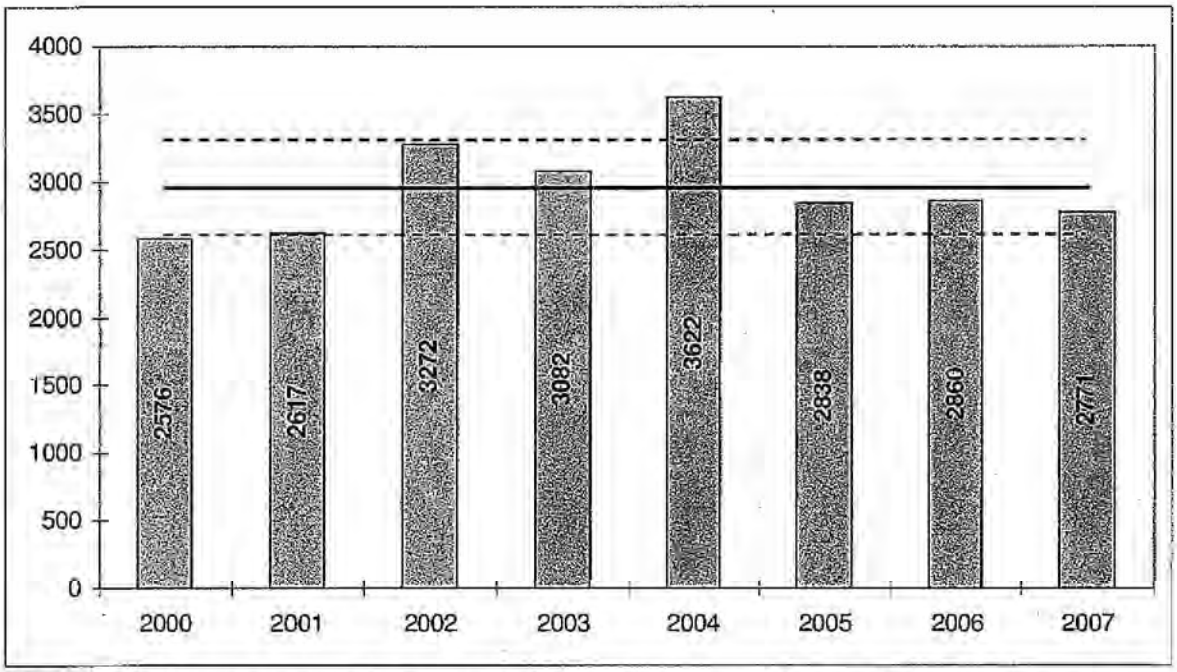

Figure 2. Maximum counts of harbor seal adults and immatures during the breeding season (March-May) at Marin County locations. The solid line on the graph represents the mean of the maximum adult counts from 2000-07 (2954.8), and the dashed lines represent one standard deviation from the mean (353.7).

Pups: The combined maximum pup count for all Marin County locations during the 2007 breeding season was 903 pups (Table 1). The 2007 maximum pup count was 21% lower than the mean maximum pup count from 2000-2007 (1154.5 ± 153.0). The maximum pup counts for 2006 and 2007 fell below one standard deviation from the mean maximum pup count from 2000-2007 (Figure 3). Since 2004 the maximum pup counts have decreased; however, further analyses are needed to determine if these decreases are statistically significant (Figure 3). Drakes Estero and Double Point accounted for 54% (488) of pups at Marin haul outs, which was consistent with the proportions of pups in the past.

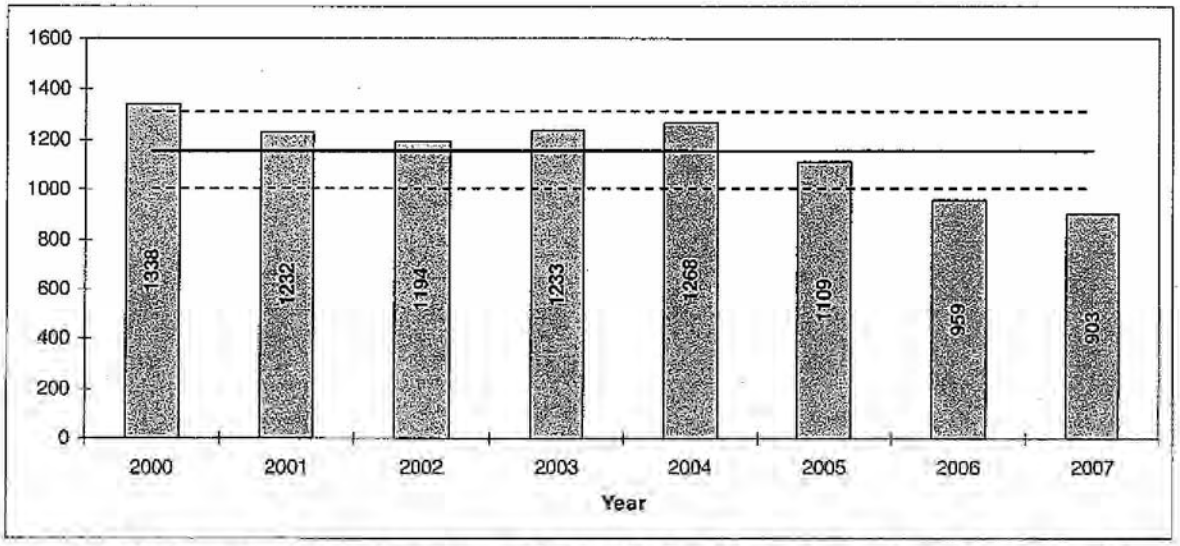

Figure 3. Maximum harbor seal pup counts for 2000-07 at Marin County locations. The solid line on the graph represents the mean of the maximum pup counts from 2000-07 (1154.5), and the dashed lines represent one standard deviation from the mean (153.0).

The first pup observed has been documented since 2000, and there was no apparent trend in the date or location of the first pup observed from 2000 to 2007 (Table 2). In 2007 three pups were observed at Tomales Bay on February 14th but were not seen after that date. It is suspected that these pups may have been premature. Because the pups were not observed closely and not confirmed, they were not included as the first date for the season. The first confirmed pup observed was at Double Point on March 2, 2007, within the normal birth date range.

Table 2. Date of first pup observed in the season by location, 2000-07.

Year	Date	Location
2000	March 14	Point Reyes Headlands
2001	March 16	Tomales Bay
2002	March 3	Drakes Estero
2003	March 27	Bolinas Lagoon
2004	March 20	Double Point
2005	March 6	Drakes Estero
2006	March 9	Double Point
2007	March 2	Double Point

Of the dominant pupping sites (Bolinas Lagoon, Double Point, Drakes Estero, Tomales Bay, and Tomales Point), only Tomales Point did not have a decline in pup numbers from 2006 to 2007 (Figure 4). Tomales Bay experienced the biggest difference (33%) in pup numbers from 2006 to 2007. However, in the past, seals have shifted annually between Tomales Bay and Tomales Point (Allen 2004), and the combined maximum pup counts for 2006 and 2007 were comparable (212 versus 230).

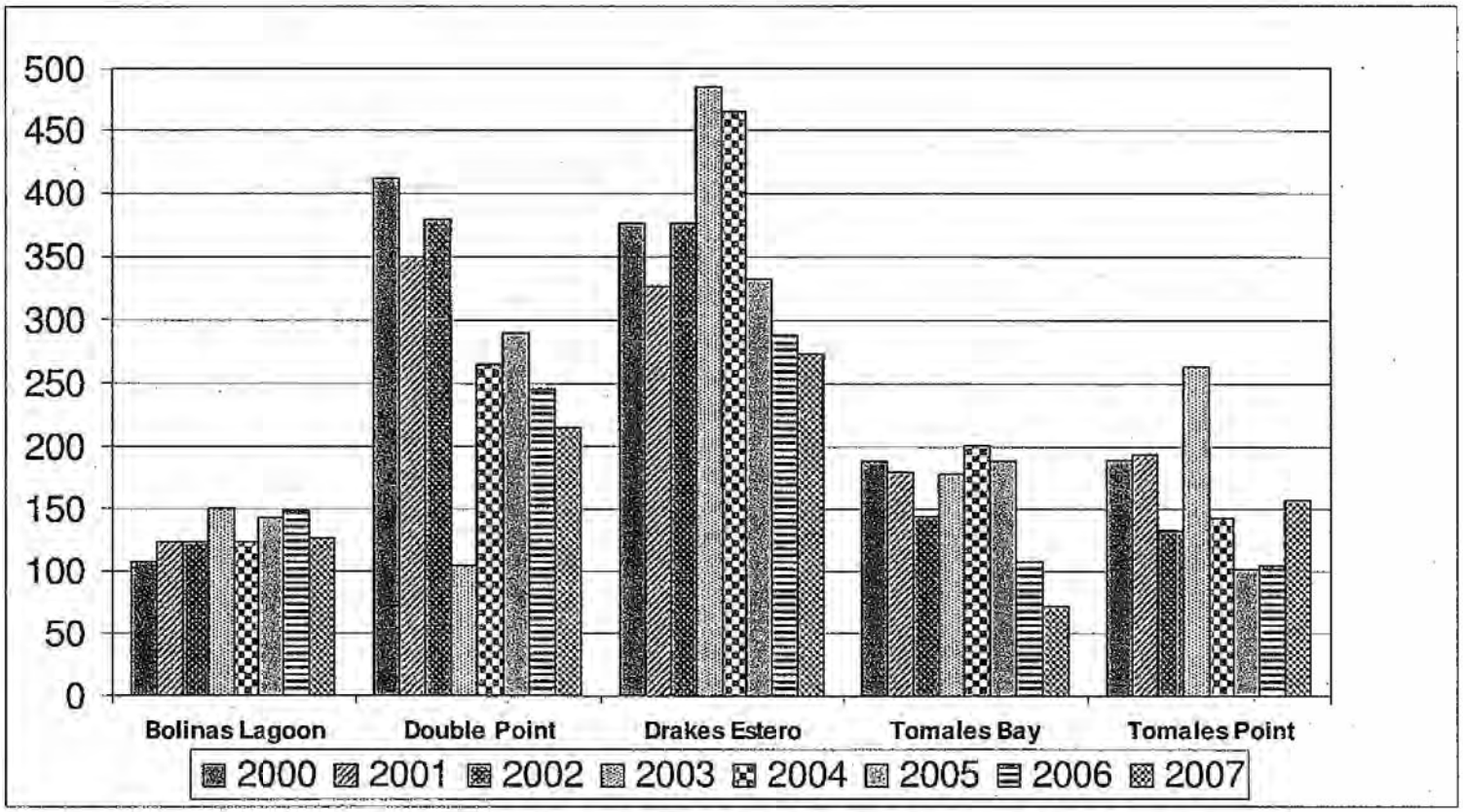

Figure 4. Maximum harbor seal pup counts (*Phoca vitulina richardii)* at the dominant Marin County pupping locations, 2000-2007. The maximums of each site may have been observed on different days.

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Molting Counts

The maximum count of all seals during the 2007 molt season for all Marin County locations was 4218 seals. This fell below but within one standard deviation of the mean maximum molt count observed from 2000-07 (4331 ± 637.7, Figure 5). Similar to the pupping season, Drakes Estero and Double Point comprised 52% of the total seals counted during the molt season (Table 1).

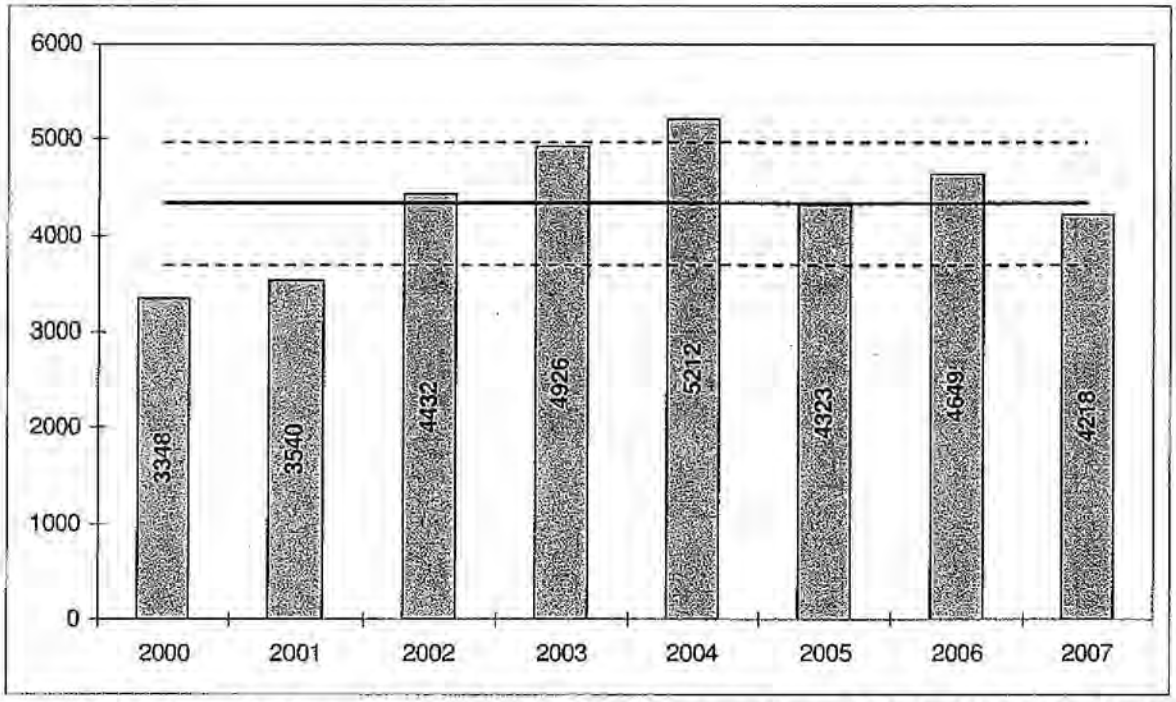

Figure 5. Maximum harbor seal counts during the molt season (June-July) for 2000-07 at Marin County locations. The solid line on the graph represents the mean of the maximum molt counts from 2000-07 (4331), and the dashed lines represent one standard deviation from the mean (637.7).

Disturbances

At the Marin County locations in 2007, 215 disturbances were recorded that elicited a response from harbor seals, representing the greatest number in the study period of 2000-07 (Table 3). Further analysis is required to determine if this increase in disturbances is statistically significant or related to an increase in survey effort. The most common disturbance source (76) was humans, which could have been a clammer, researcher, angler, or hiker (Table 3). Motorboats and non-motorboats had 51 disturbances combined, and a large portion of them were associated with the clammers in Tomales Bay. Bolinas Lagoon had the most disturbances (61), but Tomales Bay and Drakes Estero were close with 45 and 57 disturbances, respectively. Bolinas Lagoon has a subsite (Hwy 1) that is adjacent to a major roadway. This site is subject to loud, sudden noises from vehicles, as well as visitors that approach the seals. The disturbances at Tomales Bay were

Table 3. Identified sources of disturbances (head alert, flush, flush into water) for Marin County locations, from March 1st to July 31st, 2007.

	Motorboat		Non-Motor Boats		Vehicle		Dog		Aircraft		Human		Bird		Unknown		Other		Total
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	
2000	14	10.6	9	6.8	0	0.0	0	0.0	14	10.6	30	22.7	20	15.2	41	31.1	4	3.0	**132**
2001	15	10.6	17	12.0	2	1.4	0	0.0	4	2.8	48	33.8	9	6.3	32	22.5	15	10.6	**142**
2002	16	8.9	20	11.1	8	4.4	0	0.0	9	5.0	72	40.0	10	5.6	38	21.1	7	3.9	**180**
2003	11	7.9	23	16.5	3	2.2	0	0.0	10	7.2	43	30.9	10	7.2	32	23.0	7	5.0	**139**
2004	1	1.0	10	10.0	7	7.0	2	2.0	3	3.0	39	39.0	7	7.0	24	24.0	7	7.0	**100**
2005	9	7.4	15	12.3	1	0.8	2	1.6	11	9.0	38	31.1	10	8.2	30	24.6	6	4.9	**122**
2006	13	7.9	16	9.7	4	2.4	1	0.6	8	4.8	59	35.8	16	9.7	36	21.8	12	7.3	**165**
2007	31	14.4	20	9.3	11	5.1	2	0.9	14	6.5	76	35.3	13	6.0	45	20.9	3	1.4	**215**
Average	**13.8**	**8.6%**	**16.3**	**11.0%**	**4.5**	**2.9%**	**0.9**	**0.6%**	**9.1**	**6.1%**	**50.6**	**33.6%**	**11.9**	**8.1%**	**34.8**	**23.6%**	**7.6**	**5.4%**	**149**

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mostly related to passing boat traffic and recreational clammers. Hundreds of people dig for clams on the mudflats in Tomales Bay during low tide weekends. The Farallones Marine Sanctuary Association (FMSA) formerly coordinated a program that situated docents on the mudflats during these high visitation days to educate visitors and protect the seals, but this program was terminated in 2005. Disturbances at Drakes Estero, including Limantour Estero, resulted from hikers, clam diggers, and oyster operation activities. Tomales Point, Duxbury Reef, and Point Reyes Headlands received few to no disturbances (3, 0, 0) likely because of the inaccessibility of these sites.

In 2007, Bolinas Lagoon had the greatest disturbance rate (0.75 disturbances per hour), followed by Tomales Bay (0.68) (Figure 6). Of the sites that regularly have more than five disturbances per season, Point Bonita experienced the greatest change compared with 2006 with a 76.1% decrease in the disturbance rate (1.19 versus 0.28) (Figure 7). Double Point and Bolinas Lagoon saw a 67.2% and 16.7% increase in disturbance rates, respectively, while Tomales Bay and Drakes Estero had rates comparable to the previous season. The rates of disturbances vary greatly from year to year depending on activities at each location.

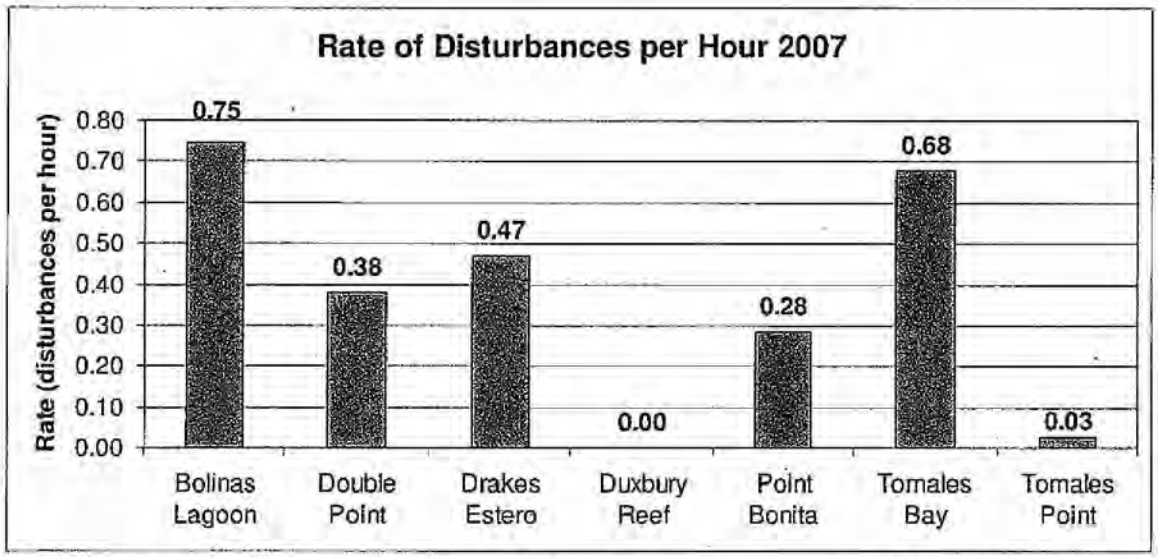

Figure 6. Rates of disturbances per hour at Marin County locations from March through July 2007. Only actual disturbances (head alert, flush, flush water) were used, and survey time was based on observation time for all complete surveys (with or without disturbances).

Summary by Site

Bolinas Lagoon

Bolinas Lagoon had 38 complete surveys between March 1st and July 31st, 2007. Of those surveys, 30 were on weekdays and 8 were on weekends. The maximum count during the breeding season had 262 adults and 126 pups. During the molting season, the maximum count was 448 seals (Table 1). Bolinas had the most disturbances of all sites in 2007 and the dominant

sources were humans and vehicles. This site is along scenic Highway 1 and many visitors stop to see the seals and approach them. Traffic noise also disturbs the seals. This was the only site that documented dog disturbances in 2007, and they were associated with human disturbances. One report documented visitors who drove by the haul-out site and "barked at seals". Bolinas Lagoon had the greatest disturbance rate of all locations in 2007 (0.75 disturbances per hour), and the rate increased 14.8% from 2006.

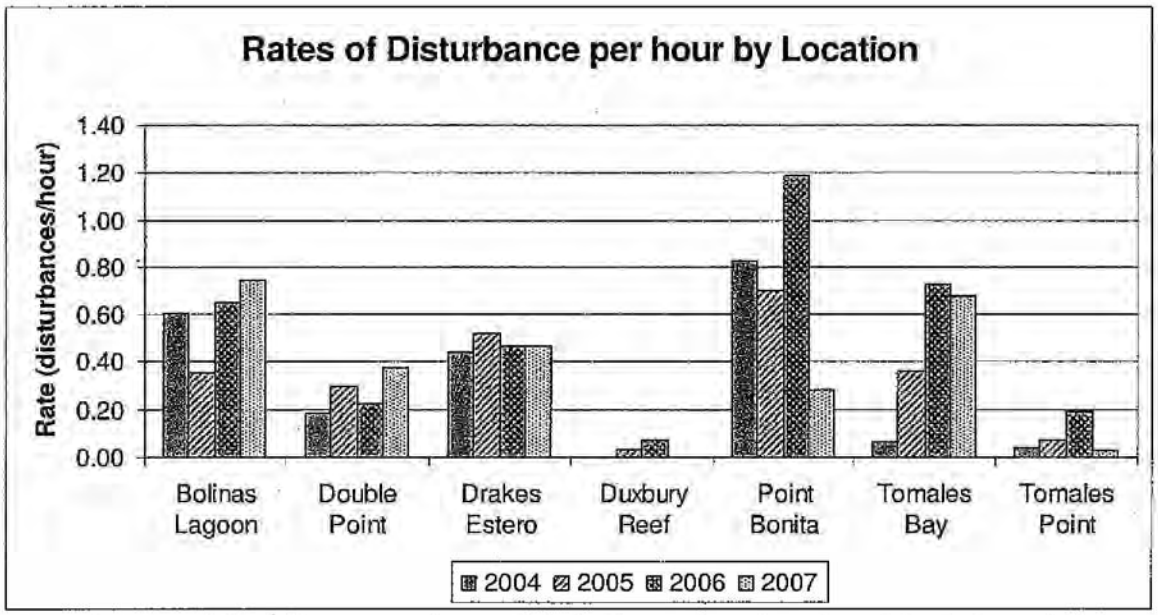

Figure 7. Rates of disturbances per hour at Marin County locations from March through July of 2004-2007. Only actual disturbances (head alert, flush, flush water) were used, and survey time was based on observation time for all complete surveys (with or without disturbances).

Double Point

Double Point had 30 complete surveys between March 1st and July 31st, 2007. Of those, 20 were on weekdays and 10 were on weekends. The maximum count during the breeding season was 469 adults and 215 pups. Molting season yielded a maximum count of 1190 seals (Table 1). Double Point's disturbances were moderate and came mostly from "unknown" sources and aircraft, which fly over the area at various heights. Rarely did the aircraft actually flush seals, but their noise at times elicited head alerts from the seals. Of the 25 actual disturbances, 14 were from an unknown source from the subsite *South Beach*. The bluffs over this beach are actively crumbling and perhaps small rockslides that observers can't see or hear elicited the flushes. Only once this season were people observed on the beach; it was during a weekend survey and no seals were hauled out on that portion of beach. Double Point had a substantial increase in the disturbance rate from last year (2006: 0.23, 2007: 0.38, 67.2% increase) due to increases in both aircraft and "unknown" sources.

Drakes Estero

The Drakes Estero complex which includes Limantour Estero had 40 complete surveys between March 1st and July 31st, 2007. Of those, 22 were on weekdays and 18 were on weekends. The maximum count during the breeding season was 759 adults and 273 pups, and the maximum molt count was 1005 (Table 1). Next to Bolinas Lagoon, Drakes Estero had the second highest disturbance count, with 57 disturbances within the breeding and molting seasons. The disturbance rate, however, was moderate compared to other sites (Figure 6). Most of the disturbances (26) were from human sources and this included hikers, anglers, swimmers, horseback riders, and recreational clammers. Clamming is popular on Drakes Beach, where seals do not always haul out in large numbers, but the activities at times affect seals on nearby sandbars. Fishermen are frequently seen on the tip of Limantour Spit in the exact area where seals haul out during the molting season. In addition, activities associated with the oyster operation in Drakes Estero at times disturbed harbor seals at the upper estero subsites. The disturbance rate for 2007 and 2006 were identical, with 0.47 disturbances per hour (Figure 7).

Duxbury Reef

Duxbury Reef had 33 complete surveys between March 1st and July 31st, 2007. Of those, 25 were on weekdays and 8 were on weekends. During the breeding season, the maximum adult count was 81 and the maximum pup count was 7, while during the molting season the maximum seal count was 56 (Table 1). Duxbury had the lowest number of seals and, as with the Point Reyes Headlands, no documented disturbances. Disturbances are rarely recorded at Duxbury Reef, possibly due to the low accessibility of the location.

Point Bonita

Point Bonita had 50 complete surveys between March 1st and July 31st, 2007. Of those, 41 were on weekdays and 9 were on weekends. During the breeding season, the maximum adult count was 226 and the maximum pup count was 6 pups, while during the molting season the maximum seal count was 166. In an effort to better document the seal numbers and disturbances, more pre-season surveys were conducted. The disturbances at Point Bonita were primarily from people on the beach, which often consisted of school groups. Because of repeated disturbances to harbor seals, the area below the paved walkway was closed to visitors in mid-June 2007. Future observations will tell the efficacy of this action. However, disturbance rates decreased substantially in 2007, with only 0.28 disturbances recorded per hour compared to the 2006 rate of 1.19 (76.1% decrease).

Point Reyes Headlands

Point Reyes Headlands had 16 complete surveys between March 1st and July 31st, 2007, and all but one of them were completed during weekdays. During the breeding season, the maximum adult count was 119 and the maximum pup count was 46, while during the molting season the maximum seal count was 312 (Table 1). This site rarely has disturbances because of its remoteness and inaccessibility. Most of the harbor seals were seen at a large elephant seal colony pocket beach. There were some vacated spaces on the beach during the elephant seal molt, but harbor seals were also seen in extremely close proximity to the elephant seals. Some surveys were hindered by heavy fog that is usually present in the Point Reyes Headlands.

Tomales Bay

Tomales Bay had 23 complete surveys between March 1st and July 31st, 2007. Of those, 11 were weekday and 12 were weekend surveys. During the breeding season, the maximum adult count was 226 and the maximum pup count was 72, while during the molting season the maximum seal count was 415 (Table 1). The pup count was the second lowest it has been since 2002 (Figure 4). There were 45 recorded disturbances, most of which were caused by boats and humans, including recreational clammers. Tomales Bay had the second highest disturbance rate of all locations, with 0.68 disturbances per hour, which was consistent with last year's rate. . The increase in disturbances in 2006 coincided with the cessation of a FMSA docent program that educated clammers to avoid seals from 1997 through 2005.

Tomales Point

Tomales Point had 22 complete surveys between March 1st and July 31st, 2007. Of those, 13 were on weekdays and 9 were on weekends. During the breeding season, the maximum adult count was 226 and the maximum pup count was 158, while during the molting season the maximum seal count was 626. Only three disturbances occurred at this location (human, bird, and unknown), and due to its remoteness, is not frequented by park visitors. Abalone divers were observed there during the breeding season, but they were never seen disturbing seals.

Regional Sites

Thirteen regional surveys occurred between March 10th and July 28th, 2007 at 20 different locations. Not all sites were surveyed on all scheduled days. Some sites were surveyed on days other than regional survey days, and therefore could not be used in this summary. Other sites had difficulty with weather on certain days. During the breeding season, a maximum of 3979 adults and 974 pups were observed, although the maximum counts may have occurred on different days for each location (Table 4). During the molting season, the combined maximum of all seals from each site was 4787. Marin County locations accounted for 73.2% (2916/3979) of the maximum adult/immature breeding count, 84.4% (765/974) of the maximum pup count, and 74.1% (3459/4787) of the maximum molt count.

Within the San Francisco Bay, high counts for seals occurred at Castro Rocks and Mowry Slough, as has been observed in the past. In San Mateo County the highest concentration of seals was on the coast at Fitzgerald Marine Reserve, but the most pups occurred at Pebble Beach (20). In Sonoma County, the Sonoma Coast location accounted for the most seals this year, which is consistent with previous data. No counts were conducted this year at Yerba Buena Island (in San Francisco Bay), or Fort Ross (in Sonoma County).

Disturbances in San Francisco Bay were only recorded at Castro Rocks, and it was from the CalTrans truck associated with the observers. At Fitzgerald Marine Reserve and Sonoma Coast, tide poolers and airplanes disturbed hauled out seals. At Jenner, kayakers, hikers, and divers caused disturbances.

Table 4. Regional surveys of harbor seal numbers in central California, March 1st through July 31st, 2007. Thirteen surveys were scheduled on alternating weekends, eight during the breeding season and five during the molt. ND=No data.

	Breeding Season					Molting Season			
Location	**n**	**Mean of adults**	**Standard error**	**Max of adults[1]**	**Max of pups[2]**	**n**	**Mean of adults**	**Standard error**	**Max of adults**
Sonoma County									
Sonoma Coast	5	146.4	18.33	190	35	3	203.7	23.84	251
Fort Ross	ND	ND	ND	ND	ND	ND	ND	ND	ND
Jenner	5	54.6	13.83	89	6	3	272.3	77.95	400
Marin County									
Tomales Bay	7	315.3	39.44	644	65	3	331	27.62	384
Tomales Point	7	190	41.19	506	105	2	301.5	230.5	532
Pt. Reyes Headland	6	34.67	8.22	119	46	2	79	6	278
Drakes Estero	6	573	61.07	683	273	3	650.33	141.05	932
Double Point	7	314.86	59.02	424	198	2	628	137	765
Duxbury Reef	8	26.3	8.81	84	4	5	17.2	10.74	56
Bolinas Lagoon	8	172.13	21.38	262	126	5	303.2	49.5	448
Point Bonita	7	74.29	21.74	148	5	5	105.8	18.46	153
San Francisco Bay									
Alcatraz	3	12	2.35	15	0	ND	ND	ND	ND
Castro Rocks	6	164	14.2	213	36	3	88.3	10.33	109
YBI	ND	ND	ND	ND	ND	ND	ND	ND	ND
Newark Slough	2	14	3	17	8	1	0	0	0
Mowry Slough	3	32.3	10.11	50	5	1	15	0	15
San Mateo County									
Point San Pedro	5	14.4	2.46	22	2	2	15.5	3.5	19
Cowell Ranch	4	70.3	10.94	86	18	2	79	1	80
Pescadero	5	32	4.22	41	6	3	29.7	12.25	54
Pebble Beach	5	75.6	13.22	117	20	3	95.3	4.37	104
Bean Hollow	5	6.8	2.63	15	1	3	13.3	2.91	18
Fitzgerald Marine Reserve	7	174.9	8.52	208	15	4	153	13.8	189
ALL LOCATIONS				**3979**	**974**				**4787**

[1]Based on the total for a single day

[2]Based on the total for the same single day as above

Conclusion

Highlights

- 36 volunteers completed 251 surveys at Marin County locations between March 1st and July 31st 2007, donating approximately 2152 hours of their time.

- A maximum of 2771 adults/immatures seals hauled out during the breeding season.
    - The 2007 maximum fell below but within one standard deviation of the mean number observed from 2000-07 (2954.8 ± 353.7).
    - The greatest number of adults hauled out at Drakes Estero (759), followed by Tomales Bay (481) and Double Point (469).

- A maximum of 903 pups were born in Marin haul outs.
    - The 2007 maximum pup count fell below one standard deviation from the mean maximum pup count from 2000-2007 (1154.5 ± 153.0).
    - The greatest number of pups was born at Drakes Estero (273), followed by Double Point (215).

- A maximum of 4218 animals molted at Marin County sites.
    - The 2007 maximum molt count fell below but within one standard deviation of the mean maximum molt count observed from 2000-07 (4331 ± 637.7, Figure 5).
    - Double Point had the most molting seals (1190), followed by Drakes Estero (1005).

- 215 disturbances were recorded during surveys.
    - The most common categories of disturbances were human (35.3%), unknown (20.9%), and motor boat (14.4%).

- Regional surveys occurred 13 times throughout the season, which include Sonoma, Marin, San Francisco, and San Mateo counties.
    - Marin County locations accounted for 73.2% (2916/3979) of breeding season adults/immatures, 84.4% (765/974) of pups, and 74.1% (3459/4787) of seals during the molting season.

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The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS D-553, June 2008

National Park Service
U.S. Department of the Interior

Natural Resource Program Center
1201 Oakridge Drive, Suite 150
Fort Collins, CO 80525

www.nature.nps.gov

EXPERIENCE YOUR AMERICA ™

"Kevin Lunny" <kevin@drakesbayoyster.com>

10/16/2008 05:53 PM

To "'Roberts, Susan'" <SRoberts@nas.edu>, "'Goodman, Corey'" <Corey.Goodman@Pfizer.com>, <David_Graber@nps.gov>, <Don_Neubacher@nps.gov>

cc "'Thompson, Professor Paul M.'" <lighthouse(b) (6) "'David M. Weiman'" <agresources@erols.com>, "'Walsh, Jennifer'" <JWalsh@nas.edu>, "'Chiarello, Heather L.'"

bcc

Subject RE: NRC study of Drakes Estero

Dr. Roberts,

DBOC will be happy to participate with the visit from Dr. Thompson as well as any others. Any time on the 29th or the 30th is OK. Your later email mentions Thursday the 30th at 10:30 AM. This will work just fine. Please send me the entire schedule for the visit and let me know if we can help in any other way.

Sorry for the delay with my response.

Kevin

From: Roberts, Susan [mailto:SRoberts@nas.edu]
Sent: Tuesday, October 14, 2008 2:29 PM
To: Kevin Lunny; Goodman, Corey; David_Graber@nps.gov; Don_Neubacher@nps.gov; Ben_Becker@nps.gov; Sarah_Allen@nps.gov; Jon_Jarvis@nps.gov; John_Dennis@nps.gov; gina_banks@feinstein.sen.gov
Cc: Thompson, Professor Paul M.; David M. Weiman; Walsh, Jennifer; Chiarello, Heather L.
Subject: NRC study of Drakes Estero

Greetings all,
One of the new members of the committee, Dr. Paul Thompson, is an expert in harbor seals and he has kindly offered to take a few extra days to visit Pt. Reyes and meet with you since he was not present at the committee's first meeting. He will be in the Pt. Reyes area on October 29 and 30 and would like to visit Drakes Bay Oyster Company and Pt. Reyes National Seashore to learn more about the issues with the harbor seals in Drakes Estero. This is not a committee meeting and no formal presentations will be given (Dr. Thompson will have already reviewed the presentations from the September meeting and other written materials provided to the committee). The priority will be to give Dr. Thompson an opportunity to gather information through Q&A. However, to ensure transparency in these discussions, we will organize the visits to allow limited public attendance and we will record them so that they will be available to those unable to attend. I'm writing to ask for your cooperation in arranging these visits. For each visit (DBOC and PRNS) we will need space to accommodate 10-12 people. Also, I ask that you cooperate in making it possible for us to record these sessions so that each speaker can be clearly heard - we will provide a digital recording device. Please let us know where and when on these two days you could host Dr. Thompson. Also, if you would like to be present during these discussions, please indicate that in your response. We will give you priority in the spaces made available for public attendance.

Thank you for your assistance in arranging these visits for Dr. Thompson. A staff member from the NRC will accompany Dr. Thompson for these visits and will record them for public access.

-Susan

****

Susan Roberts, Ph.D.
Director, Ocean Studies Board
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Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94956
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

RECEIVED
Point Reyes
National Seashore
OCT 6 - '08

✓	SUPT.
	SCIENCE
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	BUDGET
✓	CENTRAL FILES

October 6, 2008

Don Neubacher, Superintendent
Point Reyes National Seashore
National Park Service
1 Bear Valley Road
Point Reyes Station, CA 94956

Dear Mr. Neubacher,

This letter requests that you affirm the application of law and policy in the preparation and presentation of the so-called "Becker Report."

On September 4, 2008, the Ocean Studies Board of the National Academy of Sciences/National Research Council (NAS/NRC) held its first panel meeting on ***"Best Practices for Shellfish Mariculture and the Effects of Commercial Activities in Drakes Estero, Pt. Reyes National Seashore, California."***

The first presentation on the panel's agenda was identified as **"Models for Harbor Seal Counts in Drakes Estero."** National Park Service (NPS) official, Dr. Ben Becker, presented the results of a new peer-reviewed report titled, ***"MODELING THE EFFECTS OF EL NINO, DENSITY-DEPENDENCE, AND DISTURBANCE ON HARBOR SEAL (PHOCA VITULINA) COUNTS IN DRAKES ESTERO, CALIFORNIA: 1997-2007"*** [Becker Report] authored by three members of the Point Reyes National Seashore (PRNS) staff – Dr. Ben Becker, Pacific Coast Learning Center, David Press, Inventory and Monitoring Program, and Sarah G. Allen, Lead Scientist. Dr. Becker presented the report's results on behalf of the authors.

Dr. Becker informed us that he was directed to initiate this paper in August 2007 – immediately after Senator Feinstein's meeting in Olema – and that the authors completed their work in

February 2008. It was then submitted to the Journal of Marine Mammal Science for peer review and, if and when approved, publication. On May 28, 2008, the Journal's editor, Dr. Daryl Boness, informed Dr. Becker that his revised Report was approved for publication. Several days later, on June 3, 2008, the Becker paper, now peer-reviewed and approved for publication, was submitted to the Ocean Studies Board (NAS/NRC), but not made public until the Board's September 4, 2008 hearing.

At no time between August 2007 when work on this science at Drakes Estero was initiated until the present have you or anyone from your staff informed Drakes Bay Oyster Company that this report was being prepared, underway or reviewed, consulted us about any aspect of it or invited us to review it as subsequently required by an agreement between DBOC and NPS when our current Special Use Permit (SUP) was executed.

At the conclusion of the September 4 meeting, an exchange between Dr. Becker and Dr. Goodman, recounted in Dr. Goodman's letter to the Ocean Studies Board, revealed that you and your staff intended this study to remain secret until presented at the Board's recent meeting. Why, in direct conflict with our permit agreements, the Park Service would want to invoke secrecy regarding the Report's preparation and presentation is not understood.

At and after the September 4 Ocean Studies Board meeting, the Becker Report and presentation generated a series questions about it's accuracy, assumptions and data, first by Ocean Studies Board panel members, and then by Dr. Goodman and Mr. Hulls. Several days later, the Marine Mammal Science Journal's editor, Dr. Daryl Boness, informed us that he asked Dr. Becker to respond to the issues raised about his report.

At DBOC and the Historic G Ranch, we grow oysters and we grow organic beef. We practice sustainable agriculture. We don't pretend to know much about computer modeling, regression analysis or a negative bionominal distribution – three technical concepts found in the Becker Report. But, we at DBOC know a whole lot about Drakes Estero, growing oysters and living respectfully with harbor seals.

Since last year, we have had to work – repeatedly – to overcome false and contradictory statements in the five versions of NPS Report, "*Drakes Estero, A Sheltered Wilderness Estuary*," in testimony and public statements, as well as in other documents. Now, the Becker Report

makes similar accusations of harm to harbor seals. The Federal government, the Department of Interior, and the National Park Service are governed by a series of laws, regulations, policies and procedures to ensure that you and your staff prepare science to the highest scholarly standards.

According to the NPS *Management Policies 2006, "the management of the national park system and NPS programs is guided by the Constitution, public laws, treaties, proclamations, executive orders, regulations and directives of the Secretary of the Interior and the Assistant Secretary for Fish, Wildlife and Parks. NPS policy must be consistent with these higher authorities and with appropriate delegations of authority."*

Issues pertaining to science, data, data analysis and data presentation regarding the Becker Report were addressed by Ocean Studies Board panel members as well as others. Given all that has occurred and various revelations about the Becker Report, we now ask about the applicable policies and procedures that governed its preparation and presentation in the first instance. Therefore, we ask the following:

[1] **National Parks Omnibus Management Act of 1998**, P.L. 105-391. On January 27, 1998, Congress enacted this Management Act. Section 202 states that the *"Secretary is authorized and directed to assure that the management of units of the National Park Service is enhanced by the availability and utilization of a broad program of the highest quality science and information."* **DBOC believes that this statutory requirement applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report meets the "*highest quality science*" requirement of this law?**

[2] **White House, Office of Science and Technology Policy Federal Policy on Research Misconduct.** On December 6, 2000, the Executive Office of the President, White House Office of Science and Technology Policy (OSTP) published in the Federal Register, the Final Policy, *"Federal Policy on Research Misconduct."* According to that Federal Register Notice, in part:

> *Advances in science, engineering, and all fields of research depend on the reliability of the research record....*
>
> *Sustained public trust in the research enterprise also requires*

guidelines identify the ethical standards within which employees and volunteers will conduct NPS-sponsored scientific and scholarly activities.

This policy defines administrative review, distinguishing it from higher levels of review and states:

> *The scientific and scholarly peer review process outlined here does not eliminate the need for administrative review of scientific and scholarly activities by managers. Managers conduct administrative review to ensure that proposed activities are compatible with Park Service policies and regulations...and proposed activities are pertinent to park purposes, programs, and needs...*

Part III of this NPS policy statement sets forth a 12-point "Code of Scientific and Scholarly Conduct," which states, *"to enhance their contribution to quality, objectivity, utility, and integrity of such information, all NPS employees working with scientific and scholarly information will, in performing their duties,"* and is presented here, in full:

- *act in the interest of the advancement of knowledge and contribute the best, highest quality scientific and scholarly information for the NPS;*
- *conduct, process data from, and communicate the results of scientific and scholarly activities honestly, objectively, thoroughly, and expeditiously;*
- *be responsible for the entrusted resources, including equipment, funds, work time, employee work time, and prompt and accurate use and reporting of financial resources and scientific and scholarly work;*
- *fully disclose all research methods used, available data, and final reports and publications in a timely manner and consistent with applicable laws and policy;*
- *respect, to the fullest extent permitted by law, confidential and proprietary information regarding interests and resources that are studied or affected by scientific or scholarly activities or the*

resulting information;

- *neither hinder the scientific or scholarly activities of others nor engage in dishonesty, fraud, deceit, misrepresentation, coercive manipulation, or other scientific or scholarly misconduct;*

- *welcome constructive criticism of scientific and scholarly activities, welcome and participate in appropriate peer reviews, critique others' work respectfully and objectively, and substantiate comments with care;*

- *be diligent in creating, using, preserving, documenting, and maintaining collections and data, ensuring established quality assurance and quality control programs, follow the NPS's records retention policies, and comply with Federal law and agreements related to use, security, and release of confidential and proprietary data;*

- *adhere to appropriate standards for reporting the results of scientific and scholarly activities, including respecting the intellectual property rights of others;*

- *to the extent possible and practical, differentiate among facts, opinions, hypotheses, and professional judgment in reporting the results of scientific and scholarly activities to others, including scientists, decision makers, and the public;*

- *be responsible for the quality of collected data and interpretations, and for the integrity of conclusions drawn in the course of scientific and scholarly activities; and*

- *place integrity, utility, and objectivity of scientific and scholarly activities and reporting of their results ahead of personal gain or allegiance to individuals or organizations.*

DBOC believes this policy applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report fully adheres to each of the policies set forth in this "Interim Guidance Document?" Further, please certify that Becker and the co-authors, in the preparation, design, data management, completion and presentation of their Report followed each of the twelve requirements of the Code of Scientific and Scholarly Conduct.

All information disseminated by the NPS must comply with basic standards of quality to ensure and maximize the objectivity, utility, and integrity of information disseminated to the public.

A. Reliable Data. The National Park Service will ensure that information it releases will be developed from reliable data sources and will otherwise ensure information quality at each stage of information development. The NPS's methods for producing quality information will be made transparent, to the maximum extent practicable, through accurate documentation, use of appropriate internal and external review procedures, consultation with experts and users, and verification of the quality of the information disseminated to the public. The NPS will also keep users informed about corrections and revisions.

Information will be developed only from reliable data sources based on accepted practices and policies utilizing accepted methods for information collection and verification. It will be reproducible to the extent possible.

B. Accuracy and Timeliness. All information will be accurate, timely, and reflect the most current information available. All information sources will be documented.

IV. POLICIES AND INSTRUCTIONS

A. Information Approval. All information disseminated to the public must be approved by the appropriate program and/or regional office prior to its dissemination and must satisfy OMB and Departmental guidelines. The approval process will include documentation of the specific information quality standards used in producing the information in a way to substantiate the quality, utility, objectivity, and integrity of the information in a manner that conforms to OMB and Departmental guidelines.

DBOC believes that the Director's Order applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report meets the "reliable data" standard as well as the "information quality at each stage of information development" standard. Will you also certify that the standards for transparency, accurate documentation, appropriate reviews, consultation with experts and verification requirements

confidence in the research record and in the processes involved in its ongoing development.

This policy applies to federally-funded research...

The policy establishes the scope of the Federal government's interest in the accuracy and reliability of the research record and the processes involved in its development. It consists of a definition of research misconduct and basic guidelines for the responses of Federal agencies and research institutions to allegations of research misconduct. .

DBOC believes this policy applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report meets the over-arching accuracy and reliability standards and did not violate the Federal research misconduct policy?

[3] **Data Quality Act.** The Data Quality Act [DQA], P.L. 106-554, Section 515, December 21, 2000, requires that guidelines be developed that provide guidance to Federal agencies *"for ensuring and maximizing the quality, objectivity, utility and integrity of information (including statistical information) disseminated by Federal agencies..."* In February, 2002, OMB published guidelines in the Federal Register and the Department of the Interior did the same. **DBOC believes that the DQA applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report meets the DQA requirement of *"maximizing quality"* and, will you do the same for *"objectivity, utility of information (including statistical information), and integrity?"***

[4] **Director's Order # 11B, Pursuant to the DQA.** According to *NPS Management Policies 2006* source book, *"primary source of policy is the publication, Management Policies 2006. Director's Orders supplement and may amend Management policies."* On October 16, 2002, then NPS Director, Fran Mainella, issued DIRECTOR'S ORDER # 11B, *"Ensuring Quality of Information Disseminated by the National Park Service."*

According to this Order, in part and excerpted:

were fully met as required? And, will you also certify that, as required, the information was accurate, timely and reflected the most current information available? Finally, please certify that all information publicly disseminated was "approved by the appropriate program and/or regional office prior to its dissemination" and that it satisfied "OMB and Departmental guidelines."

[5] **Peer Review Policy.** OMB, Final Information Quality Bulletin for Peer Review, Office of Management and Budget, Executive Office of the President. Pursuant to the DQA, on January 15, 2005, OMB published the Federal Peer Review Policy Bulletin in the Federal Register. According to that formal Notice:

> *Peer review is one of the most important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. It is a form of deliberation involving an exchange of judgments about the appropriateness of methods and the strength of the author's inferences. Peer review involves the review of a draft product for quality by specialists in the field who were not involved in producing the draft.*
>
> *The peer reviewer's report is an evaluation or critique that is used by the authors of the draft to improve the quality of the product. Peer review typically evaluates the clarity of the hypotheses, the validity of the research design, the quality of the data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product.*

DBOC believes this policy applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report meets the standards of peer review as set forth in this policy?

[6] **NPS Management Policies, 2006: Scholarly Analysis Standard.** The Management Policies 2006, at Section 2.1.2, titled, "*Scientific, Technical and Scholarly Analysis,*" states, "*decision-makers and planner will use the best available scientific and technical information and scholarly analysis to identify appropriate management actions for protection and use of park resources.*" **DBOC believes this policy applies to the**

Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report followed the *"scientific, technical and scholarly analysis"* principles and standards set forth in this policy?

[7] **Kempthorne Ethics Policy, US Department of the Interior**. On July 27, 2007, slightly more than a year after being confirmed, Dirk Kempthorne, Secretary, US Department of the Interior, circulated a Memorandum to all 80,000 Interior Department employees titled, "*Promoting Ethics, the Public Interest, and Respectful Behavior*." Five "ideals" were cited, the third of which required, "*compliance with applicable laws, policies and procedures regarding the development and disclosure of science.*" **DBOC believes this policy applies to the Becker Report. If not, please explain why not. Assuming it does, will you please certify that the Becker Report properly adhered to the ethical standards pertaining to both the *"compliance with applicable laws, policies and procedures"* standard as well as the *"development and disclosure"* of science?**

[8] **NPS Interim Guidance Document Governing Code of Conduct, Peer Review, and Information Quality Correction for National Park Service Cultural and Natural Resource Disciplines**. The NPS, on January 31, 2008, issued a new comprehensive, 20-page collection of policies detailing a scientific code of conduct, peer review standards and procedures, ethics policies and information quality policies and procedures to implement the requirements of the Data Quality Act. According to this NPS policy:

> *The scientific and scholarly guidance presented in this document ensures that the review requirement is met using a consistent, conscientious, and appropriate level of effort. Such technical peer review is essential to demonstrate the professional stature and ensure the accountability of the National Park Service's acquisition and application of scientific and scholarly information. Such scientific peer review complements, and is part of, administrative review.*

Defining the scope of these policies, NPS states:

> *These guidelines apply to all scientific and scholarly information and assessments produced, used, or sponsored by the NPS. These*

[9] **Confirmation Hearings, Director Bomar.** NPS Director, at the May 21, 2006, Senate Confirmation hearing, in her prepared statement stated to the Senate Energy Committee, *"while park superintendents and program managers are vested with much authority, it comes with an equal amount of responsibility that demands high quality results, stellar performance and the utmost levels of accountability."* **DBOC concurs with Director Bomar's statement and believes it applies to directives given by you for the preparation and presentation of the Becker Report. Please certify that responsibility, high quality results, stellar performance and the utmost accountability was achieved in the preparation and presentation of the Becker Report.**

[10] **Oversight Hearing, House Natural Resources Committee on Science Integrity.** Assistant Secretary Laverty testified before the Committee last May. In response to a question from Parks Subcommittee Chair, Rep. Raul Grijalva who inquired about the scientific Code of Conduct, he stated, *"I would be happy to share with you the letter I sent to the Department folks, to both Fish and Wildlife Service and the Park Service that established my personal code of conduct and how I was going to operate, how I was going to establish that set of principles for my staff. I believe that we have a very, very solid platform to work. We can assure that."* **Please certify that the preparation and presentation of the Becker Report fully met the principles and standards referenced by Assistant Secretary Laverty.**

[11] ***NPS Management Policies, 2006*, Introduction, Law, Policy and Other Guidance.** The very first page of the Introduction to "Management Policies, 2006," entitled "Law, Policy and Other Guidance," states, *"this volume is the basic Service-wide policy document of the National Park Service. Adherence to policy is mandatory unless specifically waived or modified by the Secretary, the Assistant Secretary, or the Director."* **Were waivers, at any time or in any manner, issued by the Secretary, Assistant Secretary or the Director?**

[12] **Ethical Standards – Dignity and Respect.** Finally, the Kempthorne Ethics policy, July 2007, also states, *"we also treat each other, and the public whom we*

serve with dignity and respect. The Department's policy in this area is set forth at 43 CFR, Section 20.501." **Will you please certify that, according to and consistent with Interior Department ethics policy, the Lunny family was treated by you with "*dignity and respect?*"**

We respectfully request that responses be expedited. NPS made the Becker Report the centerpiece of your presentation to the Ocean Studies Board. Given the questions that have been raised about that report and in consideration of the Board's limited timetable, it is important that your responses be available as quickly as possible.

Sincerely,

Kevin Lunny Nancy Lunny

cc: Dr. Susan Roberts, Executive Director, Ocean Studies Board
Dr. Pete Peterson, Chair, Ocean Studies Board Panel
Jon Jarvis, Regional Director, Pacific West Region, National Park Service
Dr. John Dennis, Deputy Chief Scientist, National Park Service
Dr. Ben Becker, Pacific Coast Science and Learning Center, Point Reyes National Seashore
Dr. Sarah Allen, Lead Scientist, Point Reyes National Seashore
David Press, Inventory and Monitoring Program, Point Reyes National Seashore
Dr. Corey Goodman, Marshall, CA
John Hulls, Point Reyes Station

Don Neubacher/PORE/NPS
08/26/2008 08:43 AM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc "Susan Roberts" <sroberts@nas.edu>
bcc Holly Bundock/OAKLAND/NPS@NPS; Jon Jarvis/OAKLAND/NPS@NPS
Subject Re: NAS / Drakes Estero

Kevin, thanks for the offer and we appreciate you checking with us. Because of safety and other concerns--life jackets, etc, we are not sure about your offer. We are under the impression that the vessels for the public would have to be Coast Guard approved for transport. In addition, law enforcement staff have reviewed your operating permit and this type of NAS activity is not allowable under your current permit and the administrative law that governs the DBOC use of the area. Regardless, we have managed the areas as wilderness; thus, we would have to do a minimum tool and NEPA compliance process because this activity may be scrutinized and would require issuance of a new permit. At this late date, as required by policy and law, it would not be possible to "make a diligent effort to involve any interested and affected public that exist" (Director's Order 12)(CEQ 1506.6).

I told Susan we can explore other ways with you (kayaks, research trips, your operations) to get the committee out in the Estero at a later date. We agree getting a perspective from the water would be important for all parties. And, again, we appreciate you working on this access issue with us.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/21/2008 03:25 PM

To "Don Neubacher" <Don_Neubacher@nps.gov>
cc "Susan Roberts" <sroberts@nas.edu>
Subject NAS / Drakes Estero

Don.

The Ocean Studies Board will be here in early September and have asked that we arrange an on-shore and off-shore tour. Board members indicated that a boat tour would be important.

We are modifying our barges to accommodate the group and working out the off-shore logistics. Susan Roberts, who is copied by this email, will be contacting you as well.

Please provide the necessary permit (or waiver) as appropriate. This is, of course, a one-time event.

Thank you.

Kevin Lunny

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/21/2008 12:42 PM MST

To: <Kevin_McKay@nps.gov>
cc: <Paul_Robinson@nps.gov>
Subject: RE: Oyster Farm Housing

Kevin,

We got it. Thank you very much.

Kevin

-----Original Message-----
From: Kevin_McKay@nps.gov [mailto:Kevin_McKay@nps.gov]
Sent: Thursday, August 21, 2008 12:10 PM
To: Kevin Lunny
Cc: Paul_Robinson@nps.gov
Subject: RE: Oyster Farm Housing

Hi Kevin,

No problem, we had planned to include the past inspection report along with the most recent inspection report however we have included it with a letter that went out earlier this week on the 18th. Let me know if you have not received the letter.

Regards, Kevin

Kevin E. McKay
Special Park Uses Coordinator
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5111
Fax (415) 464-5182

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/18/2008 08:04 PM MST

To: "Kevin McKay" <Kevin_McKay@nps.gov>
cc: <Paul_Robinson@nps.gov>
Subject: RE: Oyster Farm Housing

Kevin,

We plan to submit our CDP application this week. It is very important that we have the JOC housing inspection records to refer to in this submittal. As you know, a portion of the Cease and Desist Order that was issued by the CCC against the JOC was related to the housing. Please forward these as soon as you can. You first agreed to get these to me two months ago. I don't want to delay our application submittal. (Sorry about the deadline.)

Kevin

From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Sunday, August 10, 2008 7:55 PM
To: Kevin McKay (Kevin_McKay@nps.gov)
Subject: Oyster Farm Housing

Hi Kevin,

As you recall, on June 18th, you and Paul Robinson inspected the housing at the oyster farm. Both you and Paul agreed that the worker housing has improved significantly since the Lunnys took over the operations of the oyster farm. I asked for, and you agreed to provide, all the inspection reports of the Johnson Oyster Company housing prior to 2005. We are ready to re-submit our Coastal Development Permit application to the California Coastal Commission and we need these annual records to proceed.

You also told me that you would get back to me about transitioning to the new oyster SUP signed in April. Last I spoke with you; you were unaware that the Yovino-Young appraisal included the well in its valuation of the property. There is no real hurry on this one - we'll just keep paying the invoices that we receive for the old SUPs until you make the change.

Hopefully, you can just go to the files for the Johnson housing inspections that we need soon. Let me know if we can stop by and pick them up

Thank you,

Kevin Lunny

(b) (6) [redacted]

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

August 18, 2008

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

Per your request, enclosed is a copy of an employee housing inspection report for an inspection conducted by U.S. Public Health Service Consultant Paul Robinson at the Johnson's Oyster Company site in November of 2004. Our records reflect that this was the initial employee housing inspection conducted at the site. Subsequent employee housing evaluation reports were addressed to you during and/or after the transfer of the reservation of use and occupancy. CAPT. Paul Robinson with the United States Public Health Service recently completed an additional employee housing inspection in June of 2008. This report will be forwarded to you once completed.

In regards to the well and water previously permitted for the oyster operation site under Special Use Permit MSC-8530-6000-2010, we have temporarily suspended billing for this service while Michael Yovino-Young completes an appraisal to determine a fair market value both for this service and for the leach field located on National Park Service property. The leach field was previously permitted under Special Use Permit MSC-8530-6000-2011.

A copy of the Yovino-Young appraisal will be provided to you upon completion. If you have questions please contact Kevin McKay in the Special Park Uses Office (415) 464-5111.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure
KEMcKay:kem 8/18/08

COPY

L1425
02-106

December 7, 2004

Mr. Tom Johnson
Johnson Oyster Company
P. O. Box 69
Inverness, CA 94937

Dear Mr. Johnson:

On November 23, 2004, US Public Health Service consultant Paul Robinson conducted a public health evaluation of the employee housing and commercial facilities at the Johnson Oyster Company. Chief Ranger Colin Smith represented the Point Reyes National Seashore and assisted with the evaluation.

Inspection of the employee housing at Johnson's Oyster Company included observing the structural condition of the residences and examining the water and wastewater systems. The commercial oyster harvesting and processing facility was also evaluated. Mr. Robinson strongly recommend that the homes be revisited in 30 to 45 days to ensure that deficiencies are corrected in a timely manner.

Main House

1. The electrical outlets in the kitchen within four feet of the sink must be GFCI protected.
2. Provide a battery for the smoke detector. Consider installing smoke alarms in all bedrooms.
3. Install a GFCI protected electrical outlet in the bathroom.

House on the Hill

1. Check the kitchen window sill for rain water leakage and repair if necessary.
2. Repair the severe water damage observed around the bathtub.
3. Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
4. Install a GFCI protected electrical outlet in the bathroom.
5. Install plate on living room light switch.

Trailer

1. This entire structure is in a poor state of repair and would require major work to bring it up to acceptable standards. Water damage was apparent in numerous places in the ceiling and around windows throughout the trailer. Window glass was broken in several windows. The front entry porch consists of rotting wood boards.
2. Check the kitchen window sill for leakage and repair if necessary.
3. Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
4. While the gas stove burners worked, the knobs to each burner were extremely difficult to turn. These should be repaired.

5. Repair the light fixture in the bedroom.
6. Install another hinge on the bedroom door so that it can open properly.
7. Replace the missing glass in the bedroom window.
8. The shower was severely water damaged requiring extensive repair.
9. Install plates on electrical outlets in the living room.
10. Replace the missing glass in the blue bedroom window.
11. Repair the leaking shower fixture.

Thank you for your attention to these matters.

Sincerely,

Don L. Neubacher
Superintendent

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

May 19, 2008

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

CAPT. Paul Robinson with the United States Public Health Service has scheduled to conduct on site inspections of the ranch and oyster operation employee residential units within Point Reyes National Seashore on June 17th and 18th of 2008. The inspections will last approximately one to two hours and will include an evaluation of ranch water and wastewater systems. National Park Service Staff will accompany CAPT. Robinson during the inspections.

We will be contacting you prior to June 17, 2008 to inform you of a scheduled time of arrival. If you have questions or concerns please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. Thank you for your help and cooperation in keeping Point Reyes National Seashore Ranches safe.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 5/19/08

Paul Hastings

Paul, Hastings, Janofsky & Walker LLP
55 Second Street
Twenty-Fourth Floor
San Francisco, CA 94105
telephone 415-856-7000 • facsimile 415-856-7100 • www.paulhastings.com

Atlanta
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Paris
San Diego
San Francisco
Shanghai
Tokyo
Washington, DC

(415) 856-7427
michaelsharpless@paulhastings.com

February 5, 2008 73344.00002

VIA UPS OVERNIGHT

George Turnbull
Deputy Regional Director
National Park Service
1111 Jackson Street
Suite 700
Oakland, CA 94607-4807

Re: Drakes Bay

Dear Mr. Turnbull:

On behalf of Drakes Bay Oyster Company, please find enclosed documents as required by section 3.2.10 of the Consent Order.

Should you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Michael Sharpless
Senior Environmental Paralegal

Enclosures

cc: Zack Walton w/o Enclosures
LEGAL_US_W # 58132312.1

George Turnbull/OAKLAND/NPS
01/29/2008 05:35 PM

To Jon_Jarvis@nps.gov, "Kevin Lunny" <kevin@drakesbayoyster.com>, "Walton, Zachary R." <zacharywalton@paulhastings.com>
cc
bcc
Subject Draft SUP

Kevin/Zach,

Attached is a redline draft SUP with the revisions we agreed upon Friday. I assume you'll get us the oyster poundage figure so we can complete the signable document? Let me know if you need anything else....

George T.

DBOC Draft SUP 1.28.08 - redline shows differences with NPS 1.11.08 version.doc

Form 10-114
Rev. Jan. 00

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2007
Reviewed 20
Reviewed 20
Expires November 30, 2012

Permit # MISC-8530-6000-8002
Type Park Code No. #

Long Term X
Short Term

Point Reyes National Seashore
Name of Area

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on _____, 20078 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP"); the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases; NPS Resources and SUP Area"); the land designated as the "Well Area" on the map attached hereto as Exhibit D ("Drakes Bay Oyster Company Well Area"); and the land designated as the "Sewage Area" on the map attached hereto as Exhibit E ("Drakes Bay Oyster Company Sewage Area"). Collectively, the areas so designated shall be referred to as the "Premises." The Premises governed by this Permit do not include the area designated as the ROP Area on the map attached hereto as Exhibit B.

Field Code Changed

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Use of the area designated as the "Well Area" on the map attached hereto as Exhibit D for the purpose of supplying water for the Drakes Bay Oyster Company facilities using Permittee well, pump, and pipelines. Use of the area designated as the "Sewage Area" on the map attached hereto as Exhibit E for the purpose of use and maintenance of existing sewage pipeline and sewage leachfield to service the Drakes Bay Oyster Company facilities. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND: Required ____ Not Required X Amount: ____ Field Code Changed

LIABILITY INSURANCE: Required X Not Required ____ Amount: As set forth in Article 15 of this Permit. Field Code Changed

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year, plus an amount to be determined by appraisal for the use of the Sewage Area and the Well Area including water use.

PERMITTEE: _____
Signature Organization Date

Authorizing Official: _____ George Turnbull _____

Signature | Deputy Regional Director | Date

Additional Authorizing Official: _____
(If Required)

Signature | Title | Date

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D: Map – Drakes Bay Oyster Company Well Area

EXHIBIT E: Map – Drakes Bay Oyster Company Sewage Area

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

   a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

   b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

   c. standards or requirements pertaining to the health and safety of employees or the public.

g) 'Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

   a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

   b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

   c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

   d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described in this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)].

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Members of the general public visiting the Drakes Bay Oyster Company operation may park in the adjacent NPS parking area and walk over to the SUP or ROP areas.

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, which can include occasional inspections required by Agencies, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area. To comply with this paragraph, Permittee will not encourage barbecuing in the SUP Area. Picnic tables will be provided by the NPS at the adjacent parking area.

k) Unauthorized discharge into the estuary is prohibited. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, Permittee will ensure that Permittee and Permittee's officers, agents, employees, and contractors comply with Applicable Laws regarding pets, including the NPS regulation at 36 C.F.R. § 2.15.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies, including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

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a) If Permittee and Permitter disagree about an issue related to this Permit, they will first make a good faith effort to resolve such issue at the Park level. If they are unable to resolve the issue at the Park level, Permittee may request a review of the issue by the Regional Director.

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ab) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) The maximum annual production limit for oysters, rock scallops and clams will be approximately ~~700,000~~ _____ pounds.

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ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed without the prior approval of the Permitter. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) To minimize the chances of introducing invasive species or pathological microorganisms to Drake's Estero, Permittee will only import shellfish in the form of larvae and seed. Within 30 days of the Commencement Date, Permittee shall produce sufficient evidence, for the review and approval of the Permitter, that larvae and seed from outside sources have been certified by the California Department of Fish and Game ("CDFG") to be

free of pathogens. If the Permitter determines that the ~~evidence~~ documentation is insufficient, Permittee shall cease from importing larvae within 30 days of receiving notification of the determination from the Permitter.

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from hauled out seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel is authorized during the pupping harbor seal closure period.

c) Permittee's agreement to the provisions of this Permit does not waive Permittee's ability to take contrary positions with regard to similar provisions with other Agencies.

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5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs, provided that Permittee and Permitter acknowledge that certain repairs are necessary to comply with Applicable Laws. Permittee will make such repairs at its sole cost and expense in compliance with Applicable Laws.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable

Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site, without the presence of an NPS archeological monitor.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) Except As set forth in Section 3(k) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS laws, regulations, and policies.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species, except for the cultivation of the shellfish species authorized by this Permit.

~~c) As set forth in Section 3(j) of this Permit, Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites.~~

~~d)~~c) On a case by case basis, the Permitter will evaluate incidences of depredation caused by Permittee and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

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14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles or for standard household cleaners. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes, except as

authorized by Applicable Laws.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past, ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any final report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e). Notwithstanding the foregoing, neither Permittee nor Permitter shall be required to provide a report under this Section 14(e) if such report is protected by attorney-client privilege.

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall

provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings; betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability Insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design,

construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and Improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Except as provided in Paragraph 3(g), Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences shall be maintained in good condition and shall be timely repaired in conformance with

Applicable Laws. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) New lighting under Permittee's control of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road from Sir Francis Drake Boulevard to the SUP Area will be maintained by the NPS. The Park will respond in a timely manner to Permittee and/or visitor complaints regarding the condition of the main entrance road. Notwithstanding the foregoing, Permitter may enter into a road maintenance contract with Permittee.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines within the Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall maintain the sewage pipeline and sewage leachfield in the "Sewage Area."

i) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws as required by law. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee relate to the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. Permitter will pay for the preparation of NEPA or NHPA documents. If there is litigation regarding NEPA or NHPA compliance, it will not trigger the indemnification requirements of Article 16.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit..

22) PENALTY

a) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

a) At the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permittor or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

EXHIBIT A

Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D

Map – Drakes Bay Oyster Company Well Area

EXHIBIT E

Map – Drakes Bay Oyster Company Sewage Area

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

JAN 15 2008

IN REPLY REFER TO:

A7221 (PWR-RD)

JAN 14 2008

Kevin and Nancy Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd
Inverness, CA 94937

Dear Mr. and Mrs. Lunny:

Thank you for your long and detailed letter of December 31, 2007 regarding the Drakes Bay Oyster Company. This issue has been dominating all of our time and in keeping with our mutual discussion with Senator Feinstein on Monday, January 7, I think it is in all of our interests that we try to bring it to a mutually agreeable solution as soon as possible. You have a legitimate business to run and I have the public trust responsibility to operate a unit of the National Park System. I do not think long detailed, point by point responses are productive, but rather a focus on the three key issues as follows:

1. The Science: Our scientists and those employed by the California Coastal Commission agree that there are negative effects on the environment from oyster farming in Drakes Estero. You and your associates, such as Dr. Goodman, disagree with that assessment. In order to resolve those disagreements, the National Park Service is prepared to contract with the National Research Council (NRC) to produce two reports, one specific to Drakes Estero as a "case study" and the other to look more broadly at the ecological effects of mariculture. It is my understanding that you, and Dr. Goodman have concurred with the NRC on the scope of this review. I suggest that we all, including the California Department of Fish and Game, actively participate in this review and trust the highest scientific body in the US to give us their objective analysis.

2. The allegations of scientific validity in the report "Drakes Estero, A Sheltered Wilderness": Allegations are just that, not proof of anything, and we await independent confirmation or dismissal. This is being thoroughly investigated by the Department of the Interior's Office of the Inspector General.

3. The Special Use Permit: DBOC is currently operating a commercial business within a unit of the National Park System without any permit. Our regulations require that any

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special use permit to carry out any activity in a unit of the National Park System to have specific provisions to protect the environment. You are not being singled out in any way. You need the NPS Special Use Permit to be in compliance with the California Coastal Commission. As discussed with the Senator, we have structured the permit to be nearly identical to the dairy permits in the insurance and other "boiler plate" provisions. These should be very familiar to you. We have offered the permit until 2012, when the Reservation of Use and Occupancy expires and stated that we would only reopen the environmental provisions based on NEPA and the results of the NRC review of the science. That offer gives you full assurance you can fully operate until 2012, without having to come back for another permit. As for the environmental provisions, they are nearly identical to those required by the California Coastal Commission's Consent Cease and Desist Order, which you signed in December of 2007 (see attachment). At your request, we have incorporated the Consent Order Harbor seal map as the basis for operational protocol. These provisions are designed so that you can conduct your business and the natural resources of Drakes Estero are protected. That is our public responsibility and consistent with the commitment we made at the meeting in Olema.

Kevin, you have stated many times that you would like to go back to a former time, when the relations with the NPS were cordial. I agree. Unfortunately, this issue now involves attorneys, reporters, DC lobbyists, environmental and agriculture constituency groups, elected officials, scientists, investigators, state regulators and now the highest scientific body in the United States. Each of them has interests that will not always lead to a mutual resolution and a re-establishment of a working relationship on the ground at Point Reyes National Seashore. The best way we can bring back that relationship back is for you to negotiate in good faith. We have attached a permit that meets all the points we discussed with the Senator and it is my hope you will sign it. With your signature, we can move this back to an on-going operation and collaborative relationship.

I look forward to meeting with you later this month.

Jonathan B. Jarvis

Jonathan B. Jarvis

CA MMISSION
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SAN
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FAX
TDD (415) 597-5885

CONSENT ORDER NO. CCC-07-CD-04 (DRAKE'S BAY OYSTER COMPANY)

1.0 General

Pursuant to its authority under Public Resource Code §30810,[1] the California Coastal Commission ("Commission") hereby orders and authorizes Drake's Bay Oyster Farm, run by Drake's Bay Oyster Company (hereinafter referred to as "Respondent"), its employees, agents, contractors, and anyone acting in concert with any of the foregoing, and successors in interest and future owners/operators of the business or lessees to comply with the terms and conditions of this Consent Cease and Desist Order (hereinafter referred to as "Consent Order"). Respondent agrees to undertake the following, pursuant to this Consent Order and in the interest of resolving and settling this matter:

2.0 Further Unpermitted Development

Respondent agrees to cease and desist from performing any new development, as the term "development" is defined in Coastal Act §30106, on the property, which is defined in Provision 10.0 of this Consent Order, and from expanding or altering the current development that exists on the property. Nothing in this Consent Order prohibits the Respondent from continuing current operational activities, provided that all protective measures set forth in Provision 3.0 of this Consent Order are implemented as required and that the current activities are not expanded.

3.0 Resource Protection Measures

Respondent agrees to implement the following measures to minimize potential resource impacts to onshore and offshore areas caused by the operation of the facility. Nothing in this Consent Order shall be construed to authorize the corresponding development or the operations.

3.1 Onshore Conditions

3.1.1 Additional Structures. Construction and/or placement of any additional onshore structures are prohibited until Respondent obtains a coastal development permit. Nothing in this Consent Order precludes Respondent from seeking a waiver for de minimis development, as set forth in Coastal Act §30624.7, or from seeking a CDP for development on the property.

[1] The Coastal Act is codified in sections 30,000 to 30,900 of the California Public Resources Code. All further section references are to that code, and thus, to the Coastal Act, unless otherwise indicated.

3.1.2 **Water Quality/Hazardous Waste.** Within 60 days of the issuance of this Consent Order, Respondent shall submit a hazardous materials/discharge management plan which: 1) identifies and outlines procedures for the removal or replacement of any receptacle for oil, paint, or other hazardous materials that is leaking or could leak in the near future; 2) identifies current and potential polluted discharges and outlines protocols for addressing the discharges; 3) provides a contingency plan for potential leaks; 4) states that Respondent shall take all necessary measures to prevent leaks or spills; and 5) states that all adequate or new receptacles shall be moved at least 100 feet from sensitive areas, or to paved areas or inside structures, securely stored, and properly labeled. If the information required under this provision has been provided to a county or state agency in order to comply with that agency's regulations or requirements, the information supplied to that agency may be submitted in lieu of the hazardous materials/discharge management plan.

3.1.3 **Thermal Discharges and Seawater Use.** Elevated temperature waste discharges shall comply with limitations necessary to ensure protection of marine resources and biological productivity. The maximum temperature of waste discharges, as measured from the point of discharge of the "incubation area", shall not exceed the maximum temperature of the receiving waters by more than 20 degrees F. In addition, all seawater intake structures shall be designed to ensure that maximum through-screen intake velocity does not exceed 0.5 feet per second. Measures shall be adopted to minimize the facility's intake and use of seawater, including the use of a seawater collection and re-circulation system in the grow-out room.

3.2 Offshore Conditions

3.2.1 **Additional Structures.** Construction and/or placement of any additional offshore aquaculture racks/cultivation infrastructure is prohibited until Respondent obtains a coastal development permit.

3.2.2 **Future Abandonment and Removal of Equipment.** To prevent the degradation of oyster cultivation apparatus and the release of debris into Drake's Estero, within 30 days of the cessation of harvesting on any plot that is being temporarily taken out of production, Respondent shall remove oyster culture apparatus from that plot except for permanent structures including oyster racks located within certified harvest areas. Notwithstanding the foregoing, Respondent may resume harvesting on any plot temporarily taken out of production. Within 30 days of the cessation of harvesting on any plot that is being permanently taken out of production, Respondents shall remove all oyster cultivation apparatus from that plot, including permanent structures such as oyster racks, stakes, and pallets.

3.2.3 **Removal of Abandoned Equipment.** All currently abandoned materials including cultivation equipment/apparatus, including those stakes and racks not currently and actively being used to produce shellfish, except those plots that are identified for repair, shall be removed. Within 90 days of the issuance of this order, Respondent shall submit a Debris Removal Plan to the National Park Service and Executive Director of the Coastal Commission for approval. The plan shall include location of debris identified for removal, proposed techniques and equipment to be used for debris removal, and identification of the debris disposal facility. Within 60 days of approval by the Executive Director and National Park Service of the Debris Removal Plan, Respondents shall remove all debris as approved in the Debris Removal Plan. Within 30 days of completing debris removal, Respondent shall submit to the Executive Director and National Park Service a final report detailing the material that was removed, the locations from which this material was removed, the techniques and equipment used, and the location of the disposal facility.

3.2.4 **Invasive Species.** To minimize the chances of introducing invasive species or pathological microorganisms to Drake's Estero, Respondent will only import shellfish in the form of larvae and seed. Within 30 days of the issuance of this Consent Order, Respondent shall produce sufficient evidence, for the review and approval of the Executive Director, that larvae and seed from outside sources have been certified by California Department of Fish and Game to be free of pathogens. If the Executive Director determines that the evidence is insufficient, Respondent shall cease from importing larvae within 30 days of receiving notification of the determination from the Executive Director.

3.2.5 **Boat Transit.** Boat traffic shall be limited to established channels that do not violate the protective measures set forth in this Consent Order. In situations where visibility is poor, Respondent will make every effort to use only the established channels. Within 60 days of the issuance of this order, Respondent shall submit to the National Park Service and the Executive Director a Vessel Transit Plan for review and approval. This plan shall include proposed access lanes (distinguishing between commonly-used channels and channels only used when certain racks/bags are active) and mooring areas for maintenance and harvesting of oysters, clams, and scallops. Once approved, only the vessel lanes and mooring areas described and mapped in the Vessel Transit Plan shall be used by Respondent and Respondent's employees.

3.2.6 **Harbor Seal Protection Areas.** All of Respondent's boats, personnel, and any structures and materials owned or used by Respondent shall be prohibited from the harbor seal protection areas defined on the map, which is attached to this Consent Order as Figure 1. Within 60 days of issuance of this Consent Order, Respondents shall submit a plan outlining the removal of all equipment and materials located in these areas. Within 60

days of the approval of this plan by the Executive Director, Respondents shall implement the plan as approved. In addition all of Respondent's boats and personnel shall be prohibited from coming within 100 yards of hauled out harbor seals.

3.2.7 **Pacific Oyster and European Flat Oyster.** Cultivation of Pacific oyster (*Crassostrea gigas*) and European flat oyster (*Ostrea edulis*) shall only occur in the "cultivation area" defined in Provision 3.2.11 of this Consent Order. Cultivation of additional oyster species within this area shall not be allowed and cultivation of these oyster species outside of this lease area shall also not be allowed. Within 60 days of the issuance of this Consent Order, Respondent shall submit a plan outlining the removal of all shellfish and equipment from prohibited areas, as defined in this provision, and setting forth protocols for cultivation of allowable species and prevention of intrusion by prohibited species in the areas defined in this provision. Within 30 days of the approval of this plan by the Executive Director, Respondent shall implement the plan as approved.

3.2.8 **Non-Oyster Species Areas.** Cultivation of manila clams (*Venerupis phillipinarum* formerly *Tapes japonica*) and purple-hinged rock scallops (*Crassodoma gigantean* formerly *Hinnities multirugosus*) shall only occur where currently cultivated in the "cultivation area" defined in Provision 3.2.11 of this Consent Order. Cultivation of additional non-oyster species shall not be allowed. Within 60 days of the issuance of this Consent Order, Respondent shall submit a plan outlining the removal of all clams, scallops or any unpermitted species and any associated cultivation equipment located outside of the cultivation area. Within 30 days of the approval of this plan by the Executive Director, Respondent shall implement the plan as approved.

3.2.9 **Use of Bottom Bags.** Bottom bags shall only be placed in intertidal areas devoid of eelgrass. No eelgrass shall be removed to create additional areas for bottom bags. Within 60 days of the issuance of this Consent Order, Respondent shall submit protocols for the location and practices regarding the use of bottom bags according to this provision and the terms and conditions of this Consent Order.

3.2.10 **Maximum Annual Production Limit.** Within 60 days of the issuance of this Consent Order, Respondents shall provide documentation showing the "current production level," including the amount harvested in the last year and any projected increases in yield for the coming year. Production of all shellfish species shall be capped at this "current production level."

3.2.11 **Cultivation Area.** All cultivation shall be confined to areas which are: 1) currently included in the California Department of Fish and Game lease numbers M438-01 and M438-02; 2) consistent with the California Department of Health, the Food and Drug Administration, and the

National Shellfish Sanitation Program approved shellfish harvest areas within Drakes Estero; and 3) specified as oyster beds or primary water quality sites on the map attached to this Consent Order as Figure 1.

4.0 Plan Revisions

If the Executive Director determines that any immaterial modifications or additions to the plans submitted under Provision 3.0 of this Consent Order are necessary, he shall notify Respondent. Respondent shall complete the requested modifications and resubmit the plan(s) for approval within 10 days of the notification.

5.0 Completion of Coastal Development Permit (CDP) Application

5.1 Within 60 days from the issuance date of this Consent Order or within such additional time as the Executive Director may grant for good cause, pursuant to Section 18.0 of this Consent Order, Respondent shall revise the project description in Coastal Development Permit (CDP) application No. 2-06-003 to include all unpermitted onshore and offshore development, as that term is defined and addressed in the Coastal Act and Commission's regulations (California Code of Regulations (CCR), Title 14, Division 5.5), subject to Respondent's reservation of rights, positions and defenses as specified in Provision 13.0.

5.2 Within 120 days from the date of issuance of a National Park Service Special Use Permit for the operations on the property, or within such additional time as the Executive Director may grant for good cause, Respondent shall submit all materials which are required to complete CDP application No. 2-06-003, to:

California Coastal Commission
Energy, Ocean Resources, and Federal Consistency Division
Attn: Cassidy Teufel
45 Fremont St., Suite 2000
San Francisco, CA 94105-2219

The application shall address all existing development, as that term is defined and addressed in the Coastal Act and Commission's regulations (Title 14 of the California Code of Regulations), that is unpermitted, including but not limited to the development identified in Provision 11.0, on the property identified in Provision 10.0, subject to Respondent's reservation of rights, positions and defenses as specified in Provision 13.0. If Respondent believes that one or more items of development listed in Provision 11.0 do not exist on the property, Respondent shall submit evidence supporting the claim(s) to the Executive Director. If the Executive Director determines that the claim is valid, this Consent Order shall not apply to that portion of cited development.

5.3 Respondent shall not withdraw the application submitted under Provision 5.1 and shall allow the application to proceed through the Commission permitting process

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2007
Reviewed 20
Reviewed 20
Expires November 30, 2012

Permit # MISC-8530-6000-8002
Type Park Code No. #

Long Term X
Short Term

Point Reyes National Seashore
Name of Area

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on _____, 2007 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP"); the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"); the land designated as the "Well Area" on the map attached hereto as Exhibit D ("Drakes Bay Oyster Company Well Area"); and the land designated as the "Sewage Area" on the map attached hereto as Exhibit E ("Drakes Bay Oyster Company Sewage Area"). Collectively, the areas so designated shall be referred to as the "Premises." The Premises governed by this Permit do not include the area designated as the ROP Area on the map attached hereto as Exhibit B.

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Use of the area designated as the "Well Area" on the map attached hereto as Exhibit D for the purpose of supplying water for the Drakes Bay Oyster Company facilities using Permittee well, pump, and pipelines. Use of the area designated as the "Sewage Area" on the map attached hereto as Exhibit E for the purpose of use and maintenance of existing sewage pipeline and sewage leachfield to service the Drakes Bay Oyster Company facilities. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required	Not Required X	Amount:
LIABILITY INSURANCE:	Required X	Not Required	Amount: As set forth in Article 15 of this Permit.

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $2,800.00 per year, plus an amount to be determined by appraisal for the use of the Sewage Area and the Well Area including water use.

PERMITTEE: _____
Signature Organization Date

Authorizing Official: _____ George Turnbull _____

Signature | Deputy Regional Director | Date

Additional Authorizing Official: _____

(If Required) Signature | Title | Date

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described in this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Members of the general public visiting the Drakes Bay Oyster Company operation may park in the adjacent NPS parking area and walk over to the SUP or ROP areas.

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, which can include occasional inspections required by Agencies, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area. To comply with this paragraph, Permittee will not encourage barbecuing in the SUP Area. Picnic tables will be provided by the NPS at the adjacent parking area.

k) Unauthorized discharge into the estuary is prohibited. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, Permittee will ensure that Permittee and Permittee's officers, agents, employees, and contractors comply with Applicable Laws regarding pets, including the NPS regulation at 36 C.F.R. § 2.15.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

a) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) The maximum annual production limit for oysters, rock scallops and clams will be 700,000 pounds.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) To minimize the chances of introducing invasive species or pathological microorganisms to Drake's Estero, Permittee will only import shellfish in the form of larvae and seed. Within 30 days of the Commencement Date, Permittee shall produce sufficient evidence, for the review and approval of the Permitter, that larvae and seed from outside sources have been certified by the California Department of Fish and Game ("CDFG") to be free of pathogens. If the Permitter determines that the evidence is insufficient, Permittee shall cease from importing larvae within 30 days of receiving notification of the determination from the Permitter.

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such

modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from hauled out seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel is authorized during the pupping harbor seal closure period.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs, provided that Permittee and Permitter acknowledge that certain repairs are necessary to comply with Applicable Laws. Permittee will make such repairs at its sole cost and expense in compliance with Applicable Laws.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and

maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site, without the presence of an NPS archeological monitor.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) As set forth in Section 3(k) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS laws, regulations, and policies.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species, except for the cultivation of the shellfish species authorized by this Permit.

c) As set forth in Section 3(j) of this Permit, Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites.

d) On a case by case basis, the Permitter will evaluate incidences of depredation caused by Permittee and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles or for standard household cleaners. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes, except as authorized by Applicable Laws.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past, ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized

under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any final report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e). Notwithstanding the foregoing, neither Permittee nor Permitter shall be required to provide a report under this Section 14(e) if such report is protected by attorney-client privilege.

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal

Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Except as provided in Paragraph 3(g), Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences shall be maintained in good condition and shall be timely repaired in conformance with Applicable Laws. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) New lighting under Permittee's control of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road from Sir Francis Drake Boulevard to the SUP Area will be maintained by the NPS. The Park will respond in a timely manner to Permittee and/or visitor

complaints regarding the condition of the main entrance road.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines within the Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall maintain the sewage pipeline and sewage leachfield in the "Sewage Area."

i) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee relate to the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. Permitter will pay for the preparation of NEPA or NHPA documents. If there is litigation regarding NEPA or NHPA compliance, it will not trigger the indemnification requirements of Article 16.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit..

22) PENALTY

a) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

a) At the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of

Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D: Map – Drakes Bay Oyster Company Well Area

EXHIBIT E: Map – Drakes Bay Oyster Company Sewage Area

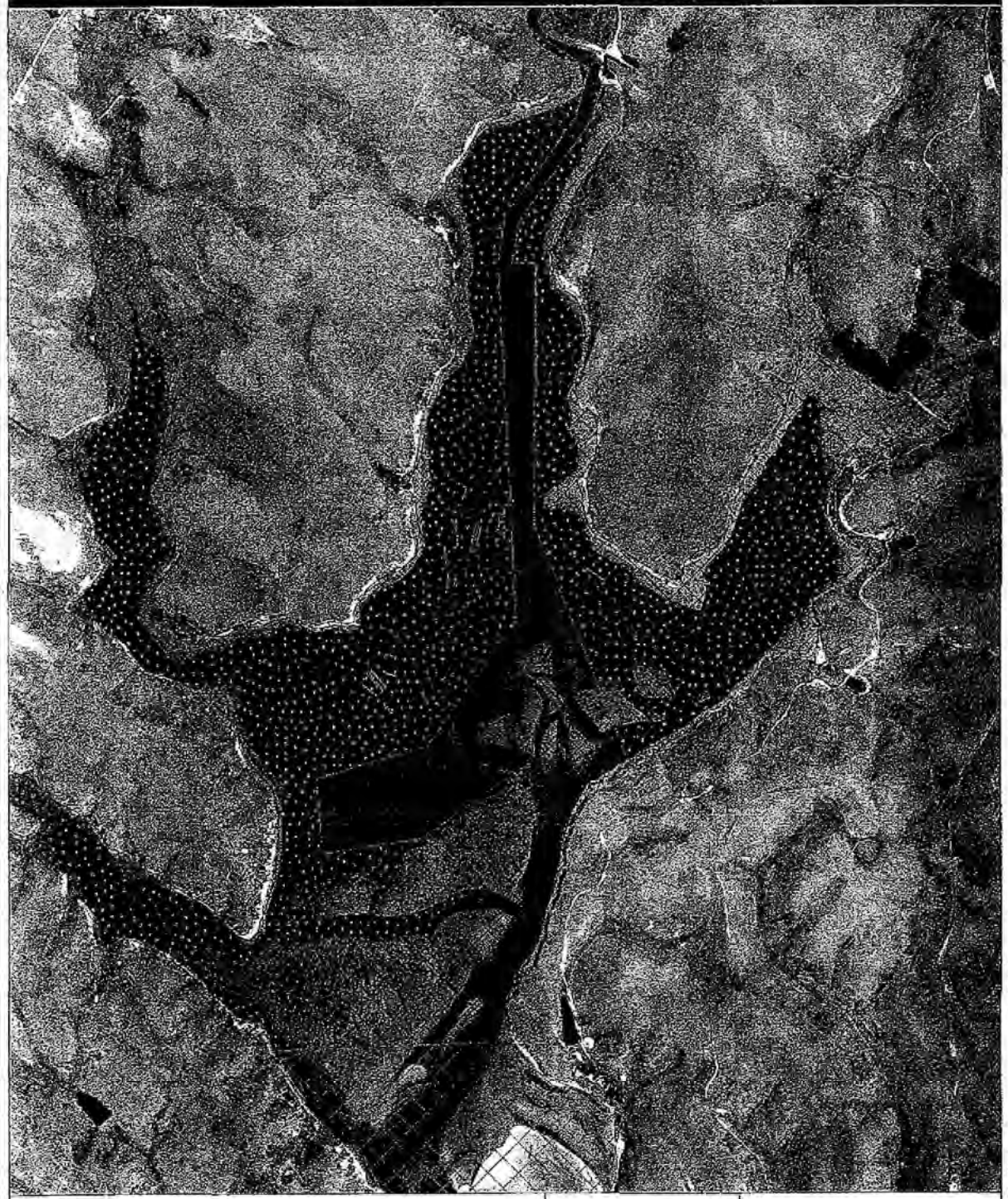
EXHIBIT A

Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior



Permit Type

- ROP
- SUP

Oyster Racks

- Active
- Dilapidated

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

Map Location

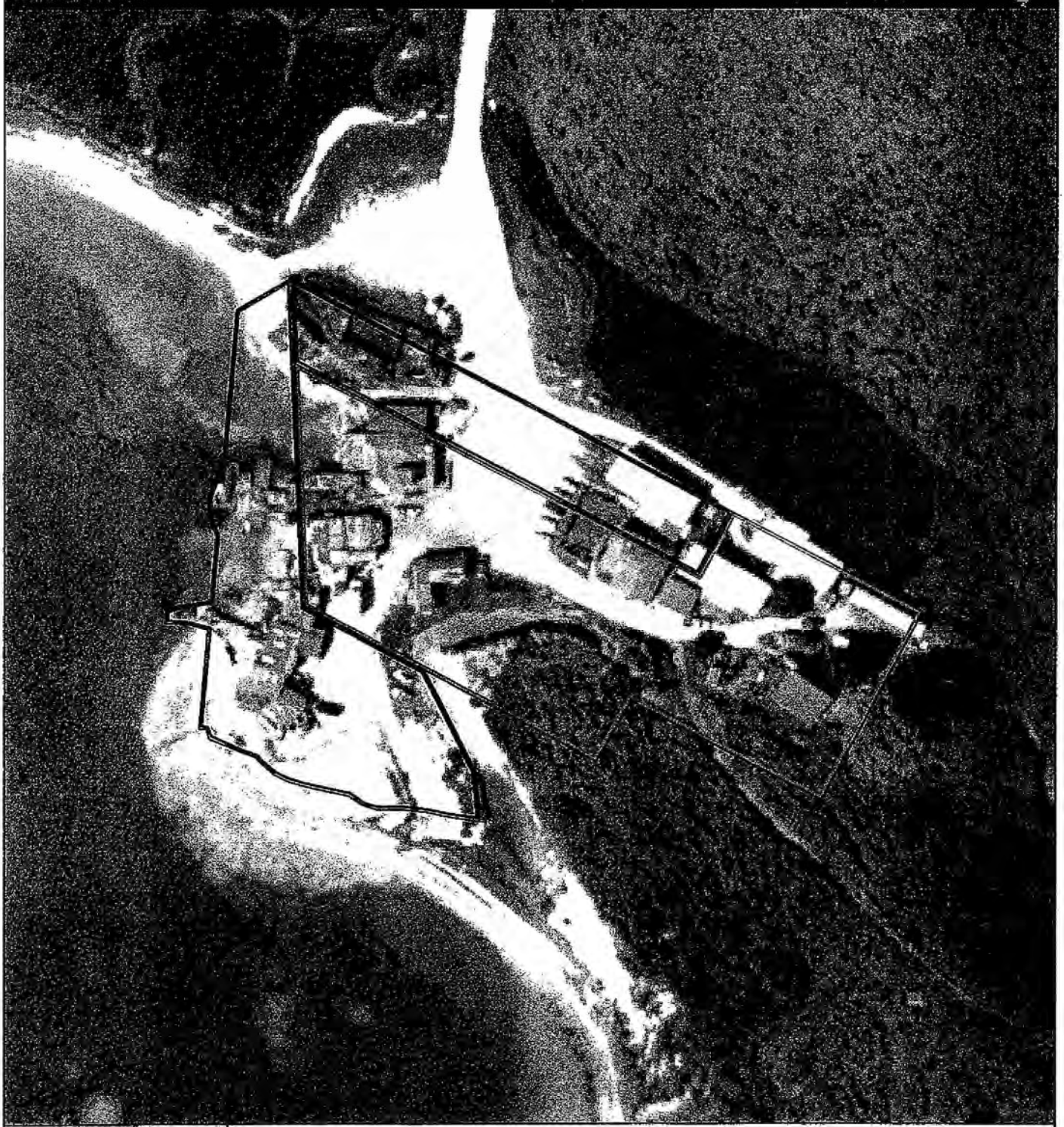
N
W E
S

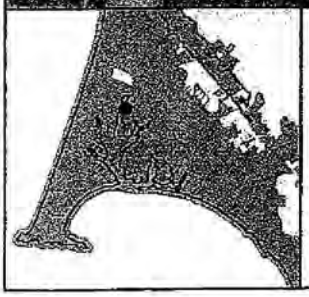
0 0.5 Miles

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

Drake's Estero Oysters - SUP & ROP





National Park Service
Point Reyes National Seashore
Marin County, CA

N
W E
S

0 50 100 150 200
Feet

Permit Type

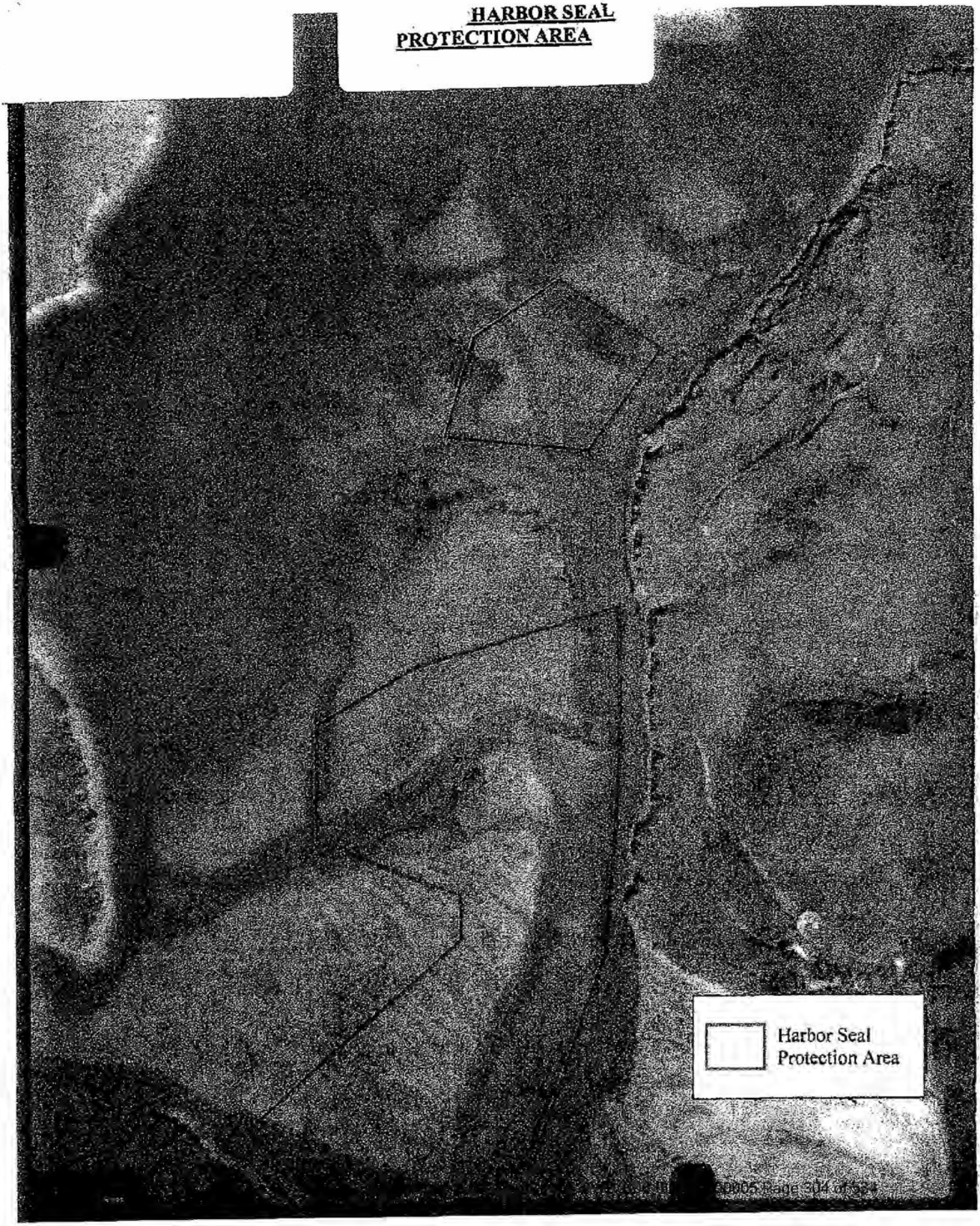
ROP - 1.5 acres

SUP - 1.1 acres

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol

HARBOR SEAL PROTECTION AREA



Drakes Estero Aquaculture and
Harbor Seal Protection Protocol

The following items are mutually agreed to for protection of harbor seals in and adjacent to the Harbor Seal Protection Areas identified in the Map, attached hereto and incorporated herein by reference ("Protocol Map"):

1. During the breeding season, March 1 through June 30, the "Main Channel" and "Lateral Channel" of Drakes Estero will be closed to boat traffic. During the remainder of the year, the Lateral Channel and Main Channel are open to boat traffic outside of the protection zone.

2. During the breeding season, Permittee boats may use the "West Channel" at low speed while maintaining a distance of at least 100 yards from hauled out seals.

3. Throughout the year, all of Permittee's boats, personnel, and any structures and materials owned or used by Permittee shall be prohibited from the harbor seal protection areas identified on the Protocol Map. In addition, all of the Permittee's boats and personnel shall be prohibited from coming within 100 yards of hauled out harbor seals.

EXHIBIT D

Map – Drakes Bay Oyster Company Well Area

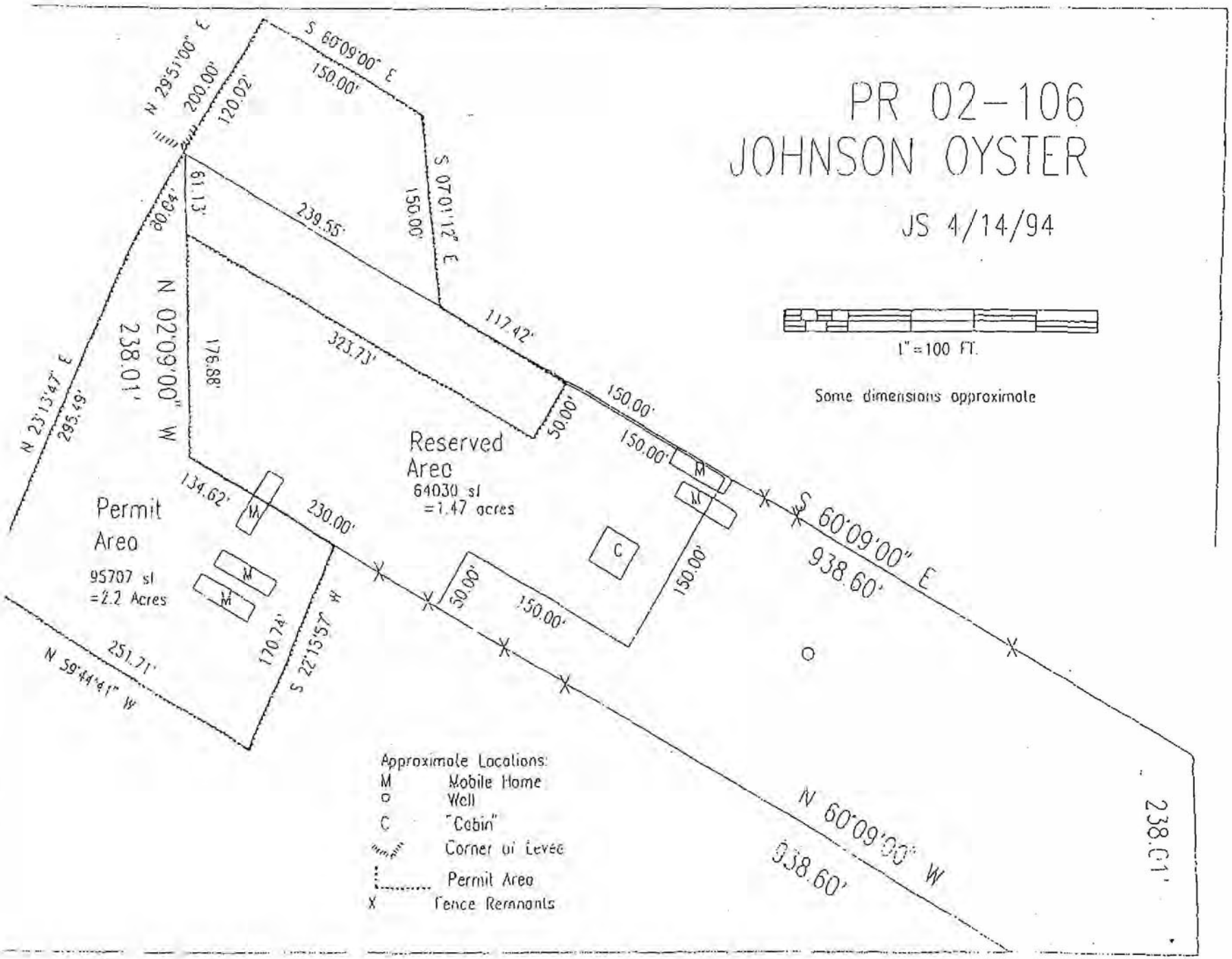


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EXHIBIT E

Map – Drakes Bay Oyster Company Sewage Area

EXHIBIT

Oyster Farm Leach Field (Approximate Location and Size)

Location Map

National Park Service

Point Reyes National Seashore

Marin County, CA

Oyster Farm Leach Field

0 175 350 525 700 Feet

Plot Date: 1/7/08 S:/GIS/projects1/Range/SpecialParkUses/DBOLeachField.mxd

"Kevin Lunny"
<kevin@drakesbayoyster.com>
12/31/2007 11:43 AM

To "Jon Jarvis" <jon_jarvis@nps.gov>
cc "Kevin Lunny" <kevin@drakesbayoyster.com>, "Lesley Guth" <lguth@sfchronicle.com>, "Peter Fimrite" <PFimrite@sfchronicle.com>, "John Diaz"
bcc
Subject SF Chronicle article - 12/28/07

Jon,

Attached is a letter seeking clarification of statements recently made to the SF Chronicle. As indicated in the letter, we are at a loss to understand what you said or why. The signed orginal is being put in the mail today.

The calendar tells our family that 2007 comes to a close without resolution on our permits and with every accusation made by NPS from last April and May back on the table. It's as if you hit the "refresh" button on the keyboard.

It is our sincere hope that 2008 brings us resolution and to achieve it, your leadership is required. The National Park Service has been part of my life since I was in "short pants." Our mutual relationship, until recent times, has always been excellent. We speak for the entire family when we say that we long for a return to those times.

On behalf of the Lunny family, we extend best wishes for a happy and healthy New Year.

Kevin and Nancy Lunny

Lunny to Jarvis re SF Chron.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

December 31, 2007

Jon Jarvis
Regional Director, Pacific West Region
National Park Service
1111 Jackson Street, Suite 700
Oakland, CA 94607

Dear Mr. Jarvis.

National Park Service (NPS) accusations of environmental harm by Drakes Bay Oyster Company (DBOC) in Drakes Estero made by you in an article published by the San Francisco Chronicle (*"Dispute Over Oysters in Drakes Bay Pits Harvester Against Park Service,"* December 28, 2007) require explanation and clarification. Your statements contradict retractions you issued last September.

As you are aware, on May 8, 2007 the Marin County Board of Supervisors adopted Agenda Item No. 7, *"Supervisor Kinsey requesting approval of a letter to Senator Dianne Feinstein regarding management of Drake's Bay Estero."* The Senator's assistance was requested after Don Neubacher, Point Reyes National Seashore Superintendent, informed Board President Steve Kinsey on April 5, 2007 that NPS was halting all work on permits for DBOC because of "criminal and civil" acts – green crimes and other violations of law and policy against the environment in Drakes Estero. In particular, Neubacher told Kinsey that NPS had overwhelming evidence that DBOC was harming harbor seals, a federally-protected marine mammal.

The Marin Board "Recommendation Memorandum" from Board President Kinsey states, *"Recently, I met with Superintendent Don Neubacher of the Point Reyes National Seashore and he shared his belief that the environmental consequences of the operation do not warrant facilitation of the necessary permits and regulatory actions required for the current owner to operate."* Given the serious and sweeping nature of these accusations, the Marin Board sought Senator Feinstein's involvement and assistance.

At that hearing, Superintendent Neubacher led a delegation of four NPS officials who submitted reports, maps and made new and still more serious allegations. Harm to harbor seals was called a

"national issue" and a recently-received letter from the Marine Mammal Commission was cited as *"another reason why the permit (to DBOC) is not available at this time."* Another NPS official testified declaring *"this year, chronic disturbance and placement of bags on the nursery area has caused an 80% reduction in the seals..."* These provocative charges were quickly picked up and repeated by various environmental groups and now, were repeated once again in the December 28, 2007 issue of the San Francisco Chronicle.

The only problem – these accusations were, and still are, false. Immediately upon receipt of the Marin Board letter, Senator Feinstein formally asked the NPS to provide her with full and complete administrative record of recorded ecological and environment harm by DBOC. Under the circumstances, one would expect NPS to rush forward with evidence of criminality and other wrong-doing. It did not happen. NPS took almost two months to respond to the Senator and when they did, there was nothing in that record. No letters. No violations. No citations. No record of meetings or telephone calls advising us of any wrong-doing. No administrative record of ecological or environmental harm to the Estero or its resources by DBOC. Similarly, California Department of Fish and Game, who owns the lease by which we operate in Drakes Estero, had not heard one word from NPS that substantiates NPS claims of ecological harm.

The Senator convened a meeting at Olema on July 21, 2007 attended by the representatives from the California Coastal Commission and California Department of Fish and Game (CDFG), Supervisor Kinsey and a delegation from NPS led by Director Bomar and Deputy Director Wenk, Superintendent Neubacher, you and others. I was present as was Dr. Goodman. At the conclusion of the meeting, Senator Feinstein and all parties agreed to, among other things:

- *remove* the NPS Report, *"Drakes Estero, A Sheltered Wilderness Estuary,"* from the Point Reyes National Seashore web site;
- *collaborate* with Dr. Goodman in the preparation of a statement of correction for positing on the Point Reyes National Seashore web site;
- *arrange,* in collaboration with Dr. Goodman and CFDG's Tom Moore, for an independent outside scientific review of the NPS Report, *"Drakes Estero, A Sheltered Wilderness Estuary,"* related public presentation and underlying NPS science to be undertaken;
- *release* all the harbor seal data to Dr. Goodman by August 6;
- *respond* to all outstanding FOIA requests;
- *withhold* the issuance of a Point Reyes National Seashore ready-to-be-released "rebuttal" paper to Dr. Goodman's testimony until the independent science review is completed; and,

- *provide* copies of peer reviews of the Drakes Estero Report to Dr. Goodman.

On September 19, 2007, you sent Dr. Goodman a NPS peer-reviewed document entitled, *"Clarification of Law, Policy and Science in Drakes Estero* " dated September 18, 2007 in which every major accusation made by Superintendent Neubacher and his staff against the Drakes Bay Oyster Company and its operations was **retracted**.

- NPS Accusations about Impacts to Fish – **RETRACTED**.
- NPS Accusations about Impacts to Sediment –**RETRACTED**.
- NPS Accusations about Impacts to Harbor Seals – **RETRACTED**.
- NPS Accusations about Impacts from Oyster Feces – **RETRACTED.**

Notwithstanding these **retractions** prepared by you and sent to Dr. Goodman, you now tell the San Francisco Chronicle that:

> ***"There are some inherent differences of opinion about whether there is a positive or negative effect on eelgrass, harbor seals and general water quality," said Jon Jarvis, the regional director for the Pacific West division of the National Park Service. "Our research would indicate there are some negative effects."***

Yet, 90 days ago, in your formal "*Clarification*" document, you stated:

With regard to eelgrass:

> ***The current level of impact to eelgrass beds by the oyster operation may or may not be significant to the overall persistence of eelgrass within Drakes Estero.***

With regard to oyster feces:

> ***The Eliott-Fisk et al (2005) report notes oyster feces are not a problem in Drakes Estero.***

With regard to water quality:

> ***The extent of indirect adverse impacts from boat operations or changes to water quality has not been measured and further research is clearly needed to determine the extent***

and persistence of these impacts.

With regard to harbor seals:

> ***More focused analyses are required to determine if oyster operations are affecting seal distribution and productivity within Drakes Estero. The overall Drakes Estero and regional population declined in 2007, but not necessarily in response to the oyster farming operations.***

Each of these retractions reversed accusations made by NPS during April and May 2007 in NPS Reports, NPS testimony or in NPS statements in the media.

If NPS determined in December 2007, as you have informed the Chronicle, that negative impacts are occurring, then such a determination could only come from new, undisclosed research conducted by or at the direction of NPS sometime after September 19, 2007.

(1) With regard to this new research, please provide a description of the scope and magnitude of it, and which issues were included or not, and kindly provide full and complete responses to the following questions:

(a) Identify the new research.

(b) Identify the author(s) of the new research.

(c) Did you contract for this new research or conduct it in-house?

(d) Provide the work plan for this new research.

(e) In the preparation of both the work plan and the resulting research, did NPS adhere to the DOI and NPS requirements for "scholarly analysis" as provided for in the NPS 2006 Management Policy? If so, please indicate how this was accomplished.

(f) Did you adhere to the Federal policies for peer-review of this new research?

(g) Provide a copy of the peer-review work plan and resulting recommendations as specified and described in your *Clarification* document.

(h) Provide a copy of the research product or products.

(i) Was the research, when completed, peer-reviewed to ensure conformity with the required peer-review plan?

(j) Since this research, based on your statement to the Chronicle, concluded there were negative impacts, why haven't you or staff from Point Reyes contacted us so that whatever problems were identified could be addressed?

(k) Why weren't we notified that this research was underway?

(l) Why weren't we informed when results were available?

(m) When and how did you notify CDFG?

With regard to harbor seals, the Chronicle story goes on to say:

> ***"Park service officials recently complained that Lunny expanded his operation to an area historically used by female harbor seals and their pups and that oyster boats were observed scaring off seals in the area. The park service said harbor seals declined from 250 to 50 in the area Lunny recently developed."***

These statements conflict with two very specific retractions made by you in your *Clarification* document from 90 days prior. At the end of September, the National Park Service, in its *Clarification* document did not know whether or not oyster operations were having any negative impacts to harbor seals and acknowledged that other factors may and likely do impact the harbor seal colony (ocean conditions, climate change, food availability, etc.). Yet, by December, NPS informs the Chronicle that (a) Park Service officials recently complained about the oyster farm; (b) we expanded our operation; (c) we expanded it into areas historically used by seals and pups; (d) oyster boats were observed scaring off seals; and (e) harbor seals declined five-fold – from 250 to 50 in the area specifically "developed" by our company (DBOC).

Presumably, to support these accusations, NPS developed new information and new documentation.

With regard to these NPS accusations:

(2) The Chronicle story states that "*Park Service officials recently complained...*"

(a) To whom did NPS complain?

(b) Why did NPS fail to complain to us?

(c) Did NPS complain to anyone else associated with DBOC? If so, please identify to whom and when?

(d) Provide the record made of that communication.

(e) Did NPS complain to CDFG? If so, please identify to whom and when.

(f) Provide the record made of the communication with CFDG.

(g) Did NPS file an official complaint to anyone who could have made a change in protocols during the 2007 harbor seal pupping season?

(3) The Chronicle story, in the same paragraph, goes on to state, *"... that Lunny expanded his operation to an area historically used by female harbor seals and their pups..."*

(a) Precisely to where did we expand our operation to areas "*historically used by female harbor seals and their pups*"?

(b) We and CDFG are certain that oysters are being grown only in historically utilized oyster beds. If NPS is aware of any newly developed oyster beds, please show on a historic 1992 map into which historic harbor seal haul-out area you are claiming that we expanded our operation.

(c) We are unaware of any change to the location of our oyster bags in 2007. Is NPS aware of any change in location outside or beyond historic growing beds?

(d) The oyster bags are on the island/sandbar UEN. The harbor seals are on the east side of island/sandbar UEN. Oysters have been grown this way, in the same places, for many decades. Explain what change in operations took place this year that is inconsistent with historic use.

(e) We are, however, now aware of a change to your harbor seal haul out map. This new haul out map, which was never provided to us, was included with the April 13 and 26, 2007 NPS Trip Reports and submitted to the Marin County Board of Supervisors on May 8, 2007. When was this new map created?

(f) Why was this new map created?

(g) Provide the new "science" to support the redrawing and expansion of harbor seal haul out boundaries.

(h) Harbor seals are known to stay near the edge of a sandbar and at an edge or lip immediately adjacent to deep water (to avoid danger and facilitate immediate escape). The new map extends the haul out area to the interior of an approximately 4,000' by 3,000' island sandbar. Does NPS have new science that now shows that harbor seals prefer the interior of sandbars away from the safety of immediate access to deep water?

(i) Why was the haul out map altered – redrawn – in the middle of the harbor seal pupping season?

(j) Is the only change this year a boundary change on your new map or do you have evidence that oyster bags were moved into pupping areas or areas outside our CFDG designated growing areas?

(k) Did you mean to say that the NPS expanded the boundary on the harbor seal haul-out map and that this new altered map now included the historic oyster bag area?

(l) Why did NPS withhold this newly prepared seal haul out map from us?

(m) When did you provide this altered map to CDFG? And if it was not provided, why not?

(n) Did you inform the Marin County Board of Supervisors that the map submitted to them at a formal hearing deviated from the 1992 map used to establish protocols?

(4) With regard to the NPS statement that *"...oyster boats were observed scaring off seals in the area."*

(a) Please provide the data to support this statement. Indicate time, date and all relevant information pertaining to each incident.

(b) Provide all data in the NPS Inventory and Monitoring Harbor Seal database to support this statement.

(c) In the two and one-half years of DBOC ownership by our family, leading up to April 24, 2007, provide all records of harbor seal flushes (most serious of NPS-defined disturbances) by the oyster company operations during the March-to-May pupping season in the NPS database.

(d) During the two and one-half year period cited above to April 24, 2007, there were, according to the NPS database (to which NPS has restricted access by your decision) more than 2,000 recorded sightings of harbor seals getting flushed into the water by kayakers, hikers, recreational clammers, airplanes, predators and other sources. Provide, for that same period, the NPS database records that document harbor seals being flushed into the water by the DBOC oyster operation.

(5) With regard to the NPS statement that *"The park service said harbor seals declined from 250 to 50 in the area Lunny recently developed."*

(a) Does this statement refer to sandbar A?

(b) Do you have any data to show that this alleged decrease in harbor seals on sandbar A had anything to do with our oyster operation?

(c) Do you have any evidence to show that our oyster bags are located on sandbar A?

(d) Do you have any evidence to show that we recently developed our oyster operations on sandbar A?

(e) Are you aware that sandbar A is connected to the mainland?

(f) What are the major sources of disturbances, and in particular seal flushings, on sandbar A?

(g) Did you tell Peter Fimrite, the Chronicle reporter, that sandbar A is far outside the oyster operation's lease?

(h) Did you tell the reporter that we have never cultured oysters of any kind on sandbar A?

(i) Are you aware that our crews, boats and equipment have never been anywhere near sandbar A?

(j) Are you aware that, according to NPS records, park visitors, airplanes, and predators are the major source of disturbances at sandbar A? Was the reporter informed about this?

(k) Are you aware that, according to NPS records, the seals that abandoned sandbar A in 2007 appear to have moved a few hundred yards to the east side of sandbar/island UEN, the sandbar/island that they share with the oyster bags?

(l) Are you aware and did you inform the Chronicle that there is approximately 1,000' between oyster bags placed in the inter-tidal zone on sandbar UEN and where the harbor seals haul out (on the eastern lip of that same sandbar) – a distance of more than three football fields?

(m) Are you aware that, with regard to harbor seals and placement of oyster bags, we operate pursuant to a 1992 Federal-State, multi-agency set of protocols and those protocols allow us to operate within 100 yards of harbor seals during pupping season – and we maintain, as a practical operational matter, a distance that is more than three times greater than required?

(n) Did the harbor seal population decline 80% in an area where we operate – or, where we recently developed as NPS testified and reported in May 2007 and NPS has since repeated elsewhere?

(o) Don't the NPS records show that one sandbar declined by 80%, but the adjoining sandbar increased by a similar percentage?

(p) Aren't the overall harbor seal population numbers from 2005 to 2006 and then 2007 within the management objectives of the Pinniped Long-Term Monitoring Program protocols?

(q) A 25% harbor seal population reduction should have triggered a "management action." With your report of a purported 80% reduction, was a "management action" initiated last May? Are you directing that one be triggered today?

(6) A short time ago, you provided ABC/KGO Channel 7 in San Francisco, pursuant to a FOIA request, a copy of a one-page email dated April 24, 2007, from NPS to NOAA, copied to Superintendent Neubacher, stating that NPS had no direct observations of the DBOC oyster operation disturbing harbor seals.

(a) Did you provide that email to the Chronicle reporter? If not, why not?

(b) Did you inform the reporter that NPS had "no observations" of harbor seal disturbances through April 24, 2007 by DBOC recorded in the NPS Inventory and Monitoring database?

(c) Given the statement in the April 24 email, why did Superintendent Neubacher fail to include this critical piece of information to the Marin County Board of Supervisors at the May 8, 2007 hearing?

(d) As the Superintendent's direct supervisor, did you know that this information was being withheld from the Board of Supervisors and the public?

(e) Did your Regional Chief Scientist, David Graber, clear or approve Mr. Neubacher's testimony to the Board, and if so, was he aware of that, as of April 24, NPS had no observations of harbor seal disturbances?

(f) In retrospect, do you believe it was appropriate to withhold this information from the Board of Supervisors?

(g) Why did Superintendent Neubacher testify that this was a "national issue" if it was not, according to documents provided to him fourteen days prior to the hearing?

(h) Why was this information withheld from our company?

(i) Why is NPS, pursuant to your direction, insisting on "mitigation" in our pending Permit for impacts to harbor seals while, at the same time, you are releasing emails pursuant to FOIA requests that reveal NPS had "no observations?"

(j) What was NOAA's response to the NPS April 24 email?

(k) Why was this information withheld from CDFG?

(7) What information and documents did NPS provide to the Chronicle reporter and specifically, did that information include the NPS/PRNS Trip Reports of April 13 and April 26 both of which contain copies of the altered seal haul out map?

(a) If you did provide the Chronicle reporter with the April 13 or 26, 2007 Trip Reports, did you inform him that serious questions have been raised by us as to their authenticity?

(b) Did NPS also provide the Chronicle with the 1992 inter-agency harbor seal haul-out map?

(c) Did you tell him that you were provided a copy of a letter sent to the Coastal Commission which sets forth why the April 26 Trip Report cannot possibly be accurate.

(d) Did you tell him that you were informed that our white oyster boat was broken and was not on the Estero that day?

(e) Did the Chronicle reporter know that our employees had already clocked out for the day when some of these observations were supposedly being made?

(f) Was the reporter told that the April 26 Trip Report contains claims concerning seals getting flushed into the water that were not entered into the official NPS harbor seal database in violation of NPS protocols?

(g) Did the Chronicle reporter know that the NPS never mentioned this April 26 Trip Report in its May 8th testimony to the Marin County Board of Supervisors or in its May 11th version of the NPS Drakes Estero Report?

(h) Did you tell the reporter that the first time the April 26 Trip Report was referenced was in the September 11 report to the California Coastal Commission by Dr. John Dixon?

(i) Was the Chronicle reporter informed that the now-questionable April 26 Trip Report is the only harbor seal data referenced by Dr. John Dixon in the California Coastal Commission report of September 11?

(j) Moreover, did he know that Dr. John Dixon was apparently unaware that he too had been given a new map with an altered harbor seal haul-out boundary?

One final question – do you stand by the NPS Clarification letter from last September or are you withdrawing the retractions you made public at that time?

The NPS statements to the Chronicle are needlessly inflammatory, contradictory, and plainly wrong. You are either unfamiliar with your own NPS record in this matter or your actions are deliberate. We don't know which and will reserve judgment.

You issued the Clarification document; the so-called "rebuttal" to Dr. Goodman, even though Senator Feinstein directed you not to do so. In it, speaking for NPS, you retracted every categorical major accusation made against the Drakes Bay Oyster Company. Today, you overturn that which is already discredited – NPS statements, NPS testimony, and NPS reports. We are at a loss to understand what you are doing and saying, or understand why. We candidly admit – it makes no sense to us.

One thing is clear – these NPS management inconsistencies are harming our company and have repeatedly interfered with our ability to finalize action on pending permits or to move forward.

You are overturning or undermining almost every agreement reached at Olema. And, we are the object of NPS accusations, one after another. None right. None justified. To what end?

The Freedom of Information Act requests we submit to NPS are rarely answered, and if they are answered, are late and incomplete. You continue to withhold the 1973 – 1996 harbor seal data from Dr. Goodman incorrectly invoking inappropriate exemptions. In one, sent last October, we inquired as to the date the NPS' Drakes Estero Report was first published as it is undated. It was a simple, straight-forward uncomplicated and non-controversial inquiry. Two months later, the NPS response, signed by you, was, "*we are uncertain of what you mean by the word, 'publication'*".

And most recently, you submitted a proposal for an independent scientific review to the National Academy of Sciences that overturned the Olema directive. First, you excluded CDFG's Tom Moore. Then, after telling Dr. Goodman that all parties would go to the National Academy of Sciences together, you ignored that too. You submitted the NPS proposal without telling Dr. Goodman for two weeks. As for DBOC in the process, you elected to exclude us altogether. Worst of all, instead of an independent scientific investigation into the Drakes Estero Report, presentations and underlying science as directed at Olema and agreed to by all parties, you asked the National Academy of Sciences to investigate the Drakes Bay Oyster Company.

We are third generation family farmers at Drakes Estero. I have lived my entire life and we have raised our triplets here. Our love for the Point Reyes National Seashore is complete and total. This truly is one of the most beautiful places on this planet. It is also an ideal place to grow oysters and practice sustainable agriculture. Oysters are being reinstated and restored in Washington state, up and down the Atlantic Coast (especially in the Chesapeake Bay), and in the Gulf Coast. The "ecological services" provided by oysters are being recognized throughout our Nation except here. Three years ago, January 2005, our family purchased the oyster farm and spent a third of a million dollars cleaning up numerous problems at the farm and surrounding areas, including the Estero. These were legacy problems from the previous owner, not from the Lunny ownership. Prior to that purchase, we never had a cross word with the National Park Service.

That changed shortly after the purchase in January 2005. Since then, we feel like we have been constantly under attack.

Something is terribly wrong. Instead of resolving our differences, you are working overtime to make them worse. For that, our hearts are heavy. We are being treated unjustly. Our family is intimidated and fearful for our future and our financial survival.

If these questions are answered, fully and completely, it can be a starting point for progress. The choice is up to you.

Sincerely,

Kevin Lunny Nancy Lunny

cc: Peter Fimrite, San Francisco Chronicle
Lesley Guth, San Francisco Chronicle
John Diaz, San Francisco Chronicle

George Turnbull/OAKLAND/NPS
12/21/2007 04:04 PM

To Jon Jarvis/OAKLAND/NPS@NPS, "Kevin Lunny" <kevin@drakesbayoyster.com>, "Walton, Zachary R." <zacharywalton@paulhastings.com>
cc
bcc
Subject Next DBOC meeting re. SUP

Kevin/Zach,

Based on our most recent discussions, attached is a redline version of the current draft of the special use permit to reflect changes in "onshore" provisions. Hopefully you are available for our January 25 face-to-face meeting in Oakland (at 10 am). I also propose we have another conference call on either Monday January 14 (after 2 pm) or Tuesday January 15 (after 1 pm) to continue our "onshore" dialogue. Let me know if either of these dates work.

Hope you both have happy holidays....

George

DrakesBayOysterSUP Draft 12.21.07 -- redline shows difference with NPS 11.27.07 draft.pdf

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2007
Reviewed 20
Reviewed 20
Expires November 30, 2012

Permit # MISC-8530-6000-8002
Type Park Code No. #

Long Term X
Short Term

Point Reyes National Seashore
Name of Area

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on _____, 2007 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP"); and the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"); the land designated as the "Well Area" on the map attached hereto as Exhibit D ("Drakes Bay Oyster Company Well Area"); and the land designated as the "Sewage Area" on the map attached hereto as Exhibit E ("Drakes Bay Oyster Company Sewage Area"). ~~In addition, the Permittee intends to fence off some of the boundaries of the SUP Area shown on Exhibit B, and in the event of any conflict between Exhibit B and fencing provided by the Permittee, the fencing will control.~~ Collectively, the areas so designated shall be referred to as the "Premises." The Premises governed by this Permit do not include the area designated as the ROP Area on the map attached hereto as Exhibit B.

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Use of the area designated as the "Well Area" on the map attached hereto as Exhibit D for the purpose of supplying water for the Drakes Bay Oyster Company facilities using Permittee well, pump, and pipelines. Use of the area designated as the "Sewage Area" on the map attached hereto as Exhibit E for the purpose of use and maintenance of existing sewage pipeline and sewage leachfield to service the Drakes Bay Oyster Company facilities. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required		Not Required X	Amount:
LIABILITY INSURANCE:	Required X		Not Required	Amount: As set forth in Article 15 of this Permit.

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year, plus an amount to be determined by appraisal for the use of the Sewage Area and the Well Area including water use.

PERMITTEE: _____

Signature | Organization | Date

Authorizing Official: _____ George Turnbull _____

Signature | Deputy Regional Director | Date

Additional Authorizing Official: _____

(If Required) Signature | Title | Date

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D: Map – Drakes Bay Oyster Company Well Area

EXHIBIT E: Map – Drakes Bay Oyster Company Sewage Area

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described In this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) ~~Permittee's operations are to be set back on the shore a minimum of 50 feet from the mean high tide mark, excepting that area which is the subject of this Permit and that is described in the attached map (Exhibit B)~~Members of the general public visiting the Drakes Bay Oyster Company operation may park in the adjacent NPS parking area and walk over to the SUP or ROP areas.

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, which can include occasional inspections required by Agencies, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area. To comply with this paragraph, Permittee will not encourage barbecuing in the SUP Area.; ~~visitors may be directed to facilities located at Drakes Beach.~~ Picnic tables will be provided by the NPS at the adjacent parking area.

k) ~~No~~Unauthorized discharge into the estuary is prohibited~~ermitted~~. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, Permittee will ensure that Permittee and Permittee's officers, agents, employees, and contractors comply with ~~no pets, including dogs and cats, shall be permitted in the Special Use Permit Area~~Applicable Laws regarding pets, including the NPS regulation at 36 C.F.R. § 2.15.

~~m)~~In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

m)

4) SPECIAL PERMIT CONDITIONS

a) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) The maximum annual production limit for oysters, rock scallops and clams will be 700,000 pounds.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) Permittee and Permitter acknowledge the importance of preventing the introduction of invasive species into the estuary. In order to control invasive species, Permittee will make every effort to ensure that no new species enter the estuary and to minimize the spread of invasive species as a result of Permittee's operations. Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval an invasive species mitigation plan that includes best management practices (BMP's).

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the California Department of Fish and Game ("CDFG"). Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel or any other channel is authorized during the pupping harbor seal closure period.

viii) In order to avoid introduction of invasive species to Drakes Estero only oyster "seed" and not whole oysters may be imported. Seed must be obtained from regions approved by Permitter. At issuance of this Permit Washington, Oregon, and California are exclusively approved regions for obtaining oyster seed.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs, provided that Permittee and Permitter acknowledge that certain repairs are necessary to comply with Applicable Laws. Permittee will make such repairs at its sole cost and expense in compliance with Applicable Laws.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable

Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site, without the presence of an NPS archeological monitor.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) As set forth in Section 3(~~km~~) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS ~~legislation, the Code of Federal Regulations, and NPS policies, including but not limited to NPS Management Policies 2006, as such may be amended~~laws, regulations, and policies.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species, except for the cultivation of the shellfish species authorized by this Permit.

c) As set forth in Section 3(j) of this Permit, Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites.

d) On a case by case basis, the Permitter will evaluate incidences of depredation caused by Permittee and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles or for standard household cleaners. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes, except as authorized by Applicable Laws.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past, ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any final report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e). Notwithstanding the foregoing, neither Permittee nor Permitter shall be required to provide a report under this Section 14(e) if such report is protected by attorney-client privilege.

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action,

judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Except as provided in Paragraph 3(g), Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual

Meeting).

c) Docks and Fences shall be maintained in good condition and shall be timely repaired in conformance with Applicable Laws ~~must be in good repair~~. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) New ~~L~~lighting under Permittee's control of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road from Sir Francis Drake Boulevard to the SUP Area will be maintained by the NPS. The Park will respond in a timely manner to Permittee and/or visitor complaints regarding the condition of the main entrance road.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines within the Premises. ~~from the main line to the structures within the Premises.~~ Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall maintain the sewage pipeline and sewage leachfield in the "Sewage Area."

~~h~~)i) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA; NHPA

a) General Compliance. As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee relate to ~~require~~ the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA") ~~("Compliance Activity")~~, Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. ~~If Permitter determines that the Compliance Activity is warranted,~~ Permitter will pay for the preparation of e-NEPA or NHPA documents ~~as appropriate~~. If there is litigation regarding NEPA or NHPA compliance, it will not trigger the indemnification requirements of Article 16. ~~Permittee shall not implement any aspect of the Compliance Activity until all applicable NEPA and NHPA requirements have been met.~~

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit. ~~Any proposed changes or modifications to this Permit which are required in order to meet National Park Service requirements or objectives shall be discussed and negotiated at the Annual Meeting. If National Park Service requirements or objectives require prompt attention, the date of the Annual Meeting may reasonably be changed by Permitter.~~

22) PROCEDURE IN CASE OF DEFAULT

[Drakes Bay Oyster Company to propose a provision.]

a) This Permit is made upon the express condition that if Permittee fails to keep and perform any of the Provisions of this Permit, this Permit shall become void at the option of Permitter, provided that Permitter shall first give Permittee thirty days written notice ("thirty day notification period") of Permitter's intention to revoke this Permit and regain possession of the Premises. The notice shall describe the specific Default and shall state Permitter's intention to reenter the Premises and declare this Permit forfeited if such Default continues. Such notice shall be served in the manner provided in Article 29 of this Permit.

b) The parties agree to meet promptly within the thirty day notification period to discuss the reasons for the notice and to try to resolve their differences.

c) If Permittee does not cure the Default or present a reasonable plan therefor within the thirty (30) day period, then Permitter shall be entitled to the possession of the Premises, and may enter into and upon the same or any part thereof and repossess the same and expel Permittee and those claiming through or under Permittee and remove their effects without being guilty of any manner of trespass and without any prejudice to any remedies that might otherwise be used for arrears of rent or preceding Default.

d) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES; RESTORATION

A) On the Termination Date of this Permit, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the Termination Date, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this

Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference,

constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the

singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

EXHIBIT A

Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D

Map – Drakes Bay Oyster Company Well Area

EXHIBIT E

Map – Drakes Bay Oyster Company Sewage Area

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:

NOV 2 8 2007

L1425 (PWR-DRD)

Kevin and Nancy Lunny
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

Dear Kevin and Nancy Lunny:

Thank you for taking the time to speak with us on November 20, 2007 regarding finalizing negotiations for a special use permit for use of the estuary and shoreline in Drakes Estero. We are looking forward to meeting with you on December 3, 2007 to continue our negotiations. As we discussed, please find enclosed a draft of the special use permit for your consideration. This permit includes a revised harbor seal protocol as well as a revised provision regarding the term of the permit.

We look forward to meeting with you next Monday.

Sincerely,

Jonathan B. Jarvis
Regional Director, Pacific West Region

cc: George Turnbull, PWR-DRD
Don Neubacher, PWR-PORE
Suzanne Boyce-Carlson, SOL

TAKE PRIDE® IN AMERICA

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2007
Reviewed 20
Reviewed 20
Expires November 30, 2012

Permit # MISC-8530-6000-8002
Type Park Code No.#

Long Term X
Short Term

Point Reyes National Seashore
Name of Area

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on _____, 2007 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP") and the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"). In addition, the Permitter intends to fence off some of the boundaries of the SUP Area shown on Exhibit B, and in the event of any conflict between Exhibit B and fencing provided by the Permitter, the fencing will control. Collectively, the areas so designated shall be referred to as the "Premises."

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required	Not Required X	Amount:
LIABILITY INSURANCE:	Required X	Not Required	Amount: As set forth in Article 15 of this Permit.

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year.

PERMITTEE: _____
Signature Organization Date

Authorizing Official: _____ George Turnbull
Signature Deputy Regional Director Date

Additional Authorizing Official: _____

(If Required)	Signature	Title	Date

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described in this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Permittee's operations are to be set back on the shore a minimum of 50 feet from the mean high tide mark, excepting that area which is the subject of this Permit and that is described in the attached map (Exhibit B).

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area; visitors may be directed to facilities located at Drakes Beach. Picnic tables will be provided by the NPS at the adjacent parking area.

k) No discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, no pets, including dogs and cats, shall be permitted in the Special Use Permit Area.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

a) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) The maximum annual production limit for oysters, rock scallops and clams will be 700,000 pounds.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) Permittee and Permitter acknowledge the importance of preventing the introduction of invasive species into the estuary. In order to control invasive species, Permittee will make every effort to ensure that no new species enter the estuary and to minimize the spread of invasive species as a result of Permittee's operations. Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval an invasive species mitigation plan that includes best management practices (BMP's).

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the California Department of Fish and Game ("CDFG"). Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel or any other channel is authorized during the pupping harbor seal closure period.

viii) In order to avoid introduction of invasive species to Drakes Estero only oyster "seed" and not whole oysters may be imported. Seed must be obtained from regions approved by Permitter. At issuance of this Permit Washington, Oregon, and California are exclusively approved regions for obtaining oyster seed.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner

and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) As set forth in Section 3(m) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS legislation, the Code of Federal Regulations, and NPS policies, including but not limited to NPS Management Policies 2006, as such may be amended.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species.

c) As set forth in Section 3(j) of this Permit, Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites.

d) On a case by case basis, the Permitter will evaluate incidences of depredation and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past, ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors,

Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e).

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or

its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences must be in good repair. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) Lighting of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road will be maintained by the NPS.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines from the main line to the structures within the

Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee require the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA") ("Compliance Activity"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. If Permitter determines that the Compliance Activity is warranted, Permitter will prepare NEPA or NHPA documents as appropriate. Permittee shall not implement any aspect of the Compliance Activity until all applicable NEPA and NHPA requirements have been met.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit. Any proposed changes or modifications to this Permit which are required in order to meet National Park Service requirements or objectives shall be discussed and negotiated at the Annual Meeting. If National Park Service requirements or objectives require prompt attention, the date of the Annual Meeting may reasonably be changed by Permitter.

22) PROCEDURE IN CASE OF DEFAULT

a) This Permit is made upon the express condition that if Permittee fails to keep and perform any of the Provisions of this Permit, this Permit shall become void at the option of Permitter, provided that Permitter shall first give Permittee thirty days written notice ("thirty day notification period") of Permitter's intention to revoke this Permit and regain possession of the Premises. The notice shall describe the specific Default and shall state Permitter's intention to reenter the Premises and declare this Permit forfeited if such Default continues. Such notice shall be served in the manner provided in Article 29 of this Permit.

b) The parties agree to meet promptly within the thirty day notification period to discuss the reasons for the notice and to try to resolve their differences.

c) If Permittee does not cure the Default or present a reasonable plan therefor within the thirty (30) day period, then Permitter shall be entitled to the possession of the Premises, and may enter into and upon the same or any part thereof and repossess the same and expel Permittee and those claiming through or under Permittee and remove their effects without being guilty of any manner of trespass and without any prejudice to any remedies that might otherwise be used for arrears of rent or preceding Default.

d) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

A) On the Termination Date of this Permit, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the Termination Date, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

Drakes Estero Aquaculture and
Harbor Seal Protection Protocol

The following items are mutually agreed to for protection of harbor seals in and adjacent to the Harbor Seal Haul-Out Zones identified in the Map entitled, "Drake's Estero Aquaculture & Seal Protection Zones," attached hereto and incorporated herein by reference ("Protocol Map"):

1. During the breeding season, March 1 through June 30, the "Main Channel" and "Lateral Channel" of Drakes Estero will be closed to boat traffic.[a] The channels and other areas discussed in this Protocol are identified on the Protocol Map.

2. During the breeding season, Permittee boats may use the "West Channel" at low speed while maintaining a distance of at least 200 yards from seals. During the breeding season, Permittee may maintain bags in the area labeled on the Protocol Map as "Breeding Season Area," provided that Permittee boats and personnel maintain a distance of at least 200 yards from seals.

3. During the remainder of the year outside the breeding season, from July 1st to the end of February, Permittee may use the three channels and may maintain bags in the area labeled on Protocol Map as "Non-Breeding Season Area," provided that Permittee boats and personnel maintain a distance of at least 100 yards from seals.

4. Throughout the year, no motorized watercraft may enter the area labeled as "Existing Wilderness" on the Protocol Map.

[a] The dates March 1 and June 30 are based on the birthing dates of seals at haul out sites during the breeding season. Pregnant female seals usually arrive around a week before giving birth. The earliest dates of first pup observed in Drakes Estero over the past five years were March 3 and March 6. At Tomales Bay the earliest date in 2007 was 14 February.

PORE

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:

DEC 17 2007

L1425(PWR-C)
Tract 02-106 PORE

RECEIVED
Point Reyes
National Seashore
DEC 18 '07
SUPT.
SCIENCE
SPEC PR USES
LAW ENFORCE.
RESOURCE MGMT.
RANGE CONS.
FIRE MGT.
INTERP.
CULL RES.
MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

Mr. and Mrs. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

Dear Mr. and Mrs. Lunny:

This letter is in response to your October 23, 2007, letter regarding clarification of law, policy and science on Drakes Estero. We are providing answers to your questions in a table format for your perusal.

We are doing so even though the Freedom of Information Act ("FOIA") does not require agencies to answer questions or to create documents in response to requests. By providing this information, the NPS has not waived its ability to invoke applicable FOIA exemptions for similar or related information in the future.

We hope the information is helpful to you.

Sincerely,

George P. Turnbull

FOR Jonathan B. Jarvis
Regional Director, Pacific West Region

Enclosure

TAKE PRIDE IN AMERICA

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

October 23, 2007

Jon Jarvis
Regional Director
National Park Service
Pacific West Regional Office
One Jackson Center
1111 Jackson Center, Suite 700
Oakland, CA 94607

Re: National Park Service, Clarification of Law, Policy and Science on Drakes Estero

Dear Mr. Jarvis.

On September 18, 2007, you sent the document *"Clarification of Law, Policy, and Science on Drakes Estero"* to Dr. Goodman and have widely circulated it since.

According to your statement, at the bottom of page 5 and top of the following page:

> "With regards to NPS studies within the estero, we wish to clarify points regarding the independence and quality of NPS data. Dr. Goodman questions the quality of the data collected by NPS biologists and others as not independent and not peer-reviewed through published scientific journals. It is true that much of the research within the NPS is applied and often not published in scientific journals; nevertheless, research projects within the NPS are submitted to a rigorous peer-review process that includes scientists from the NPS, other agencies, and academia. An implementation plan is required before a project can begin which requires a detailed description and peer-review of the methods. The protocol development, although not as rigorous as the journal publication process, nevertheless does subject NPS applied

research projects to a significant degree of review intended to insure the quality of the research and the integrity of the findings. The Point Reyes National Seashore Park News publication, "Drakes Estero - A Sheltered Wilderness Estuary," for example was reviewed by scientists from the U.S. Geological Survey and NPS."

This clarification is instructive.

To further assist our understanding of the NPS process regarding the preparation and presentation of research reports, would you provide the following:

(1) **According to your letter and this NPS Statement, "*research projects within the NPS are submitted to a rigorous peer-review process that includes scientists from NPS, other agencies and academia.*"**

(a) When was this peer-review process initiated for the NPS report, *"Drakes Estero, A Sheltered Wilderness Estuary?"*

(b) Identify each NPS scientist who participated in the peer-review process for this report.

(c) Identify each scientist from other agencies who participated in the peer-review process for this report.

(d) Identify each member of academia who participated in the peer-review process for this report.

(e) Provide copies of the instructions and documents provided to each participant in the peer-review process.

(f) Provide reviewer comments pursuant to this process.

(g) Provide the dates of meetings, who attended and participated and copies of the agenda.

(h) In the preparation and publication of the Drakes Estero Report, did NPS fully adhere to Federal policy requirements for peer review?

(2) **According to your Clarification letter, "*an implementation plan is required before a project can begin which requires a detailed description and a peer-review of the methods.*"**

(a) When did this project – the preparation of this report – begin?

(b) When was the required "Implementation Plan" initiated? Completed?

(c) When completed, what was the Implementation Plan approval process and who approved it?

(d) Provide a copy of the implementation plan.

(3) **According to your Clarification letter, "*The protocol development, although not as rigorous as the journal publication process, nevertheless does subject NPS applied research projects to a significant degree of review intended to insure the quality of the research and the integrity of the findings.*"**

(a) Describe the "*protocol development*" as applied to *"Drakes Estero, A Sheltered Wilderness Estuary*."

(b) Provide copies (or results) of the "protocol development."

(c) When were the protocols approved and who approved them?

(4) **According to the "Clarification" document cited above, at its conclusion, "*The Point Reyes National Seashore Park News publication, "Drakes Estero - A Sheltered Wilderness Estuary," for example was reviewed by scientists from the U.S. Geological Survey and NPS.*"**

(a) Identify the "scientists" from the USGS who participated in the review.

(b) At what point in the process did they initiate their review?

(c) Provide copies of their review and/or their comments in whatever form they were provided.

(d) Identify the "scientists" from the National Park Service in the same review.

(e) When did this review occur?

(f) Provide copies of their review and/or comments on the proposed research project in whatever form they were provided.

(5) **Did anyone else, outside of the NPS, other agencies and/or academia participate in the review and/or preparation of the Drakes Estero Report – at any time during the process? If so, please identify that individual or those individuals.**

As you are aware, the NPS report, "*Drakes Estero, A Sheltered Wilderness Estuary*," is very important and we have spent considerable time and effort to fully understand it. Your responses to these questions assist us in that effort.

Thank you.

Kevin Lunny

Nancy Lunny

"Kevin Lunny"
<kevin(b) (6)
12/11/2007 07:21 AM

To "Ben Becker" <ben_becker@nps.gov>
cc
bcc
Subject FW: NPS Drakes Estero Report Reviewer Survey - November 6, 2007

Dear Ben,

"DBOC has not received your response to the Peer-Review Survey, Drakes Estero, A Sheltered Wilderness Estuary. We ask that you take a few moments and respond." We thank you.

Kevin and Nancy Lunny

-----Original Message-----
From: Kevin Lunny [mailto:kevin@drakesbayoyster.com]
Sent: Tuesday, November 06, 2007 1:36 AM
To: Ben Becker (ben_becker@nps.gov)
Subject: NPS Drakes Estero Report Reviewer Survey - November 6, 2007

Dear Ben:

Last July, NPS Regional Director, Jon Jarvis and PRNS Superintendent, Don Neubacher, announced, at a meeting called by Senator Feinstein that several scientists peer-reviewed the NPS Report, *Drakes Estero, A Sheltered Wilderness Estuary* . Regional Director Jarvis recently indicated that you were among those reviewers.

So that we better understand the review, we ask that you take a few minutes to fill out the enclosed Survey on this NPS Report. The attached survey is computer based, and we recommend that you save the attachment to your hard drive, fill it out, then email it back to us as an attachment. If you would prefer to fill it out by hand and snail-mail it to us, you could do that as well.

If you have any questions, or want additional information, please contact us at Drakes Bay Oyster Company at kevin@drakesbayoyster.com or nancy@drakesbayoyster.com OR (415) 669-1149. Our mailing address is 17171 Sir Francis Drake Boulevard, Inverness, CA 94937.

Thank you.

Kevin Lunny Nancy Lunny

NPS Drakes Estero Report Reviewer Survey - November 6, 2007.doc

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

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Point Reyes National Seashore
NATIONAL PARK SERVICE
DEC 3 '07
SUPT.
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RANGE CONS.
FIRE MGT.
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IN REPLY REFER TO:

NOV 2 8 2007

L1425 (PWRO-DRD
62-106
Kevin and Nancy Lunny
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

Dear Kevin and Nancy Lunny:

This letter is in response to your November 4, 2007 letter regarding the Drakes Bay Oyster Company and repairs to buildings. It is our preference to focus on finalizing negotiations regarding a special use permit which would address repairs rather than treating the repairs as a separate issue. To this end, we are sending under separate cover a draft of the special use permit for your consideration in advance of our meeting scheduled for December 3, 2007.

Nevertheless, we are prepared to authorize minor repairs separately provided appropriate approvals are in place. As was previously stated in a June 19, 2007 letter to you, we are not opposed to allowing minor repairs to existing structures to occur once approval is received from the California Coastal Commission and any other relevant agencies. For the record, this June 19, 2007 letter also stated that we were prepared to apply the conditions in the Reservation of Use and Occupancy to the area located in the Stevens survey.

We recently contacted the Coastal Commission staff, and they have informed us that either a Coastal Development Permit or a waiver still needs to be obtained from them before the repairs can be accomplished. If you have additional information regarding this issue, please contact us. As we stated in the above paragraph, we are prepared to authorize the repairs once you have the proper authorizations from relevant agencies.

Finally, we want to reiterate our readiness to finalize negotiations for a special use permit, and we look forward to meeting with you on December 3, 2007.

Sincerely,

George J. Turnbull

George J. Turnbull
Deputy Regional Director, Pacific West Region

Enclosure

cc: Don Neubacher, Superintendent, PORE
Suzanne Boyce-Carlson, SOL

TAKE PRIDE® IN AMERICA

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:

NOV 2 8 2007

L1425 (PWR-DRD)

Kevin and Nancy Lunny
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

Dear Kevin and Nancy Lunny:

Thank you for taking the time to speak with us on November 20, 2007 regarding finalizing negotiations for a special use permit for use of the estuary and shoreline in Drakes Estero. We are looking forward to meeting with you on December 3, 2007 to continue our negotiations. As we discussed, please find enclosed a draft of the special use permit for your consideration. This permit includes a revised harbor seal protocol as well as a revised provision regarding the term of the permit.

We look forward to meeting with you next Monday.

Sincerely,

Jonathan B. Jarvis
Regional Director, Pacific West Region

cc: George Turnbull, PWR-DRD
Don Neubacher, PWR-PORE
Suzanne Boyce-Carlson, SOL

TAKE PRIDE IN AMERICA

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2007
Reviewed 20
Reviewed 20
Expires November 30, 2012

Permit # MISC-8530-6000-8002
Type Park Code No. #

Long Term X
Short Term

Point Reyes National Seashore
Name of Area

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on _____, 2007 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP") and the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"). In addition, the Permitter intends to fence off some of the boundaries of the SUP Area shown on Exhibit B, and in the event of any conflict between Exhibit B and fencing provided by the Permitter, the fencing will control. Collectively, the areas so designated shall be referred to as the "Premises."

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required		Not Required X	Amount:
LIABILITY INSURANCE:	Required X		Not Required	Amount: As set forth in Article 15 of this Permit.

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $**2,800.00** per year.

PERMITTEE: _____
Signature Organization Date

Authorizing Official: _____ George Turnbull
Signature Deputy Regional Director Date

Additional Authorizing Official: _____

(If Required)	Signature	Title	Date

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described In this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Permittee's operations are to be set back on the shore a minimum of 50 feet from the mean high tide mark, excepting that area which is the subject of this Permit and that is described in the attached map (Exhibit B).

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area; visitors may be directed to facilities located at Drakes Beach. Picnic tables will be provided by the NPS at the adjacent parking area.

k) No discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, no pets, including dogs and cats, shall be permitted in the Special Use Permit Area.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

a) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) The maximum annual production limit for oysters, rock scallops and clams will be 700,000 pounds.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) Permittee and Permitter acknowledge the importance of preventing the introduction of invasive species into the estuary. In order to control invasive species, Permittee will make every effort to ensure that no new species enter the estuary and to minimize the spread of invasive species as a result of Permittee's operations. Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval an invasive species mitigation plan that includes best management practices (BMP's).

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the California Department of Fish and Game ("CDFG"). Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel or any other channel is authorized during the pupping harbor seal closure period.

viii) In order to avoid introduction of invasive species to Drakes Estero only oyster "seed" and not whole oysters may be imported. Seed must be obtained from regions approved by Permitter. At issuance of this Permit Washington, Oregon, and California are exclusively approved regions for obtaining oyster seed.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner

and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) As set forth in Section 3(m) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS legislation, the Code of Federal Regulations, and NPS policies, including but not limited to NPS Management Policies 2006, as such may be amended.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species.

c) As set forth in Section 3(j) of this Permit, Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites.

d) On a case by case basis, the Permitter will evaluate incidences of depredation and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past, ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors,

Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e).

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or

its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences must be in good repair. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) Lighting of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road will be maintained by the NPS.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines from the main line to the structures within the

Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee require the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA") ("Compliance Activity"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. If Permitter determines that the Compliance Activity is warranted, Permitter will prepare NEPA or NHPA documents as appropriate. Permittee shall not implement any aspect of the Compliance Activity until all applicable NEPA and NHPA requirements have been met.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit. Any proposed changes or modifications to this Permit which are required in order to meet National Park Service requirements or objectives shall be discussed and negotiated at the Annual Meeting. If National Park Service requirements or objectives require prompt attention, the date of the Annual Meeting may reasonably be changed by Permitter.

22) PROCEDURE IN CASE OF DEFAULT

a) This Permit is made upon the express condition that if Permittee fails to keep and perform any of the Provisions of this Permit, this Permit shall become void at the option of Permitter, provided that Permitter shall first give Permittee thirty days written notice ("thirty day notification period") of Permitter's intention to revoke this Permit and regain possession of the Premises. The notice shall describe the specific Default and shall state Permitter's intention to reenter the Premises and declare this Permit forfeited if such Default continues. Such notice shall be served in the manner provided in Article 29 of this Permit.

b) The parties agree to meet promptly within the thirty day notification period to discuss the reasons for the notice and to try to resolve their differences.

c) If Permittee does not cure the Default or present a reasonable plan therefor within the thirty (30) day period, then Permitter shall be entitled to the possession of the Premises, and may enter into and upon the same or any part thereof and repossess the same and expel Permittee and those claiming through or under Permittee and remove their effects without being guilty of any manner of trespass and without any prejudice to any remedies that might otherwise be used for arrears of rent or preceding Default.

d) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

A) On the Termination Date of this Permit, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the Termination Date, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

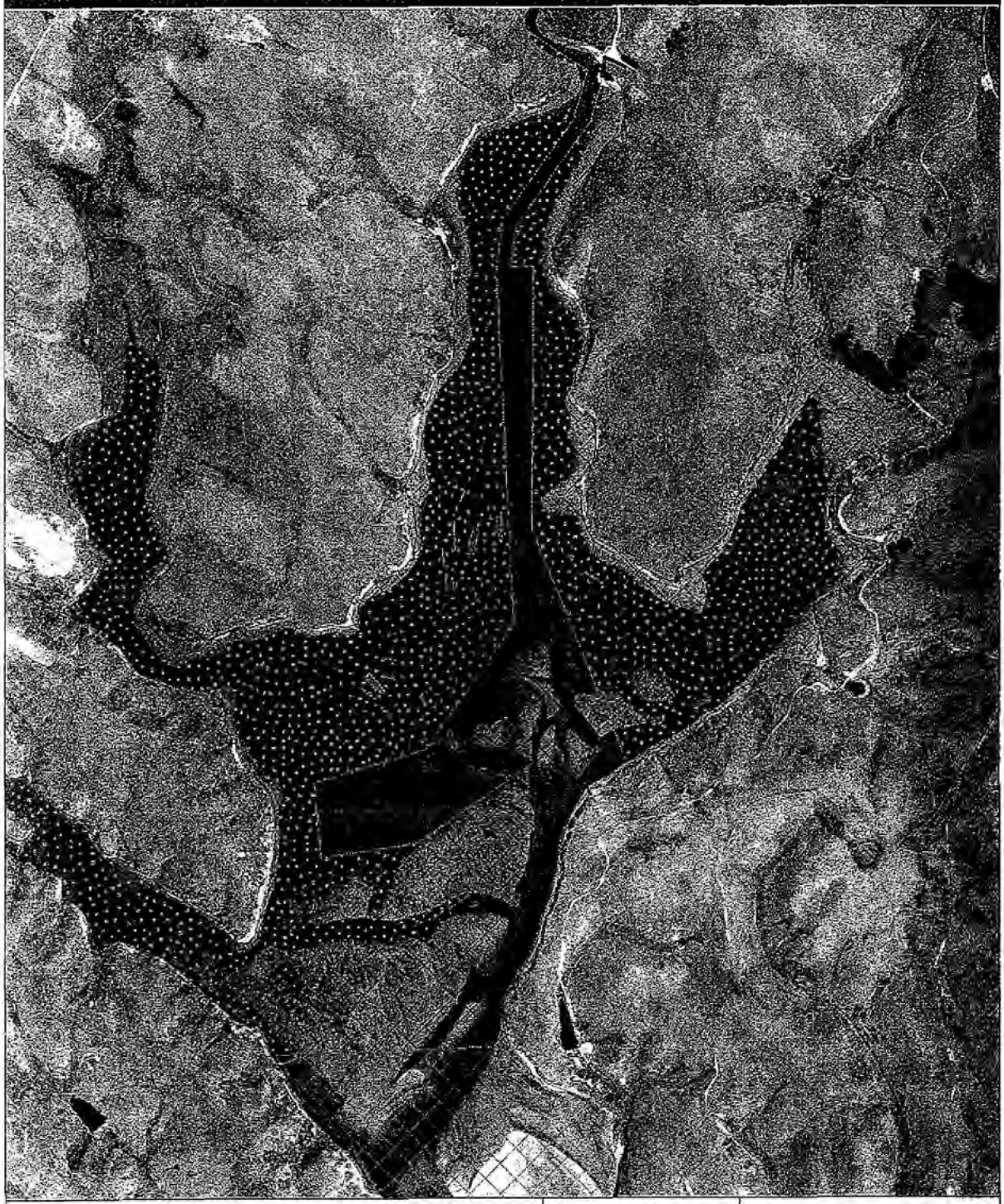
42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior



Permit Type

- ROP
- SUP

Oyster Racks

- Active
- Dilapidated

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

Map Location

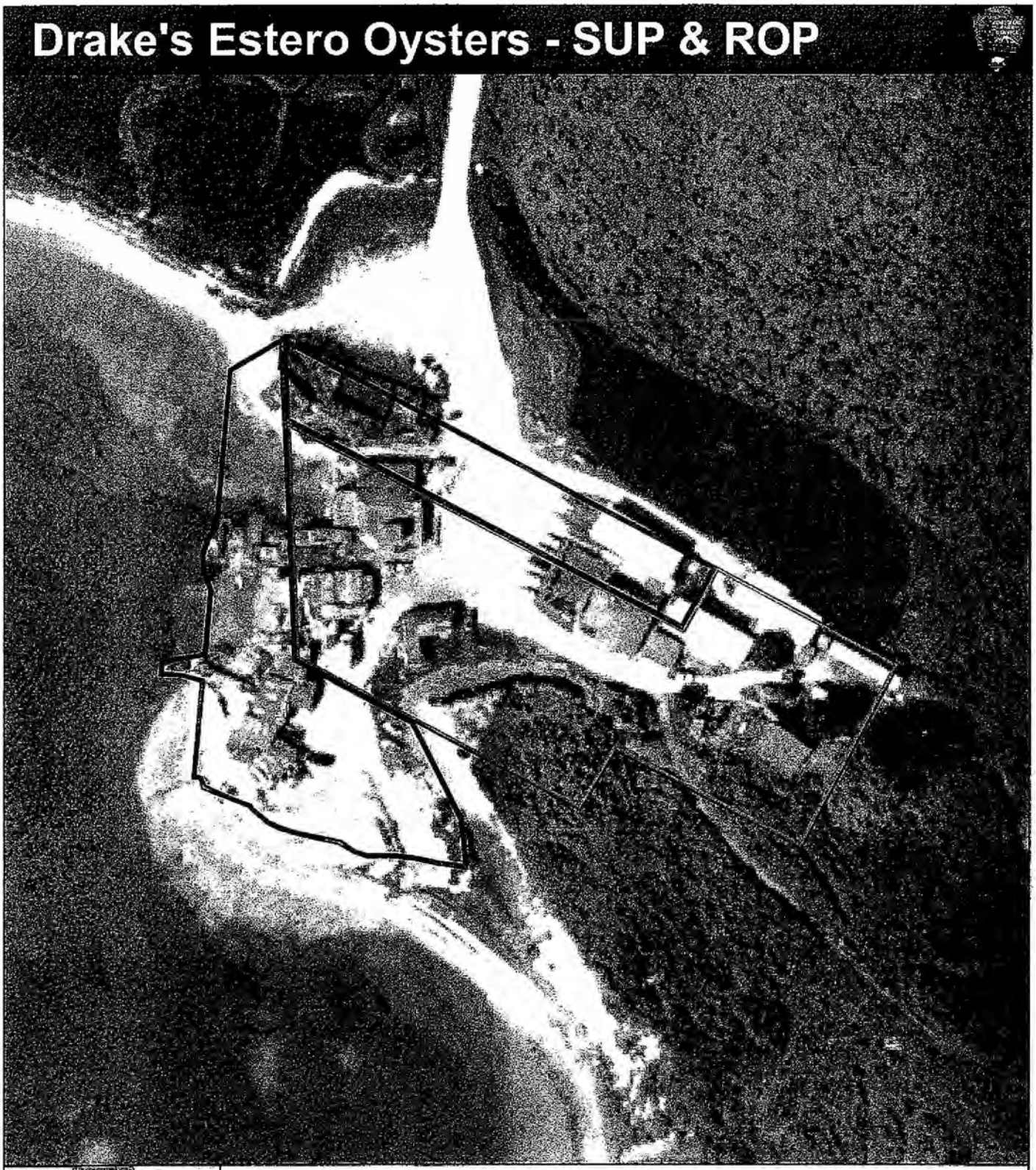
N
W E
S

0 0.5 Miles

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

Drake's Estero Oysters - SUP & ROP



National Park Service
Point Reyes National Seashore
Marin County, CA

N
W E
S

0 50 100 150 200
Feet

Permit Type

ROP - 1.5 acres

SUP - 1.1 acres

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol

Drakes Estero Aquaculture and
Harbor Seal Protection Protocol

The following items are mutually agreed to for protection of harbor seals in and adjacent to the Harbor Seal Haul-Out Zones identified in the Map entitled, "Drake's Estero Aquaculture & Seal Protection Zones," attached hereto and incorporated herein by reference ("Protocol Map"):

1. During the breeding season, March 1 through June 30, the "Main Channel" and "Lateral Channel" of Drakes Estero will be closed to boat traffic.[a] The channels and other areas discussed in this Protocol are identified on the Protocol Map.

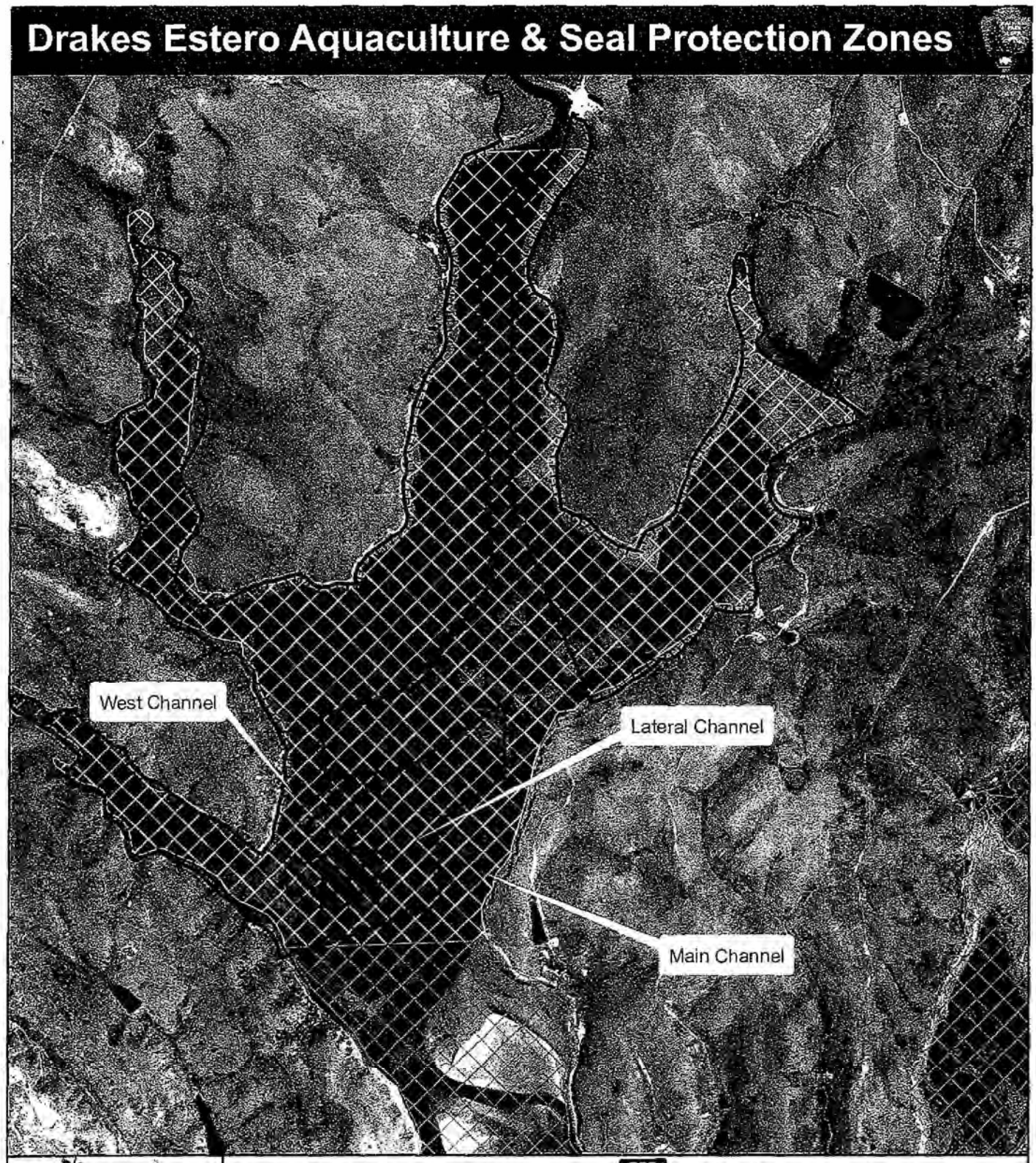
2. During the breeding season, Permittee boats may use the "West Channel" at low speed while maintaining a distance of at least 200 yards from seals. During the breeding season, Permittee may maintain bags in the area labeled on the Protocol Map as "Breeding Season Area," provided that Permittee boats and personnel maintain a distance of at least 200 yards from seals.

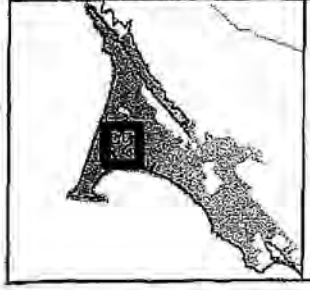
3. During the remainder of the year outside the breeding season, from July 1st to the end of February, Permittee may use the three channels and may maintain bags in the area labeled on Protocol Map as "Non-Breeding Season Area," provided that Permittee boats and personnel maintain a distance of at least 100 yards from seals.

4. Throughout the year, no motorized watercraft may enter the area labeled as "Existing Wilderness" on the Protocol Map.

[a] The dates March 1 and June 30 are based on the birthing dates of seals at haul out sites during the breeding season. Pregnant female seals usually arrive around a week before giving birth. The earliest dates of first pup observed in Drakes Estero over the past five years were March 3 and March 6. At Tomales Bay the earliest date in 2007 was 14 February.

Drakes Estero Aquaculture & Seal Protection Zones





National Park Service
Point Reyes National Seashore
Marin County, CA

0 0.25 0.5 0.75 1
Miles

Aquaculture lease
Potential Wilderness
Existing Wilderness
Harbor Seal Haulout Zone
Oyster Bag Zone
Breeding Season Area
Non-Breeding Season Area

N
W E
S

L1425
Tract 02-106 PORE

November 21, 2007

Kevin and Nancy Lunny
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

Dear Kevin and Nancy Lunny:

This letter is in response to your October 23, 2007 regarding the Trip Reports prepared by Dr. Sarah Allen and the inserted map—Drakes Estero Aquaculture and Seal Habitat. We are providing answers to your questions in a table format for your perusal.

We are doing so even though the Freedom of Information Act ("FOIA") does not require agencies to answer questions or to create documents in response to requests. By providing this information, the NPS has not waived its ability to invoke applicable FOIA exemptions for similar or related information in the future.

We hope the information is helpful to you. We want to also inform you that these documents have been the subject of FOIAs and have been released to those requesting the information. Copies of the Trip Reports are enclosed with this letter as well.

Sincerely,

Don L. Neubacher
Superintendent

Enclosures

DLNeubacher/SBCarlson:an 11/21/07

Response to Drakes Bay Oyster Company
October 23, 2007 Letter

1. Why is the map undated, unnumbered and without any GIS or other appropriate designation.	PDF map was created at Point Reyes National Seashore as an insert to the Trip Reports dated April 13 and 26, 2007. Trip Reports and electronic files were dated.
2. When—what day—was the map created?	See #3 below.
3. Please provide the documentation requesting the new map be created and documentation showing which day it was created.	No documents exist. However, the document PDF files were created on April 27, 2007.
4. Who ordered the map to be created?	The map as an insert was created to illustrate the location of aquaculture areas and seal areas in Drakes Estero. The map was created by PRNS staff.
5. Who drew the lines or ordered the lines to be drawn that depict the seal haul out pupping area?	PRNS staff drew the line on the map based on current harbor seal population and site information.
6. The lines depicting the haul out area are considerably different when compared to the 92 NMFS-NPS Agreement or a map provided by Sarah Allen shortly after we took over the oyster farm. Why has the map changed?	PRNS staff update maps as information is obtained as fluctuations occur in harbor seal pupping and haul out locations.
7. Provide the documentation—reports, documents, memorandum, other information—which justifies the haul out boundary changes on this new map.	No formal document exists. The change was made based on field observations and expert opinion.
8. Presumably, there is new science which justifies this expanded haul out area. Please provide a full and complete documentation of the new science?	No formal document exists. The change was made based on field observations and expert opinion.
9. Why was the new map created in the middle of a pupping season?	The map was created to illustrate conditions at the time the field observations where made in the spring of 2007.
10. This map this "aquaculture" map—was not provided to us—your leasee. Why not?	This map was created as an insert to Trip Reports and was released as part of the Trip Reports. See #1 and #12 for further information.
11. This new map was not provided to California Department of Fish and Game, the agency which manages the lease. Why not?	The NPS did not send the map to California Department of Fish and Game because the main purpose of the map was to illustrate the information in the Trip Reports.
12. To whom did you provide copies of this map? Federal agencies? State agencies? Local government? Non-profits or NGOs? Individuals? Provide names, affiliations, and contact information.	There is no listing of individuals or agencies that exists regarding whom was given copies of the map. The map was created as an insert to Trip Reports and was released as part of the Trip Reports. The Trip Reports were released to anyone requesting them under a Freedom of

	Information Act (FOIA) Request and to anyone requesting the information.
13. To whom did you provide copies of the April 13 and/or April 26 Trip Reports which contain this map? Provide names, affiliations, contact information.	There is no listing of individuals or agencies that exists regarding whom was given copies of the Trips Reports. The Trip Reports were released to anyone requesting them under a FOIA Request and to anyone requesting the information.

Trip Report
Drakes Estero
4/13/07
3:45-5:00 PM

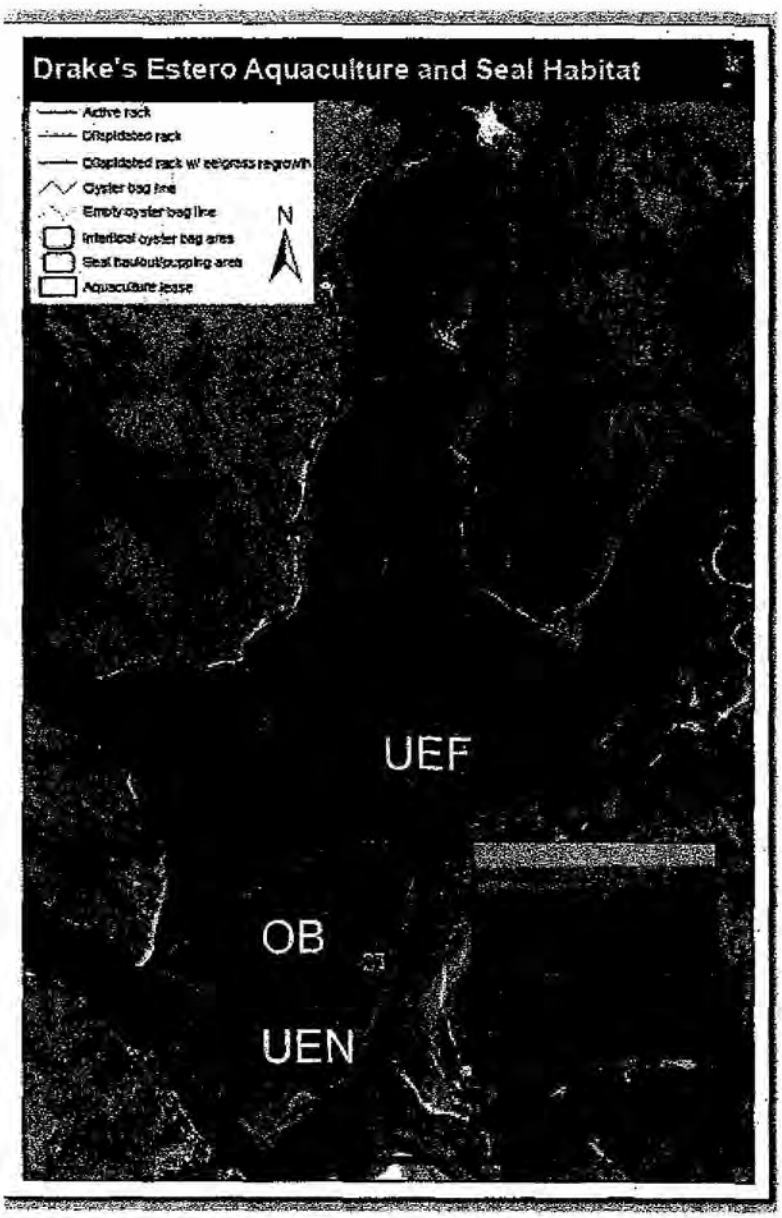
Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Friday during the afternoon low tide to count harbor seals and to determine the distribution and number of oyster bags on the seal haul out sites.

I arrived at 3:40 PM and met a volunteer who surveys harbor seals who had been present since 1:45 PM. She stated that she had observed 2 people in a boat tending oyster bags at the OB sand bar (see map) at around 2:30 PM. There were no seals present on the OB sand bar and the number at UEN was 133 with 21 pups, and the total count for the estero was 525, including 46 pups when she counted the seals at 2:20-30 PM.

When I conducted the survey at 4 PM, there were 10 seals present and 2 pups at the OB sandbar and 117 seals and 54 pups on UEN sand bar, a 157% increase in seals on the UEN sandbar. These two sites have historically had the higher numbers of females with pups likely because the pups are more protected from strong currents and the water is warmer in the middle of the estero. The total count for the estero was 618 including 88 pups, a 120% increase in pups after the boat left, even though it was late in the day. Seal numbers are highest mid day to mid-afternoon, depending on the tide level. The tide was low enough for the seals to haul out at 1:00 PM. For comparison of numbers on OB, in 2005 on April 12, there were 105 seals and 62 pups, and in 2004 on April 11, there were 169 seals and 36 pups.

I observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because of distance, I could not get an accurate count of bags, but the number of rows was around 20. The bags were adjacent to and directly on the haul out sites where the seals historically have hauled out in the past at OB and UEN (see map).


Drake's Estero Aquaculture and Seal Habitat
Active rack
Oyster bag line
Empty oyster bag line
Intertidal oyster bag area
Aquaculture lease
N
UEF
OB
UEN

Trip Report
Drakes Estero
4/26/07
3:45-5:00 PM

Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Thursday during the afternoon low tide to count harbor seals for the peak pupping season count.

I arrived at 3:45 PM and began counting the seals at A and A1 sandbars. At 3:50 PM I noted a white boat (@20 ft long) with outboard motor and two people aboard in the east end of the OB seal haul out site. The boat was fowled in eelgrass and the operators were poling through the eelgrass bed. Once half way along the channel going west, they used the engine again. I did not see the number of seals present before the boat was there; however there were only 5 (2 pups) when I began surveying and I saw seal heads in the water. There were seal drag marks on the sand bar indicating other seals may have been present and several fresh wet seals were hauling out on UEN, an adjacent sand bar. Also on previous day 4/25, a volunteer counted 21 (8 pups) on the OB haul out. When the boat went by the seals at 3:55 PM, all flushed into the water except one lone seal. Seals on UEN raised their heads but I did not see any enter the water. The boat continued west along the channel and flushed around 120 Black Brant that were in the eelgrass beds in the channel.

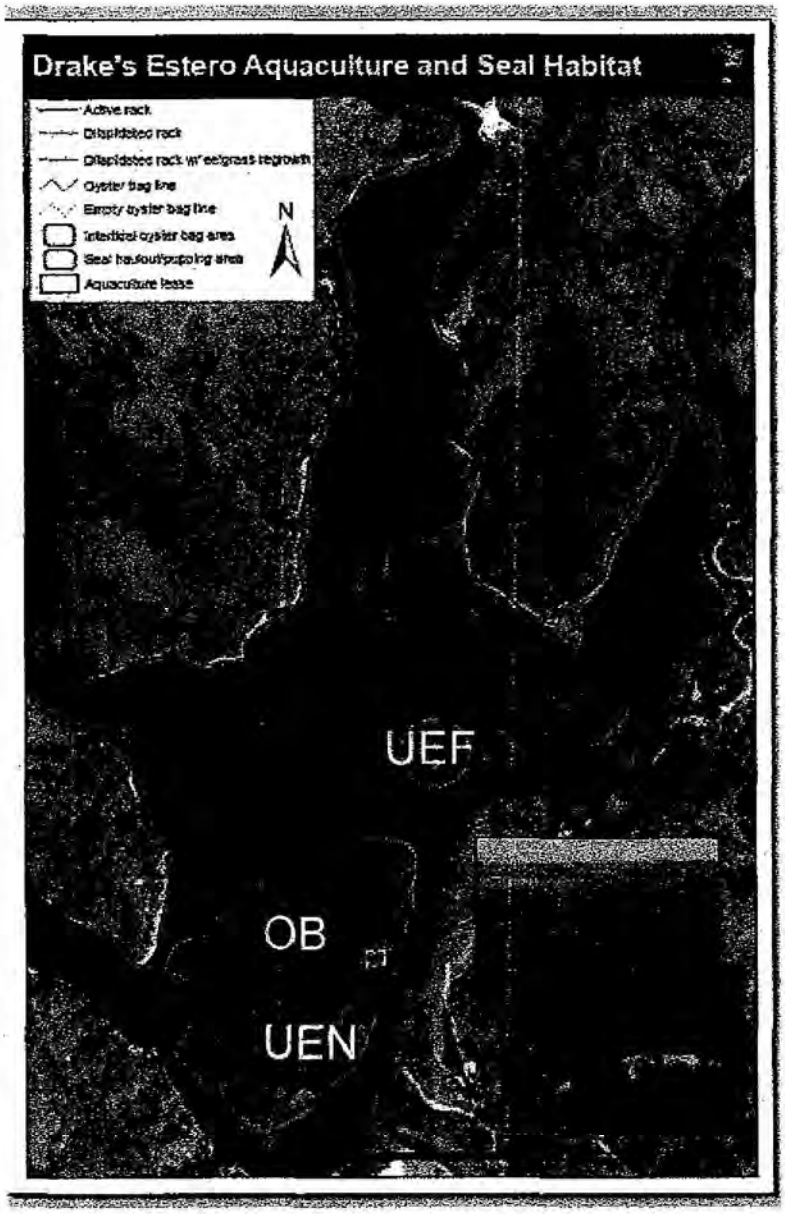
The boat then landed at around 4:10 PM about 2/3 of the way along the channel going west on the OB channel on the north west side where many oyster bags are located. Two men got off the boat, one taller in a green slicker and another in yellow slicker pants. They remained on the site until around 4:38 OM. During this time, they checked bags and added around 30 more bags onto the sandbar on the north west side of the sand bar and closer to the seals. During the interim time, 6 (2) seals hauled out at OB. When the boat proceeded back down the channel going east towards the seals at 4:55 PM, 5 seals flushed into the water included 2 mother-pup pairs at OB, another 3 mother pup pairs flushed at UEN sand bar, and around 75 seals alerted at UEN but did not enter the water. Additionally, around 200 black brant were flushed that were in the eelgrass beds in the channel after previously being flushed by the boat. At 4:58 PM, the boat then proceeded up into Home Bay. I terminated the survey at 5:00 PM.

A total of around 90 seals including around 50 pups were disturbed by the boat, and of these, I observed 14 seals including 7 pups directly flushed into the water. From previous research, we know that females with pups are more disturbed than adult males or immature seals. Additionally, around 320 black brant were flushed while in eelgrass beds.

During surveys of the estero, I again observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because this is the peak pupping season, mothers with pups are hauling out all over UEN, including near where the oyster bags are

located. There also appeared to be more bags on UEN, in addition to the bags added to OB today. Again, the bags were adjacent to and directly on the haul out sites where the seals historically hauled out in the past three decades of surveys that I have conducted.

Map of Drakes Estero – red circle indicates where seals and Black Brant were disturbed.



"Kevin Lunny"
<kevin@lunnypaving.com>
11/16/2007 10:33 AM

To <Jon_Jarvis@nps.gov>
cc "Zachary Walton" <zacharywalton@paulhastings.com>
bcc
Subject RE: Proposed SUP Meeting

History: This message has been replied to.

Thank you, Jon.

Is 2:00PM OK?

Would you be willing to initiate a conference call?

I will be at (b) (6)
Zack will be at 415-856-7076

Thank you,

Kevin

-----Original Message-----
From: Jon_Jarvis@nps.gov [mailto:Jon_Jarvis@nps.gov]
Sent: Friday, November 16, 2007 9:07 AM
To: Kevin Lunny
Cc: George Turnbull
Subject: Re: Proposed SUP Meeting

Sounds good. I will call on tuesday. Sorry about the message issue.
We had computer problems nationwide.

Jon

Sent from my BlackBerry Wireless Handheld
Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland
206-220-4010 Seattle

----- Original Message -----
From: "Kevin Lunny" [kevin@drakesbayoyster.com]
Sent: 11/16/2007 06:12 AM PST
To: Jon Jarvis
Cc: "Zachary Walton" <zacharywalton@paulhastings.com>
Subject: FW: Proposed SUP Meeting

Jon,

My last email to your address was returned.

Kevin

-----Original Message-----
From: Kevin Lunny [mailto:kevin@lunnypaving.com]
Sent: Friday, November 16, 2007 5:43 AM
To: Jon_Jarvis@nps.gov
Cc: Zachary Walton
Subject: RE: Proposed SUP Meeting

Jon,

We can be available any time after 1:00PM on Tuesday. Please feel free to pick a time that is convenient for you. Zack Walton will also be on the call.

Thank you,

Kevin

-----Original Message-----
From: Jon_Jarvis@nps.gov [mailto:Jon_Jarvis@nps.gov]
Sent: Thursday, November 15, 2007 3:23 PM
To: Kevin Lunny
Subject: RE: Proposed SUP Meeting

Kevin: Sorry I have been on travel. I left a voice mail today. When would be a good time to talk?

Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland

United States Department of the Interior

NATIONAL PARK SERVICE
1849 C Street, N.W.
Washington, D.C. 20240

(0001)

NOV 13 2007

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake Boulevard
Inverness, California 94937

Dear Mr. Lunny:

Thank you for your letter dated October 5, 2007, which transmitted correspondence you sent to Congresswoman Lynn Woolsey. I apologize for the delay in responding to you. Your letter was not received by the National Park Service until October 18, 2007.

As you may know, Senator Feinstein wrote to me regarding the follow-up to the meeting held in Olema in July. I recently responded to her letter and am including a copy of my response for your information. I assure you that I am committed to the National Park Service following through as was agreed to in Olema. As my letter to Senator Feinstein indicates, we are not seeking new scientific reviews, but rather, an independent review of what has already been done.

Thank you for your letter. I am copying Regional Director Jarvis as I have assigned him responsibility for managing this issue. He remains willing to meet with you at any time to resolve the remaining issues associated with the special use permit.

Sincerely,

Mary A. Bomar

Mary A. Bomar
Director

Attachment

cc: Jon Jarvis, PWR

Kevin please talk with Jon to work through completion of the special use permit.

"Kevin Lunny" <kevin@drakesbayoyster.com>

11/09/2007 03:11 PM

To <Jon_Jarvis@nps.gov>

cc

bcc

Subject RE: Proposed SUP Meeting

History: This message has been replied to and forwarded.

Jon,

I would be happy to talk on the phone. As you know, we're anxious to get the SUP completed as soon as possible. I am available anytime on Monday except lunch time, anytime Tuesday afternoon and anytime Wednesday afternoon.

I look forward to hearing from you,

Kevin

-----Original Message-----
From: Jon_Jarvis@nps.gov [mailto:Jon_Jarvis@nps.gov]
Sent: Tuesday, November 06, 2007 5:34 PM
To: Kevin Lunny
Subject: Re: Proposed SUP Meeting

Kevin: we never really got this call set up and I would like to try again. As I said in Olema, I would like to get you a permit and want to figure out how we can make that happen. A phone call is a start. I do not plan to have my attorney on the call, but you may yours if you feel that is necessary. Please let me know when you are available.

Jon

Sent from my BlackBerry Wireless Handheld
Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland
206-220-4010 Seattle

----- Original Message -----
From: "Kevin Lunny" [kevin@drakesbayoyster.com]
Sent: 09/14/2007 09:24 AM MST
To: Jon Jarvis
Cc: "David M. Weiman" <agresources@erols.com>; "Zachary Walton" <zacharywalton@paulhastings.com>
Subject: RE: Proposed SUP Meeting

Jon,

Sorry for the delay in my response. I would be happy to talk with you as soon as we can arrange a time. I have to leave right now and will be in the field most of the day today. Monday or Tuesday could work. I

would like to have Zachery Walton, our attorney, join us for the call. Feel free to recommened a time.

Thank you,

Kevin

-----Original Message-----
From: Jon_Jarvis@nps.gov [mailto:Jon_Jarvis@nps.gov]
Sent: Thursday, September 13, 2007 7:22 AM
To: Kevin Lunny
Subject: Re: Proposed SUP Meeting

Kevin: any chance I could call you to talk briefly? I will not ask you for anything other than to listen to my perspective. Friday?

Sent from my BlackBerry Wireless Handheld
Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland
206-220-4010 Seattle

----- Original Message -----
From: "Kevin Lunny" [kevin@drakesbayoyster.com]
Sent: 09/12/2007 03:50 PM MST
To: George Turnbull
Cc: Jon Jarvis; Holly Bundock; "'Walker, Michael \(Feinstein\)'" <Michael_Walker@feinstein.senate.gov>; "'Walton, Zachary R.'" <zacharywalton@paulhastings.com>; "'David M. Weiman'" <agresources@erols.com>
Subject: RE: Proposed SUP Meeting

Dear George,

Thank you for the note. I will talk to our team to see if they are available.

Please include David Weiman and Zachary Walton in all your correspondence with us regarding the Drakes Bay Oyster Farm and the G Ranch.

Thank you,

Kevin

-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Tuesday, September 11, 2007 6:06 PM
To: Kevin Lunny
Cc: Jon_Jarvis@nps.gov; Holly_Bundock@nps.gov; Walker, Michael (Feinstein)
Subject: Proposed SUP Meeting

Hi Kevin,

Thank you for taking the time to meet with us on the Drakes Bay Oyster SUP and other issues yesterday. After further conversations with the Regional Director and Senator Feinstein's staff, I would like to propose meeting with you and your team again next week to see if we can finalize an SUP within the next couple of weeks. Once again, we do still feel NEPA compliance is required, but we would offer you a two year interim permit. We would like to specifically discuss mitigation measures that might be included in the SUP, all of which we have discussed in our earlier session. Mr. Michael Walker from Senator Feinstein's office has offered to participate in the meeting to help broker an agreement. I am available all day September 18 (Tuesday) and September 20 (Thursday). Hopefully you are available one or both of these days so we can continue to make progress towards an agreement on an SUP. Let me know either way about your availability. Thanks again.

George Turnbull

"Kevin Lunny" <kevin@drakesbayoyster.com>
11/06/2007 01:36 AM

To "Ben Becker" <ben_becker@nps.gov>
cc
bcc
Subject NPS Drakes Estero Report Reviewer Survey - November 6, 2007

Dear Ben:

Last July, NPS Regional Director, Jon Jarvis and PRNS Superintendent, Don Neubacher, announced, at a meeting called by Senator Feinstein that several scientists peer-reviewed the NPS Report, *Drakes Estero, A Sheltered Wilderness Estuary* . Regional Director Jarvis recently indicated that you were among those reviewers.

So that we better understand the review, we ask that you take a few minutes to fill out the enclosed Survey on this NPS Report. The attached survey is computer based, and we recommend that you save the attachment to your hard drive, fill it out, then email it back to us as an attachment. If you would prefer to fill it out by hand and snail-mail it to us, you could do that as well.

If you have any questions, or want additional information, please contact us at Drakes Bay Oyster Company at kevin@drakesbayoyster.com or nancy@drakesbayoyster.com OR (415) 669-1149. Our mailing address is 17171 Sir Francis Drake Boulevard, Inverness, CA 94937.

Thank you.

Kevin Lunny Nancy Lunny

NPS Drakes Estero Report Reviewer Survey - November 6, 2007.doc

POKE

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

RECEIVED
Point Reyes
National Seashore
NATIONAL PARK SERVICE
NOV 13
SUPT.
SCIENCE
SPEC. PK. USES
LAW ENFORC.
NAT. RES.
RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

IN REPLY REFER TO:

A7221(PWR-C)

NOV 0 5 2007

Mr. Kevin Lunny
17171 Sir Francis Drake Boulevard
Inverness, California 94937

Dear Mr. Lunny:

I have received your letter to Congresswoman Woolsey which asks for answers to a set of questions concerning *Drakes Estero: A Sheltered Wilderness Estuary*. I have spoken with the staff of Congresswoman Woolsey, and we agree it is most expeditious to reply directly to you.

As you know, the document known as *Drakes Estero: A Sheltered Wilderness Estuary* ("Park News Document") was one of the subjects of the July 21, 2007, meeting we both attended. We discussed the questions you include in your letter on peer review and the postings of the document on the NPS website at the July meeting. You might recall the conversation between myself, Dr. Corey Goodman, and Mr. David Weiman before the full group in attendance.

As a way to move forward, the NPS agreed at this meeting to remove the Park News Document from its website and arrange for an independent scientific review at NPS expense. The NPS has followed through on these commitments. The NPS removed the Park News Document from its website the next business day, and the NPS has submitted a proposal to the National Academy of Sciences for an independent review.

Your letter now indicates that you believe you cannot move forward with Special Use Permit negotiations until the NPS provides answers to a detailed set of questions regarding the Park News Document. We are very interested in moving forward to complete the Special Use Permit negotiations. This is why I recently wrote to you following the last negotiation meeting to assure you that the NPS has every intention of allowing your operation to continue until November of 2012, under the terms of the Reservation of Use and Occupancy and in compliance with a valid special use permit.

Because we would like to move forward, we are providing brief answers to your questions in a table format like that attached to your letter and enclosures. We are doing so even though the Freedom of Information Act ("FOIA") does not require agencies to answer questions or to create documents in response to requests. By providing this information, the NPS has not waived its ability to invoke applicable FOIA exemptions for similar or related information in the future.

TAKE PRIDE® IN AMERICA

Your letter to Congresswoman Woolsey indicates that lacking an understanding of our working process, you are unable to meet with us. We trust that by providing you with these answers about our process on information collection and delivery, you will be able to finalize your pending NPS permit. As you know, my Deputy Regional Director George Turnbull and our Solicitor, Suzanne Boyce-Carlson, are prepared to meet with you as soon as possible to complete negotiations on the much needed Special Use Permit for the Drakes Estero.

Sincerely,

Jonathan B. Jarvis
Regional Director, Pacific West Region

Enclosures

cc:
Senator Dianne Feinstein
Congresswoman Lynn Woolsey

Drakes Bay Oyster Company Requested Information
Drakes Estero: A Sheltered Wilderness Estuary
October 19, 2007
Draft, Privileged and Confidential—Not for public distribution

	Information Requested	Park Service Response
1.	Date of Original Publication, Drakes Estero Report	We are uncertain of what you mean by the word "publication." However, the NPS began working on the Park News Document in August of 2006.
2.	Drakes Estero Report First Uploaded to the NPS/PRNS Web Site	The Park News Document was first posted on the Point Reyes National Seashore ("PRNS") NPS website on February 9, 2007.
3.	Identify Author or Authors Who Contributed to Drakes Estero Report	There is no document listing those who contributed to the Park News Document. It is common when producing information for the NPS website for various staff members to contribute to the information. NPS documents can go through various drafts with different staff members having different roles as relate to their particular duties. This Park News Document was developed through such a process involving NPS staff. The Park News Document was prepared by the NPS, and the NPS takes responsibility for the Park News Document.
4.	Provide Titles of Each Author Who Contributed to Drakes Estero Report	See answer to item 3.
5.	Provide Qualifications for Each Author Who Contributed to Drakes Estero Report	See answer to item 3.
6.	For Each Version of Drakes Estero Report, Identify All Reviewers (formal or informal, internal or external)	There is no document listing this information for the Park News Document. Various staff from PRNS, USGS, and individuals from outside entities provided review. PRNS has in its files some documents related to review provided by individuals from outside entities in the context of reviewing the Park News Document and another publication entitled, "National Park Service Clarification of Law, Policy, and Science on Drakes Estero." We have previously sought the permission of these reviewers to release their comments. We are discretionarily releasing those documents to which the reviewers have consented to release.

	Information Requested	Park Service Response
7.	For Each Version of Drakes Estero Report, Provide Titles and Qualifications of Each Version	There is no document listing this information for the Park News Document. Titles and qualifications are contained in some of the information we are releasing as discussed in item 6.
8.	Identify Each NPS Official Who Signed Off on and/or Approved Drakes Estero Report at NPS Regional Office	There is no document indicating "sign off" on the Park News Document.
9.	Identify Each NPS Official Who Signed Off on and/or Approved Drakes Estero Report at NPS Headquarters	See response to item 8.
10.	Identify Each NPS Official Who Signed Off on and/or Approved Drakes Estero Report at Other NPS Offices	See response to item 8.
11.	Identify Each NPS Official Who Signed Off on and/or Approved Drakes Estero Report at NPS/PRNS	See response to item 8.
12.	Prior to Publication When Was the Drakes Estero Report Peer Reviewed	See response to item 6.
13.	Prior to Publication, Identify Each Peer-Reviewer(s)	See response to item 6.
14.	Specify Qualifications for Each Peer Reviewer	See response to item 6.
15.	Provide Copies of Peer Reviewer's Comments	See response to item 6.
16.	Itemize and List Each Version of the Drakes Estero Report, in Total, Exist	There is no document listing this information. The NPS began working on the Park News Document in August of 2006. It was posted on the PRNS NPS website on February 9 and May 11, 2007. It was provided to the Marin County Board of Supervisors at a meeting held on May 8, 2007. It was revised in July 2007 but has not been publicly released because the NPS is committed to an independent review of the science related to this matter.
17.	Itemize and List When Each Version of the Drakes Estero Report was Published	There is no document listing this information. The Park News Document was posted on the PRNS NPS website on February 9 and May 11, 2007.

	Information Requested	Park Service Response
18.	Itemize Each Change to Each Version of the Drakes Estero Report	There is no document containing this information, and we decline to create such a document for the reasons stated in the cover letter accompanying this table.
19.	Itemize Each Change to Each Version of the Drakes Estero Report including Additions, Deletions and Modifications	See response to item 18.
20.	For Each Version of the Drakes Estero Report, Provide a Full and Complete Explanation for Each (Estimated to be 25-30 Changes)	See response to item 18.
21.	If New Data [for Drakes Estero Report] Was Obtained, Include that New Data and Provide a Full and Complete Analysis	The Park News Document references the sources that were used in preparing the Park News Document. There is no document separately listing this information or providing analysis.
22.	If New Data [for Drakes Estero Report] Was Obtained, Indicate How the Data Was Obtained	See answer to item 21.
23.	If New Data [for Drakes Estero Report] Was Obtained, from Whom Was it Obtained	See answer to item 21.
24.	If New Data [for Drakes Estero Report] Was Obtained, When Was It Obtained	See answer to item 21.
25.	Explain why the [Drakes Estero] Report was republished so frequently	There is no document providing this information. The NPS periodically updates its website for a variety of reasons including the availability of new information.
26.	NPS management policy states, in part, "*Decision-makers and Planners will use Best Available Scientific and Technical Information and Scholarly Analysis...*" Affirm, in approval of Drakes Estero Report, the requirements of the policy were fully met.	This issue is being handled separately through the complaint process provided under Director's Order 11B.
27.	Provide Policy Regarding Preparations and Publication of Drakes Estero Report	There is no policy specific to this Park News Document. Director's Order 11B provides NPS policy regarding ensuring the quality of information disseminated by the NPS.
28.	Provide Reviewer Comments for each Version of the [Drakes Estero] Report	See response to item 6.

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

November 4, 2007

Mr. George Turnbull
Deputy Regional Director
National Park Service
US-CA-Pacific West Regional Office
1111 Jackson Street, Suite 700
Oakland, CA 94607

Dear Mr. Turnbull,

In 2005, Drakes Bay Oyster Company (DBOC) submitted plans to Marin County Community Development Agency (CDA) for a permit to make repairs to the existing buildings at the oyster farm. This planned work would complete the requirements listed by the Point Reyes National Seashore (PRNS) and the California Coastal Commission (CCC) in their Cease and Desist Order (issued to the former owners of the farm, Johnson Oyster Company, in 2003). Since 2005, there has been a planning hold (attached) issued by the CDA. The last requirement, prior to permit issuance, is written authorization from the National Park Service, as property owner, to perform this work. Superintendent Neubacher has refused to give the CDA the authority to issue this permit to DBOC. Mr. Neubacher's refusal was based on his claim that the buildings were not located on the Reservation of Use and Occupancy, citing a drawing that was prepared for Johnson Oyster Company in 2003. It has since been agreed (at the 7/21/07 meeting called by Senator Dianne Feinstein) that the buildings in question are indeed situated properly on the Reservation of Use and Occupancy.

We, therefore, ask you to send the NPS authorization to process and approve the permit applied for in 2005 (plans prepared by William W. Kirsch, and submitted to the CDA, the NPS and the CCC, with revisions dated 7/25/06) to Tod Carr, Marin County Community Development Agency, 3501 Civic Center Drive, #308, San Rafael, CA 94903-4157.

Sincerely yours,

Kevin Lunny

Nancy Lunny

Marin County
Community Development Agency

Alex Hinds, Director

Date 12/3/07

Drake's Oyster Kursch

RE: Building Permit at 17171 Sir Francis Drake.

Assessor's Parcel # 109-130-17

A building permit application was received for the subject property. Upon customary transmittal of the building permit to the Planning Division, it was determined that your application does not conform to certain zoning and/or subdivision requirements. The item(s) checked below must be corrected before the Planning Division will approve your application and send it back to the Building Inspection Division for their review. If a Planning Division permit is required, please attach a copy of this letter to the application. This letter will assist in coordination of building permit processing following Planning Division review.

- ☐ The plot plan is missing/incorrect/has no scale/otherwise incomplete or unclear (see attached).
- ☐ Front/side/street-side/rear yard setbacks for the house/accessory structure are less than permitted (see attached).
- ☐ House/accessory structure exceeds maximum permitted height/number of stories.
- ☐ Proposed work on the floating home/ark will require approval of an architectural deviation/floating home exception (see attached).
- ☐ Ratio of floor area to lot size (FAR) exceeds maximum permitted (30%).
- ☐ Second units not permitted by the zoning on your property.
- ☐ Existing structure/use is nonconforming and its expansion is restricted (see attached).
- ☐ Due to the location and height of the retaining wall(s), a Design Review is required (see attached).
- ☐ A Master Plan is required.
- ☐ A Coastal Permit is required.
- ☐ A Design Review (minor/exemption) is required.
  - ☐ proposed development is not single family residential.
  - ☐ your property is zoned planned district.
  - ☐ your lot is less than half the size required.
    - ☐ ***Therefore, please submit the attached application(s), $_____ in fees and _____ sets of plans to the Planning Division.***
- ☒ Other: Retail space located within reservation under National Park Service. Please provide written approval from National Park Service (Pt. Reyes)

If we do not receive a response within fifteen days from the date of this letter, your building permit application will be considered withdrawn. If an attachment is included, please read it carefully to determine what is needed for project conformance. Please contact Lori Cam 499 6285 if you have any questions regarding this letter. If you wish to meet with the planner, please call for an appointment. Drop-ins are not advised. Thank you.

\FORMS/ORIGIN/BP.CHECK.DOC
(Rev 7/8/99)

3501 Civic Center Drive, #308 - San Rafael, CA 94903-4157 - Telephone (415) 499-6269 - Fax (415) 499-7880

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

October 23, 2007

Jon Jarvis
Regional Director
National Park Service
Pacific West Regional Office
One Jackson Center
1111 Jackson Center, Suite 700
Oakland, CA 94607

Re: National Park Service, Clarification of Law, Policy and Science on Drakes Estero

Dear Mr. Jarvis.

On September 18, 2007, you sent the document *"Clarification of Law, Policy, and Science on Drakes Estero"* to Dr. Goodman and have widely circulated it since.

According to your statement, at the bottom of page 5 and top of the following page:

> "With regards to NPS studies within the estero, we wish to clarify points regarding the independence and quality of NPS data. Dr. Goodman questions the quality of the data collected by NPS biologists and others as not independent and not peer-reviewed through published scientific journals. It is true that much of the research within the NPS is applied and often not published in scientific journals; nevertheless, research projects within the NPS are submitted to a rigorous peer-review process that includes scientists from the NPS, other agencies, and academia. An implementation plan is required before a project can begin which requires a detailed description and peer-review of the methods. The protocol development, although not as rigorous as the journal publication process, nevertheless does subject NPS applied

research projects to a significant degree of review intended to insure the quality of the research and the integrity of the findings. The Point Reyes National Seashore Park News publication, "Drakes Estero - A Sheltered Wilderness Estuary," for example was reviewed by scientists from the U.S. Geological Survey and NPS."

This clarification is instructive.

To further assist our understanding of the NPS process regarding the preparation and presentation of research reports, would you provide the following:

(1) **According to your letter and this NPS Statement, "*research projects within the NPS are submitted to a rigorous peer-review process that includes scientists from NPS, other agencies and academia.*"**

(a) When was this peer-review process initiated for the NPS report, "*Drakes Estero, A Sheltered Wilderness Estuary*?"

(b) Identify each NPS scientist who participated in the peer-review process for this report.

(c) Identify each scientist from other agencies who participated in the peer-review process for this report.

(d) Identify each member of academia who participated in the peer-review process for this report.

(e) Provide copies of the instructions and documents provided to each participant in the peer-review process.

(f) Provide reviewer comments pursuant to this process.

(g) Provide the dates of meetings, who attended and participated and copies of the agenda.

(h) In the preparation and publication of the Drakes Estero Report, did NPS fully adhere to Federal policy requirements for peer review?

(2) **According to your Clarification letter, "*an implementation plan is required before a project can begin which requires a detailed description and a peer-review of the methods.*"**

(a) When did this project – the preparation of this report – begin?

(b) When was the required "Implementation Plan" initiated? Completed?

(c) When completed, what was the Implementation Plan approval process and who approved it?

(d) Provide a copy of the implementation plan.

(3) **According to your Clarification letter, "*The protocol development, although not as rigorous as the journal publication process, nevertheless does subject NPS applied research projects to a significant degree of review intended to insure the quality of the research and the integrity of the findings.*"**

(a) Describe the "*protocol development*" as applied to *"Drakes Estero, A Sheltered Wilderness Estuary."*

(b) Provide copies (or results) of the "protocol development."

(c) When were the protocols approved and who approved them?

(4) **According to the "Clarification" document cited above, at its conclusion, "*The Point Reyes National Seashore Park News publication, "Drakes Estero - A Sheltered Wilderness Estuary," for example was reviewed by scientists from the U.S. Geological Survey and NPS."***

(a) Identify the "scientists" from the USGS who participated in the review.

(b) At what point in the process did they initiate their review?

(c) Provide copies of their review and/or their comments in whatever form they were provided.

(d) Identify the "scientists" from the National Park Service in the same review.

(e) When did this review occur?

(f) Provide copies of their review and/or comments on the proposed research project in whatever form they were provided.

(5) **Did anyone else, outside of the NPS, other agencies and/or academia participate in the review and/or preparation of the Drakes Estero Report – at any time during the process? If so, please identify that individual or those individuals.**

As you are aware, the NPS report, "*Drakes Estero, A Sheltered Wilderness Estuary,*" is very important and we have spent considerable time and effort to fully understand it. Your responses to these questions assist us in that effort.

Thank you.

Kevin Lunny

Nancy Lunny

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoysters.com
nancy@drakesbayoysters.com

RECEIVED
Point Reyes
National Seashore
OCT 24 '07
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SCIENCE
SPEC. PR. USES
LAW ENFORC.
PLNG. RES.
RANGE CONS.
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PERSONNEL
BUDGET
CENTRAL FILES

October 23, 2007

Don Neubacher
Superintendent
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956

Dear Don.

With regard to the Sarah Allen Trip Reports of April 13 and 26, both include a map. So that we better understand the map – *Drake's Estero Aquaculture and Seal Habitat* – included in these trip reports, would you please respond to the following:

(1) Why is the map undated, unnumbered and without any GIS or other appropriate designation?

(2) When – what day – was this map created?

(3) Please provide the documentation requesting the new map be created and documentation showing which day it was created.

(4) Who ordered the map to be created?

(5) Who drew the lines or ordered the lines to be drawn that depict the seal haulout pupping area?

(6) The lines depicting the haulout area are considerably different when compared to the 92 NMFS-NPS agreement or a map provided by Sarah Allen shortly after we took over the oyster farm. Why was this map changed?

(7) Provide the documentation – reports, documents, memorandum, other information – which justifies the haul out boundary changes on this new map?

(8) Presumably, there is new science which justifies this expanded haul out area. Please provide a full and complete documentation of that new science.

(9) Why was a new map created in the middle of a pupping season?

(10) This map – *this "aquaculture" map* – was not provided to us – your leasee. Why not?

(11) This new map was not provided to California Department of Fish and Game, the agency which manages the lease. Why not?

(12) To whom did you provide copies of this map? Federal agencies? State agencies? Local government? Non-profits or NGOs? Individuals? Provide names, affiliations and contact information.

(13) To whom did you provide copies of the April 13 and/or April 26 Trip Reports which contain this map? Provide names, affiliations and contact information.

Thank you.

Sincerely,

Kevin Lunny

Nancy Lunny

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:

SEP 28 2007

A7221(PWR-C)

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd
Inverness, CA 94937

Dear Mr. Lunny:

This letter transmits copies of *Drakes Estero: A Sheltered Wilderness* that were sought under the Freedom of Information Act (FOIA) by two other inquirers. During the FOIA process and prior to our July 21, 2007, meeting, Congresswoman Woolsey wrote this office asking specific questions concerning this document on your behalf.

The FOIA process is now completed with the inquirers.

We are providing you with these same documents in an effort to be transparent in the communications on the Drakes Estero.

Sincerely,

Holly Bundock
Freedom of Information Act Officer

Enclosure

cc: Senator Dianne Feinstein
Congresswoman Lynn Woolsey
George Turnbull, PWR-DRB
Don Neubacher, Supt. PORE

RECEIVED
Point Reyes
National Seashore
OCT 1 - '07
SUPT.
SCIENCE
SPEC. PR. USES
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FIRE MGT.
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BUDGET
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TAKE PRIDE® IN AMERICA

"Kevin Lunny" <kevin@drakesbayoyster.com>

09/18/2007 06:51 PM

To "Jon Jarvis" <jon_jarvis@nps.gov>

cc "Zachary Walton" <zacharywalton@paulhastings.com>, "George Turnbull" <George_Turnbull@nps.gov>, "Lisa Bush" <lisab@sonic.net>, "David M. Weiman"

bcc

Subject Oyster SUP Meeting

Dear John,

Since we met last we received a number of communications that require review and clarification. We are very anxious to move forward, but in light of these recent communications, we will need a bit more time before we can meet. We will get back to you shortly to discuss an alternative time for our meeting.

Thank you,

Kevin Lunny

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:

A90 (PWR-C)

SEP 14 2007

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA. 94937

Dear Mr. Lunny:

It has been six weeks since our meeting at the Olema Inn and our discussions concerning Drakes Estero and your oyster operation. I wrote to you on July 30, 2007 with our action items. It seems appropriate to provide an update of the actions the National Park Service has taken and to reassure you of the positive direction we believe the negotiations for the special use permit are taking.

As you may remember, we agreed July 21 to:

- remove *Drakes Estero: A Sheltered Wilderness* from the park website pending an independent review of scientists – completed
- release data collected at the Estero – completed
- provide chronology of legally significant events – completed
- develop process for an independent science panel – underway
- develop an interim special use permit using the Stevens boundary survey – underway
- confirm that environmental compliance will be paid for by the NPS – confirmed

I remain very pleased with the positive flow of conversation and the willingness of everyone to freely discuss their concerns at our subsequent meetings. Deputy Regional Director George Turnbull and Assistant Field Solicitor Suzanne Boyce Carlson report healthy discussions involving the special use permit for the oyster operation.

They have suggested I assure you that we have every intention of allowing your operation to continue until November of 2012, as provided under the terms of the Reservation of Use and Occupancy and in compliance with a valid special use permit.

We recognize your right to operate until November of 2012 under the terms of the Reservation of Use and Occupancy. For the portion of your operation that is outside the area governed by the Reservation, our laws and policies also require that a private activity like Drakes Bay Oyster Company operate under a special use permit to authorize the activity on park land while assuring the protection of the park's resources and values.

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As we have discussed, we are prepared to offer you an interim permit while we complete the NEPA compliance required for the longer term permit. We are committed to completing the NEPA compliance as quickly as possible, but we are not certain how long it will take. Therefore, the term of the interim permit will be two years, unless the longer-term permit is ready before that time.

Senator Feinstein's staff has asked, too, that we explain to you that the mitigations we have been discussing in negotiations to date are based upon the known environmental conditions of which both you and the NPS are aware. The interim permit will require these mitigations and other provisions to assure compliance with applicable laws pending completion of the environmental compliance. Some of these mitigations include protection of harbor seals and eelgrass, control of exotic species, determination of an annual production limit, appropriate limits on new construction, and limits on the introduction of species of oysters and clams beyond those described in existing leases with the California Department of Fish and Game. To this end, we ask that negotiations continue based on the last draft of the interim permit that we sent to you on August 23, 2007.

It is our intention to work with you within the parameters and time frame of the environmental assessment. As you know, in response to your request we also are seeking an independent science review of Drakes Bay Oyster Company oyster operations on Drakes Estero. It is our hope that this review will be completed by the summer and provide useful information for the environmental assessment.

Our public affairs office has fielded a number of questions concerning the compliance issue, the data collection complaint, the independent science review, as well as the various Freedom of Information Act requests. To help respond to these inquiries, we have produced a "frequently asked questions" sheet, which we enclose for your reference.

In closing, you have my commitment that the NPS will work fairly with you to respect the terms of the Reservation of Use and Occupancy and to complete the permitting process for activities on park property. We look forward to our next meeting and hope we will be signing the interim special use permit for the oyster operation in the next two weeks.

Sincerely,

Jonathan B. Jarvis
Regional Director, Pacific West Region

Enclosures (2)

cc: Senator Dianne Feinstein
Congresswoman Lynn Woolsey
Don Neubacher, Superintendent, Point Reyes
Suzanne Boyce Carlson, Assistant Field Solicitor

Frequently Asked Questions
Oyster operations at Drakes Estero
Point Reyes National Seashore

What triggers NEPA compliance?

NEPA—the National Environmental Policy Act—is the basic national charter for environmental protection. It requires an interdisciplinary study of impacts associated with major federal actions, and it emphasizes public involvement. It ensures that federal agencies fully consider the environmental costs and benefits of the proposed actions before they make any decision to undertake the actions.

An Environmental Screening Form, attached, aids a National Park Service (NPS) manager in determining what level of NEPA compliance must be completed: (1) categorical exclusion (for actions with no measurable impacts on the environment), (2) environmental assessment (to determine whether an action may have a significant impact and thus require preparation of an environmental impact statement), or (3) environmental impact statement (for actions with a potential significant impact). Some of the factors triggering preparation of an environmental assessment or environmental impact statement include whether the environmental effects of the proposed action are highly controversial or uncertain; whether the proposed action is in proximity to park lands, wetlands, wilderness areas, or floodplains; whether the action may affect endangered or threatened species; and whether the action may implicate non-native invasive species (see "Mandatory Criteria" in Environmental Screening Form, attached).

Why did NPS do an Environmental Assessment in 1998?

The Johnson Oyster Company (JOC) operated the facility at Drakes Estero in 1998. JOC proposed an expansion of their land based facilities on the JOC Reservation of Use and Occupancy at Point Reyes National Seashore (approximately 1.5 onshore acres), including the construction of a new oyster processing plant, the replacement and rehabilitation of several accessory structures, and the moving of all facilities 100 feet back from the water. The NPS prepared the EA to analyze the impacts of this proposal.

Did the 1998 EA address production levels, seek a biological opinion, and outline impacts on estuarine and water quality?

The proposal analyzed in the 1998 EA involved only land based facilities. Thus, when the 1998 EA examined impacts on water resources, it only looked at those impacts that might result from the land-based activities. For example, the EA discusses impacts to the estero that could result from runoff associated with ground disturbance and grading during construction, and it discusses construction of drainage systems to avoid contamination of the estero from the land-based facilities. However, the 1998 EA itself contains no analysis of the impacts of the water-based operations. For example, the 1998 EA does not discuss whether oyster growing operations in the estero had impacts, whether positive or negative, on water quality, wildlife, or any other natural resources.

The "Finding of No Significant Impact" or FONSI does contain some discussion of production levels in the estero in the context of discussing public comments that were received during the public comment period conducted by the NPS and Marin County. The FONSI explains that three of the comment letters expressed concern that the proposed new facilities might create additional growth in the overall oyster operation in the estero. In the context of discussing this public comment, the FONSI states that JOC had voluntarily agreed not to exceed an annual production of 700,000 lbs of oyster weight. Thus, the FONSI addresses production levels in the context of discussing public comments, but the EA itself contains no analysis of the water-based operations.

Why is NEPA triggered as part of a Special Use Permit for the Drakes Bay Oyster Company?

In 2005, the Drakes Bay Oyster Company (DBOC) purchased the remaining seven years of the Reservation of Use and Occupancy from the Johnson Oyster Company. NPS notified DBOC before the purchase that the commercial oyster operation allowed by the Reservation of Use and Occupancy could not be extended beyond the expiration of the Reservation of Use and Occupancy in 2012, and various activities involved in the commercial oyster operation (particularly those on park lands outside the Reservation) would require a Special Use Permit.

NEPA requires at least an environmental assessment be conducted for two primary reasons. First, NEPA requires analysis of the impacts of the water-based operations. The California Department of Fish and Game has recently recognized that the Drakes Bay Oyster Company mariculture operation in the estero "is properly within the primary management authority of [Point Reyes National Seashore], not the Department." CDF&G Letter, dated May 15, 2007. Thus, an NPS Special Use Permit is required for the water-based operations. Because prior NEPA compliance did not evaluate impacts from the water-based operations, an environmental assessment is required to examine such impacts.

Second, if any of the "Mandatory Criteria" set forth in the NPS environmental screening apply, the NPS cannot issue a categorical exclusion. As set forth above, Mandatory Criteria include whether the environmental effects of the proposed action are highly controversial or uncertain; whether the proposed action is in proximity to park lands, wetlands, wilderness areas, or floodplains; whether the action may affect endangered or threatened species; and whether the action may implicate non-native invasive species.

Why is a Special Use Permit proposed for an interim period?

The NPS is responsible for administering Point Reyes National Seashore and other units of the National Park System to protect their resources and values and to provide for their enjoyment. The NPS requires that a private activity on park land, like DBOC's oyster business, operate under a special use permit that authorizes the activity while assuring protection of the park's values and purposes. DBOC does not currently have a permit.

Therefore, to provide immediate authorization to DBOC and protection to the park, NPS has offered an interim permit to address key operational issues while NPS completes the required NEPA compliance for the longer term. An interim permit would also allow DBOC to move forward expeditiously with permits that it needs from State agencies.

What are Harbor Seal Protocols?

In 1992, an agreement between the park and Johnson Oyster Company resulted in guidelines or a protocol for working in Drakes Estero and around pinnipeds (seals). There have been changes to the Estero animal populations since the protocol was developed fifteen years ago. As a consequence, visitor activities, commercial activities, and NPS activities have to adjust to these changes. The animals are protected by the Marine Mammal Protection Act. The 1992 protocol can be a start to developing a protocol for working in Drakes Estero around pinnipeds today.

What standards does the NPS use to store scientific data?

Microsoft Access is the NPS standard for natural resource data sets, adopted specifically by the Inventory and Monitoring Program, nationwide. See http://www1.nature.nps.gov/im/units/sfan/reports/Monitoring_Plan/SFAN_DMP_v2.pdf

What is an independent science review?

The NPS will seek and pay for a review by the National Academy of Science's Natural Research Council of the ecological effects of DBOC's operations on Drake's Estero, Point Reyes National Seashore. It is expected that a review could take up to nine months to complete its analysis.

What is a complaint against Director's Order 11B, Ensuring Quality Information Disseminated by the National Park Service?

This is a complaint filed on August 23, objecting to a Park news report that is no longer on the Point Reyes National Seashore website. NPS has acknowledged receipt of the complaint and will respond to the complaint within 60 days. This is the first complaint NPS has received under Director's Order 11B.

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

This form should be attached to all NEPA documents sent to the regional director's office for signature. Sections A and B should be filled out by the project initiator (may be coupled with other park project initiation forms). Sections C, D, E, and G are to be completed by the interdisciplinary team members. While you may modify this form to fit your needs, you must ensure that the form includes information detailed below and must have your modifications reviewed and approved by the regional environmental coordinator. To access this form and other compliance project information, go to http://pepc.nps.gov.

A. PROJECT INFORMATION

Park Name _____ Project/PMIS Number _____

Project Type (*Check*): ☐ Cyclic ☐ Cultural Cyclic ☐ Repair/Rehab ☐ ONPS
☐ NRPP ☐ CRPP ☐ FLHP
☐ Line Item ☐ Fee Demo ☐ Concession Reimbursable
☐ Other (specify) _____

Project Location _____

Project Originator/Coordinator _____

Project Title _____

Contract # _____ Contractor Name _____

Administrative Record Location _____

Administrative Record Contact _____

B. PROJECT DESCRIPTION/LOCATION

(To begin the statutory compliance file, attach to this form, maps, site visit notes, agency consultation, data, reports, categorical exclusion form (if relevant), or other relevant materials.)

_____

_____

_____

_____

Preliminary drawings attached? ☐ Yes ☐ No Background info attached? ☐ Yes ☐ No

Date form initiated _____ Anticipated compliance completion date _____

Projected advertisement/Day labor start _____ Projected construction start _____

Is project a hot topic (controversial or sensitive issues that should be brought to attention of Regional Director)?
☐ Yes ☐ No

C. RESOURCE EFFECTS TO CONSIDER

(Please see section F, Instructions for Determining Appropriate NEPA Pathway, prior to completing this section. Also use the process described in DO-12, 2.9 and 2.10; 3.5(G) to (G)(5) and 5.4(F) to help determine the context, duration, and intensity of effects on resources.)

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
1	Geological resources – soils, bedrock, streambeds, etc.					
2	From geohazards					
3	Air quality					
4	Soundscapes					
5	Water quality or quantity					
6	Streamflow characteristics					

ENVIRONMENTAL SCREENING FORM (ESF)

(Revised June 2004, per DM)

-continued-

	Identify potential effects to the following physical, natural, or cultural resources	No Effect	Negligible Effects	Minor Effects	Exceeds Minor Effects	Data Needed to Determine
7	Marine or estuarine resources					
8	Floodplains or wetlands					
9	Land use, including occupancy, income, values, ownership, type of use					
10	Rare or unusual vegetation – old growth timber, riparian, alpine					
11	Species of special concern (plant or animal; state or federal listed or proposed for listing) of their habitat					
12	Unique ecosystems, biosphere reserves, World Heritage Sites					
13	Unique or important wildlife or wildlife habitat					
14	Unique, essential or important fish or fish habitat					
15	Introduce or promote non-native species (plant or animal)					
16	Recreation resources, including supply, demand, visitation, activities, etc.					
17	Visitor experience, aesthetic resources					
18	Archeological resources					
19	Prehistoric/historic structures					
20	Cultural landscapes					
21	Ethnographic resources					
22	Museum collections (objects, specimens, and archival and manuscript collections)					
23	Socioeconomics, including employment, occupation, income changes, tax base, infrastructure					
24	Minority and low income populations, ethnography, size, migration patterns, etc.					
25	Energy resources					
26	Other agency or tribal use plans or policies					
27	Resource, including energy, conservation potential, sustainability					
28	Urban quality, gateway communities, etc.					
29	Long-term management of resources or land/resource productivity					
30	Other important environmental resources (e.g., geothermal, paleontological resources)?					

Comments _____

D. MANDATORY CRITERIA

Mandatory Criteria: If implemented, would the proposal:	Yes	No	Comment or Data Needed to Determine
A. Have significant impacts on public health or safety?			
B. Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation, or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds; and other ecologically significant or critical areas?			
C. Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources (NEPA section 102(2)(E))?			
D. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?			
E. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?			
F. Have a direct relationship to other actions with individually insignificant, but cumulatively significant, environmental effects?			
G. Have significant impacts on properties listed or eligible for listing on the National Register of Historic Places, as determined by either the bureau or office?			
H. Have significant impacts on species listed or proposed to be listed on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species?			
I. Violate a federal law, or a state, local, or tribal law or requirement imposed for the protection of the environment?			
J. Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898)?			
K. Limit access to and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007)?			
L. Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112)?			

For the purposes of interpreting these procedures within the NPS, any action that has the potential to violate the NPS Organic Act by impairing park resources or values would constitute an action that triggers the DOI exception for actions that threaten to violate a federal law for protection of the environment.

E. OTHER INFORMATION *(Please answer the following questions/provide requested information.)*

Are personnel preparing this form familiar with the site? ☐ Yes ☐ No

Did personnel visit site? ☐ Yes ☐ No *(If yes, attach meeting notes re: when site visit took place, who attended, etc.)*

Is the project in an approved plan such as a General Management Plan or an Implementation Plan with an accompanying NEPA document? ☐ Yes ☐ No If so, plan name _____

Is the project still consistent with the approved plan? ☐ Yes ☐ No

(If no, you may need to prepare plan/EA or EIS.)

Is the environmental document accurate and up-to-date? ☐ Yes ☐ No

(If no, you may need to prepare plan/EA or EIS.)

FONSI ☐ ROD ☐ *(Check one)* Date approved _____

Are there any interested or affected agencies or parties? ☐ Yes ☐ No

Did you make a diligent effort to contact them? ☐ Yes ☐ No ☐ NA

Has consultation with all affected agencies or tribes been completed? ☐ Yes ☐ No ☐ NA *(If yes, attach additional pages re: consultations, including the name, dates, and a summary of comments from other agencies or tribal contacts.)*

Are there any connected, cumulative, or similar actions as part of the proposed action (e.g., other development projects in area or identified in GMP, adequate/available utilities to accomplish project)? ☐ Yes ☐ No *(If yes, attach additional pages detailing the other actions.)*

F. INSTRUCTIONS FOR DETERMINING APPROPRIATE NEPA PATHWAY

First, always check DO-12, section 3.2, "Process to Follow," in determining whether the action is categorically excluded from additional NEPA analyses. Other sections within DO-12, including sections 2.9 and 2.10; 3.5; 4.5(G) and (G)(5); and 5.4(F), should also be consulted in determining the appropriate NEPA pathway. Complete the following tasks: conduct a site visit or ensure that staff is familiar with the site's specifics; consult with affected agencies, and/or tribes, and interested public; and complete this environmental screening form.

If your action is described in DO-12, section 3.3, "CEs for Which No Formal Documentation is Necessary," follow the instructions indicated in that section.

If your action is not described in DO-12, section 3.3, and IS described in section 3.4, AND you checked YES or identified "data needed to determine" impacts in any block in section D (Mandatory Criteria), this is an indication that there is potential for significant impacts to the human environment, therefore you must prepare an EA or EIS or supply missing information to determine context, duration, and intensity of impacts.

If your action is described in section 3.4 and NO is checked for all boxes in section D (Mandatory Criteria), AND there are either no effects or all of the potential effects identified in Section C (Resource Effects to Consider) are no more than minor intensity, usually there is no potential for significant impacts and an EA or EIS is not required. If, however, during internal scoping and further investigation, resource effects still remain unknown, or are at the minor to moderate level of intensity, and the potential for significant impacts may be likely, an EA or EIS is required.

In all cases, data collected to determine the appropriate NEPA pathway must be included in the administrative record.

G. INTERDISCIPLINARY TEAM SIGNATORIES *(All interdisciplinary team members must sign.) By signing this form, you affirm the following: you have either completed a site visit or are familiar with the specifics of the site; you have consulted with affected agencies and tribes; and you, to the best of your knowledge, have answered the questions posed in the checklist correctly.*

Interdisciplinary Team Leader Name	Discipline/Field of Expertise	Date
Technical Specialists Names	**Discipline/Field of Expertise**	**Date**

H. SUPERVISORY SIGNATORY

Based on the environmental impact information contained in the statutory compliance files and in this environmental screening form, environmental documentation for the subject project is complete. If the project involves hot topics or sensitive issues, I have briefed the deputy or regional director.

Recommended:

Compliance Specialist	Telephone Number	Date

Approved:

Superintendent	Telephone Number	Date

"Kevin Lunny" <kevin@drakesbayoyster.com>

09/12/2007 03:50 PM

To <George_Turnbull@nps.gov>

cc <Jon_Jarvis@nps.gov>, <Holly_Bundock@nps.gov>, "'Walker, Michael \(Feinstein\)'" <Michael_Walker@feinstein.senate.gov>, "'Walton, Zachary

bcc

Subject RE: Proposed SUP Meeting

History: This message has been replied to.

Dear George,

Thank you for the note. I will talk to our team to see if they are available.

Please include David Weiman and Zachary Walton in all your correspondence with us regarding the Drakes Bay Oyster Farm and the G Ranch.

Thank you,

Kevin

-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Tuesday, September 11, 2007 6:06 PM
To: Kevin Lunny
Cc: Jon_Jarvis@nps.gov; Holly_Bundock@nps.gov; Walker, Michael (Feinstein)
Subject: Proposed SUP Meeting

Hi Kevin,

Thank you for taking the time to meet with us on the Drakes Bay Oyster SUP and other issues yesterday. After further conversations with the Regional Director and Senator Feinstein's staff, I would like to propose meeting with you and your team again next week to see if we can finalize an SUP within the next couple of weeks. Once again, we do still feel NEPA compliance is required, but we would offer you a two year interim permit. We would like to specifically discuss mitigation measures that might be included in the SUP, all of which we have discussed in our earlier session. Mr. Michael Walker from Senator Feinstein's office has offered to participate in the meeting to help broker an agreement. I am available all day September 18 (Tuesday) and September 20 (Thursday). Hopefully you are available one or both of these days so we can continue to make progress towards an agreement on an SUP. Let me know either way about your availability. Thanks again.

George Turnbull

George Turnbull/OAKLAND/NPS
09/11/2007 05:40 PM PDT

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc Jon Jarvis/OAKLAND/NPS, Holly Bundock/OAKLAND/NPS, "Walker, Michael (Feinstein)" <Michael_Walker@feinstein.senate.gov>
bcc carlsondo(b) (6)
Subject Proposed SUP Meeting

Hi Kevin,

Thank you for taking the time to meet with us on the Drakes Bay Oyster SUP and other issues yesterday. After further conversations with the Regional Director and Senator Feinstein's staff, I would like to propose meeting with you and your team again next week to see if we can finalize an SUP within the next couple of weeks. Once again, we do still feel NEPA compliance is required, but we would offer you a two year interim permit. We would like to specifically discuss mitigation measures that might be included in the SUP, all of which we have discussed in our earlier session. Mr. Michael Walker from Senator Feinstein's office has offered to participate in the meeting to help broker an agreement. I am available all day September 18 (Tuesday) and September 20 (Thursday). Hopefully you are available one or both of these days so we can continue to make progress towards an agreement on an SUP. Let me know either way about your availability. Thanks again.

George Turnbull

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031
XL1425 02-106
September 6, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service (USPHS) conducted inspections of ranch employee housing units in Point Reyes National Seashore on June 13th and June 14th 2007. Point Reyes National Seashore Special Park Uses Coordinator, Kevin McKay, accompanied CDR Robinson on the inspections. In a report submitted to the Park CDR Robinson noted that many recommendations and deficiencies from past ranch inspections had been addressed. We truly appreciate the efforts that have been made to improve the quality of ranch employee housing. This is an issue that we know to be important to the community in and around Point Reyes National Seashore and we ask that you continue to be diligent in devoting attention to the maintenance of safe and healthy employee housing.

The inspection of employee housing at Drakes Bay Oyster Company revealed the following items requiring attention. Comments marked with an asterisk (*) indicate recommendations made in previous surveys that remain uncorrected. Additional asterisks indicate the number of years a deficiency has appeared in the inspection report.

Drakes Bay Oyster Company

Water and Wastewater Systems

The water system provides potable water to the residences and the packing house. It consists of a drilled well located on the slope above the residences, a hydropneumatic tank, and distribution piping. The well is reported to have an adequate sanitary seal, and there are no apparent sources of contamination within a 50 foot radius. Chlorination of the water is not done. Periodic bacteriological testing is done, with no positive results reported.

A communal wastewater system serves the residences and the packing house toilet. The packing house currently does not have a means of disposing process waste, so no processing is done on-site. The wastewater system consists of gravity sewage collection lines, five septic tanks, two lift stations, forcemain, and gravity fed leachfield. Sewage flows by gravity from the homes to the septic tanks where solids are removed. The effluent is then pumped from the lift stations via forcemain to the leachfield. The leachfield consists of four separate

In order to ensure that deficiencies are corrected in a timely manner, Point Reyes National Seashore Staff will be contacting you regarding progress on repairs and scheduling of any follow up visit. Please notify Kevin McKay, (415) 464-5111, if you have questions or concerns. Thank you for your continued efforts and cooperation.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 9/4/07

"Kevin Lunny"
<kevin@drakesbayoyster.com>

08/31/2007 01:01 PM

To <George_Turnbull@nps.gov>, "Kevin Lunny" <kevin@drakesbayoyster.com>
cc "David M. Weiman" <agresources@erols.com>, <Don_Neubacher@nps.gov>, "Holly Bundock" <Holly_Bundock@nps.gov>, <Jon_Jarvis@nps.gov>, "Kevin
bcc
Subject RE: Meeting on Special Use Permit

Sounds good. See you on the 10th.

Kevin

-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Friday, August 31, 2007 12:43 PM
To: Kevin Lunny
Cc: David M. Weiman; Don_Neubacher@nps.gov; Holly Bundock; Jon_Jarvis@nps.gov; Kevin Lunny; Lisa Bush
Subject: RE: Meeting on Special Use Permit

Kevin, how about if Suzanne and I meet with you at 11 am on Monday, September 10 at your facility?

Getting us your comments on the SUP on Wednesday, September 5 would be great.

Talk to you soon...

George

"Kevin Lunny"
<kevin@drakesbayoyster.com>

08/31/2007 11:02 AM MST

To "Kevin Lunny" <kevin@drakesbayoyster.com>, <George_Turnbull@nps.gov>
cc "David M. Weiman" <agresources@erols.com>, "Holly Bundock" <Holly_Bundock@nps.gov>, "Lisa Bush" (b) (6) <Jon_Jarvis@nps.gov>, <Don_Neubacher@nps.gov>
Subject RE: Meeting on Special Use Permit

George,

Any time on September 10th will work for us - after 10:00AM preferred. We will get our SUP comments to you by Wednesday the 5th.

Thank you,

Kevin

-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Thursday, August 30, 2007 5:17 PM
To: Kevin Lunny
Cc: agresources; Don_Neubacher@nps.gov; Jon_Jarvis@nps.gov; Lisa Bush; Holly Bundock
Subject: Re: Meeting on Special Use Permit

Kevin,
Suzanne Boyce Carlson and I are available to meet you Thursday September 6 in the morning or anytime Monday September 10. Let me know if either of these dates work. If not, give me a range of other dates that might work. Also, it would be helpful if you could provide us a list of any concerns you might have with the draft provisions of the SUP we provided you. We also look forward to an agreement soon.

George
Sent from my Blackberry
George Turnbull
510-817-1435

----- Original Message -----
From: "Kevin Lunny" [kevin@drakesbayoyster.com]
Sent: 08/29/2007 08:11 AM MST
To: George Turnbull; "Kevin Lunny" <kevin@drakesbayoyster.com>
Cc: <agresources@erols.com>; Don Neubacher; Jon Jarvis; "Lisa Bush" (b) (6)
Subject: RE: Meeting on Special Use Permit

George,

Thank you for giving us a few more days to go over the SUP. Please feel free to schedule a meeting at your earliest convenience. We look forward to
an agreement on the SUP soon.

A copy of the "Record of Agreement Regarding Drakes Estero Oyster Farming and Harbor Seal Protection" will be sent to you today.

Kevin

-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Friday, August 24, 2007 4:03 PM
To: Kevin Lunny
Cc: agresources@erols.com; Don_Neubacher@nps.gov; Jon_Jarvis@nps.gov;

Lisa Bush
Subject: RE: Meeting on Special Use Permit

Kevin,

Thanks for letting me know. Keep me posted on when you might be available to meet. I am out of the office all next week but back September 4.

George

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/24/2007 03:44 PM MST

To <George_Turnbull@nps.gov>
cc "Lisa Bush" (b) (6) >, <agresources@erols.com>, <Don_Neubacher@nps.gov>, <Jon_Jarvis@nps.gov>
Subject RE: Meeting on Special Use Permit

Hello George,

I'm sorry for taking all day to respond to your note. We have tried to meet
with our attorney, Judy Davidoff, to review the proposed SUP. Unfortunately,
she does not have the time to review the document before Monday. We have been advised to postpone our meeting that is scheduled for Monday 08/27/07 as we need time to review the SUP proposal.

Thank you,

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-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Thursday, August 23, 2007 3:53 PM
To: kevin@drakesbayoyster.com
Cc: Jon_Jarvis@nps.gov; Don_Neubacher@nps.gov; agresources@erols.com
Subject: Meeting on Special Use Permit

Hi Kevin,

I'm back in the office and wanted to confirm that we are meeting at your site on Monday, August 27 at 11 am to continue our discussion on special use permit terms. We are proposing to bring Suzanne Boyce Carlson (the attorney from our Solicitor's office), myself, and, as you requested at the last meeting, Don Neubacher. Jon Jarvis is out of town and will be unable to attend. Please let us know who you plan to have in attendance. We would like to propose that since we will be at your site that we would initially tour your facility onshore. Because of NPS management policies regarding wilderness, we will not be able to go on a boat. After this, we thought we might break for lunch and then reconvene to discuss the permit. A conference room is available at Point Reyes NS headquarters if you would like to meet there. I have to catch a plane and will have to leave at 3 pm, as will Suzanne.

Attached is a pdf file that represents the editorial changes we discussed at our last meeting. These changes should be shown in green. This document can be the starting point for our discussions. We were also hoping that you might send us the harbor seal monitoring protocol you referred to in our discussions in section 3j.

We look forward to seeing you Monday morning.

George Turnbull

(See attached file: DrakesBayOysterSUP Draft 8.22.07.pdf)

George Turnbull/OAKLAND/NPS
08/31/2007 12:43 PM

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cc "David M. Weiman" <agresources@erols.com>, Don_Neubacher@nps.gov, "Holly Bundock" <Holly_Bundock@nps.gov>, Jon_Jarvis@nps.gov, "Kevin carlsondo(b) (6)
bcc
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cc "David M. Weiman" <agresources@erols.com>, "Holly Bundock" <Holly_Bundock@nps.gov>, "Lisa Bush" (b) (6) <Jon_Jarvis@nps.gov>, <Don_Neubacher@nps.gov>
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We look forward to seeing you Monday morning.

George Turnbull

(See attached file: DrakesBayOysterSUP Draft 8.22.07.pdf)

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/13/2007 04:58 PM

To <George_Turnbull@nps.gov>
cc
bcc
Subject RE: Drakes Bay Oyster Farm SUP

George,

Thank you. We look forward to seeing the updated SUP as soon as it can be arranged so that we can have some time to review it before our meeting on the 27th.

Have a great vacation!

Kevin

-----Original Message-----
From: George_Turnbull@nps.gov [mailto:George_Turnbull@nps.gov]
Sent: Monday, August 13, 2007 4:15 PM
To: Kevin Lunny
Subject: Re: Drakes Bay Oyster Farm SUP

Kevin, thanks for the email. As I think I mentioned the other day, I will be on vacation from today until next Thursday (August 23) when I return. I look forward to meeting with you on August 27. Your attorney is more than welcome to attend the meeting. Your three points are interesting. We can provide a fuller discussion of NEPA compliance at the meeting. As you may imagine, we take a different point of view on these issues. I was not at the meeting with Senator Feinstein, but I was told that it was agreed that some level of NEPA compliance was required as a condition of developing this permit.

When I return, we will forward you a revised SUP based on the discussions last week. I look forward to further discussions with you on this matter

George Turnbull

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/13/2007 02:38 PM MST

To "George Turnbull" <George_Turnbull@nps.gov>
cc
Subject Drakes Bay Oyster Farm SUP

Dear George.

This is a partial response to the new NPS' proposed permit. A more comprehensive response will be forthcoming as we proceed.

Now that we better understand the new NPS permit proposal, we are beginning to review it. Last Tuesday's meeting helped explain your new proposal.

With regard to the NPS' new requirement that an Environmental Assessment (EA) is required, our discussion concluded:

(1) None of the four draft SUPs previously prepared by the Superintendent
required an EA. In fact, NPS, in each draft previously submitted, stated that (at the bottom of the first page) "NEPA & NHPA Compliance: CATEGORICALLY EXCLUDED..." is marked with an "x" indicating that it was not required.

(2) NPS indicated that the justification for the EA was based on the NPS determination that Drakes Bay Oyster Company (DBOC) was "expanding" the oyster farm. As discussed in some detail, DBOC is not expanding production.
As a general proposition, today (two and a half years after the purchase of DBOC), shellfish production is roughly one-third of that in the 1990's under
the previous owner.

(3) NPS further indicated that justification for the EA was based on the need for environmental review. As discussed, an EA was finalized in May 1998 in partnership with the County of Marin -- and a Finding of No Significant Impact (FONSI) was approved. This was initiated when the NPS proposed that the current site be rebuilt and redesigned, new buildings constructed and the entire oyster operation upgraded. We showed you the document and, in particular, the drawings of the new building complex, proposed to be 12,000 square feet (about three-to-four times the current onshore footprint).

At our meeting, neither you, Mr. Jarvis or the Solicitor were aware of these
three matters..

Based on the above, the provisions in the proposed SUP can now be deleted..

One additional matter. We were not informed that a representative of the Solicitor's Office would be attending this meeting. Had we known, we would
have had our attorney present.

We appreciate the time and effort to discuss these many new provisions.

Kevin and Nancy Lunny

George Turnbull/OAKLAND/NPS
08/13/2007 04:15 PM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc
bcc Jon Jarvis/OAKLAND/NPS
Subject Re: Drakes Bay Oyster Farm SUP

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cc
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Kevin and Nancy Lunny

George
Turnbull/OAKLAND/NPS
08/03/2007 03:48 PM

To "Kevin Lunny" <kevin@drakesbayoyster.com>
cc "David M. Weiman" <agresources@erols.com>, "Jon Jarvis" <jon_jarvis@nps.gov>
bcc
Subject Re:

Hi Kevin,

Jon Jarvis (after discussions today with Mr. Weiman) asked that I set a meeting up for Tuesday, August 7 in the afternoon to go through provisions of the revised Special Use Permit (SUP) we have sent to you (sorry it was undated, it should have been dated July 30, 2007). We propose to meet with you in San Francisco on Tuesday at 2 pm at Building E in lower Fort Mason (San Francisco Maritime NHS headquarters - second floor). I can send you specific directions if you like. I am also working to provide the material you requested below, hopefully in advance of the meeting. I am assuming the earlier SUP you are referring to was the one sent to you on December 20, 2005?

Please let me know if you are available. I know Jon's schedule is particularly challenging so hopefully the time/date will work.

I look forward to meeting with you.

George Turnbull
Deputy Regional Director
Pacific West Region
510/817-1435

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny"
<kevin@drakesbayoyster.com>
08/03/2007 09:37 AM MST

To "Jon Jarvis" <jon_jarvis@nps.gov>
cc "David M. Weiman" <agresources@erols.com>, "George Turnbull" <George_Turnbull@nps.gov>
Subject

Dear Jon,

This will acknowledge receipt of your letter, undated (A90(PWR-C) which contained a draft SUP.

A quick read indicates that numerous changes have been made to this proposed SUP as compared to the SUP previously submitted.

So that we have a comprehensive understanding of this new proposal, would you please itemize the changes, and provide an explanation for each.

I would like to meet next week to discuss this proposal and therefore need the clarification about the new proposal as soon as possible.

Thank you,

Kevin Lunny.
Drakes Bay Oyster Farm

"Kevin Lunny"
<kevin@drakesbayoyster.com>

08/03/2007 09:37 AM

To "Jon Jarvis" <jon_jarvis@nps.gov>

cc "David M. Weiman" <agresources@erols.com>, "George Turnbull" <George_Turnbull@nps.gov>

bcc

Subject

History: This message has been replied to and forwarded.

Dear Jon,

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A quick read indicates that numerous changes have been made to this proposed SUP as compared to the SUP previously submitted.

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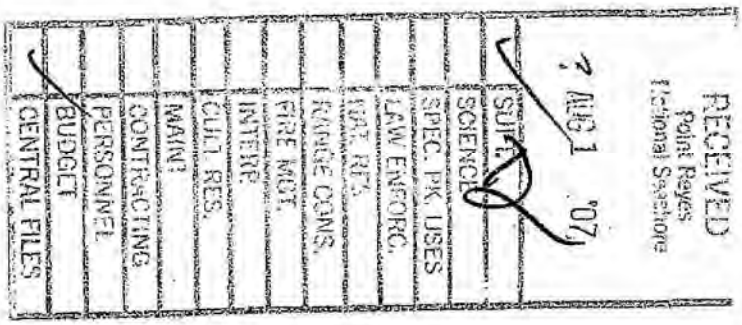
Thank you,

Kevin Lunny
Drakes Bay Oyster Farm

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
1111 Jackson Street, Suite 700
Oakland, California 94607-4807

IN REPLY REFER TO:
A90(PWR-C)
7.30.07
L3619
SOP Lunny
X L1425
02:106



Mr. Kevin Lunny
Drakes Bay Oyster Company
17300 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Mr. Lunny:

This transmits a copy of the special use permit for the operation of the Drakes Bay Oyster Company. Once you have endorsed the permit, we will promptly sign it and complete the initial environmental compliance. You will have an interim special use permit to maintain and operate for a period of one year, as we agreed to on Saturday, July 21, 2007. Please return a fully executed copy to the NPS at the above address. During this period, however, no additions to the facilities can be made. In addition, California Coastal Commission approval and permits must be secured for any actions they have jurisdiction over before site actions can be taken.

This letter also summarizes our action items agreed to at the meeting on July 21. The NPS agreed to:

- Remove *Drakes Estero: A Sheltered Wilderness* from the park website pending an independent review of scientists—report removed July 23
- Release data collected at the Estero by August 6
- Provide chronology of legally significant events—attached
- Develop process for an independent science panel—underway
- Develop an interim special use permit using Stevens boundary survey—attached
- Confirm that environmental compliance will be paid for by the NPS—confirmed

Deputy Regional Director George Turnbull is designated as your point of contact for the negotiations for the special use permit. Please contact him at 510-817-1435 if you have any concerns about the enclosed copy of the permit.

Sincerely,

Jonathan B. Jarvis
Regional Director, Pacific West Region

Enclosures

cc: Don Neubacher, Superintendent, Point Reyes
Barbara Goodyear, Field Solicitor

TAKE PRIDE® IN AMERICA

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2007
Reviewed 20
Reviewed 20
Expires 2008

Permit # MISC-8530-6000-7012
Type Park Code No. #

Long Term X
Short Term

Point Reyes National Seashore
Name of Area

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period of one year ("Term") commencing on August 1, 2007 ("Commencement Date") and terminating on July 31, 2008 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP") and the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Oysters: Aquaculture Lease/SUP Area and NPS Resources"). In addition, the Permitter intends to fence off some of the boundaries of the SUP Area shown on Exhibit B, and in the event of any conflict between Exhibit B and fencing provided by the Permitter, the fencing will control. Collectively, the areas so designated shall be referred to as the "Premises."

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items as set forth in Exhibit D, the interpretation of oyster cultivation to the visiting public and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of oyster growing. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: CATEGORICALLY EXCLUDED ___ EA/FONSI ___ EIS ___ OTHER APPROVED PLANS

PERFORMANCE BOND:	Required	Not Required X	Amount:	
LIABILITY INSURANCE:	Required X	Not Required	Amount: As set forth in Article 15 of this Permit.	

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year.

PERMITTEE: _____
Signature Organization Date

Authorizing Official: _____ George Turnbull
Signature Deputy Regional Director Date

Additional Authorizing Official: _____
(If Required) Signature Title Date

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Oysters: Aquaculture Lease/SUP Area and NPS Resources

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Designated Retail Site

EXHIBIT D: Approved List of Complimentary Food Items

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this one year instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires in 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described In this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon breach of any of the conditions herein or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees,

contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed under the Federal Tort Claims Act.

h) Permittee's operations are to be set back on the shore a minimum of 50 feet from the mean high tide mark, excepting a portion of that area which is the subject of this Permit and that is described in the attached map (Exhibit B).

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee shall not place oyster and/or clam bags in seal haul-out areas as identified in Exhibit A. Any bags or cultivation equipment currently placed in haul-out areas shall be immediately removed.

k) In order to avoid introduction of exotic pests to Drakes Estero only oyster "seed" and not whole oysters may be imported. Seed must be obtained from regions approved by Permitter. At issuance of this Permit Washington, Oregon, and California are exclusively approved regions for obtaining oyster seed.

l) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area; visitors may be directed to facilities located at Drakes Beach. Picnic tables will be provided by the NPS at the adjacent parking area.

m) No discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

n) In order to ensure public health and safety, no pets, including dogs and cats, shall be permitted in the Special Use Permit Area.

o) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

p) Permittee shall retail only those items that are approved by the superintendent in writing. Exhibit D sets forth the approved list of retail items. The designated retail site as set forth in Exhibit C is the sole building that can be used for retail items.

4) SPECIAL PERMIT CONDITIONS

a) The maximum annual production limit for oysters, rock scallops and clams shall be 700,000 pounds. Oysters are limited in number to 9,000,000 and clams to 1,000,000.

b) No additional oyster racks and/or cultivation infrastructure shall be constructed during the term of this permit. Permittee shall remove abandoned oyster racks and/or cultivation infrastructure and equipment from Drakes Estero.

c) Placement of bags for oyster and/or clam production is prohibited in eelgrass areas. Any bags currently placed in

eelgrass areas shall be removed immediately.

d) Within sixty (60) days following the signing of this interim Permit, Permittee shall submit for National Park Service and California Coastal Commission approval a boating operations plan designed to mitigate impacts to eelgrass beds within Drakes Estero. This plan shall indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing oyster racks and/or cultivation equipment.

e) In order to control invasive species, Permittee shall make every effort to ensure that no new species enter the estuary. Within sixty (60) days following the signing of this interim Permit, Permittee shall submit for National Park Service and California Coastal Commission approval a concise invasive species mitigation plan that includes best management practices (BMP's).

f) Permittee shall not introduce species of oysters and/or clams beyond those described in the existing leases from the California Department of Fish and Game.

g) This Permit is subject to the good faith participation of the Permittee in the environmental compliance process regarding the issuance of a Special Use Permit for the remainder of the term of the ROP. Such good faith participation shall include complying with the requirements set forth in Section 20(b) of this Permit.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

b) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

c) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

d) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

e) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

f) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

g) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

h) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of oyster racks.

i) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Areas in Drakes Estero must be kept free of debris associated with oyster production operations including wood from racks, plastic spacers, unused oyster bags, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) As set forth in Section 3(m) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS legislation, the Code of Federal Regulations, and NPS policies, including but not limited to NPS Management Policies 2006, as such may be amended.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species.

c) As set forth in Section 3(j) of this Permit, Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites.

d) On a case by case basis, the Permitter will evaluate incidences of depredation and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past, ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e).

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United

States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before August with the remaining fifty percent payable on or before December of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences must be in good repair. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) Lighting of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road will be maintained by the NPS.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines from the main line to the structures within the Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so

as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee require the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA") ("Compliance Activity"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. If Permitter determines that the Compliance Activity is warranted, Permitter will prepare NEPA or NHPA documents as appropriate. Permittee shall not implement any aspect of the Compliance Activity until all applicable NEPA and NHPA requirements have been met.

21) ANNUAL MEETING

a) The Parties shall meet annually in the spring of each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit. Any proposed changes or modifications to this Permit which are required in order to meet National Park Service requirements or objectives shall be discussed and negotiated at the Annual Meeting. If National Park Service requirements or objectives require prompt attention, the date of the Annual Meeting may reasonably be changed by Permitter.

22) PENALTY

a) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) TERM

a) Six months prior to the Expiration Date of this Permit, this Permit, or a similar permit, may be offered to Permittee for an additional period.

b) If a subsequent permit is not entered into prior to the Expiration Date, the Provisions of this Permit regarding Permittee's obligations to surrender and vacate the Premises shall apply.

c) The Permittee and Permitter acknowledge and recognize that the Reservation of Use and Occupancy referenced in the deed from Johnson Oyster Company to the United States of America, recorded on November 30, 1972, in book 2634, page 641 of the Official Records of Marin County, California, expires on November 9, 2012. The Permittee acknowledges that they have been informed about the Congressional designation in 1976 of Drakes Estero as potential wilderness and the statutory mandate that the Park be managed "in a manner . . . supportive of the maximum protection, restoration, and preservation of the natural environment within the area." The Permittee also acknowledges that they have been provided the Office of the Solicitor legal opinion dated February 26, 2004 regarding the future of the potential wilderness area.

24) SURRENDER AND VACATE THE PREMISES, RESTORATION

A) On the Termination Date of this Permit, Permittee shall surrender and vacate the Premises, remove Permittee's

Personal Property therefrom, and repair any damage resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the Termination Date, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

25) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

26) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

27) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

28) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

29) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

30) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

31) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

32) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

33) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

34) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

35) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

36) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646.

37) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been

contained in this Permit.

38) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

39) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

40) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

41) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

42) MEANING OF TERMS

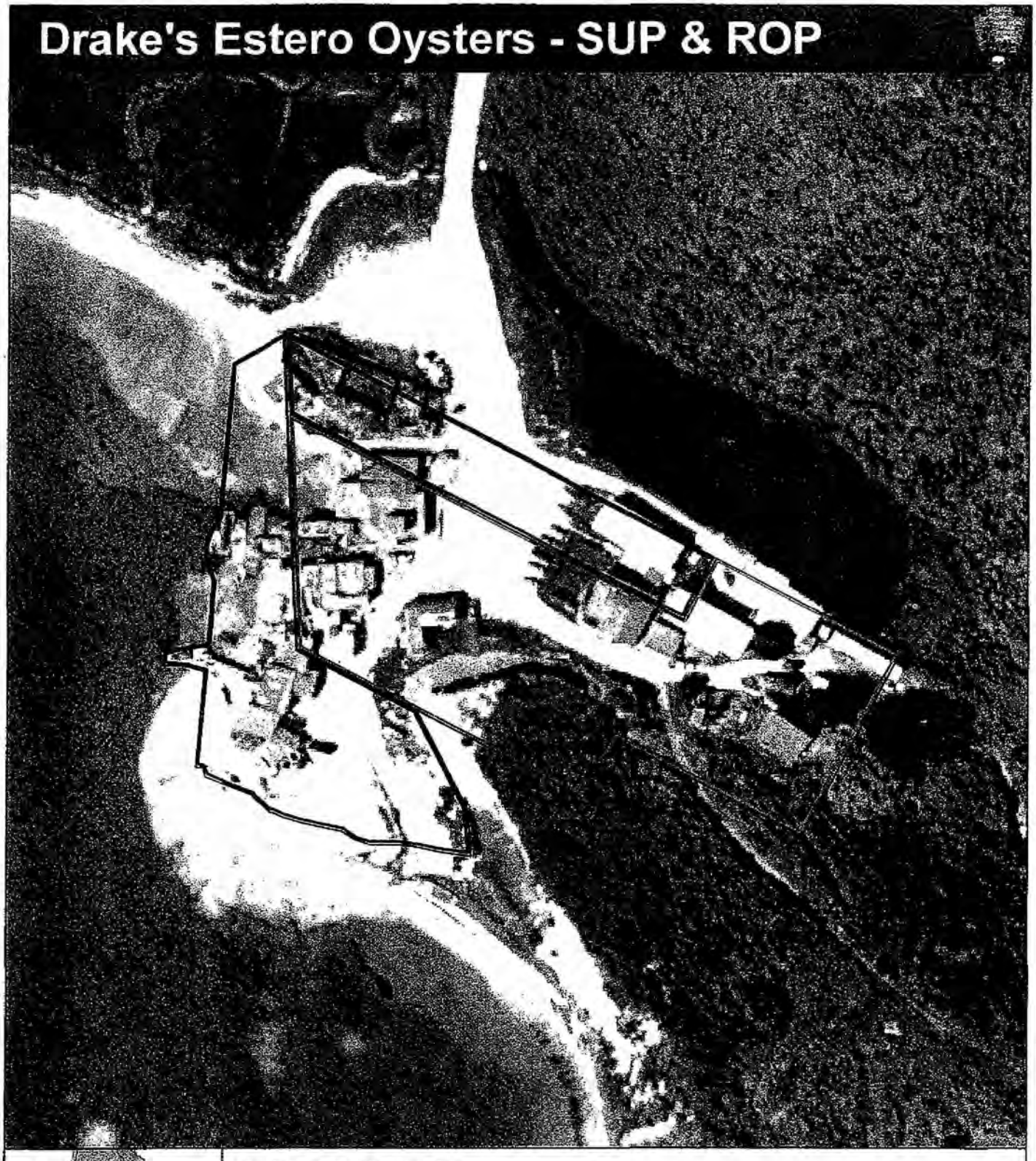
a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

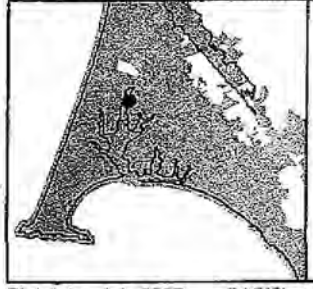
43) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

EXHIBIT A
MAP

Drake's Estero Oysters - SUP & ROP





National Park Service
Point Reyes National Seashore
Marin County, CA

N
W E
S

0 50 100 150 200
Feet

Permit Type

- ROP - 1.5 acres
- SUP - 1.1 acres

Plot date: July 2007 S:\GIS\projects1\neubad\johnsons\johnsons_lease_7-12-2007

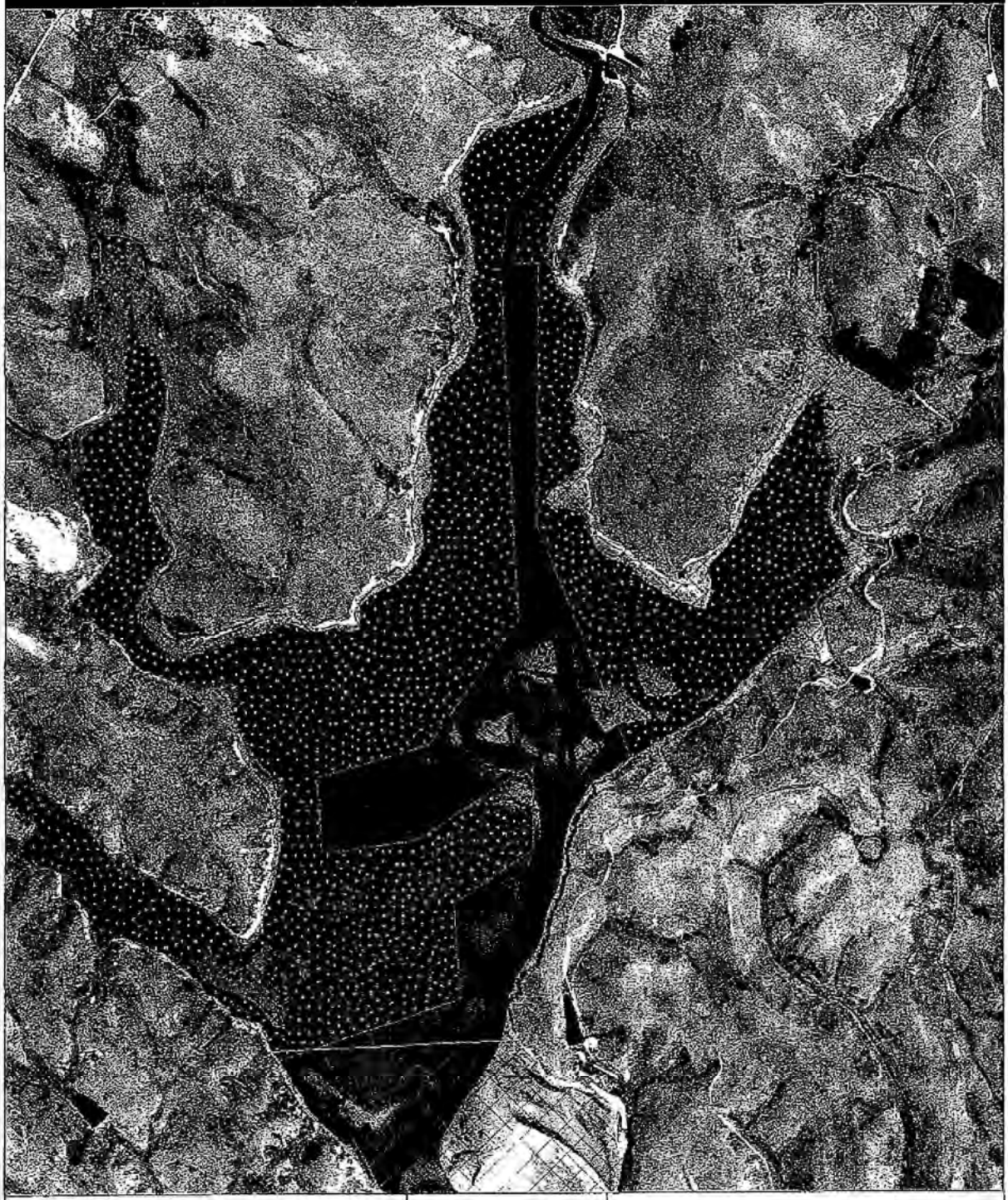
EXHIBIT B

MAP

Drake's Estero Oysters

National Park Service
U.S. Department of the Interior

Aquaculture Lease/SUP Area and NPS Resources



Astragalus Pychostachys
Aquaculture Lease/SUP Area
Harbor Seal Haulout Area
Potential Wilderness - Water
Existing Wilderness - Water

Permit Type
ROP
SUP

Map Location

N
W E
S

0 0.5 Miles

1:25,551 1 inch equals 0.4 miles

Plot date: February 1, 2007 s:\gis\projects\lvieubacher\Adamsohn\Drakes Estero Oyester [illegible]

EXHIBIT C
Designated Retail Site

EXHIBIT C
Designated Retail Site

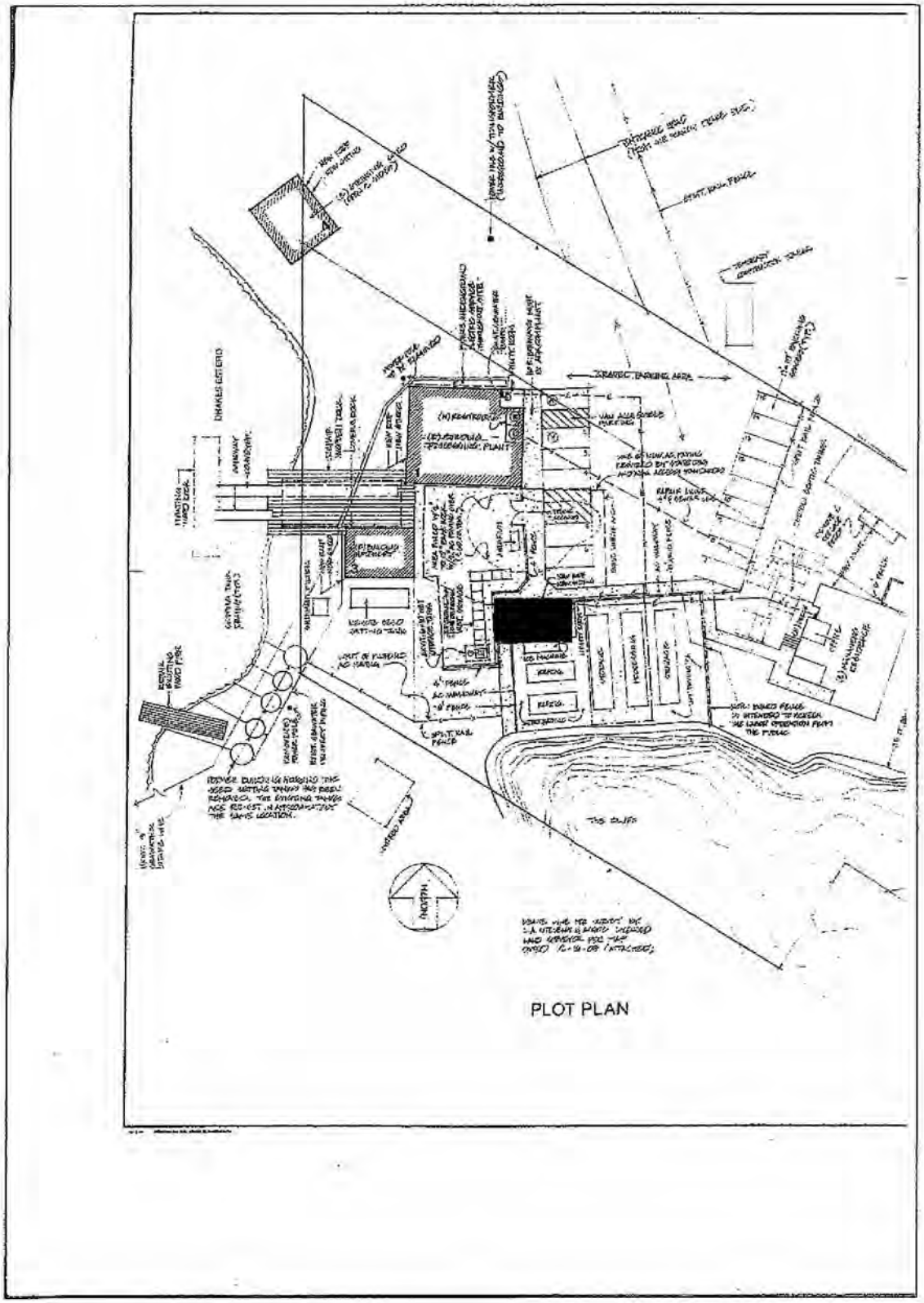


EXHIBIT D

Approved List of Complimentary Food Items

- Limes
- Sauces
- Sodas – Permittee may retail no more than four varieties of sodas.
- Water
- Ranch food products grown and or processed on adjacent ranches.

The non-food items that the DBOC would like to continue to retail:

- Oyster knives
- Crab shell crackers
- Insulated containers
- Gloves
- Aprons

Drake's Bay Oyster Company's Reservation of Use and Occupancy
Updated, NPS
July 26, 2007

Chronology of Legally Significant Events

1934: According to State, earliest state water bottom leases at Drakes Estero

1962: Enactment of Point Reyes National Seashore enabling act (codified at 16 U.S.C. § 459c – 459c-7), to include Drakes Estero.

1965: By act of the California Legislature, State grants to the United States "all of the right, title, and interest of the State of California…in and to all of the tide and submerged lands or other lands beneath navigable waters situated within the boundaries of Point Reyes National Seashore…." **Thus, the tidal and submerged lands of Drakes Estero become NPS land, subject to the laws, regulations, and policies governing NPS land.**

- Because of this conveyance to the United States, the California Department of Fish and Game (CDF&G) recognizes that the Drakes Bay Oyster Company mariculture operation in the estuary "is properly within the primary management authority of [Point Reyes National Seashore], not the Department." CDF&G Letter to Supt. Neubacher, dated May 15, 2007. The CDF&G water bottom lease is also expressly contingent on the 1972 Reservation of Use and Occupancy (described below) and subject to all NPS rules and regulations. *Id.*

1972: United States purchases Johnson Oyster Company's property ("five acres, more or less" onshore) for $79,200, subject to a **Reservation of Use and Occupancy** on approximately 1.42 of those acres for a period of forty (40) years—till 2012.

- Thus, the Reservation of Use and Occupancy is not a lease. Rather, it is "a terminable right to use and occupy" the 1.42 acres for a period of 40 years for specified purposes. *See* Reservation of Use and Occupancy, Exhibit "C" to the 1972 Grant Deed (copy attached). The United States owns the underlying fee, having purchased the property for a price that reflects the value of the 40-year reservation.
- The Reservation of Use and Occupancy has 18 paragraphs of terms and conditions, including but not limited to requirements that (a) the Oyster Company "abide by all rules and regulations pertaining to National Park System areas"; (b) "[t]he premises…be maintained in a safe, sanitary, and sightly condition… meeting all Federal, State, and County health, sanitation, and safety standards…"; (c) "[n]o permanent or temporary structure, sign or other improvement of any type whatsoever…be erected…in or upon the reserved premises or improvements without the prior written approval of the Director."
- The Reservation of Use and Occupancy expires in 2012.

1976: Enactment of additional Point Reyes National Seashore legislation to designate wilderness and strengthen the enabling act (Pub. L. No. 94-544 (Oct. 18, 1976):

- **Wilderness:** Designates as wilderness, to be administered by the Secretary of the Interior in accordance with the Wilderness Act, 25,370 acres and potential wilderness additions (including Drakes Estero) comprising 8,003 acres.[1]

  The House Committee Report (H. Rep. No. 94-1680)[2] states the following about potential wilderness additions: "As is well established, it is the intention that those lands and waters designated as potential wilderness additions *will be essentially managed as wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these lands and waters to wilderness status.*" (Emphasis added.) Case law has made clear that commercial operations and structures and installations are not compatible with wilderness.

- **Prioritization of natural values:** The Secretary shall administer the Seashore "*without impairment of its natural values*, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the *maximum protection, restoration, and preservation of the natural environment within the area.*" (Emphasis added.)

  The House Committee Report states that this language "underscores the intention that *the Seashore is to be managed for the protection of its natural environment and values.*" (Emphasis added.) The Report makes clear that the Seashore should be managed under the then existing NPS policies governing "natural" areas rather than the policies for "recreational" areas. These policies emphasize, among other things, the preservation of the total environment of natural areas, the removal of all inconsistent physical improvements or land uses on acquired property, and the elimination "as rapidly as possible" of nonpark uses and developments. *SeeAdministrative Policies (Natural Area Category),* revised 1970, at 16, 28, 62.

1985: Congress names the wilderness area in Point Reyes National Seashore the **"Phillip Burton Wilderness"** to recognize Congressman Burton's "dedication to the protection of the Nation's outstanding natural, scenic, and cultural resources and his leadership in establishing units of the National Park System and preserving their integrity against threats to those resources..." Pub. L. No. 99-68 (July 19, 1985).

1997 to present: Issues of authorization and compliance by Johnson Oyster Company and, since 2005, Drakes Bay Oyster Company with respect to County and State laws:

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[1] "Potential wilderness additons" are lands that do not qualify for immediate designation as wilderness "due to temporary nonconforming or incompatible conditions. *See NPS Management Policies 2006*, Ch. 6 ("Wilderness Preservation and Management"), especially ¶¶ 6.2.1.2, 6.2.2.1, and 6.3.1. Once these nonconforming or incompatible conditions have been removed or eliminated, the Secretary shall designate these lands wilderness by publishing a notice in the *Federal Register*. *See* Pub. L. No. 94-567, § 3 (Oct. 20, 1976).

[2] There is no Senate Committee Report.

1997 to present: Stipulated Agreement between Marin County and Johnson Oyster Company concerning various compliance and authorization requirements. Court continues to retain jurisdiction as all the requirements have not been met.

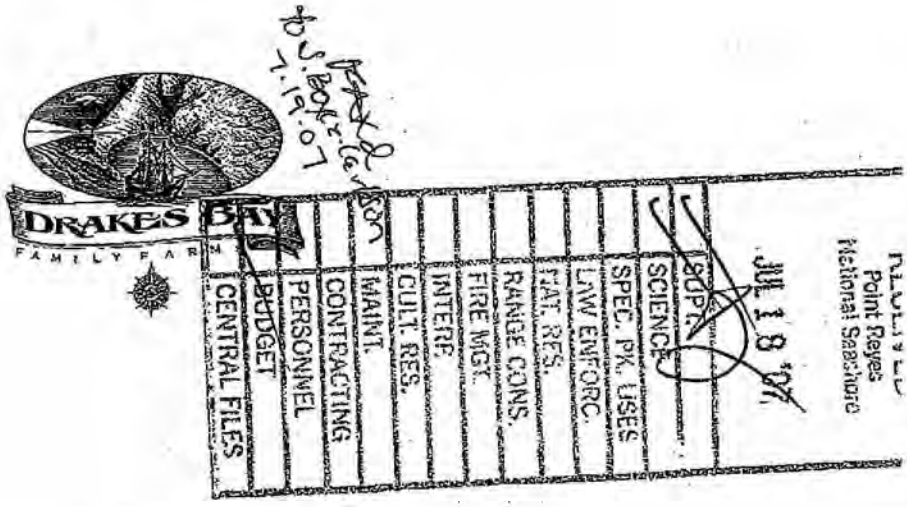
2003 to present: California Coastal Commission's Cease and Desist Order concerning various compliance and authorization requirements. This Order, and the continuing notices of violation, concern onshore development by the Oyster Company, which still does not have the required coastal development permit. On June 5, 2007, the California Coastal Commission wrote to Drakes Bay Oyster Company concerning "potential impacts to sensitive resources in Drakes Estero" and the need to obtain a coastal development permit for the offshore aquaculture operations as well.

2004: California Department of Fish & Game renews water bottom leases for an additional 25 years, contingent on the Reservation of Use and Occupancy and compliance "with all rules and regulations now or hereinafter promulgated by any governmental agency having authority by law..." The State has acknowledged that NPS has primary management authority over the subject tidal and submerged lands. CDF&G letter to Supt. Neubacher (May 15, 2007).

2005: Drakes Bay Oyster Company's purchase of Johnson Oyster Company for an undisclosed price.

- Mr. Lunny bought the remainder of the Reservation of Use and Occupancy with full knowledge of the 2012 expiration date, the Solicitor Office's opinion on termination in 2012, the Stipulated Agreement with the County, and the California Coastal Commission's Cease and Desist Order.
- Extensive record of correspondence on this matter since 2005 regarding the National Park Service's concerns relating to the oyster farming operations in Drakes Estero, including impacts to the natural conditions. Park managers must take into consideration a multiplicity of environmental laws that govern these resources including the Point Reyes National Seashore Act, the National Park Service Organic Act, the Wilderness Act, the Endangered Species Act, and the Marine Mammal Protection Act.

Going Forward: The National Park Service will again provide Mr. Lunny a draft Special Use Permit for his review. This permit would authorize oyster farming operations on his Reservation and on the adjacent onshore and offshore parkland, subject to restrictions to protect sensitive resources. *See, e.g.,* NPS regulations requiring such authorization at 36 C.F.R. §§ 5.3 (business operations), 5.6 (commercial vehicles), 5.7 (construction of buildings or other facilities). Issuance of Special Use Permits is subject to compliance with the National Environmental Policy Act, but the National Park Service believes that it can expedite such compliance to put in place an interim permit, and then complete compliance on a permit to cover the remainder of the Reservation of the Use and Occupancy in a reasonable timeframe because of the 2012 termination of use. These NPS authorizations are also necessary for Mr. Lunny's compliance with State and local laws.



07/16/07

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

Dear Mr. Neubacher.

We were just informed that you are planning to release "new" science in some form.

We don't know whether or not it's another republished version of Drakes Estero, A Sheltered Wilderness Estuary, letters and/or communications from other scientists or experts, or data or information in some other form.

Regardless of the form, would you please provide the documents and supporting information by Thursday, July 19, so that it can be reviewed prior to Saturday's meeting with Senator Feinstein, National Park Service, California Coastal Commission, Department of Fish and Game and the Marin County Board of Supervisors. This includes:

(1) Document or Report containing new data, analysis and/or information.

(2) Indication if peer-reviewed, and if so, list of reviewers, reviews, responses and revisions, and re-reviews.

(3) References and source material identification.

(4) Complete primary database, including protocols, for all statements or conclusions.

(5) Statistical analysis for all statements and/or conclusions.

(6) Complete letters or documents for any unpublished references or quotations.

(7) With regard to anyone who provides a letter or statement, provide credentials and expertise.

(8) And further, with regard to anyone who provides a letter or statement, indicate whether they have any primary data from Drakes Estero

Our ability to review and to analyze this new science will ensure a more productive meeting.

Thank you.

Kevin Lunny Nancy Lunny

Drakes Bay Family Farms

17171 Sir Francis Drake Blvd.
Inverness, California 94937

t: 415.669.1149
f: 415.669.1262
w: drakesbayfamilyfarms.com

L1425
02-106

07/12/07

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

Dear Mr. Neubacher,

You have requested a meeting with Drakes Bay Oyster Company and advise that representatives of the National Park Service Western Regional Office, the Office of the Solicitor and the California Coastal Commission will participate.

So that we can properly prepare for this meeting, the following is requested:

[1] Please identify each individual that will attend the meeting, and include title, organization and complete contact information (address, telephone and email).

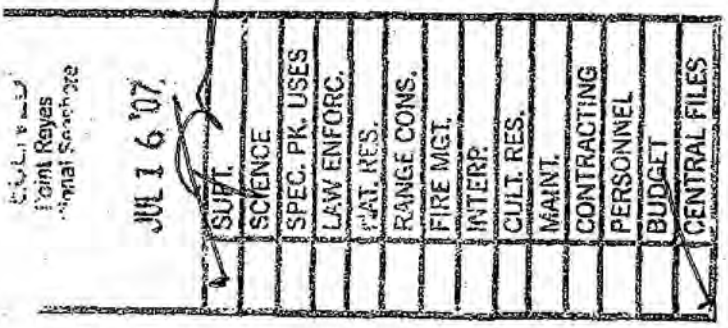
[2] Provide the proposed agenda, with specificity. If you have documents to present or discuss, in draft or otherwise, we request that they be submitted sufficiently in advance so that they can be fully evaluated prior to the meeting.

[3] If you have issued or received directives or guidance for this meeting, please provide copies so they can be fully evaluated prior to the meeting.

[4] With regard to permits or related documents, please highlight any proposed changes, and provide an explanation for each.

[5] Your letter states: *"regarding the Reservation boundary, as we stated previously, we are prepared to apply the conditions in the Reservation to the area located within the Stevens survey."* Please confirm the Reservation now includes all oyster farm buildings, including those near the water.

Mr. Neubacher, for more than two years, you insisted that a drawing, prepared for the Johnson Oyster Company in 2003, that was specifically prepared to meet a condition of the California Coastal Commission Cease and Desist Order – the Lafranchi drawing – controlled all regulatory and permitting issues. You knew that the Lafranchi drawing was not a boundary survey. You knew the Lafranchi drawing was in error. You knew that the Lafranchi drawing was prepared for "appraisal" and not "boundary" purposes. You knew that the Lafranchi drawing chopped the oyster farm in half. And you knew that any map that cut the farm in two made no practical sense. Notwithstanding, you were adamant. The Lafranchi drawing, by your declaration, was controlling.



Drakes Bay Family Farms

17171 Sir Francis Drake Blvd.
Inverness, California 94937

t: 415.669.1149
f: 415.669.1262
w: drakesbayfamilyfarms.com

That decision on your part, as much as anything else, delayed this permit process, prevented us from resolving the Coastal Commission's Cease and Desist Order issues, interfered with our right to conduct business and cost our family farm significant amounts of time and money. At the May 8 Marin County Board of Supervisor's hearing, you testified that the Coastal Commission, not NPS, was the reason for these delays. Plainly, that was not accurate.

Early on, when you raised this issue, you recognized the limitations of the Lafranchi plans and subsequently agreed to have the NPS prepare a formal boundary survey. Then a short time later, without explanation, you reversed from your own recommendation by saying that you would not spend any more money on this project and that if there was going to be a survey, "Lunny will have to pay for it". We were left with no choice. The Drakes Bay Oyster Company then spent over $20,000 in direct costs and more than that in indirect costs and lost opportunities to have a formal boundary survey prepared. We contracted with L.A. Stevens & Associates, a well-known and highly regarded survey firm in Marin County.

When completed, the boundary survey showed that all oyster farm buildings were on the Reservation and that the Lafranchi plans were not accurate. The survey – the Stevens survey – was submitted to you and your staff. Then, with an official survey in hand, one that showed all the oyster buildings on the Reservation, you rejected the formal boundary survey (Stevens) and instead declared that NPS would rely on the incorrect appraisal drawings (Lafranchi). Moreover, Lafranchi stated, in writing, that these drawings were not prepared for boundary purposes and should not be used for such. Your rejection of the Stevens survey, more than a half year ago, was both arbitrary and punitive.

Today, some seven months later, in your letter of June 19, 2007, without explanation, you abruptly reversed yourself again and admit that the Stevens survey (a survey which is consistent with all prior appraisals, descriptions, maps, drawings and permits prepared for the oyster farm since the creation of the PRNS) is now the basis for NPS permits.

Given this history, and to eliminate any possibility of misinterpretation, we request that you confirm, in writing, that (1) the Lafranchi plan was a drawing, not a property boundary survey, for appraisal purposes and not applicable, suitable or appropriate for boundary purposes; (2) that NPS no longer asserts that Lafranchi plans will be raised or considered in permit discussions; and (3) that the oyster farm buildings are properly within the Reservation.

For two and a half years, since shortly after our family purchased the oyster farm, you have insisted that the boundaries would be determined by the Lafranchi drawing. These delays have served as a functional "surtax" on Drakes Bay Oyster Company that undermined our ability to conduct business.

Thank you for your attention to these matters.

Sincerely,

Kevin Lunny & Nancy Lunny

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

L3019

L1425
Tract 02-106 PORE

July 2, 2007

Mr. Kevin Lunny
dba. Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

This document will serve as a "Letter of Authorization" (LOA) further extending the terms and conditions contained in Special Use Permit MSC-8530-6000-2010 regarding the well and water system located at the current Drakes Bay Oyster Company Site. This Special Use Permit expired on June 30, 2006 and was previously extended by a "Letter of Authorization" dated June 16, 2006.

The terms and conditions of MSC-8530-6000-2010 are hereby extended for an additional period of one year until July 1, 2008 or until such time as a Special Use Permit addressing Drakes Bay Oyster Company operations and use of non-reserved portions of Tract 02-106 is issued, whichever occurs first. Contingent upon successful resolution of remaining issues between the National Park Service, the California Coastal Commission and Drakes Bay Oyster Company, future Special Use Permits associated with the site will either be combined into a single document or issued for a concurrent period.

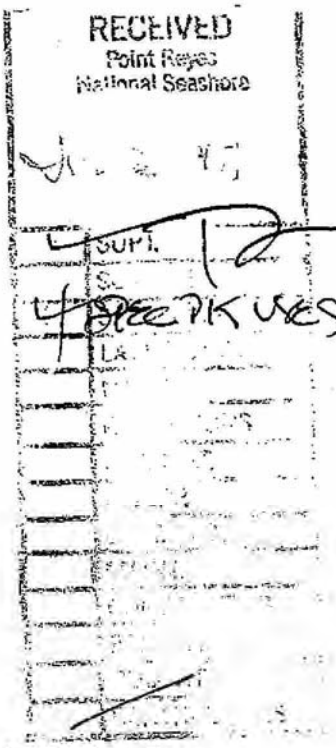
For the period of this letter the annual fee of $2,925.00 will remain unchanged and the current quarterly billing schedule of $731.25 will be continued. If you have questions or concerns regarding this "Letter of Authorization," contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 7/2/07
bcc: Lynn Fosbender

L3019



DRAKES BAY
FAMILY FARMS

06/29/07

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

Re: SUP #MSC 8530-6000-2010 Water from Well

Dear Don,

On June 16, 2006, SUP #MSC 8530-6000-2010 "Water from Well" at the Drakes Bay Oyster Farm was extended for one year by a Letter of Authorization, until July 1, 2007.

Drakes Bay Oyster Company requests that another extension of this permit be issued.

Thank you,

Kevin Lunny

Attachments: Water from well SUP
Letter of Authorization

Drakes Bay Family Farms

17171 Sir Francis Drake Blvd.
Inverness, California 94937

t: **415.669.1149**
f: 415.669.1262
w: drakesbayfamilyfarms.com

Form 10-114
Rev. DEC. 99

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use Water from Well

Date Permit Reviewed 2002 05/08
Reviewed 20 __ _____
Reviewed 20 __ _____
Expires 2006 06/30

Long Term X

Short Term ___

Permit # MSC 8530-6000-2010
Region Park Type No. #

POINT REYES NATIONAL SEASHORE
Name of Area

Johnson's Oyster Company of P. O. Box 69, Inverness, CA 94937 (415) 669-1149
Name or Permittee Address Phone

is hereby authorized during the period from (Time 12:01 am day 01 Month July, 2000), through (Time 11:59 pm day 30 Month June, 2006), to use the following described land or facilities in the above named area:
Continuing the use of the water well drilled by the Permittee on the non-reserved eastern portion of Tract 02-106. The base fee (established by appraisal dated 06/13/94) of $2,124.00 has been adjusted utilizing the Inflation Calculator to adjust the annual fee to $2,500.00. A quarterly billing schedule of $625.00 will be established.
This permit is contingent on a well drilling and well operating permit having been obtained from the Environmental Health Services Division of the Community Development Agency.

For the purpose(s) of: Supplying water for the Johnson's Oyster Company facilities using Permittee well, pump and pipelines (previously authorized by Permit # WRO PORE 6000-501). The electrical supply and all maintenance of the facilities is the responsibility of the Permittee. The location of the well is identified on the attached "Site Map."

Authorizing legislation or other authority (RE - DO-53): 16 U.S.C. §§ 1, 1a-1, & 3

NEPA Compliance: CATEGORICALLY EXCLUDED X EA/FONSI ___ EIS ___ OTHER APPROVED PLANS ___

PERFORMANCE BOND: Required ___ Not Required X Amount $_____

LIABILITY INSURANCE: Required X Not Required _____ Amount $ 500,000.00 per occurrence.

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $ 12,500.00.

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE JOHNSON OYSTER COMPANY 8-28-02
Signature Date

Tom Johnson

Authorizing Official D L Neubacher Don L. Neubacher Superintendent 8/29/02
Signature Date

Additional Authorizing Official _____ _____ _____
(if Required) Signature Title Date

State of California - The Resources Agency
ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF FISH AND GAME
OFFICE OF THE GENERAL COUNSEL
1416 Ninth Street
Sacramento, CA 95814
http://www.dfg.ca.gov
(916) 654-3821

RECEIVED
National Seashore
MAY 18 '07
SUPT.
SCIENCE
SPEC. PK. USES
LAW ENFORC.
NAT. RES.
RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

L1425
02-106

May 15, 2007

Mr. Don Neubacher, Superintendent
Point Reyes National Seashore
Point Reyes Station, California 94956

Re: Drake's Bay Oyster Company

Dear Superintendent Neubacher:

The purpose of this letter is to memorialize the position of the Department of Fish and Game (Department) regarding the lease status of the above-referenced mariculture operation at Drakes Estero, within the Point Reyes National Seashore (PRNS). For the reasons discussed below, we conclude that the mariculture operation in question is properly within the primary management authority of the PRNS, not the Department.

By way of review, the leasing of state water bottoms at Drakes Estero dates to at least 1934. In 1965, the California Legislature granted to the United States, subject to certain limitations, "all of the right, title, and interest...to all of the tide and submerged lands or other lands beneath navigable waters" situated within the boundaries of the PRNS (Chapter 983, Statutes of 1965). The tidelands and submerged lands encompassed by this legislative grant include the leased state water bottoms. Consistent with article 1, section 25 of the California Constitution, this conveyance carried a reservation of the right to fish in the waters overlying these lands. Although the right to fish extends to both commercial and sport fishing, it does not extend to aquaculture operations. Regardless of whether its purpose is commercial or recreational, *fishing* involves the take of public trust resources and is therefore distinct from aquaculture, which is an agricultural activity involving the cultivation and harvest of private property (Fish and Game Code §§ 17, 15001, 15002, 15402). In November 1972, the Johnson Oyster Company (Johnson) conveyed its property to the United States, subject to a reservation of occupancy and use in the grant deed, which provided:

> "Upon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property...provided, however, that such permit will run concurrently with and will terminate upon the expiration of State water bottom allotments assigned to the Vendor. Any permit for continued use will be issued in accordance with National Park Services regulations in effect at the time the reservation expires."

The reservation specifies a 40-year term and additionally requires, among other things, that Johnson comply with all applicable health and safety laws, and all rules and regulations of the National Park Service. This reservation expires in November 2012.

After that time, aquaculture operations must continue subject to a special use permit that would run concurrently with, and would terminate upon, the expiration of the assigned State water bottom allotments. Since such allotments are subject to a maximum lease term of 25 years, both the grantor and grantee apparently contemplated that the state water bottom leases then in effect could be renewed, and this was in fact done in 1979. In June 2004, the Fish and Game Commission (Commission) renewed the state water bottom lease for an additional twenty-five years, contingent on this reservation, and also required Johnson to comply "with all rules and regulations now or hereinafter promulgated by any governmental agency having authority by law..." In March 2005, the Commission authorized the assignment of the state water bottom lease to Johnson's successor, Drakes Bay Oyster Company.

The 2004 lease renewal is expressly contingent upon the aquaculture facility's compliance with the 1972 grant reservation and, after its expiration, with any special use permit that PRNS may issue in its discretion. The reservation requires compliance with all applicable health and safety laws and, specifically, with all rules and regulations of the National Park Service. Conversely, the renewal imposes an additional requirement of compliance with all other applicable laws, which reasonably includes those of the National Park Service and of PRNS in particular. For these reasons, we believe the mariculture operation in Drakes Estero is properly within the primary management authority of the PRNS, not the Department.

Should you or any of your staff require any additional assistance, please contact Senior Staff Counsel Joseph Milton, Office of the General Counsel, at (916) 654-5336 or jmilton@dfg.ca.gov.

Sincerely,

for L. RYAN BRODDRICK
Director

cc: Mr. Ralph Mihan, Office of the Solicitor
U.S. Department of the Interior

Mr. Joseph Milton, Senior Staff Counsel
Department of Fish and Game

L1425
Tract 02-106 PORE

June 12, 2007

Mr. Kevin Lunny
Drakes Bay Oyster Company
17300 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Kevin:

We received your letter dated May 26, 2007, regarding the motorized boat in Drakes Estero on May 24, 2007. Two National Park Service researchers were sent to the Estero to finalize some eelgrass mapping efforts and check oyster bag locations, and entered the area at low tide so oyster operation bag locations could be reviewed.

As required by policy, the NPS did complete a "minimum requirement" process to adhere to the Wilderness Act and discussed options to ensure no harbor seals and pups were disturbed. The trip was guided by NPS biologist's expertise to ensure minimum disturbance to seals and other wildlife, and to avoid eelgrass beds. No trip report was prepared. The NPS previously entered the estero by motorized craft on two occasions in early March 2007 during the beginning of the pupping season and avoided areas where seals hauled out. A trip report is enclosed. No survey by motorized craft was conducted in 2006 during the pupping season.

The action was authorized by my office. We hope this answers your questions.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure

DLNeubacher/SAllen:an 06/12/07

Drakes Estero eelgrass, oyster bag, and oyster rack assessment
Trip Report - 3/20/2007

Crew: Don Brown, GIS Specialist, Point Reyes National Seashore
Ben Becker, Marine Ecologist, Point Reyes National Seashore

Equipment: 13 ft Alumicraft skiff with 15 hp 4-stroke outboard motor.
Trimble GeoExplorer3 GPS with real-time differential correction.

03/13/2007
Oyster rack, bag, line and eelgrass assessment

Objectives

1. Map all oyster racks in the estero and categorize as active, inactive or dilapidated. Dilapidated racks were defined as those considered too deteriorated for use.
2. Document any apparently recent repair work done to racks.
3. Map all oyster bags and line systems.
4. Report eelgrass occurrence (dense/patchy/absent) both adjacent and beneath all racks, bags and lines.

Field Methods: We launched from Drakes Bay Oyster Company (DBO) at ~11 AM and a + 3 ft tide, and traveled from North to South visiting all racks in the Estero. At each rack, we recorded whether the rack was surrounded by dense or patchy eelgrass, if eelgrass was present beneath the rack, the percentage of the rack currently occupied with oysters (= percent active), and the percent of the racks dilapidated. We mapped all visible bag systems along the intertidal and investigated all marker poles that are often used to mark where bags are kept. Survey was completed at ~2:45 PM and tide appeared to be about 0 ft.

Summary Results: There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There were 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor

seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero.

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

03/20/2007
Eelgrass satellite imagery ground truthing

Objectives

1. Ground truth satellite imagery classification of eelgrass beds.
    - Imagery used for classification was one-meter color digital orthophoto taken August 2005 at low tide classified using Erdas Imagine software.
2. Document any additional racks, bag or line systems not seen on day 1.

Field Methods: Beginning at ~ 10:30AM on 03/20/2007 at about a 0 ft tide, we surveyed the estero to ground truth a draft eelgrass bed map derived from satellite imagery. We traveled the perimeter of the eelgrass beds to verify changes from eelgrass to bare substrate, as well as to verify that eelgrass was dense or patchy within beds. We defined dense as close to 100% cover, patchy was considered down to 40% cover. We also verified that vegetation classified as eelgrass was not *Sargassum muticum* (as happened near the mouth of the estero) or enteromorphic algae (as occurred near some of the seal haul out sand flats in the middle of the estero). We took a total of 243 points throughout the estero noting eelgrass presence/absence/ dense/patchy to reclassify the satellite derived map to reflect actual field conditions. The survey was completed at ~1:30 PM and tide appeared to be about +3 ft.

Summary Results: In the field, the vast majority of satellite derived eelgrass classification appeared correct. Two shortcomings were that (1) channels are too deep to see eelgrass, even at low tide and (2) that during high tide in waters > 4 ft deep with windy conditions, choppy waters, and low sunlight, it was often difficult to see past 3 ft from the surface. In these instances we traveled very slowly until we came to an area shallow or calm enough to see bare bottom or eelgrass.

After analyzing ground truth data, ~ 95% of ground observations appeared to match to satellite image classification. Discrepancies mostly occurred in the southern part of the bay because of misclassification of *Sargassum muticum* and enteromorphic algae, as mentioned previously.

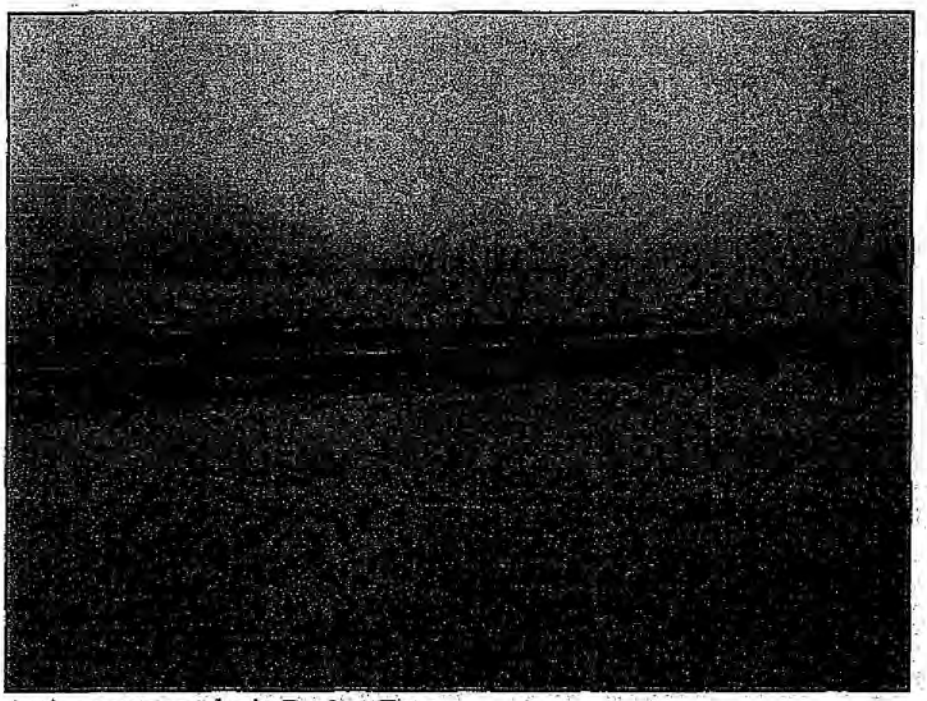
We calculated that 740 acres of the estero are covered by eelgrass, 355 acres dense, and 385 acres patchy. Oyster operations in eelgrass represent ~ 8.5 acres. We calculate that 8 acres (some dilapidated racks have patchy regrowth) of eelgrass beds are lost in Drakes Estero due to mariculture. Another factor affecting eelgrass beds which was noticed was boat propellers. It can be seen from aerial and satellite photos where regular boat paths have cut paths through eelgrass; these calculations do not reflect this factor which will necessitate further study.

We also documented three additional intertidal oyster bag systems not identified during the first survey.

Summary Statistics

Total Oyster Racks	**93**
Usable Oyster Racks	**66**
Dilapidated racks	**27**
Percentage of racks in eelgrass beds	**96% (89 of 93)**
Percentage of usable racks with eelgrass underneath	**0%**
Percentage of dilapidated racks with eelgrass regrowth	**26% (7 of 27)**
Acres of eelgrass lost to racks	**8 acres**
Number of intertidal oyster bag areas	**12**
Acreage of intertidal oyster bag sites	**10 acres**
Total eelgrass acreage in the Estero	**740 acres**

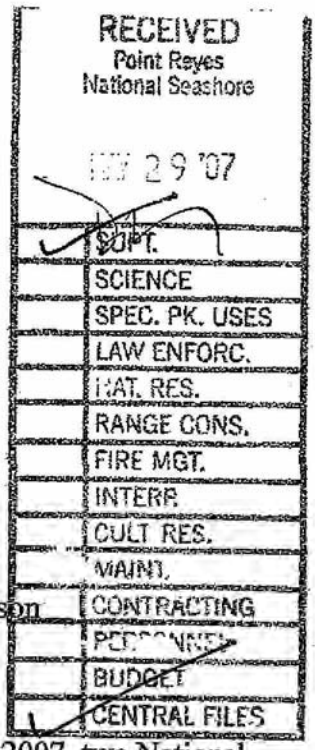
Images



Active oyster racks in Drakes Estero.

Non-native tunicates (*Didemnum* spp. A) growing on oysters.

Floating bag system tethered by ropes.



05/26/07

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

Hand-Delivered and Sent by US Mail

Re: NPS Motorized Boat in Seal Pupping Area During Pupping Season

Dear Mr. Neubacher,

Drakes Bay Oyster Company is writing to find out why, on May 24, 2007, two National Park Service (NPS) officials launched a motorized boat into Drakes Estero, proceeding to the mouth of the Estero, traveling completely across the lateral channel at Barries Bar, at low tide, at high speed and did this during seal pupping season and at the precise time when seals and their pups are on the beaches.

All of this violated NPS rules which ban going into this area of the Estero at this time.

Please provide responses to the following questions:

(1) Identify the two NPS officials in the boat.

(2) Identify the NPS official who gave them this assignment.

(3) Provide us with a copy of the directive or assignment.

(4) Why was the Drakes Bay Oyster Company manager, Jorge Mata, informed by your staff they were directed to "check eelgrass," when they passed the eelgrass areas in the Estero and proceeded directly to the seal pupping area? Why did the staff mislead our manager?

(5) Why were they directed to inspect this area during a NPS rule forbidding such entry at this time?

(6) Why did they go out at low tide, when seals frequently use the beaches?

Drakes Bay Family Farms

17171 Sir Francis Drake Blvd.
Inverness, California 94937

t: 415.669.1149
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w: drakesbayfamilyfarms.com

(7) Why were they proceeding at too fast a speed?

(8) Provide a copy of the trip report.

(9) How many times has the NPS staff gone to the seal pupping area during pupping season?

(10) Provide trip reports for each of the trips in 2006 and 2007 during pupping season.

Sincerely,

Kevin Lunny

Nancy Lunny

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031
X L1425 02106
May 23, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service has scheduled to conduct on site inspections of ranch employee residential units situated within Point Reyes National Seashore on June 13, 2007 and June 14, 2007. The inspections will last approximately one or two hours and will include an evaluation of water and wastewater systems. National Park Service Staff will accompany Mr. Robinson during the inspections.

You will be contacted prior to June 13, 2007 and informed of a scheduled time of arrival. If you have questions or concerns please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. Thank you for helping to keep Point Reyes National Seashore Ranches safe.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 5/22/07

L1425
Tract 02-106 PORE

May 21, 2007

Mr. Kevin Lunny
Drakes Bay Oyster Company
17300 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Kevin:

We received your letter dated April 18, 2007, regarding the Drakes Bay Oyster Company (DBOC) and the California Coastal Commission (CCC) Cease and Desist Order CCC-03-CD-12 (CDO). Below is our response item by item to issues addressed in your letter.

Coastal Commission [Order] Issued to Previous Owners, Not Drakes Bay Oyster Company (Lunny Family). We understand that the original CDO was issued on December 11, 2003 against Johnson Oyster Company, Inc., the prior owner of the business. Nevertheless, our review of CCC correspondence indicates that when DBOC purchased the business, it acknowledged that it was assuming the responsibility of complying with the CDO. For example, in a letter dated April 10, 2006, DBOC wrote to the CCC, "Drakes Bay Oyster Company assumed the responsibility to comply with the CDO with the purchase of the leasehold interest and shellfish business from Johnson Oyster Company in 2005." Thus, DBOC is currently subject to the CDO.

While we acknowledge that DBOC has made efforts to remove the CDO, it is also clear that DBOC has been unable to remove the CDO for several reasons that have been well-documented in correspondence from the National Park Service (NPS) and CCC. First, DBOC has failed to meet deadlines set by the CCC. Second, DBOC has not agreed to an NPS permit. Third, DBOC has engaged in new violations of the CDO and the Reservation of Use and Occupancy (ROP) since acquiring the business.

Part of the original CDO required the submission of a coastal development permit application (CDPA). The original deadline was 60 days after the December 11, 2003 issuance of the CDO. On May 11, 2005, the CCC informed DBOC that it must submit a complete CDPA no later than June 1, 2005. The CCC also stated that a proposed site plan and project description were required by that date. In 2005, the NPS also informed DBOC that a site plan was required before any NPS permits could be issued. Since that

time, DBOC has repeatedly failed to meet deadlines for the submission of the site plan, detailed drawings, and project description.

On January 20, 2006, the CCC set a new deadline for the submission of the CDPA and directed DBOC to submit a complete CDPA no later than January 27, 2006. While DBOC met the deadline for submitting the application, it was incomplete. On February 22, 2006, the CCC informed DBOC that its project description and site plan must be revised. In a subsequent letter dated March 21, 2006, the CCC reiterated the requirement to submit a detailed project description and site plan and set a new deadline of April 28, 2006.

NPS did not receive final site drawings regarding the proposed development of the site until August 2, 2006, after repeated email requests to provide the drawings for NPS review. During an August 15, 2006 meeting, DBOC then indicated that it might modify the project. However, NPS did not receive modified drawings until five months later, on January 12, 2007. In addition, these drawings were an overall draft site plan and did not contain the details regarding the dock and other site features discussed in the meeting. While NPS did receive a revised site plan on January 29, 2007, it did not contain the required details of site features, such as repairs to the dock. CCC staff has informed NPS that the final detailed drawings required for the CDPA were received on March 26, 2007 over three years after the issuance of the original CDO.

DBOC's failure to agree to an NPS permit will be discussed below as will DBOC's new violations of the CDO and ROP since acquiring the business.

Superintendent Fails to Approve Permit for Remaining Issues in Cease and Desist Order. It is our understanding that the CCC will not authorize work on the commercial buildings without a coastal development permit. As discussed above, DBOC's delays in completing a final project description, detailed drawings, and site plan have meant that the permit application to NPS has just been completed as of May 2, 2007. Consequently, the delay in completing the permit application has meant that there has been a delay in the authorization for the work on the commercial buildings.

In addition, the NPS has repeatedly informed DBOC that NPS would require a site plan before any permit could be approved and that all improvements would be subject to an environmental review as mandated by the National Environmental Policy Act (NEPA) and NPS policy. NPS has also repeatedly informed DBOC that NPS could not determine the level of environmental review necessary until NPS received the final project description, detailed drawings, and site plan. As early as March 28, 2005, NPS wrote to Mr. Lunny informing him that a site plan was necessary before NPS could issue any permit. NPS also stated that when the site plan was received park staff could begin environmental screening under the National Environmental Protection Act (NEPA). NPS re-informed DBOC in writing of the NEPA requirement on at least three additional occasions in letters dated August 18, 2006, January 25, 2007, and February 12, 2007. NPS has just received the detailed drawings for the site plan that will enable NPS to determine the level of review required by NEPA.

National Park Service Refuses to Explain Why Permit Unapproved for More than a Year. As explained above, NPS has informed DBOC that a permit could not be approved until the final project description, detailed drawings, and site plan were complete and the appropriate level of NEPA review determined. In addition, a permit has not been completed because DBOC does not agree to be under an NPS permit for the land and waters of Drakes Estero. In a January 29, 2007 letter to NPS, DBOC stated that it disagrees with NPS that an NPS permit is need for park waters and estero submerged lands.

The NPS has clearly informed DBOC that the waters of Drakes Estero are under NPS jurisdiction and will require a permit from the NPS. As we stated in our February 12, 2007, letter, the 36 Code of Federal Regulations 5.3 states: "Engaging in or soliciting any business in park areas, except in accordance with the provision of a permit contract or other written agreement with the United States, except as such may be specifically authorized under special regulation applicable to a park area, is prohibited." In turn, the 36 Code of Federal Regulations 1.2 states: "Applicability and Scope: a) The regulations contained in this chapter apply to all persons entering, using, visiting or otherwise within: (1) The boundaries of federally owned lands and waters administered by the National Park Service."

As we have also discussed, the tide and submerged lands in the Drakes Estero were conveyed to the United States in 1965 by the California legislature. As the owner of tide and submerged lands, the Seashore Act and Wilderness Act requires the NPS to use such lands for public purposes and any third party use must be in conformance with those acts.

Finally, the NPS wants to clarify that DBOC has not met many of its obligations under the ROP and has violated the terms of the ROP, CDO, and several federal laws and regulations. On three separate occasions, DBOC has committed new violations as outlined below.

In the fall of 2005, Mr. Lunny was observed on NPS land, outside the ROP area, constructing a new septic system without authorization or a permit from the NPS. The NPS told DBOC to stop construction and receive an authorization before any work could continue. This was a direct violation of the terms of the ROP, which provides among other things that:

6. [DBOC] shall abide by all rules and regulations pertaining to National Park System areas.

7. No permanent or temporary structure, sign or other improvement of any type whatsoever shall be erected by [DBOC] in or upon the reserved premises or improvements without the prior written approval of the Director.

After a meeting and additional consultation with NPS, a letter of authorization was issued to DBOC.

On December 28, 2005, the NPS inspected the site and found two large storage containers, a construction trailer, and plumbed oyster tanks that had not been approved by the CCC. NPS had directed DBOC to obtain the proper permits before installing these facilities. These violations were noted in a CCC letter to DBOC dated January 20, 2006. In addition, the site visit revealed that DBOC had stored excavated material on NPS land adjacent to the ROP without NPS approval. Finally, an abandoned car was moved from the ROP area and placed on NPS land without NPS approval. DBOC has since removed the car and excavated material from NPS lands.

In February 22, 2006, another letter from the CCC documented that DBOC had paved a substantial part of the ROP area without proper permits or NPS approval. In addition, the NPS documented in its February 23, 2006, letter that a February 17, 2006, site visit revealed the DBOC had violated its ROP agreement by paving a major area and constructing a fence without NPS approval as required.

Despite these additional violations, we do want to acknowledge that DBOC has made progress on cleaning up the site, and we appreciate these efforts. However, the Drakes Bay estuary is a significant feature of this national park unit that deserves careful attention.

As we stated above, NPS has just received the detailed drawings and site plan that will enable NPS to determine the level of review required by NEPA. We will contact you soon regarding environmental analysis of your proposed site improvements and use of the estuary. If you would like copies of any of the correspondence discussed in this letter, please do not hesitate to contact us as well.

Also, we are willing to meet with you any time regarding the special use permit for use of the estuary waters and shoreline area. We have sent you several draft copies and have not received any additional comments. Please call Kevin McKay, Special Use Permit Coordinator, 415-464-5111, if you can meet with us.

Sincerely,

Don L. Neubacher
Superintendent

cc:
NPS Field Solicitor, Pacific West Region
Regional Director, Pacific West Region

bc:
Special Park Uses Coordinator

DLNeubacher/SCarlson:an 05/21/07

Don Neubacher
04/23/2007 05:53 PM
PDT

To: kevin@drakesbayoyster.com
cc:
Subject: Reponse to Letter

Kevin, the Seashore we will be responding to your April 18 letter pending staff input and legal review; I will be gone for several days this week and we will not be able get a response to you until next week.

We are glad to see spring show up this week.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

RECEIVED
Point Reyes
National Seashore

APR 18 '07

SUPT.
SCIENCE
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PERSONNEL
BUDGET
CENTRAL FILES

April 18, 2007

Hand-Delivered and Sent by US Mail

Don Neubacher
Superintendent
Pt. Reyes National Seashore
1 Bear Valley Road
Pt. Reyes Station, CA 94956

Re: Nationl Park Service Failure to Approve County of Marin Permit Allowing Completion of Tasks to Comply with California Coastal Commission Cease and Desist Order Against Johnson Oyster Company.

Dear Mr. Neubacher

On December 11, 2003, the California Coastal Commission issued a Cease and Desist Order (CDO) against the Johnson Oyster Company, Inc. for a series of health, safety, environmental and Coastal Act violations at their Pt. Reyes oyster farm and aquaculture business[1]. This letter addresses the disposition of that Order.

Violations Leading to Coastal Commission Cease and Desist Order Existed for More Than 15 Years – NPS, Coastal Commission and County Unable to Resolve – Previous Owners Refuse to Comply, Lunny's Move to Address and Finalize. Various health, safety, environmental and building code violations have been an issue for many years – more than a decade and a half – and were well-known throughout the Pt. Reyes community[2]. Notwithstanding the California Coastal Commission's 2003 CDO, the problems and issues remained uncorrected and unresolved at the time the Drakes Bay Oyster Company purchased the Johnson Oyster Company, Inc., in

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1 See, California Coast Commission, Th-16a, Staff Report for Commission Cease and Desist Order, # CCC-03-CD-12 and Violation File V-7-03-04.

2 According to various reports, including the California Coastal Commission, these problems were documented as far back as the late 1980's. These were chronic, persistent, unaddressed and unresolved until the Lunny Family, dba, Drakes Bay Oyster Company acquired the shellfish operation and immediately began rectifying each and every one of the outstanding health, safety, environmental and permit issues.

Drakes Bay Family Farms

17171 Sir Francis Drake Blvd.
Inverness, California 94937

t: 415.669.1149
f: 415.669.1262
w: drakesbayfamilyfarms.com

January 2005, some 14 months after the CDO was issued.

New Owners – 2005 – Voluntarily Agree to Address and Resolve All Issues in Cease and Desist Order. As part of the purchase, the Drakes Bay Oyster Company voluntarily agreed to accept responsibility for correcting these various issues, including bringing the commercial business buildings up to code. Immediately after purchase, the Drakes Bay Oyster Company began systematically correcting each and every one of the ten major items.

Within 24 Months, Cease and Desist Issues Resolved by New Owners – Drakes Bay Oyster Company. Within months, and consistent with a general timetable worked out with the California Coastal Commission, eight of the ten health, safety and environmental issues were fully resolved – by the Drakes Bay Oyster Company. For more than a decade and a half, the National Park Service, County of Marin, California Coastal Commission and the Pt. Reyes community were unable to resolve health, safety and environmental issues at Drakes Estero with the Johnsons – the previous owners of the shellfish company. In less than 24 months, the Drakes Bay Oyster Company resolved each, except two in which the National Park Service blocked without reason or explanation.

New Owners Spend More Than A Third of a Million Dollars Correcting Preexisting Health, Safety and Environmental Problems. To date, Drakes Bay Oyster Company spent upwards of a third of a million dollars – correcting problems we had no role creating.

Superintendent Fails to Approve Permit Enabling Restoration of Commercial Buildings As Required to Comply with Cease and Desist Order. The last of these items in the Cease and Desist Order, bringing the commercial buildings up to code, was scheduled to be resolved more than a year ago. An evaluation was undertaken and completed. Planning was completed. A contract was issued and a contractor selected. In order to initiate construction activities, the County of Marin requires the written approval of the Superintendent, Pt. Reyes National Seashore Park, prior to issuing needed County permits. However, for more than a year, you, as Superintendent, refused to allow the County of Marin to issue the necessary building permits. Absent your concurrence, the County permit cannot be acted upon, the investment in bringing the commercial buildings up to code is blocked and the remaining issues in the Cease and Desist Order cannot be corrected[3]. As a result, the Cease and Desist Order remains in place.

Clarification – Coastal Commission Issued to Previous Owners, Not Drakes Bay Oyster Company (Lunny Family). Let me be clear here. The California Coastal Commission never issued a CDO to the Drakes Bay Oyster Company. The C&D was issued to previous owners more than a year prior to our purchase of the operation.

---

[3] The County of Martin permit requiring your concurrence was first submitted to the Marin County Community Development Department more than a year ago.

Superintendent Fails to Approve Permit for Remaining Issues in Cease and Desist Order Imposing Severe Penalties on Drakes Bay Oyster Company, Undermining Integrity of Lease. Your decision as Superintendent, to block corrective action, has made it impossible for our company to correct structural deficiencies. Additionally, our inability to correct these structural deficiencies and fulfill the legal obligations of the CDO has harmed, and with each passing day, continues to harm, our Company in numerous instances, including, but not limited to:

* *allowing* the buildings to deteriorate further;

* *increasing* the cost of correcting these items;

* *compelling* customers and visitors to stand "inside" the building and be rained upon – from holes in the roofs and structure – undermining our relations with customers and harming our business opportunities;

* *denying* us the right to our full leasehold interests;

* *interfering* with our valid contract rights;

* *harming* our name – local people, visitors are being told that we – the Lunny's – created this problem and had the CDO slapped on us for mismanagement; and,

* *exposing* Drakes Bay Oyster Company, needlessly, to potential liabilities due to uncorrected CDO health and safety violations which would be fully corrected if you concurred with the pending County permit.

National Park Service Refuses To Explain Why Permit Unapproved for More than a Year. Neither you, as Superintendent, nor anyone else from the National Park Service provided a reason for this delay, or communicated with Drakes Bay Oyster Company regarding this matter. Other than NPS relying upon an inaccurate survey, no further information of any kind has been requested by you or your National Park Service staff.

Delay Inexplicable – Constitutes Hidden Tax on Drakes Bay Oyster Company. This delay is inexplicable and now, punitive. Functionally, these actions, inactions as well as other decisions have imposed a hidden tax of tens – hundreds – of thousands of dollars and is undermining the integrity of Drakes Bay Oyster Company and its right to conduct business pursuant to a valid lease.

Immediate Action Items – Execute the Permit, Provide Explanation and Issue Clarification. In light of all the above, the Drakes Bay Oyster Company respectfully requests that you approve,

within five days of the receipt of this letter, the Marin County permit papers necessary to allow us to proceed with work to bring the several commercial buildings up to current building code and respond to the additional requests set forth below.

To that end, please provide the following:

(1) **A signed and properly executed letter or other appropriate documentation authorizing the County of Marin to issue a permit allowing the commercial buildings to be brought up to code;**

(2) **A full and complete explanation as to why you withheld – blocked – concurrence on the County of Marin permit for now more than year, and by what authority was concurrence withheld;**

(3) **A letter, signed by you, addressed to the Drakes Bay Oyster Company, acknowledging that the Lunny family, the owners of Drakes Bay Oyster Company, had no role or responsibility for creating these violations that led to the issuance of the CDO in the first place, and that, with the purchase of the company, voluntarily accepted the responsibility for addressing and correcting the issues itemized in the CDO. Such a letter is required to clarify incorrect and erroneous and other misinformation that persists to the contrary; and,**

(4) **Upon completion of the work on the commercial buildings, we request a letter from you indicating that all issues in the CDO are fully resolved – and again reiterating that the Drakes Bay Oyster Company had no role creating these various violations.**

Lunny Family – Rich, Proud History in Pt. Reyes Community – Building on 500 Generations of Oystering in Drakes Ostero. The Lunny family – now four generations – has a rich history in our Pt. Reyes community. We're proud of our organic beef and sustainable farming and ranching practices. And today, we're proud to join the ranks of the 500 generations who came before us growing and harvesting oysters and other shellfish in Drakes Estero. Today, our Drakes Estero Oysters represent half of the State of California's shellfish growing area pursuant to our 2029 lease and that production serves markets and restaurants locally throughout the San Francisco Bay Area.

Lunny Family – Resolving Conflicts that the National Park Service, Coastal Commission, County of Marin and the Pt. Reyes Community Evaded Resolution for More than 15 Years. And, finally, the Lunny Family – owners of Drakes Bay Oyster Company – are proud that we were able to resolve health, safety and environmental problems that confronted the various

Federal and State agencies, everyone in our community and those who come to visit the Point Reyes National Seashore.

Summary Chart Displaying Completed Action Items from Cease and Desist Order by Drakes Bay Except Single Issue Blocked by Superintendent. Attached to this letter is a "Summary Chart" showing that all issues identified in the Cease and Desist Order have been complied with except that issue being blocked by the NPS.

Sincerely,

Kevin Lunny
Drakes Bay Oyster Company

California Coastal Commission
Cease and Desist Order # CCC-03-CD-12 Against
Johnson Oyster Company, Inc.
December 2003

This chart is included to provide a ready status for each of the major outstanding issues subject to the Cease and Desist Order issued by the California Coastal Commission against the Johnson Oyster Company in 2003.

Cease and Desist Action Item	Action
[1] Finish Septic System and Obtain Final Inspection from County and Bring Commercial Buildings up to code.	**Resolved**. Obtained final inspection and approval from Marin County Environmental Health Services.
[2] Remove Debris and Properly Fill Seepage Pit Area Where Oyster Processing Water Was Discharged.	**Resolved**. Cleaned up and filled pit area. Obtained necessary permits to construct oyster processing wastewater septic system and completed installation, final inspection and approval of new system.
[3] Clean Up Debris Adjacent to Operations.	**Resolved**. Removed approximately 1,800 cubic yards of debris.
[4] Obtain Food Establishment Permit from County of Marin.	**Resolved**. Not required by County as food facility is on federal property. Drakes Bay Oyster Company food facility registration # 14916607102 is permitted by the US Food and Drug Administration, Dept. Of Health and Human Services.

[5] Obtain Drinking Water Permit from the County of Marin.	**Resolved.** Not required by County as Drakes Bay Oyster Company is on Federal property. Public water system is permitted – # 2110510 – by the California Department of Health Services.
[6] Obtain Housing Inspections.	**Resolved.** US Public Health Services performs routine inspections on all housing on premises [Note, we were advised that during the 30 years the Johnson's owned the shellfish farm, NPS did not inspect any of the worker housing – inspections only began after the Lunny's acquired the farm.]
[7] Remove Illegal/Unauthorized development.	**Resolved.** All non-permitted housing, storage buildings, refrigeration units, additions and miscellaneous debris were removed from premises.
[8] Obtain County of Marin Building permits to repair buildings.	***CANNOT PROCEED DUE TO FAILURE OF NPS PARK SUPERINTENDENT TO ALLOW MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY TO ISSUE PERMITS.***
[9] Submit Plans to NPS for Buildings to Remain.	**Resolved.**
[10] Bring Commercial Buildings Up to Code.	***CANNOT PROCEED DUE TO FAILURE OF NPS PARK SUPERINTENDENT TO ALLOW NECESSARY REPAIRS.***

[11] Submit an application for a Coastal Development Permit to authorize after-the-fact the unpermitted development that occurred after 1976.	**Resolved.**

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

March 3, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service (USPHS) conducted inspections of three trailer housing units at the Drakes Bay (formerly Johnson's) Oyster Company Site within Point Reyes National Seashore on February 13, 2007. Kevin McKay, Special Park Uses Coordinator, accompanied Mr. Robinson. The inspection of these employee housing units produced the following USPHS findings and recommendations.

Findings

All three units are manufactured homes. One is in fair condition. The other two are in very poor condition. Rather than catalog the numerous structural health and safety deficiencies for each home, I've compiled them into a single list below. Many of the conditions were found in multiple units, and oftentimes multiple times in one unit. I've also included photos illustrating these conditions.

Conditions observed:

1. Multiple leaks in the roofs.
2. Water stained and cracked ceiling tiles.
3. Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering.
4. Rotting and water damaged wall paneling.
5. Rotting and water damaged window sills.
6. Poorly fitting windows.
7. Poorly fitting doors with malfunctioning or no latch or locking mechanism.
8. Poor skirting around the base of the trailers.
9. Debris and garbage accumulating in the crawl spaces below the trailers.
10. Deteriorating floor insulation falling off the bottom of the trailers in the crawl space.
11. Pervasive interior water damage and severely deteriorated flooring, especially in bathrooms around sinks, toilets, bathtubs, and shower stalls.

12. Poorly installed and leaking plumbing fixtures and drains.
13. Light bulb sockets without light bulbs.
14. Partially installed bathroom sinks.
15. Dilapidated kitchen and bathroom cabinetry.
16. Evidence of recent rodent activity.
17. Damaged or missing floor heat vents.
18. Severely damaged back porch perched over the lagoon.
19. Missing water heater closet door, exposing water heater to weather and physical damage.
20. Gas cook tops that were not connected or were not functioning.

Recommendations

Two of the manufactured homes were in an advanced state of disrepair and would require a great deal of work to rehabilitate them. The evidence of multiple leaks throughout these structures and severely water damaged floors, walls and ceilings, suggests a prolonged period of exposure to water. Replacing flooring, and wall and ceiling panels will not address the probable extensive structural damage to framing, etc., but will only cover it up for a time. The structural components of these two units should be inspected by someone knowledgeable (about) structural engineering to determine the severity and extent of the damage. Any work done without taking this step should be considered a temporary, short-term fix.

The blue house (Luis') was in the best condition of the three inspected. It appears to have sustained minimal interior water damage. Ceilings were not water stained. No significant rot was apparent in the walls, especially under the window sills where moisture from condensation tends to accumulate. Measures to rehab this structure should not be as extensive.

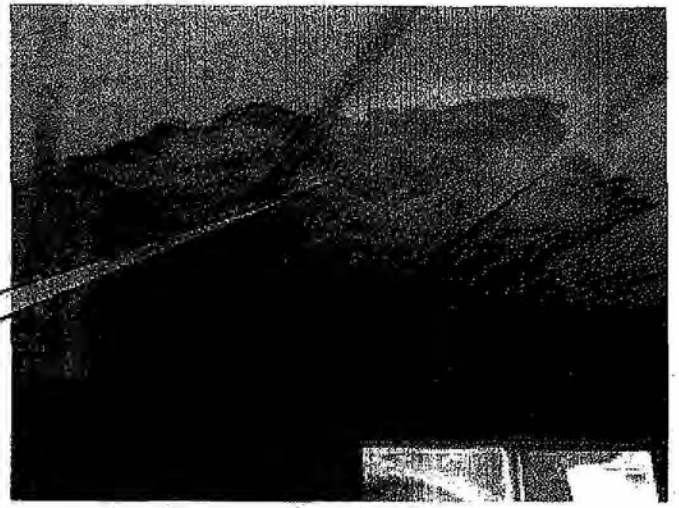
These findings and recommendations should be addressed immediately. Please notify Kevin McKay, Special Park Uses Coordinator, when the recommendations have been addressed and repairs have been completed so that a follow up inspection can be arranged with the USPHS. Kevin can be contacted at (415) 464-5111. We have enclosed the pictures that were submitted with the report.

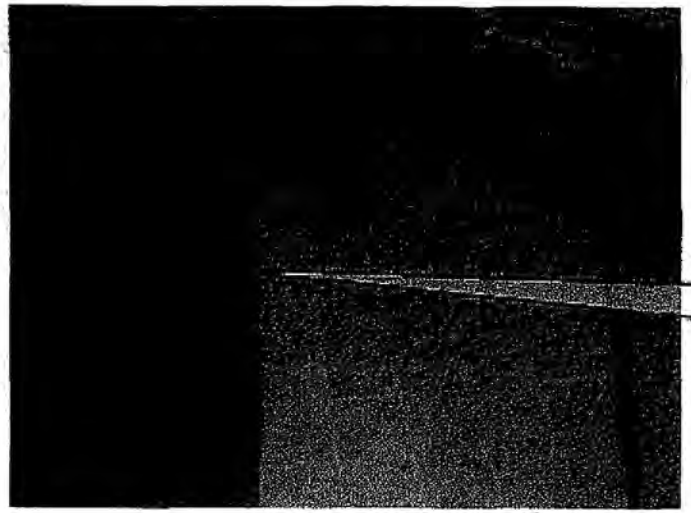
Sincerely,

Don L. Neubacher
Superintendent

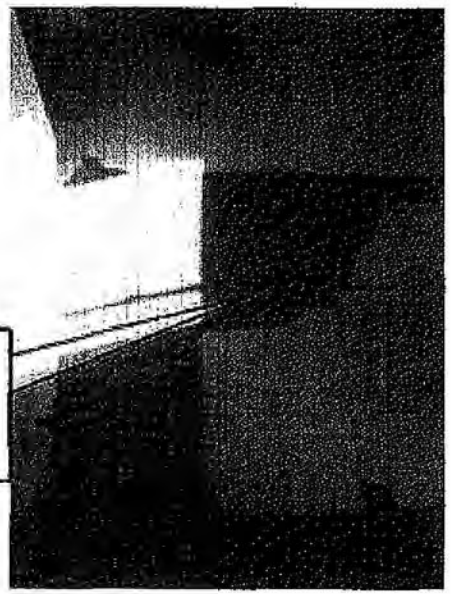
Enclosure

Leaks in the roofs with water stained and cracked ceiling tiles.





Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering



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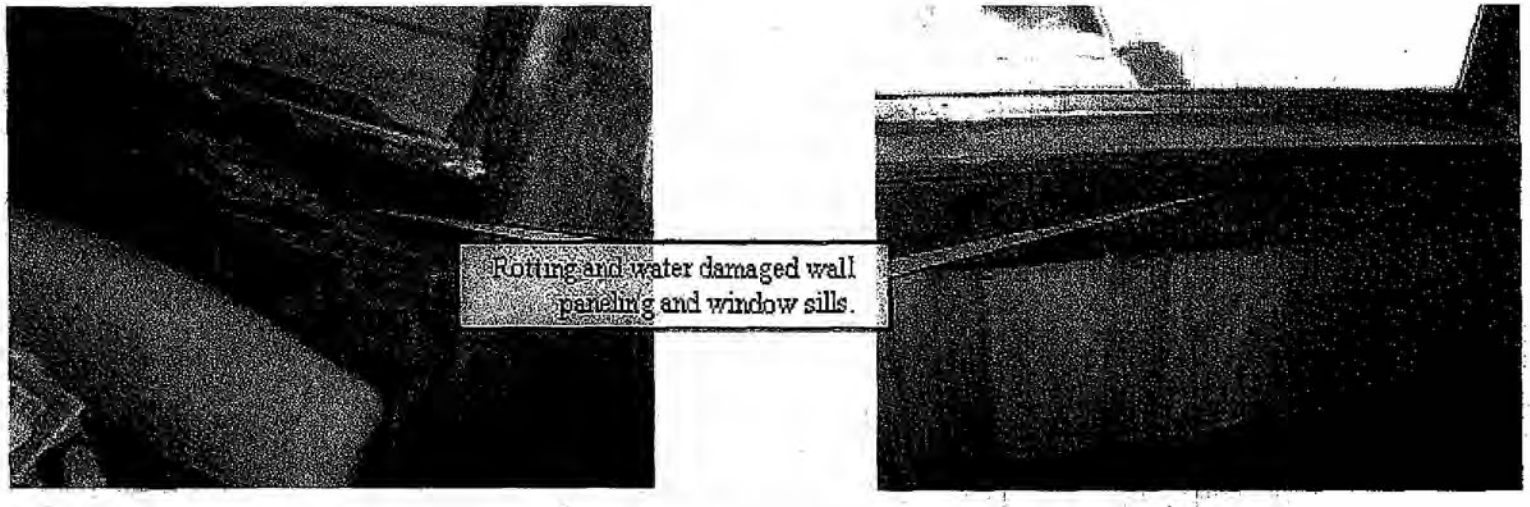

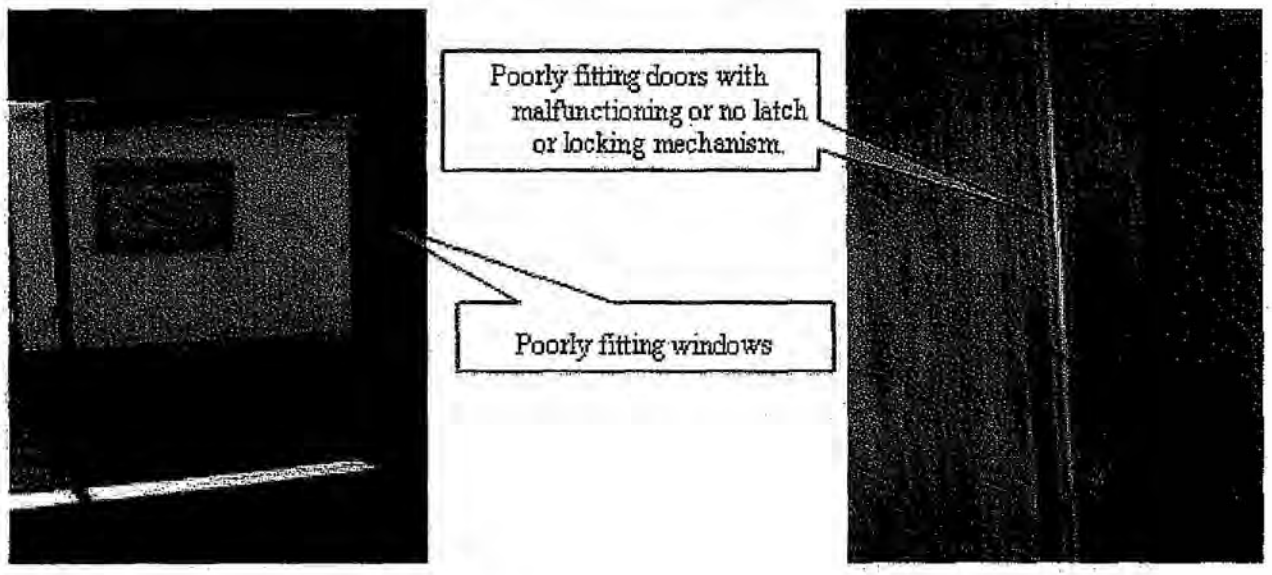

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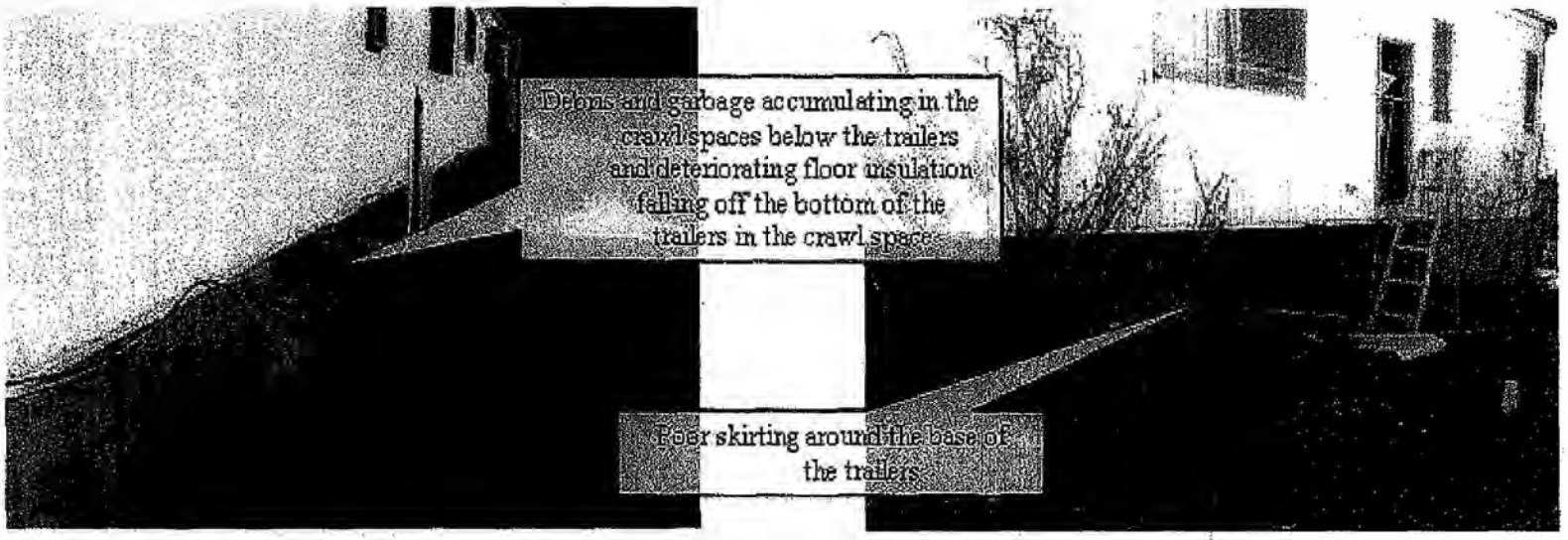
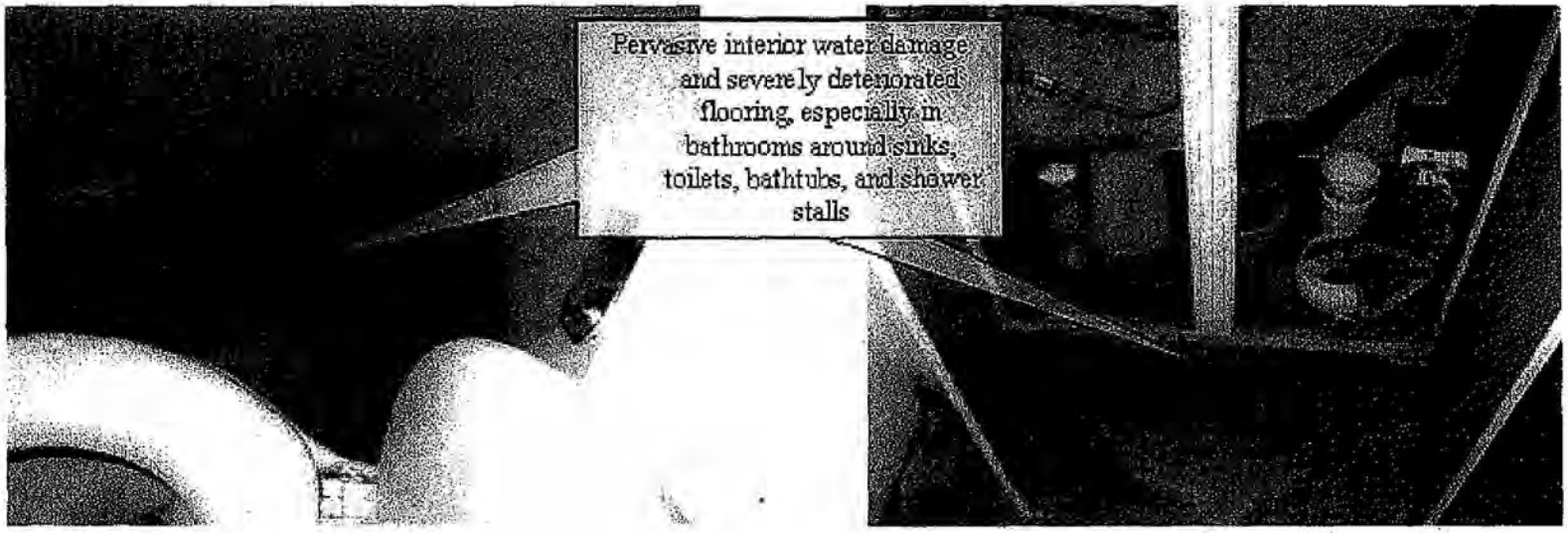
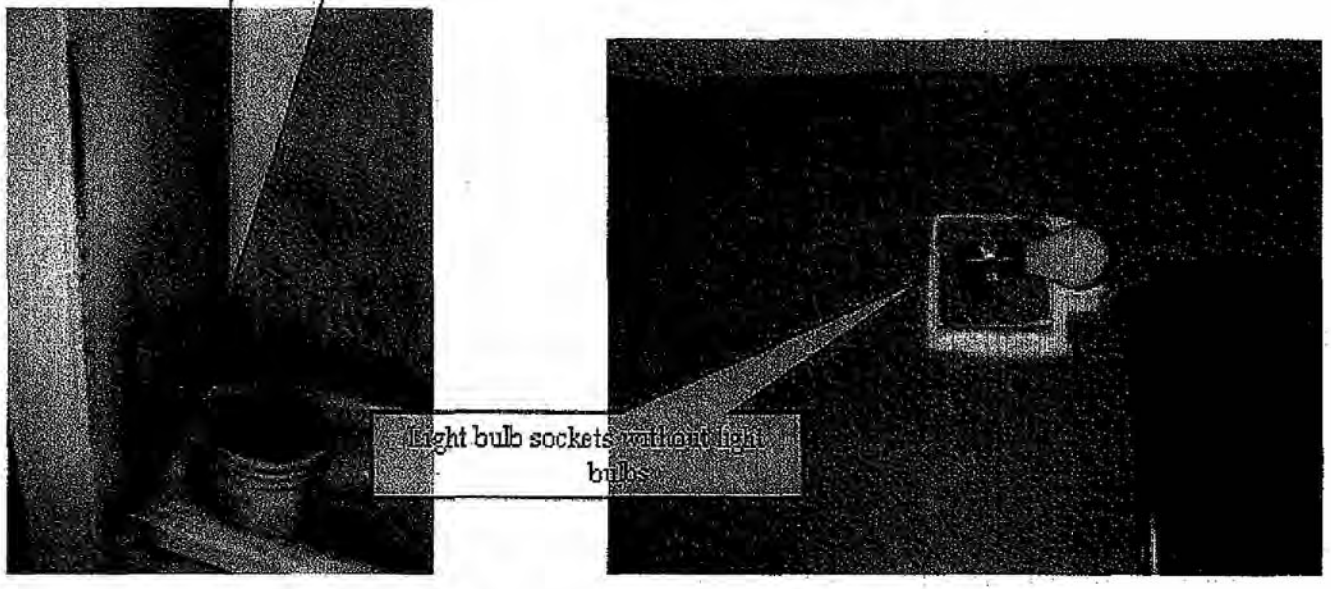




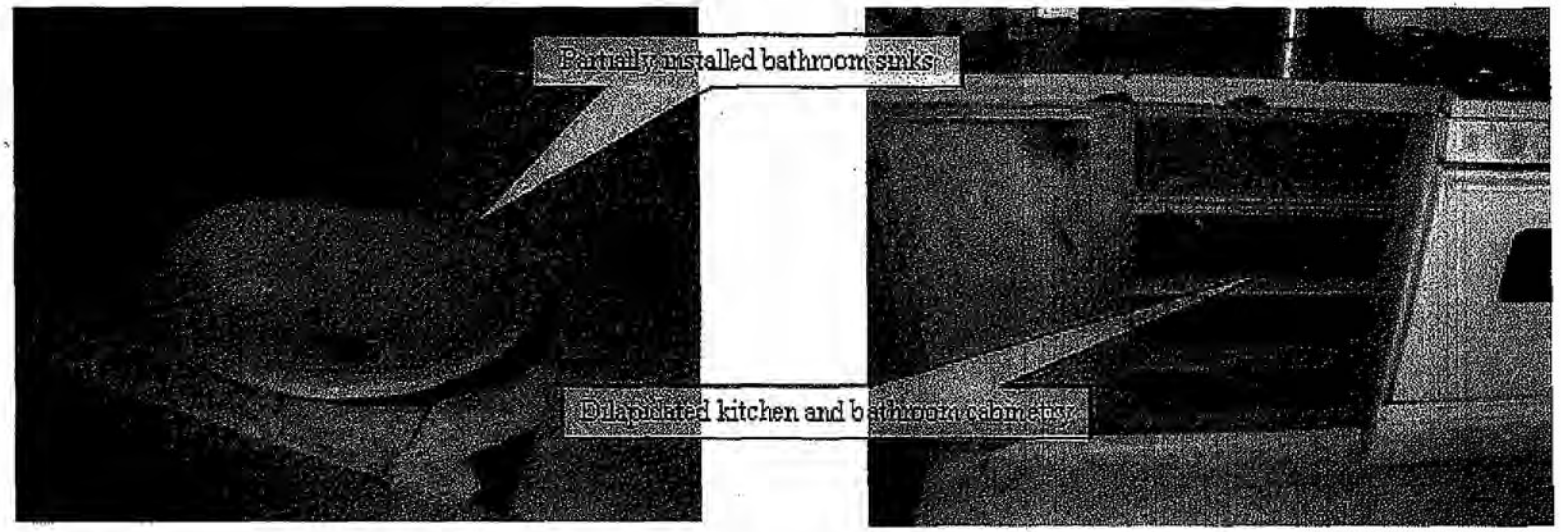
00033002 NPS-PWR-B06-00006-000005 Page 521 of 534

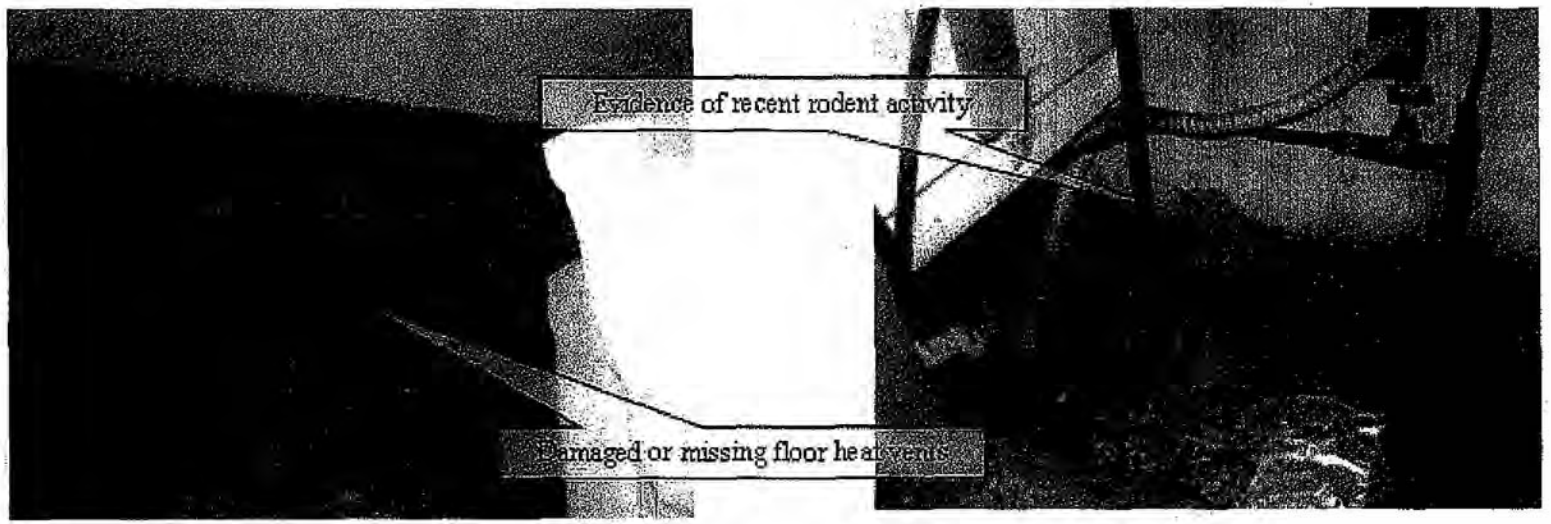
Poorly installed and leaking plumbing fixtures and drains



Light bulb sockets without light bulbs

00033002 NPS-PWR-B06-00006-000005 Page 522 of 534





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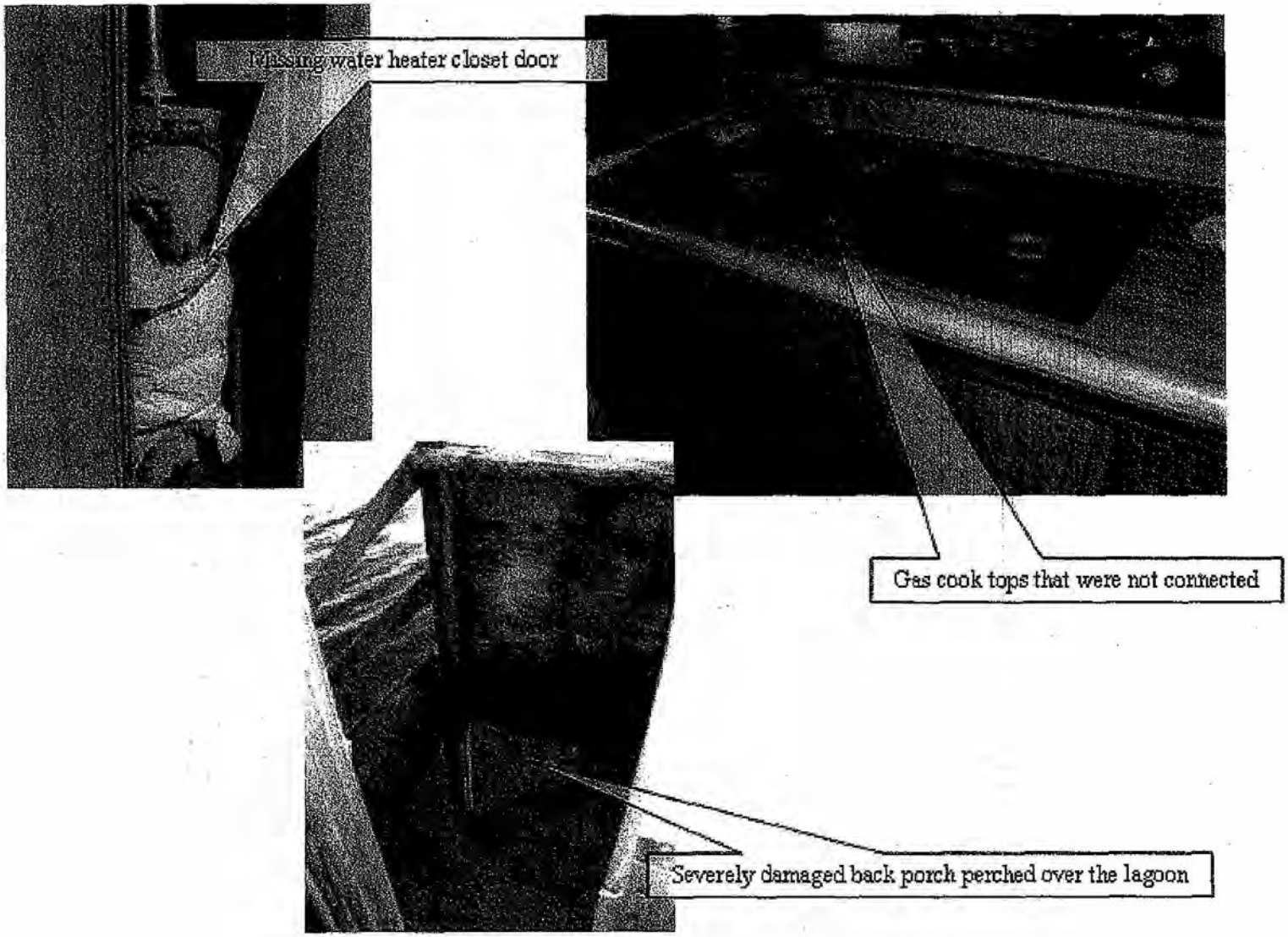


00033002 NPS-PWR-B06-00006-000005 Page 524 of 534

L1425
Tract 02-106 PORE

February 12, 2007

Mr. Kevin Lunny
17300 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Kevin:

We received your letter dated January 29, 2007. We disagree with your statement that no permit is necessary from the National Park Service (NPS) to use estuary waters. We want to restate our position that a permit(s) will be required for the use of estuary waters, the well site, parking areas, and any area beyond the reserved lands.

36 Code of Federal Regulations 5.3 states: "engaging in or soliciting any business in park areas, except in accordance with the provision of a permit contract or other written agreement with the United States, except as such may be specifically authorized under special regulation applicable to a park area, is prohibited."

As we have discussed, the tide and submerged lands in the Drakes Estero were ceded to the United States in 1965 by the California legislature and approved by the Governor. The Act requires the National Park Service to use such lands for public purposes.

36 Code of Federal Regulations 1.2 states: "Applicability and Scope: a) The Regulations contained in this chapter apply to all persons entering, using, visiting or otherwise within: (1) The boundaries of federally owned lands and waters administered by the National Park Service."

We want to reiterate that no new development may occur on the site until the current issues are resolved and Drakes Bay Oyster Company obtains a permit from the National Park Service. In addition, we want to let you know we are reviewing your current site drawing and the draft special use permit for compliance purposes under the National Environmental Policy Act and other regulatory laws. The NPS review should be completed in a couple of weeks.

Sincerely,

Don L. Neubacher
Superintendent

DLNeubacher:an 02/12/07

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

L1425
Tract 02-106 PORE
(X L3019)
February 6, 2007

Mr. Kevin Lunny
dba. Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

This document will serve as a "Letter of Authorization" extending the terms and conditions contained in Special Use Permit MSC-8530-6000-2011 and the Letter of Authorization dated December 30, 2005 regarding the leach field and septic system located at the current Drakes Bay Oyster Company and former Johnson's Oyster Company Site. The Special Use Permit expired on November 30, 2006. The terms and conditions are extended for a period of one year until November 30, 2007 or until such time as a Special Use Permit addressing Drakes Bay Oyster Company operations and use of non-reserved portions of Tract 02-106 is issued, whichever occurs first. We intend to coordinate the Special Use Permits associated with the site to be issued on the same calendar schedule however, issuance of the Special Use Permits are contingent upon successful resolution of issues with the National Park Service and the Coastal Commission.

The annual fee of $368.00 that was established on December 1, 2001 has been adjusted for inflation to $419.00. This adjustment was calculated utilizing the Bureau of Labor Statistics, Consumer Price Index, inflation calculator. An annual billing schedule of $419.00 will be established.

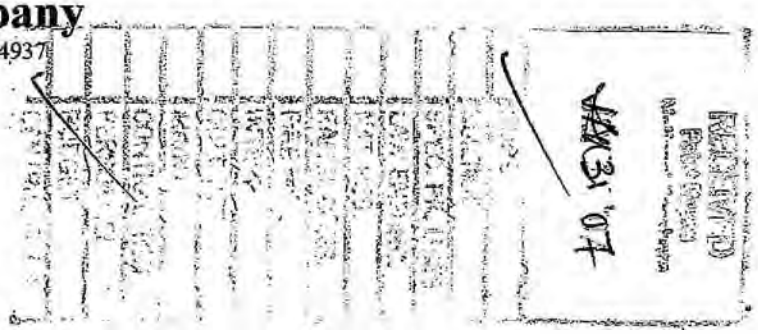
If you have questions or concerns regarding this Letter of Authorization, contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111.

Sincerely,

Don L. Neubacher
Superintendent

KMcKay:kem 11/1/06

Drakes Bay Oyster Company
17171 Sir Francis Drake Boulevard, Inverness, CA 94937



January 29, 2007

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes, California 94956

Dear Mr. Neubacher,

I received your letter dated January 25, regarding our meeting on January 12 with Al Wanger, Bill Kirsch, and Lisa Bush about Drakes Bay Oyster Company's (DBOC) Coastal Development permit (CDP). The meeting was held specifically to discuss the CDP for DBOC's upgrades to the oyster farm facilities. We did also briefly discuss a special use permit (SUP) for DBOC.

I have several comments in response to three of your four summary points listed in the letter.

Regarding point number 1, the drawings have been finalized and copies have been sent to you and Al Wanger of the California Coastal Commission.

Regarding point number 2, DBOC **did not** indicate its agreement with PRNS that an SUP for submerged lands would be necessary. You stated that an SUP would need to cover the waters of Drakes Estero, a point that we have not yet agreed on. This agreement may very well be reached in the near future when we meet to discuss the SUP.

Point number 3, the land survey, was indeed discussed. We believe that the survey issue has been resolved, and that there is no need to "work around" it. The ROP boundary with the two additions that you requested, the eastern property lines and the 50' wide "unreserved" section on the northwest corner, are included on the current drawings.

We look forward to meeting with you, Al Wanger, and Bill Kirsch very soon to complete the CDP application process.

Sincerely,

Kevin Lunny

cc: Al Wanger
Lisa Bush
W.W. Kirsch

L1425
Tract 02-106 PORE

January 25, 2007

Mr. Kevin Lunny
17300 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Kevin:

We want to thank you for attending a meeting with Point Reyes National Seashore (PRNS) and Coastal Commission (CC) staff on January 12, regarding the Drakes Bay Oyster (DBO) State of California lease, its current and proposed operation, and the status of the National Park Service special use permits at Drakes Estero.

The summary points of the meeting are listed below.

1. DBO/PRNS/ CC reviewed the proposed improvements on the leased area. DBO will finalize the drawing of proposed improvements for Coastal Commission and PRNS review. The PRNS indicated these improvements would be subject to an environmental review as mandated by the National Environmental Policy Act and National Park Service (NPS) policy. Based on the level of repair versus new construction, the NPS would determine the level of review necessary.

2. DBO indicated its agreement with PRNS that a special use permit for submerged lands would be necessary because of NPS ownership of submerged lands that were ceded by the State of California to the United States.

3. The land survey was discussed and, overall, we have agreed to work around the survey issue and create a way to more forward.

4. DBO wanted a copy of the Special Use Permit that was issued in 1972. A copy is enclosed.

We appreciate your time and effort to finalize these issues. We want to reiterate that no new development may occur on the site until the current issues are resolved.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031
X L1425 02-106
January 23, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service has scheduled to inspect the employee housing at Drakes Bay Oyster Company on February 13, 2007. This inspection will focus on the trailers that were not included in the last inspection conducted in August of 2006 because one trailer was unoccupied at that time and the other was to be vacated with the tenants relocating to "Luis' House." General items that were noted in need of attention during the follow-up employee housing inspections conducted by Park Staff on December 20, 2006 included the following: 1) in the family occupied trailer - the flooring was in the process of being worked on, the heating method utilized should be evaluated to ensure that it is adequate, the hot water heater had a leak, GFCI electrical outlets are required near sinks or water sources, gaps around entry doors should be sealed and windows need to be evaluated for leaks and rot. 2) In the second trailer – two broken windows were noted, gaps around entry doors should be sealed, GFCI electrical outlets are required near sinks or water sources, the washing machine was leaking water inside of the trailer, the heating available was inadequate, the plumbing in the bathrooms should be evaluated and windows need to be evaluated for leaks and rot.

These are general observations and not intended to be an exhaustive list of deficiencies. A copy of the United States Public Health Service Evaluation will be provided to you after the inspection on February 13, 2007 is completed. You will be contacted in advance and informed of a scheduled time of arrival.

Please find enclosed the requested additional draft copy of a Special Use Permit for Drakes Bay Oyster Company Operations at the former Johnsons Oyster Company site within Point Reyes National Seashore. If you have questions please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure
KEMcKay:kem 1/23/07

Enclosure

cc: Al Wanger, California Coastal Commission

DLNeubacher/SBoyceCarlson:dln 06/19/07

L1425
Tract 02-106 PORE

June 19, 2007

Mr. Kevin Lunny
Drakes Bay Oyster Company
17300 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Kevin:

We have attached a letter that we recently received from California Department of Fish and Game (CDFG) for your perusal. As you know, we had been waiting for clarification about jurisdiction regarding Drakes Estero waters. As the letter states, the NPS has primary authority because the tide and submerged lands were granted to the United States in 1965.

Because of this clarification, we would like to meet with you in the near future. We propose holding a meeting at the National Park Service (NPS) Pacific West Regional Office located in Oakland at 1111 Jackson Street. Senior Pacific West Regional staff, the Department of the Interior Solicitor's Office, and California Coastal Commission (CCC) staff are all available to attend the meeting. The goal would be to work out the remaining issues regarding an interim NPS permit for both lands and waters outside of the Reservation of Use and Occupancy (Reservation) and to help you proceed to get your Coastal Development Permit from the Commission. We also need to discuss the possible need for additional environmental compliance.

Regarding the Reservation boundary, as we stated previously, we are prepared to apply the conditions in the Reservation to the area located within the Stevens survey. At this meeting we will be prepared to discuss allowing minor repairs to existing structures to occur once approval is received from the Commission and any other relevant agencies.

In order to avoid any confusion, we would like to clarify that this meeting would be separate from any meeting that may be scheduled in the future with Senator Feinstein's office and that we would like to have this meeting with the CCC in order to keep the project moving forward.

Again, a meeting at your convenience is requested. Coastal Commission staff has agreed to attend to move this project forward.

Please send some dates for our consideration.

Sincerely,

Don L. Neubacher
Superintendent

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

L1425
Tract 02-106 PORE

June 16, 2006

Mr. Kevin Lunny
dba. Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

This document will serve as a "Letter of Authorization" extending the terms and conditions contained in Special Use Permit MSC-8530-6000-2010 regarding the well and water system located at the current Drakes Bay Oyster Company and former Johnson's Oyster Company Site. This Special Use Permit is set to expire on June 30, 2006. The terms and conditions are extended for a period of one year until July 1, 2007 or until such time as a Special Use Permit addressing Drakes Bay Oyster Company operations and use of non-reserved portions of Tract 02-106 is issued, whichever occurs first. We intend to coordinate the Special Use Permits associated with the site to be issued on the same calendar schedule however, issuance of the Special Use Permits are contingent upon successful resolution of issues with the National Park Service and the Coastal Commission.

The annual fee of $2,500.00 that was established on July 1, 2000 has been adjusted for inflation to $2,925.00. This adjustment was calculated utilizing the Bureau of Labor Statistics, Consumer Price Index, inflation calculator. A quarterly billing schedule of $731.25 will be established.

On another matter, we phoned last week regarding the drawings and information you submitted to the Coastal Commission as an application for a Coastal Development Permit. The Commission staff has asked for our comments and approval. As of the date of this letter, we have not received your submittal package. Please submit these drawings and the permit application to us as soon as possible.

If you have questions or concerns regarding this Letter of Authorization, contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. We look forward to seeing you at the Rancher's Meeting on June 19, 2006.

Sincerely,

Don L. Neubacher
Superintendent

Special Use Permit extended to 7-1-2007
RZ: Need to "submit drwgs + permit apps" to NPS.-

"Tim Ragen"
<tragen@mmc.gov>
07/09/2010 02:42 PM
AST

To: "'David Press'" <dave_press@nps.gov>
cc:
Subject: FW: Data points meeting

-----Original Message-----
From: Dave_Press@nps.gov [mailto:Dave_Press@nps.gov]
Sent: Tuesday, May 11, 2010 2:10 AM
To: Tim Ragen
Cc: Ben Becker; Dave Graber; John Dell'Osso; Sarah Allen; Samantha Simmons
Subject: Re: Data points meeting

Hi Tim,
June 9 is on our calendars and we received our packets with the background material in the mail today. Included is a letter to you from Dr. Goodman dated April 28, 2010 and is in regards to a disturbance event recorded on April 29 2007. Dr. Goodman's letter is a revised version of the letter he sent to the NRC on January 18, 2009.

If you have not done so already, I suggest that you and Samantha review the NPS response to Dr. Goodman's original letter to the NRC data May 1, 2009. The NPS response is posted with the list of Drakes Estero documents on the MMC website; but was not included in our packets. The PDF file name is ltr_nps_goodman_50109.

Finally, as I indicated I would do, I have revised the disturbance event spreadsheet I developed (page 131 of my packet) to indicate which records were used in Becker et al 2009, Becker et al 2010, and in our presentation to the MMC panel. I believe this will serve as a good guide to our discussion on the data in June.

Best regards, Dave

_____
David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

To: "Kevin Lunny" <kevin@[redacted], "Corey Goodman" <corey.goodman@[redacted], "Sarah Allen" <Sarah_Allen@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>, "'David Press'" <dave_press@nps.gov>, "John Dell'Osso" <John_A_Dell'Osso@nps.gov>
cc: "Dave Graber" <David_Graber@nps.gov>, "David Weiman" <agresources@erols.com>, "Samantha Simmons" <SSimmons@mmc.gov>
bcc:
Subject: Data points meeting
"Tim Ragen" <tragen@mmc.gov>

05/10/2010 10:43 AM AST

Thanks, everyone, for adding your availability to the Doodle meeting planner. Let's set June 9 for the meeting. The 9th is a Wednesday.

We just sent you a copy of the background material we had compiled for the meeting. We thought that might be an easy way to make sure we are all looking at the same material. If we missed something, please send it to me and Sam and copy others on this email.

We also will send you a revised agenda for the meeting as we have a bit more
time to think about how to maximize the value of the meeting. The revisions will be relatively small but, we hope, useful. I know none of you wants any surprises, and I do not believe the revisions will strike you as surprising.

Please contact me or Sam if you have questions or suggestions for the meeting or, for that matter, for any other related matters.

Best, Tim

Tim Ragen

Executive Director

U.S. Marine Mammal Commission

4340 East-West Highway, Room 700

Bethesda, MD 20814 USA

301.504.0087 (office)

301.504.0101 (direct)

240.676.4162 (cell)

301.504.0099 (fax)

tragen@mmc.gov

http://www.mmc.gov (web)

[attachment "winmail.dat" deleted by Dave Press/GOGA/NPS]

Cicely Muldoon/PORE/NPS
06/30/2010 04:59 PM

To Tim Ragen <tragen@mmc.gov>, David Weiman <agresources@erols.com>, Kevin Lunny <kevin@[redacted] corey.goodman@[redacted]
cc David Press <dave_press@nps.gov>, Ben Becker/PORE/NPS@NPS, "Sarah Allen" <Sarah_Allen@nps.gov>
bcc George Turnbull/OAKLAND/NPS; Maureen Foster/WASO/NPS@NPS; Alma Ripps/WASO/NPS@NPS; John A Dell'Osso/PORE/NPS; Gordon White/PORE/NPS; Ann Nelson/PORE/NPS; Brannon Ketcham/PORE/NPS@NPS; Natalie Gates/PORE/NPS
Subject requested information

Dave, Corey, Kevin, and Tim:

We have pulled together the requested images and are putting them in the mail first thing tomorrow to each of you. The images provided on the DVD include the following:

May 8, 2007. 603 total images. All images from one camera with subsite OB in the foreground.
March 14, 2008. 1440 total images. All images from both cameras, OB and UEF. Images were retrieved from the OB camera on March 14, 2008 and the camera reset. The images for the OB camera on this day are therefore divided into two separate folders.
March 23, 2008. 1440 total images. All images from both cameras, OB and UEF.

The 2007 camera was not installed until May, so there are no images from April 26 or April 29, 2007.

In response to other follow up questions from Dave and Corey --

December 10, 2008 survey
The volunteer who took the pictures referred to on this data sheet is out of town until July 20. We will pursue getting copies of the images requested after she returns. Stay tuned on this one.

June 3, 2009 survey
We have looked to see if there are any other datasheets from June 3, 2009. All of the datasheets have been provided. Because there was only one disturbance recorded that day, as indicated by the count datasheets, we would not expect there to be more than one disturbance datasheet.

March 23 images
The photos on Sunday, March 23, 2008 referenced in the briefing statement were taken from what have been referred to as camera #2. Camera #2 faces north towards subsite UEF with Schooner Bay in the background. The boat is visible in the upper right corner of the photos we sent you, between 5:23 PM and 5:29 PM, traveling from Home Bay to Schooner Bay. These are the photos that were sent to Corey and Tim on June 9 and to Kevin on June 16, 2010. This was presumed to be a DBOC boat because of the extensive boat use in the Estero by DBOC, the rarity of other motor boats in the Estero, the time of year (during the kayak closure, although I understand this is occasionally violated), and the difficulty of seeing a kayak with such limited freeboard from such a great distance.

Harbor seal volunteers
The number of harbor seal volunteers is reported in our recent annual reports. For 2009, 2008, and 2007 there were 49, 38, and 36 volunteers respectively. Please note that our 2009 annual monitoring report was finalized and posted to the website last week. Website:
http://science.nature.nps.gov/im/units/sfan/vital_signs/pinnipeds/HarborSeals.cfm

Drakes Estero camera placement to the best of our knowledge
May 5, 2007 to June 19, 2007. One camera facing the OB seal haul out site. The camera was placed to the southeast of subsite OB. All 2007 photos appear to be taken from this angle.

March 6, 2008 to June 19, 2008. Two cameras. One camera facing OB haul out site along the lateral channel. One camera facing UEF haul out site with part of Schooner Bay in the background.
April 17, 2009 to August 4, 2009. One camera. Camera faces OB haul out site along the lateral channel.
Feb 12, 2010 to late May. One camera facing UEF haul out site with part of Schooner Bay in the background. Exact end date is unknown and may extend into early June.

To our knowledge no cameras are or were positioned to photograph on shore DBOC operations. The cameras were focused on the OB and UEF seal haul out subsites.

Wildlife cameras parkwide
At present, there are two wildlife cameras in use by a USGS scientist, and one camera in use for the snowy plover monitoring program. None of these capture Drakes Estero.

May 1, 2009 Briefing Statement. Since this briefing statement has now become the subject of a FOIA request from the Point Reyes Light, the FOIA process will explore what records exist.

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

Cicely Muldoon/PORE/NPS
06/23/2010 09:11 AM

To "Dave Press" <Dave_Press@nps.gov>, "Ben Becker" <Ben_Becker@nps.gov>, Ann Nelson/PORE/NPS, "Brannon Ketcham" <Brannon_Ketcham@nps.gov>
cc
bcc
Subject Fw: info requested

Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

----- Original Message -----
From: "David M Weiman" [agresources@erols.com]
Sent: 06/23/2010 10:31 AM AST
To: Cicely Muldoon
Subject: RE: info requested

Cicely.

Thank you for your reply and the additional information.

We did not know a camera was installed at the Estero in 2007.

We ask the following:

(1) Please provide all photographic records for the April 26, 2007 Disturbance Report. Include all of the photographic records beginning at least one hour prior to and after the observation time (3:45 to 5:00 pm). By our rough calculations, that should be approximately 200 time-stamped photographic files based on our understanding of the camera and how it was operated by NPS.

(2) Please provide all photographic records for the April 29, 2007 Survey and Disturbance Report. The Survey Record indicates that the observers were present from 9:30 am until 4:00 PM. Include all of the photographic records one hour prior to and after the observation time. By our rough calculations, that should be approxomately 500 time-stamped photographic files based on our understanding of the camera and how it was operated by NPS.

(3) Please do the same for the May 8, 2007, Survey and Disturbance Report.

Given the circumstances, I would further request that these records be made available immediately -- today if possible.

Dave Press, following the June 7 MMC meeting, demonstrated that the

information is readily available. We would urge that it be placed on a disk and made available as quickly as possible.

Lastly, please send a copy of the disk to me, Kevin and Nancy Lunny, Dr. Corey Goodman, and the MMC.

Thank you for your cooperation.

Dave W.

-----Original Message-----
From: Cicely_Muldoon@nps.gov [mailto:Cicely_Muldoon@nps.gov]
Sent: Tuesday, June 22, 2010 4:39 PM
To: David M Weiman
Cc: Kevin Lunny; Tim Ragen
Subject: RE: info requested

Dave, this is my understanding of the timeline for the harbor seal monitoring cameras at Drakes Estero -

2007: one camera
2008: two cameras
2009: one camera
2010: one camera - I believe this camera was non operational as of early June - the grad student who was using this camera injured her knee and hasn't been able to monitor the camera for the last few weeks

the map already sent represents the camera angles and approximate locations

can you be more specific about your last question related to any other cameras for any other purposes - are you interested in terrestrial wildlife in and around the Estero as well? also, when you refer to prior, how far back are you interested in - prior to Kevin's operation in the Estero?

Cicely

(Embedded image moved to file: pic00893.gif)

"David M Weiman" <agresources@erols.com>		To
06/21/2010 12:40 PM	<Cicely_Muldoon@nps.gov>	cc
	RE: info requested	Subject

Cicely.

Thank you for responding to my email. In the future, any inquires will be coordinated with your office, as requested. If my inquiry caused confusion, my apologies.

Immediately after the meeting, the Lunnys and I speculated that there were likely more cameras. Hence, the inquiry. This was prior to our learning of the second camera from the Citizen's interview with Dave Graber.

To further clarify and to make certain we fully understand the situation, is it correct to say there are only two cameras, those identified on the map you provided Kevin and Nancy? And, there were only two cameras?

Or, today or prior are or were there any other cameras?

And today or prior, were there any other cameras at any time and for any other purpose?

We just want to make certain that the situation is accurately understood.

Thank you.

Dave W.

-----Original Message-----
From: Cicely_Muldoon@nps.gov [mailto:]
Sent: Monday, June 21, 2010 12:10 PM
To: agresources@erols.com
Cc: Ben_Becker@nps.gov; Sarah_Allen@nps.gov; Dave_Press@nps.gov
Subject: info requested

Hi David - a request - would you please add me to any email that you send out to Point Reyes staff requesting information? It will be more efficient, and keep everyone in the loop, if communications are coordinated through my office. We talked about this at the MMC meeting, but possible you weren't part of that conversation? Thanks for your help with this.

To follow up on your point of clarification question - there is one remote camera at present focussed on the Estero (the UEF site, I believe). The grad student who is using the camera on a project through SF State injured her knee, so we are uncertain if it is functioning at present. I sent Kevin a map on 6/14 regarding the approximate location and field of view of the remote cameras that have been used for the OB and EUF sites over the past couple of years. I assume he shared this with you?

Cicely

(Embedded image moved to file: pic05538.gif)

Cicely Muldoon/PORE/NPS
06/23/2010 09:11 AM

To George Turnbull/OAKLAND/NPS, "Alma Ripps" <Alma_Ripps@nps.gov>
cc
bcc
Subject Fw: info requested

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Deputy Regional Director
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06/21/2010 12:40 PM	<Cicely_Muldoon@nps.gov>	cc
	RE: info requested	Subject

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Dave W.

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Cicely

(Embedded image moved to file: pic05538.gif)

"Tim Ragen"
<tragen@mmc.gov>
06/22/2010 03:41 PM

To "'Corey Goodman'" <corey.goodman@[redacted]
<cicely_muldoon@nps.gov>
cc "'David Weiman'" <agresources@erols.com>, "'Kevin Lunny'"
<kevin@[redacted]
bcc
Subject RE: the photos you sent

History: This message has been forwarded.

Hi All,

I am concerned that the exchanges we've had since our data meeting may be undermining much of the progress I thought we had made in the past two meetings. That being said, I continue to believe that there is a way forward. I am wondering if we wouldn't benefit from a pause in this back and forth while we consider the next step. I had hoped that the data meeting would bring closure to many of the remaining issues and that some of us could back away and let Cicely and Kevin develop their working relationship. That may have been naive on my part, and now I am wondering if we might need or benefit from a small meeting to tie up remaining details and complete this transition. From the MMC perspective, a pause that allows everyone a chance to catch their breath would be a good thing. So I am asking everyone to step back and take a minute to let the waters calm a bit. I will try to call each of you separately in the next three days to talk about how to move forward.

Thanks for considering my request. Best, Tim

From: Corey Goodman [mailto:corey.goodman@[redacted]
Sent: Tuesday, June 22, 2010 4:59 PM
To: cicely_muldoon@nps.gov
Cc: David Weiman; David Press; Kevin Lunny; Tim Ragen
Subject: Re: the photos you sent

Hi Cicely,

I am puzzled by your June 21 reply concerning the digital photos.

We have all committed to improving communications, but I fear the past several weeks foreshadow more of the same. I fear I am still experiencing the same kinds of needless and costly administrative roadblocks to access basic data suffered under the previous administration at Point Reyes.

On Sunday June 6, I read the May 1, 2009 NPS Briefing Statement for the first time and discovered that NPS had installed a hidden camera (now understood to be multiple hidden cameras). On Monday June 7, at the MMC meeting on Disputed NPS Harbor Seal Data, I asked for the photo series from two dates: March 14, 2008 and March 23, 2008, both with implications concerning DBOC

oyster boats, NPS Harbor Seal Data, NPS observer integrity and the MMC deliberations.

About a half-hour after the meeting concluded, while Kevin and I were standing in the parking lot after the meeting, Dave Press came over, handed us a B&W print from one of the photos (March 14, 2008) and acknowledged that they were easy to find (since they are date and time stamped). Further, he indicated that there were about 10 photos (one per minute). Dave said he'd send the photos later that day. He didn't. Two days later on June 9, I requested these photos from him and you. On Friday June 11, the correct photos from March 14 arrived, and I was also sent some photos from March 23.

The March 23, 2008 photos were puzzling. They contained no boat, and they were from camera #2 and not camera #1. I wrote back to Dave and you on June 15 asking for the correct photos from March 23 (i.e., the ones allegedly containing the DBOC boat) and I got no reply. Then I wrote again one week later. You replied yesterday that your focus now is on a FOIA request, and because of it, you cannot reply at this time.

The history in this matter is well-documented. FOIA requests to PRNS and the Western Regional Office have not been answered in a timely basis and more often than not, been used to withhold and delay information, not make it available. In 2007, I was denied the requested and already public harbor seal data. Senator Feinstein intervened. NPS tried to explain that it might be expensive and after the Senator directed that the bill be sent to her, the harbor seal data was finally released. As you heard at the MMC meeting, NPS refused to answer the simplest question about the NPS claim, made in 2007 at a Board of Supervisor's meeting that harbor seals had declined 80%. I asked: "at which site?" That question took two years to get an answer to, and the answer given to the NAS panel was quite different from the answer given to the MMC panel. By the way, I was ultimately told back in Summer, 2007, after several months and rounds of appeal, that if I wanted the data, I would have to sue the federal government.

In 2008, I asked Ben Becker, David Press and Sarah Allen to provide me copies of documents submitted to the NAS. Your staff stated to the MMC that the May 1 Briefing Paper was submitted to the National Academy of Sciences. That is not correct.

David Press demonstrated that these photos are readily accessible and available. I

request that NPS honor the commitment to provide this data so that it can be reviewed and analyzed. We are under severe time constraints because of MMC. They want to complete their report and have told us that we must submit our analysis promptly.
President Obama made "transparency" a cornerstone of his presidency. The President issued directives to improve transparency on his very first day in office. FOIA should not impede access to information.

Please help us meet our commitments to the MMC and arrange to have this data made available immediately.

By the way, I am also still waiting to hear from you concerning the questions you promised to answer concerning the May 1, 2009 Briefing Statement. No one -- from the scientists to Dave Graber to you -- have yet answered three simple questions concerning this 33-page document:

Who requested it?
Who wrote it?
Who received it?

Thanks very much.

Corey

On Jun 21, 2010, at 10:42 AM, cicely_muldoon@nps.gov wrote:

Hi Corey,

My responsibility on the response time - had intended to send you one more comprehensive response last week to a series of questions you have sent to a variety of NPS staff so that the lines of communications could be a little less cluttered. Regrettably my intentions exceed the time I've had available, and as I presume you are aware we received a FOIA request last week on this same subject from the Point Reyes Light, for which we are in the process of assembling a much more comprehensive response. I'm sure you will understand that our priority has to be the FOIA response, but I do hope to get you a clarification as you request on the photos already sent.

I'm out of the office today, but will be in contact with Dave, and hope to get back to you as soon as I can.

Thanks

Cicely

(Embedded image moved to file: pic07267.gif)

Corey Goodman
<corey.goodman@[redacted]
[redacted]
06/21/2010 09:40 AM

To
Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>

cc
David Weiman <agresources@erols.com>, Kevin Lunny <kevin@[redacted] Tim Ragen <tragen@mmc.gov>

Subject
Re: the photos you sent

David and Cicely,
Nearly a week ago, I wrote and asked for further photographs, or further clarification, of photos from Sunday March 23. I never heard back from either of you. Would you please send me all of the photos from that day from both cameras, or at the very least the photos, and 30 minutes to either side, of the DBOC boat on the estero. This is a time sensitive request.
Could you please confirm how you plan to respond.
Thanks very much.
Best wishes,
Corey

On Jun 15, 2010, at 5:21 AM, Corey Goodman wrote:

David and Cicely,

Thanks very much for sending the CD with the photos. However, it is possible that may not have sent the right photos. Please correct me if I am mistaken.

When I made my request for photos last week, I was only aware of one camera pointing at Drakes Estero (you had not told us at the meeting on Monday June 7 that there was a second camera). I asked for photos from two days: March 14, 2008 (the date of a disturbance event) and March 23, 2008 (a Sunday cited in the May 1, 2009 "Briefing Statement" for which "NPS has time stamped images of a DBOC boat present on Drakes Estero").

Since my request, you have identified that you have two cameras on Drakes Estero, one (#1) further south pointing west at the lateral channel and oyster bags on UEN and OB, and the other (#2) further north and pointing northwest at UEF and the mouth of Schooner Bay.

For March 14, 2008, who correctly sent me photos of the lateral channel from camera #1 showing the image of a boat.

For March 23, 2008, who sent me a small number of photos pointing northwest from camera #2. These photos do not show a boat. Do you have other photos showing the DBOC boat?

In the "Briefing Statement", were you citing a DBOC boat in camera #1 or #2?

If you were citing camera #1, please send me those photos. If you were citing camera #2, please explain.

I presume it is simply a matter of sending me the correct photos from the appropriate camera.

Thanks for taking care of this.

Best wishes,

Corey

Corey S. Goodman, Ph.D.
corey.[redacted]

[redacted]

<pic07267.gif>

Corey Goodman
<corey.goodman@[redacted]
06/22/2010 01:59 PM

To cicely_muldoon@nps.gov
cc David Weiman <agresources@erols.com>, David Press <dave_press@nps.gov>, Kevin Lunny <kevin@[redacted]>, Tim Ragen <tragen@mmc.gov>
bcc
Subject Re: the photos you sent

History: This message has been forwarded.

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The history in this matter is well-documented. FOIA requests to PRNS and the Western Regional Office have not been answered in a timely basis and more often than not, been used to withhold and delay information, not make it available. In 2007, I was denied the requested and already public harbor seal data. Senator Feinstein intervened. NPS tried to explain that it might be expensive and after the Senator directed that the bill be sent to her, the harbor seal data was finally released. As you heard at the MMC meeting, NPS refused to answer the simplest question about the NPS claim, made in 2007 at a Board of Supervisor's meeting that harbor seals had declined 80%. I asked: "at which site?" That question took two years to get an answer to, and the answer given to the NAS panel was quite different from the answer given to the MMC panel. By the way, I was ultimately told back in Summer, 2007, after several months and rounds of appeal, that if I wanted the data, I would have to sue the federal government.

In 2008, I asked Ben Becker, David Press and Sarah Allen to provide me copies of documents submitted to the NAS. Your staff stated to the MMC that the May 1 Briefing Paper was submitted to the National Academy of Sciences. That is not correct.

David Press demonstrated that these photos are readily accessible and available. I request that NPS honor the commitment to provide this data so that it can be reviewed and analyzed. We are under severe time constraints because of MMC. They want to complete their report and have told us that we must submit our analysis promptly.

President Obama made "transparency" a cornerstone of his presidency. The President issued directives to improve transparency on his very first day in office. FOIA should not impede access to information.

Please help us meet our commitments to the MMC and arrange to have this data made available immediately.

By the way, I am also still waiting to hear from you concerning the questions you promised to answer concerning the May 1, 2009 Briefing Statement. No one -- from the scientists to Dave Graber to you -- have yet answered three simple questions concerning this 33-page document:

Who requested it?

Who wrote it?
Who received it?

Thanks very much.

Corey

On Jun 21, 2010, at 10:42 AM, cicely_muldoon@nps.gov wrote:

> Hi Corey,
>
> My responsibility on the response time - had intended to send you one more comprehensive response last week to a series of questions you have sent to a variety of NPS staff so that the lines of communications could be a little less cluttered. Regrettably my intentions exceed the time I've had available, and as I presume you are aware we received a FOIA request last week on this same subject from the Point Reyes Light, for which we are in the process of assembling a much more comprehensive response. I'm sure you will understand that our priority has to be the FOIA response, but I do hope to get you a clarification as you request on the photos already sent. I'm out of the office today, but will be in contact with Dave, and hope to get back to you as soon as I can.
>
> Thanks
>
> Cicely
>
> (Embedded image moved to file: pic07267.gif)

Corey Goodman <corey.goodman@[Ex 6] [Ex 6]		To
06/21/2010 09:40 AM		Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
		cc
		David Weiman <agresources@erols.com>, Kevin Lunny <kevin@[Ex 6] Tim

Ragen <tragen@mmc.gov>
Subject
Re: the photos you sent

David and Cicely,
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Could you please confirm how you plan to respond.
Thanks very much.
Best wishes,
Corey

On Jun 15, 2010, at 5:21 AM, Corey Goodman wrote:

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Cicely Muldoon/PORE/NPS
06/22/2010 10:33 AM

To Alma Ripps/WASO/NPS@NPS
cc
bcc
Subject Re: Fw: One more question

Believe march 07, like to confirm, need database guy who is not in yet

---
Sent from my BlackBerry Wireless Handheld
Cicely Muldoon
Deputy Regional Director
Pacific West Region
Office 510-817-1327
Cell 510-541-0195

Alma Ripps

----- Original Message -----
From: Alma Ripps
Sent: 06/22/2010 01:02 PM EDT
To: Cicely Muldoon
Cc: Sarah Allen
Subject: Re: Fw: One more question

Really need to know this date ASAP.

Alma

Alma Ripps
Management Assistant
Office of the Director
National Park Service
1849 C Street, NW, Room 3115
Washington, DC 20240

Private Line: 202 208-3326
General Line: 202 208-3818
Fax: 202 208-7889
Email: Alma_Ripps@nps.gov

Cicely Muldoon/PORE/NPS

Cicely Muldoon/PORE/NPS
06/21/2010 01:14 PM

To Sarah Allen
cc Alma Ripps/WASO/NPS@NPS
Subject Fw: One more question

Sarah, can you provide this information?
thanks
c

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

----- Forwarded by Cicely Muldoon/PORE/NPS on 06/21/2010 10:13 AM -----

Alma Ripps/WASO/NPS
06/21/2010 10:10 AM

To Cicely Muldoon/PORE/NPS@NPS
cc
Subject One more question

Briefing paper said that cameras were first placed out in 2007. Could you be more definitive about the month?

Got your other message, thanks for the info.

Alma

Alma Ripps
Management Assistant
Office of the Director
National Park Service
1849 C Street, NW, Room 3115
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Private Line: 202 208-3326
General Line: 202 208-3818
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Email: Alma_Ripps@nps.gov

Cicely Muldoon/PORE/NPS
06/21/2010 10:42 AM

To Corey Goodman <corey.goodman@[redacted]
cc David Weiman <agresources@erols.com>, David Press <dave_press@nps.gov>, Kevin Lunny <kevin@[redacted] Tim Ragen <tragen@mmc.gov>
bcc George Turnbull/OAKLAND/NPS; Ann Nelson/PORE/NPS; Sue_Husari@nps.gov; Ben Becker/PORE/NPS@NPS; Gordon White/PORE/NPS; markb@ptreyes.org; Alma Ripps/WASO/NPS@NPS; John A Dell'Osso/PORE/NPS
Subject Re: the photos you sent

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Thanks

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

Corey Goodman <corey.goodman@[redacted]

Corey Goodman
<corey.goodman@[redacted]
06/21/2010 09:40 AM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
cc David Weiman <agresources@erols.com>, Kevin Lunny <kevin@[redacted] Tim Ragen <tragen@mmc.gov>
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> In the "Briefing Statement", were you citing a DBOC boat in camera
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> were citing camera #2, please explain.
>
> I presume it is simply a matter of sending me the correct photos
> from the appropriate camera.
>
> Thanks for taking care of this.
>
> Best wishes,
>
> Corey
>
> Corey S. Goodman, Ph.D.
> corey.goodman@Ex 6
>
> Ex 6
>
>
>
>

Corey Goodman
<corey.goodman@[redacted]
06/21/2010 09:40 AM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>, David Press <dave_press@nps.gov>
cc David Weiman <agresources@erols.com>, Kevin Lunny <kevin@[redacted] Tim Ragen <tragen@mmc.gov>
bcc

Subject Re: the photos you sent

History: This message has been replied to and forwarded.

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> Best wishes,
>
> Corey
>
> Corey S. Goodman, Ph.D.
> corey.goodman@[redacted]
>
> [redacted]
>
>
>
>

Cicely Muldoon/PORE/NPS
06/16/2010 05:21 PM

To Dan Wenk/WASO/NPS
cc
bcc Ann Nelson/PORE/NPS; George Turnbull/OAKLAND/NPS; Rory_Westberg@nps.gov
Subject requested info

Dan, hope this helps:

- wildlife observation cameras are not new to Point Reyes: we've used them over the years for inventory and monitoring, research, and management. This has included cameras on harbor seals, elephant seals, elk, and wildlife in general. PORE also used remote cameras extensively after the Vision Fire, and most recently on the Giacomini Wetland restoration project. This is a common tool used in wildlife management/study everywhere.
- the Drakes Estero cameras were put out to understand why there was a drop in harbor seal numbers at the OB site, and to document if there were disturbances that might help explain the drop in numbers
- the cameras - in Drakes Estero and elsewhere - are camoflauged to protect against vandalism, theft, and accidental disturbance by cattle, wildlife, birds, etc...
- timeline to the best of my knowledge:
- 2010: there is one camera at Drakes Estero right now, being used by a student from SF State on her masters thesis focussed on harbor seals and disturbance.
- 2009: one camera focussed on OB haul out site
- 2008: there were two cameras at Drakes Estero, aimed at seal haulout sites in the upper estero, referred to as OB and UEF (see attached map) - these are two major harbor seal haulout areas that have shown the largest declines in seal numbers. These declines are documented in two peer reviewed scientific papers; one published in 2009, one to be published in 2010.
- 2007: there was one camera focussed on the OB site
- the allegations that these cameras were not focussed on haul out sites is false - the images have seal haul out sites in the foreground; they can show, when present, boats in the background - any boat would show up, kayak, oyster boat, or whatever is out there. Attached is an image that shows a kayak. This camera -when functioning- would pick up any disturbance.
- the cameras were active during the breeding season, generally March-June
- images from the cameras have not yet been analyzed in any depth - a handful of images have been used publicly: in the Marine Mammal Commission meeting that happened here in February, and in a briefing statement prepared here at PORE this time last year, in response to Corey Goodman's letter to the NRC
- an additional note: the briefing statement, which references the cameras, has been posted since at least February on the publicly accessible Marine Mammal Commission web site. Ex 5 Ex 5

Attached are: map showing the camera angles in Drakes Estero; sample photos from the cameras; the briefing statement prepared last May

oyster_activity_seal_cameras.pdf IMG_0003.JPG IMG_0037.JPG IMG_2193.JPG T0004101.JPG
NPS Response to Goodman NRC May 2009.pdf

thanks

c.

Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC
May 1, 2009

This briefing statement addresses allegations and criticisms put forth in a January 18, 2009 letter from Dr. Goodman to the National Research Council (NRC). There are additional documents in support of this rebuttal. Dr. Goodman has made several accusations that fall into three categories: falsified data, manipulated and withheld information, and not following NPS protocols. His accusations are based on a number of assumptions, little data and faulty analyses. Here, we refute the accusations with sound data and scientific analyses.

Allegations of falsified data

The allegation of falsified data on April 29, 2007 is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when sandbars are submerged and that seals are not disturbed by sources > 300 ft away. This is no supporting evidence for these allegations.

- Seals regularly hover over and rest on sandbars in Drakes Estero and elsewhere before the sandbars are exposed by falling tides. Also, disturbances of seals documented by NPS were recorded during the *breeding* season when females and pups are commonly on the sandbars. Dr. Goodman used incomplete tidal data for his analyses and analyzed tidal effects during January when seals are less common at the site.
- Dr. Goodman implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service recommends generally a distance of 300 ft for not disturbing marine mammals; however, the published literature is replete with information on harbor seals disturbed at greater distances.

Allegations of manipulated and withheld data

The record of Dr. Becker's communications to the NRC and the editor of the Journal of Marine Mammal Science (MMS) demonstrates clearly that NPS did not manipulate data or mislead either the NRC (in his presentation to the NAS panel in September 2008 and in the final published paper in MMS which he shared with them) or the editor of MMS (in correspondence back and forth in final preparation of the paper). In the process of revising the paper, Dr. Becker found additional disturbances in the database that were missed during the first version of the paper but those omissions were rectified and fully explained to both the NRC and the MMS editor.

Allegations of NPS failing to follow protocols and QA/QC

Dr. Goodman challenged the validity of the survey on April 29, 2007 because he states that it did not meet the protocol criteria of the pinniped monitoring program based on tide height and the experience of the volunteers. The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, *disturbance* data are not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. First year observers, all of who must attend trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether a disturbance occurs in poor weather conditions or at a high or low tide. Nevertheless, the volunteers in question had at least one previous year of experience which Dr. Goodman did not recognize from the pinniped database, and their count data met the protocol for tide level.

We note that in previous letters from Dr. Goodman that he criticized the NPS statistical modeling techniques. His critiques were closely examined by editors and peer reviewers at MMS and were flatly rejected. He now primarily focuses on data handling and alleges NPS falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of both the editors of MMS and the DOI Inspector General that there was no evidence of scientific misconduct. Separately, the NRC refused to consider his allegations of scientific misconduct.

National Park Service Response to
Goodman's January 18, 2009 Letter to NRC
May 1, 2009

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Goodman to the National Research Council (NRC). We are not addressing all of the allegations in the letter because many of them were presented in earlier letters of Dr. Goodman that we previously rebutted. Because Dr. Goodman's letter addresses many themes and frequently revisits them in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Several of the short responses below are supported by additional referenced documents that are attached in appendices.

1. Allegation that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 and on numerous other pages in his letter to the NRC that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."

The allegation of falsified data on April 29, 2007 is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, that DBOC generally does not operate on Sundays, and that several volunteers and NPS staff separately fabricated disturbance data on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

- Assumption that seals do not use submerged sandbars (Goodman Letter, pages 7-12) Seals (especially mothers with pups) regularly hover over and rest on sandbars in Drakes Estero before they are exposed by falling tides, and this is a common behavior of harbor seals elsewhere. NPS has time stamped images of seals on the sandbars at similar falling tides during the 2008 *breeding* season in Drakes Estero. Furthermore, the disturbances documented by NPS were recorded during the breeding season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January, the time of the "experiment" that Goodman cited in his letter. See **Appendix A** regarding tidal comparisons.

- Assumption that seals are not disturbed beyond the 300 foot Protective Zone (Goodman Letter, page 6) Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft

(190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Assumption that DBOC does not operate on Sundays (Goodman Letter, page 5) The April 29, 2007 disturbances occurred on a Sunday, however, Dr. Goodman states that DBOC does not normally operate on Sundays. We do not know at what frequency that DBOC boats operate on weekends; however, the DOI OIG investigation reports from an interview with the Chief Ranger of Point Reyes National Seashore that "Smith said that it was not uncommon for DBOC employees to take boats out into the estero after hours to fish." (see page 26 of the DOI-OIG report July 2008). The NPS harbor seal monitoring database also reports DBOC activity in Drakes Estero on Sunday, May 11, 2007. In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, also a Sunday.

- Assumption of improbability of disturbances (Goodman Letter, pages 6-7) Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. There is no basis for Dr. Goodman to have assumed this, and subsequently discounting the events as logistically impossible is unclear. Possibly, the boat staged its operations from a barge moored within Drakes Estero, which is a common practice.

- Assumption that there are no other DBOC disturbance records (Goodman Letter, page 5) Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

- Assumption that the count occurred on April 29 at 3:15 PM (Goodman Letter, page 7) Dr. Goodman used a different time at which the volunteers conducted their full count of Drakes Estero from what is in the pinniped database. The database and datasheet clearly document that the data were collected at 2:15 PM. However, apparently based on a note on the photocopied datasheet Dr. Goodman assumes that the data were collected at 3:15 PM in his letter.

"Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15. If

the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?"

The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which incorrectly supported his claims that earlier disturbances could not have occurred.

2. Allegation that 2003 disturbance data were covertly manipulated among versions of the MMS paper:

Dr. Goodman states on page 16 in his letter to the NRC that:

"The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II."

During preparation for the first Marine Mammal Science (MMS) journal submission, Becker inadvertently overlooked the 2003 disturbances. The datum (one disturbance) was in the dataset that D. Press, the NPS data manager, provided to Becker preparing the first MMS manuscript. While preparing for the NRC presentation on September 4, 2008, Becker realized his error of omission, and ***therefore, included an asterisk by the 2003 data with "possible disturbance" on the NRC presentation*** **(see Appendix B).** Additionally, in Becker's Sept. 22, 2008 letter to the MMS editor, he clearly included this one disturbance in an analysis on page 8 (that particular analysis was not used in the final paper).

Then, after the NRC meeting, when revising the MMS paper in late September, 2008, and after the first letter was sent to MMS, D. Press found an additional disturbance event in the comments section of the data sheet for that the 2003 survey day. In sum, there were two actual disturbances in 2003. Becker incorporated both into the final paper which he shared with NRC as soon as it was accepted by the editor of MMS. The MMS editor himself read through and made minor editorial corrections on the near final copy of the paper with the corrected two disturbances in it. Thus, communications to both the NRC (in the presentation and in the final paper) and the MMS editor (in correspondence back and forth) clearly demonstrate that the NPS was openly exchanging information.

3. Allegation that NPS withheld information from the MMS editor.

Dr. Goodman states on page 19 that

"In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:

"For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the

2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis""

Goodman's allegation is incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. The editor approved, and it was included in the final paper. See attached email to the MMS editor in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly with the MMS Editor, who in addition to reviewing them himself, passed them on to the Associate Editor of MMS and the two original peer reviewers. Thus, the notion that we cherry-picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the DOI Inspector General report. The MMS editor also corresponded directly with the NRC and The California Department of Fish and Game. We also offered to the MMS Editors our raw data and NPS pinniped database, so they could conclude for themselves whether the datasets were credible, that our handling of the data was appropriate, and whether Dr. Goodman's allegations had any merit.

Dr. Goodman also alleges that by our performing the correlations without some of the disturbances in order to show their robustness of the correlations, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement (quoted above) to show that even if some disturbance data are questioned, the positive correlation still exists when those data are not considered. Dr. Goodman had previously disputed only the NPS Trip Report of April 26, 2007 conducted by S. Allen. To demonstrate the robustness of the analyses to small sample size, we removed several disturbances, including the April 26 survey.

4. Inclusion of the 1996-1999, and 2008 disturbance data in the second paper.

Dr. Goodman states on page 2 that:

"In Becker II (the second revised version of the Becker et al. paper), Becker cherry-picked the data by arbitrarily going back to 1996 (instead of just 2000) to claim six oyster related disturbances in 1996 (and none in 1997-1999). Four of those six disturbances were fabricated."

We incorporated more years at the suggestion of Dr. Goodman's comments to the NRC and MMS in September of 2008. There is no cherry-picking as we included all appropriate data. The 1996-1999 data were not in the database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission. Similarly, we had not looked closely at the 2008 disturbance data prior to the first submission, but revisited it for the revision.

On page 2 of his report, Dr. Goodman asserts that we falsified disturbance records in 1996 to improve our statistical results and create a more dramatic graph.

The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidentally included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *possible* disturbances. We regret this error but it nonetheless does not alter the statistics or conclusions in any way. We will inform the Editor of MMS of our error and seek his guidance on whether a correction is warranted.

Nevertheless, the removal of two disturbances in 1996 does not change any conclusions or patterns described in the paper (see **Appendix D**). 1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remain exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is inconsistent with the facts and the analyses.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that "*many fishing and recreational motorboats enter the estero*" on page 17 of his letter is not supported by park records including law enforcement case reports, harbor seal monitoring field notes and park staff observations.

Finally, cherry-picking is alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero because some of lower estero haul-out sites are attached to the mainland). On November 12, we provided the NRC with a justification for solely analyzing the mariculture related disturbances and we explained in the MMS paper. See **Appendix E.**

5. Allegation that NPS did not follow stated QA/QC protocols:

Dr. Goodman states on page 12 that:

"April 29, 2007: Disturbance Survey Violated NPS Protocols."

Dr. Goodman challenged the validity of the survey based on tide height and the experience of the volunteers on April 29, 2007.

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level.

Dr. Goodman appears to have misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers are entered into the database and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database itself, which remain important NPS records.

Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

- poor visibility
- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regard to weather conditions

In addition, for the purposes of the Becker et al. paper, we limited the count data used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. This is clearly outlined in methods section of the MMS paper. We have confidence that our first year observers, all of who must attend trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

- Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leite) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007 (page 15). This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least one year of prior experience in our program before including their data for analysis.

6. Statement that the MMS paper title is incorrect.

Dr. Goodman states on page 25 that:

"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data only from 1997-2007, as the title describes. As is clearly explained in the paper, we include disturbance (but not *count*) data from 1996 and 2008. This data is not modeled but only used to report disturbance patterns. Count data were not complete enough to pass QA/QC protocols for 1996, and we did not model 2008 data since it was after reaffirmed guidelines that DBOC avoid seal areas during the breeding season. In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page 19 that:

> *"Becker told us that "This correlation is highly robust to sample size." As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation."*

Contrary to Dr. Goodman's assertion, the S-plus statistical software user's manual indicates that:

> *"Because both Kendall's and Spearman's methods are based on ranks, they are not so sensitive to outliers and non normality as the standard Pearson estimate."* (Insightful 2003).

Furthermore, in the MMS paper, our demonstration of the removal of several disturbances with continuing significance proves that the test is not succumbing to the effects of a "single anecdotal observation". Other correlation tests show similar results. Specifically, Pearson correlations (although not appropriate) and Kendall's Tau (which is an appropriate test).

Dr. Goodman also indicates that we must have gone back to the 1996 data only to get a stronger correlation (Page 22). However, if only considering the disturbance rate from 2000 – 2008, the P value is similar ($P < 0.03$), and the Spearman correlation is actually higher ($rs = 0.69$) than the full time series. Thus, there is no basis for the allegation that we cherry picked data (omission or commission) to improve our statistical results.

8. Conclusion

We note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques

were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of both the editors of Marine Mammal Science and the DOI Inspector General that there was no evidence of scientific misconduct (see **Appendix F**). Separately, the National Research Council refused to consider his allegations of scientific misconduct. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent allegations of scientific misconduct.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

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APPENDIX A

Appendix A
NPS Review of Tidal Patterns and Harbor Seal Behavior in Drakes Estero

On January 18, 2009, Dr. Goodman submitted a document to the National Research Council entitled "New Information Shows that the National Park Service Committed Scientific Misconduct in the Documents it Presented to Your Panel".

Dr. Goodman devotes much of this document to discrediting harbor seal data collected in Drakes Estero on April 29, 2007. On this date, volunteers noted two disturbances by Drakes Bay Oyster Company (DBOC) when workers in a motorboat dropped oyster bags on a sandbar. Dr. Goodman challenged the validity of the April 29 survey based in part on the tide chart for that day and subsequent analysis of tidal patterns in Drakes Estero. Dr. Goodman concluded that no such disturbances could have occurred on April 29, 2007 because the tide was too high.

The April 29 survey began at 9:30 AM and concluded at 3:15 PM, as noted on the datasheet for that day. The harbor seal monitoring program standardizes its tides to San Francisco (Golden Gate Bridge), and the low tide for April 29 was 1.46 ft at 4:25 PM. The first DBOC disturbance occurred at 12:50 PM from DBOC's motorboat. The observers noted that at sandbar UEN, "mom and pup flushed when boat accelerated toward Bull Point from N. end of OB channel after throwing out bags." The second DBOC disturbance, again at sandbar UEN, occurred at 1:40 PM when the "boat returned, threw more bags, left again." The observers conducted the first and only full count of the harbor seals in Drakes Estero at 2:15 PM, documenting a total of 751 harbor seals. The events of the April 29 survey are summarized in Table 1.

Table 1. Summary of significant events on April 29, 2007. Low tide is standardized to San Francisco (Golden Gate Bridge).

Time	Time before low tide	Survey Event
9:30 AM	6 h 55 m	Start of observations.
12:50 PM	3 h 35 m	First DBOC disturbance at sandbar UEN.
1:40 PM	2 h 45 m	Second DBOC disturbance at sandbar UEN.
2:15 PM	2 h 10 m	Complete harbor seal count.
3:15 PM	1 h 10 m	End of observations.

DBOC attempted to better understand how the tides may have looked on April 29, 2007 by asking John Hulls of the Point Reyes Light newspaper to conduct an experiment. Mr. Hulls selected tides on January 1 and 2, 2009 and measured the high tide at sandbar OB to determine that there was an approximate 1.3 hr lag compared to the Point Reyes NOAA buoy tide chart. More importantly, Mr. Hulls measured the tidal heights at which the very highest points on UEN and OB first rose above the water, which were at +3.0 ft and +2.0 ft, respectively. Based on Mr. Hulls' observations in January 2009, Dr. Goodman went back to April 29, 2007 and concluded that the sandbars in Drakes Estero must have been underwater at the time of the disturbance events on that date and, therefore, no seals could have been present to be disturbed.

Dr. Goodman and Mr. Hulls missed several important points in their attempts to 1) model the tides at subsites OB and UEN in Drakes Estero and 2) subsequently predict harbor seal use of these subsites at certain tide levels. We find Mr. Hulls' experiment without merit and find it unreasonable for Dr. Goodman to discredit the April 29, 2007 survey based on an incomplete investigation of tidal and seal haul-out relationships.

Mr. Hulls and Dr. Goodman failed to recognize common harbor seal behavior which invalidates their conclusions that there were no harbor seals present to disturb on April 29, 2007. Researchers of harbor seals at Point Reyes and elsewhere have noted the presence of seals hovering nearby and over the haul out sites before sandbars are exposed by low tide and after sandbars are submerged by rising tides. This is particularly important for females with pups where they can nurse their pups in shallow waters. Flushing harbor seals from a submerged sandbar is entirely possible, and can be especially detrimental during the pupping season.

In regards to the tide experiment, we believe that a sample size of two dates is too small to develop these types of tidal predictions. Second, coastal winds and barometric pressure, which may affect tidal water level, were not taken into account. There can be a marked difference between the observed water level and predicted tidal water level due to winds and barometric pressure along coastal California (Largier et al. 1993). Lastly, it is incorrect to assume that the sandbar heights and configurations did not change between 2007 and 2009. The sandbars naturally shift on a seasonal and annual basis, and larger scale shifts may dominate for several years. In summary, tidal modeling and developing tidal predictions is a sophisticated science that must incorporate a variety of atmospheric, hydrographic and oceanographic driving forces. The NPS relies on our colleagues at NOAA, USGS, and university experts for this type of guidance.

The NPS has conducted its own review of the April 29, 2007 survey and associated tides because of the questions raised by Dr. Goodman. However, the NPS review of the survey took a different approach than Dr. Goodman and Mr. Hulls. We identified six dates during the peak breeding season in 2008 that closely match the tide chart for the April 29 survey. Table 2 shows that the dates selected (April 17-19, 2008 and May 2-4, 2008) more closely match April 29, 2007 than the tides selected by Mr. Hulls for study on January 1 and 2, 2009. Harbor seal use of Drakes Estero, particularly in the middle estero where the April 29 disturbances occurred, is reduced in January, and we felt that it was more appropriate to select dates during the harbor seal breeding season for comparison. Harbor seals haul out more often and for longer time periods during the breeding and molt seasons from March 1 to July 31.

For the six dates selected by NPS for review (Table 2), the NPS examined date and time stamped photographs taken of Drakes Estero by remote camera. The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM. The camera view encompassed the "lateral" channel with sandbar OB in the foreground.

Examination of the photo series for the selected dates shows that for a low tide similar to that on April 29, 2007, the OB sandbar becomes exposed at the low tide between approximately 3.5 and 2.5 hours prior to the low tide for San Francisco (Table 3).

Table 2. NOAA low tide data for April 29, 2007 and a series of dates selected for study by NPS and DBOC. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Low Tide Time	Low Tide Height	Type
April 29, 2007	4:25 PM	1.46 ft	Original Survey
April 17, 2008	4:22 PM	0.89 ft	This Study
April 18, 2008	4:56 PM	1.28 ft	This Study
April 19, 2008	5:29 PM	1.68 ft	This Study
May 2, 2008	3:30 PM	1.01 ft	This Study
May 3, 2008	4:13 PM	1.37 ft	This Study
May 4, 2008	4:56 PM	1.74 ft	This Study
January 1, 2009	8:16 AM	2.82 ft	DBOC Study
January 2, 2009	9:17 AM	2.51 ft	DBOC Study

Table 3. Time that harbor seals are first observed at sandbar OB and time that OB is just exposed by the falling low tide on six dates chosen for review by NPS. The time before the low tide is included in parentheses. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Time of First Harbor Seals	Time Sandbar First Exposed	Low Tide Time	Low Tide Height
April 17, 2008	12:23 PM (3h 59m)	1:17 PM (3h 5m)	4:22 PM	0.89 ft
April 18, 2008	2:01 PM (2h 55m)	2:15 PM (2h 41m)	4:56 PM	1.28 ft
April 19, 2008	1:43 PM (3h 46m)	2:25 PM (3h 4m)	5:29 PM	1.68 ft
May 2, 2008	11:52 AM (3h 38m)	11:58 AM (3h 32m)	3:30 PM	1.01 ft
May 3, 2008	12:54 PM (3h 19m)	13:05 PM (3h 8m)	4:13 PM	1.37 ft
May 4, 2008	2:18 PM (2h 38m)	2:40 PM (2h 16m)	4:56 PM	1.74 ft

In summary, the NPS concludes that subsite UEN may have been slightly underwater at the time this subsite was first disturbed at 12:50 PM on April 29, 2007, which occurred about 3.5 hours before the low tide (Table 1). However, if we accept the findings of Dr. Goodman and Mr. Hulls, who conclude that the UEN sits 1 ft higher than OB, then based on the NPS photographs, subsite UEN would have been well exposed by the time of the first disturbance.

In regards to harbor seal use of the sandbars, on each of the six dates selected by the NPS, harbor seals are clearly seen in the photographs using the OB sandbar *before* the sandbar is actually exposed by the low tide (Table 3). On April 17, 2008, for example, seals were present on the sandbar 40 minutes before it was first exposed by the low tide. By the time the OB sandbar was just exposed, up to a dozen harbor seals could already be seen resting on the sandbar. If Mr. Hulls had conducted his tidal experiment in Drakes Estero at the correct time of year, he too would likely have observed this pattern of harbor seal behavior and drawn different conclusions about the validity of the April 29, 2007 disturbances.

Although our review indicates that the UEN sandbar may have been underwater at 12:50 PM on April 29, 2007, the disturbance record for that day remains reliable based on our review of tidal data and seal behavior at that site. By the time the second DBOC disturbance occurred on April 29, 2007 at 1:40 PM and the complete harbor seal count occurred at 2:15 PM, the sandbars were, without question, well exposed. Although Dr. Goodman insists that "swimming harbor seals cannot be flushed off of a sandbar that is underwater", we have photographic documentation to the contrary.

To illustrate the findings of our inquiry, Figures 1-3 depict sandbar exposure and harbor seal presence at sandbar OB on a falling tide. Although we do not have similar images taken of sandbar UEN, we believe that these photographs provide supporting evidence that the April 29, 2007 survey was accurate for both disturbance and count data.

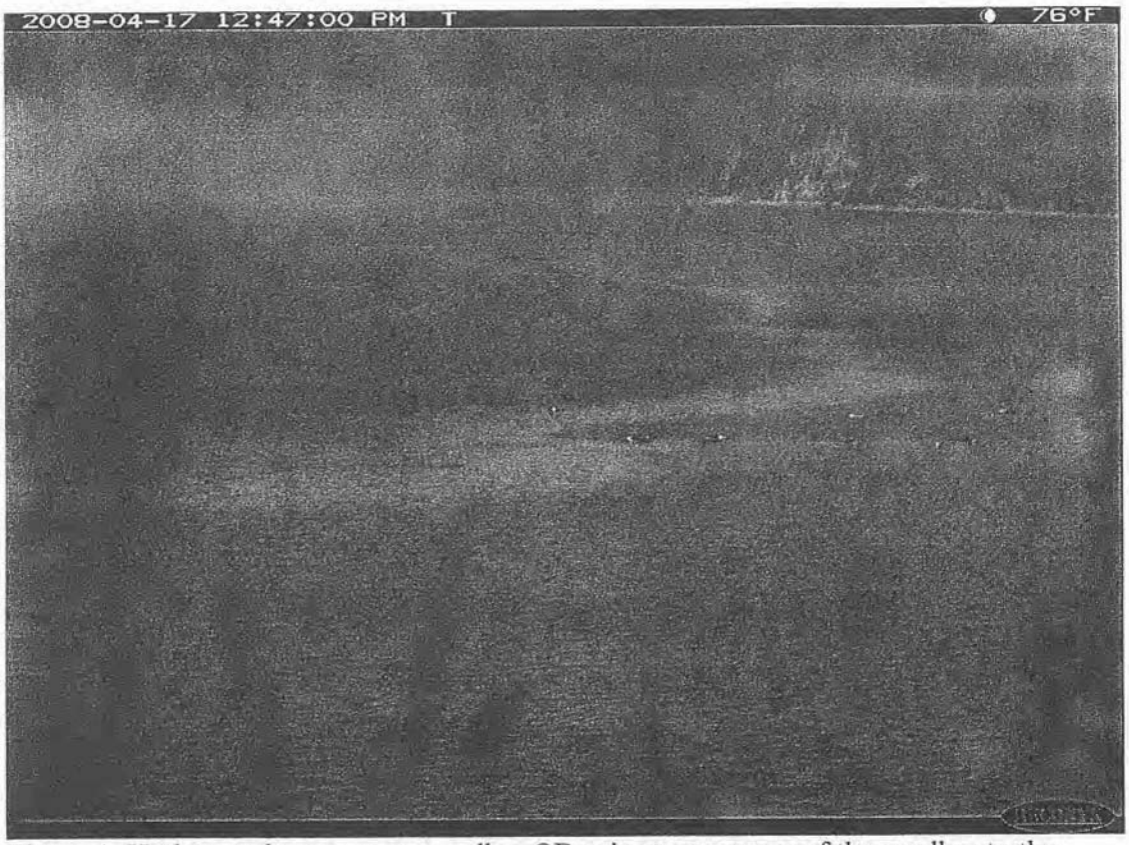


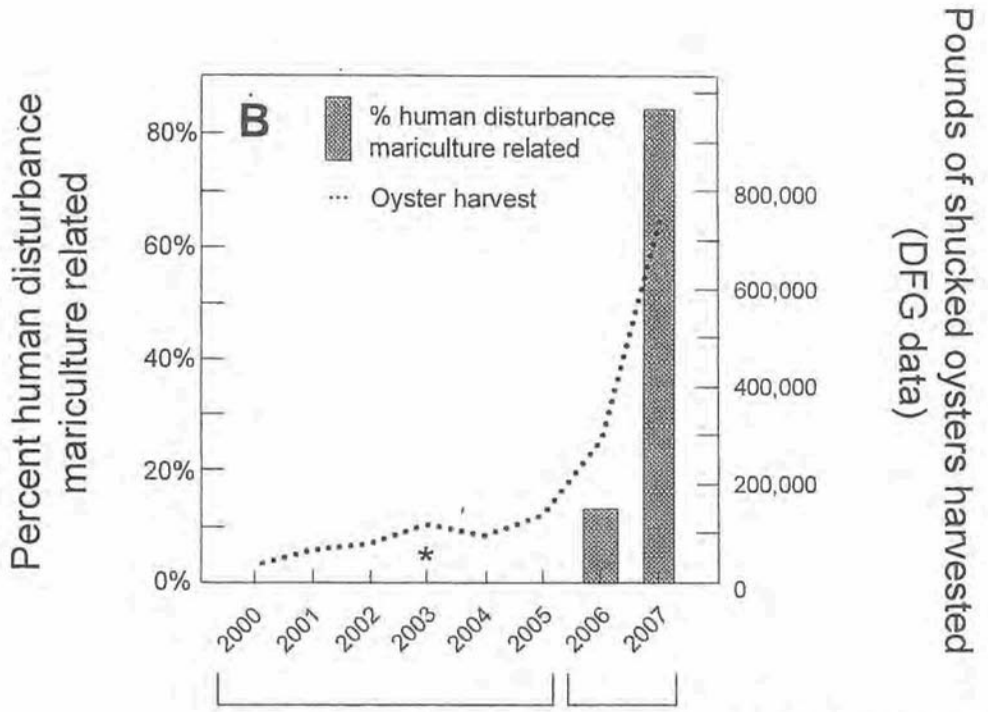
Figure 1. Harbor seals present on sandbar OB prior to exposure of the sandbar to the falling tide. Photograph taken at 12:47 PM on April 17, 2008, 3 hours and 35 minutes prior to a low tide of 0.89 ft at San Francisco. The first disturbance on April 29, 2007 also occurred 3 hours and 35 minutes before the low tide of 1.46 ft.

Figure 2. Harbor seals present on sandbar OB on the falling tide. Note paired heads of seals which are likely females with pups. Photograph taken at 2:44 PM on April 19, 2008, 2 hours and 45 minutes prior to a low tide of 1.68 ft at San Francisco. The second disturbance on April 29, 2007 also occurred 2 hours and 45 minutes before the low tide of 1.46 ft.

Figure 3. Harbor seals present on sandbar OB on the falling tide. Photograph taken at 1:20 PM on May 2, 2008, 2 hours and 10 minutes prior to a low tide of 1.01 ft at San Francisco. The full count on April 29, 2007 also occurred 2 hours and 10 minutes before the low tide of 1.46 ft.

APPENDIX B

Increase in percentage of human-related disturbance in upper estero (OB, UEN, UEF) due to mariculture: 2000 - 2007



- High statistical power ($1-\beta > 0.91$ at $\alpha = 0.05$)
- No mariculture related disturbances in middle-lower estero
- Human disturbance is less frequent in upper estero (~1-2/subsite/yr) than the middle-lower estero (~5 subsite/yr)

** Possibly one disturbance in 2003*

APPENDIX C

Dear Dr. Boness,

Below is an outline of the substantive changes to ms #2668 discussed with either you or proposed by us and accepted by the reviewers. Please note that I used the previous MMS copy edited version as a starting point, hence the formatting style. Because of this, footnotes appear at the end of the document as endnotes. I have listed the most substantive changes in **bold.**

Introduction:

No substantive changes

Methods:

1. **We now use the updated oyster harvest value for 2007.**
2. **Lines 174-185: We now include disturbance data for 1996 – 2008. Previous paper only had 2000-2007. Count data modeled for 1997-2007 (as before) but we discuss 1996 and 2008 data in the discussion.**
3. **Lines 207 – 212: Description of new tests used to analyze disturbance data as proposed in previous MMS correspondence.**
4. Lines 219-240: Clarified data handling.
5. Lines 257-265: Clarified density dependence data used in models.
6. **Lines 266-275: Description of how we look at density dependence on a daily basis but also investigate effect on an annual mean basis. Description of how we model oyster harvest in the same year, but also investigate 1-year lag.**
7. Lines 303-307: Description of regression tree methods.

Results:

1. Lines 312-318: Shortened first paragraph
2. **Lines 319-329: Results of *oyster harvest vs. disturbance* correlation and rank tests. These are all now based on disturbance *rate* rather than *frequency*. <u>We illustrate here that omitting up to nine of the disturbances</u> (including the one in 2006 and 2/3 of those 2007) still would result in a significant increase in disturbance with increase in oyster harvest. Also see Figure 2B. We also note that this includes on lines 325-326:** "including two disturbances on one day in 2007 that the mariculture company challenged". Please let us know if this is OK or if you have a different idea for this statement. Alternatively, we could leave the parenthetical statement out and just leave the part that illustrates dropping many of the disturbance events still results in a significant relationship.
3. Lines 333-351: New GLM results using updated 2007 oyster harvest value and no time lag for oyster harvest. All model rankings are similar to previous paper.
4. Lines 355-364: GLM analyses also redone to test 1-year vs no year lag effects of oyster harvest, and using density dependence as a daily or annual value. All results were robust to these different approaches with Oyster always being

important in the best models. We focus on same year oyster harvest values, though.

5. Lines 366-373: UEN best model (although weak fit) includes oyster harvest.
6. Lines 374-381: We now report a regression tree that corroborates GLM models. Tree shows lower counts with higher oyster harvest. This replaces prior 2002-2004 to 2005-2007 2-sample tests (t-test, Wilcoxon) comparisons in previous version.

Discussion:

1. Shortened first paragraph.
2. Lines 463-476: Discussion of potential reasons why lower performance of predictive model (OB model predicting UEF) when oyster harvest is high.
3. Lines 527-532: Discussion of middle-lower estero counts related to density dependent effects at upper subsites.
4. Lines 546-553: Presentation of unmodeled 1996 count data at OB and how it is low during the highest oyster harvest and the highest disturbance rate during the study period.
5. **Lines 554-577: Discussion of how small increase in 2008 subsite OB count data is consistent with restricted mariculture activity near the subsite due to a new (for 2008) California Coastal Commission guideline, and how disturbances subsequently dropped to only 1 in that year. We also suggest that this operational shift may weaken the simple use of "oyster harvest" as a proxy for modeling counts in the upper estero beyond 2007. Nonetheless, the modeling for 1997-2007 is unaffected.**

References:

1. Added Allen *et al.* 1989 (ENSO effects os seals) and Bejder *et al.* 2006 (Disturbance causing local redistribution of Dolphins).

Tables:

1. We have removed table 1, as figure 2B now illustrates these patterns and tests. We indicate in the results that human disturbance rates are higher in middle-lower estero.
2. Table 1 (Table 2 in previous version): updated with all new models, rankings are essentially the same.
3. Table 2 (Table 3 in previous version): updated with new best model coefficients.

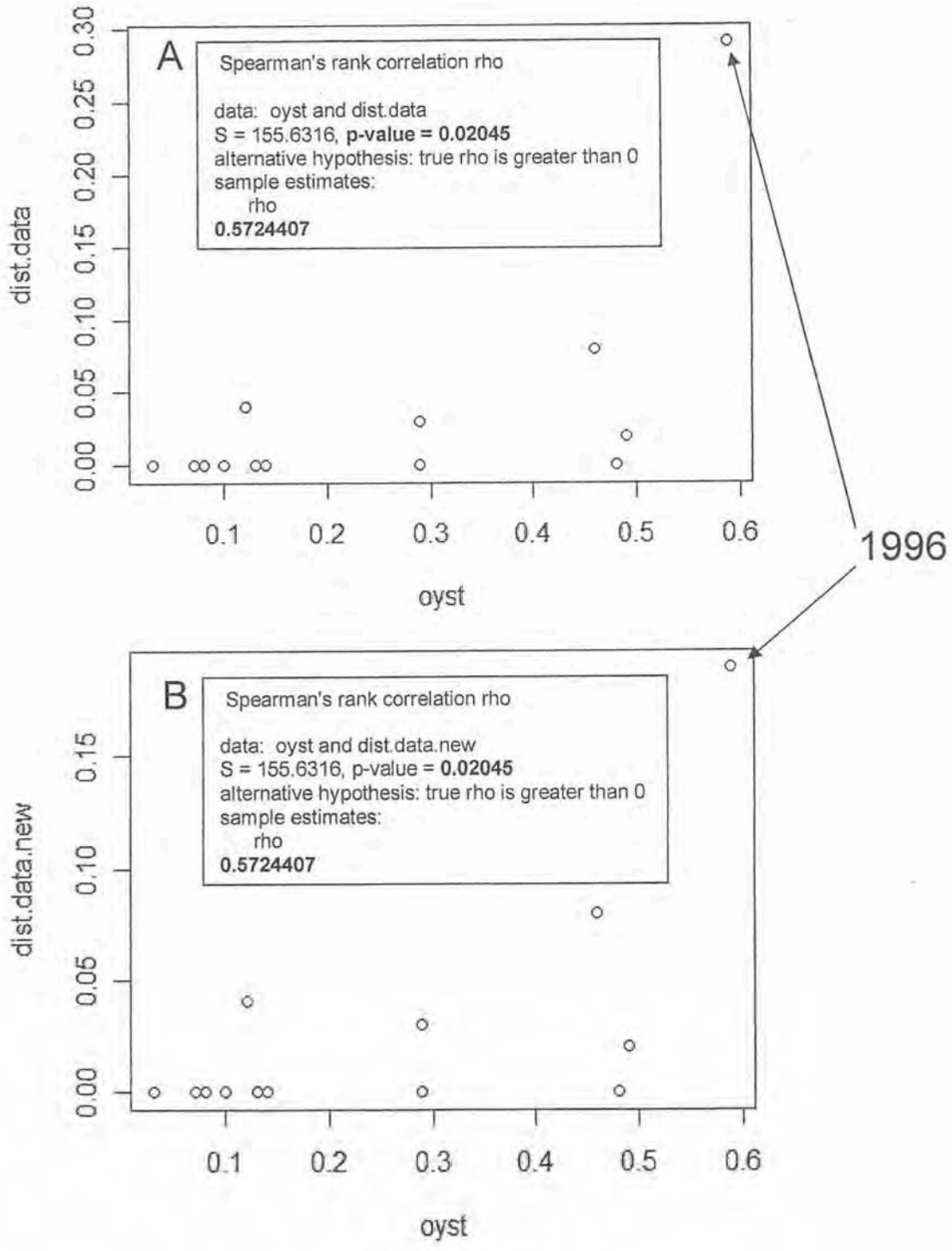
Figures:

1. Figure 2A: Now has corrected 2007 oyster harvest value.
2. Figure 2B: New, as proposed to reviewers in previous MMS correspondence. Replaces previous figure 2A.
3. Figure 3A: Similar to previous figure 3A, but is a scatter plot rather than a bar chart.
4. Figure 4: Regression tree replaces bar chart showing recent declines at OB. The new model is described in the text.

5. Figure 5: Drakes Estero Panel has been redone. There was a scaling problem (software bug) in the previous version when drawing multiple panels at the same scale that showed~15-20% fewer seals than reality at only drakes estero. We also added black bars to the Drakes Estero panel to indicate count pattern for the middle-lower estero used for density-dependence calculations.

APPENDIX D

Appendix D. (A) Original plot used in MMS paper with 6 disturbances in 1996 and (B) corrected plot with 4 disturbances in 1996. Note that 1996 is still by far the highest point, which is why the statistics have *no difference* between datasets. Note that the y-axis scale changes between plots. In the first version (MMS paper), we accidently counted two *potential* disturbances as *actual* disturbances. "Oyst" is annual lbs. oysters harvested x 10^{-6}. See text for details.



APPENDIX E

11/12/2008

To: National Research Council, Panel of Mariculture in Drakes Estero.

From: Ben Becker, David Press, Sarah Allen; Point Reyes National Seashore.

Re: Rationale for *not* modeling disturbances and counts in the entire Drakes Estero.

Becker, Press and Allen (MMS, in press) only modeled and considered disturbances in the upper estero (near oyster harvest activities) for the following reasons.

1. Subsites A, A1, OB, and UEN are the primary pupping sites for the Estero (see Figure 1). Thus, with one (and perhaps 2, OB and UEN) important pupping subsite potentially impacted by oyster harvest activities, this merited further investigation. Processes at subsite A were clearly related to attachment to the mainland. A1 was increasing (perhaps due to displacement from other sites such as A or others).

2. Plots of all 8 subsites in Drakes Estero from 1997 – 2007 indicate that the only subsites which experienced a significant decline since 2004 were subsites OB, UEF, and A (Figs 1-3). Subsite A was clearly reduced after attachment to the mainland in or around 2004 which resulted in several coyote predation events. Subsites OB and UEF had no other apparent changes other than proximity to increased oyster activities/harvest. DEM had a decline in 2006-2007, but had high inter-annual variation during the entire time series. Variation at DEM was likely because of changes in size and proximity to mainland due to wave action and tides at the mouth of the estero. Subsite L increased over time (especially in adult use), potentially related to increased visitor education on avoiding seal disturbance at the Limantour Beach access.

3. There was a clear and significant (proportions test or Fisher's exact test) increase in mariculture related disturbances in the upper estero (OB, UEF, UEN). During March-May of 2000-2004, anthropogenic, non-airplane disturbances were limited to one kayak, one clammer, and one oyster related. Then from March-May, 2005-2007, all anthropogenic, non-airplane disturbances, were related to mariculture with one in 2006 and six in 2007. This increase in mariculture related disturbances coincided with a decrease in adult and pups seals counts at subsite OB (and UEF), which warranted further investigation.

4. It is essential to model density-dependence. However, if considering all subsites, then it would not be possible to use the lower-middle estero as a control for density-dependence since all counts could not be assumed independent of the other seven sites (seals do of course move around and a loss at one site would likely result in an increase at another site). Furthermore, other regional colony data prior to 2000 had not been fully compiled before preparation of the manuscript. Nonetheless, local density-dependence (lower-middle estero) is more desirable since it more likely to reflect local processes in the estero because it (1) eliminates other confounding factors such as disturbance effects at other colonies, and (2) is closer, more similar habitat.

5. Modeling all sites and linking to mariculture would be a form of data dredging (several reviewers indicated this). We chose instead to follow an *a priori* multiple competing hypotheses approach.

6. Modeling disturbances without *a priori* hypotheses can be misleading because disturbance events require both a disturbance source *and* the presence of seals to disturb. This is illustrated clearly at subsite A: as the island attached to the mainland and seals began to abandon the subsite after 2004, disturbances also decreased.

Three figures follow

Fig 1. Mean (SE) seal **pups** at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

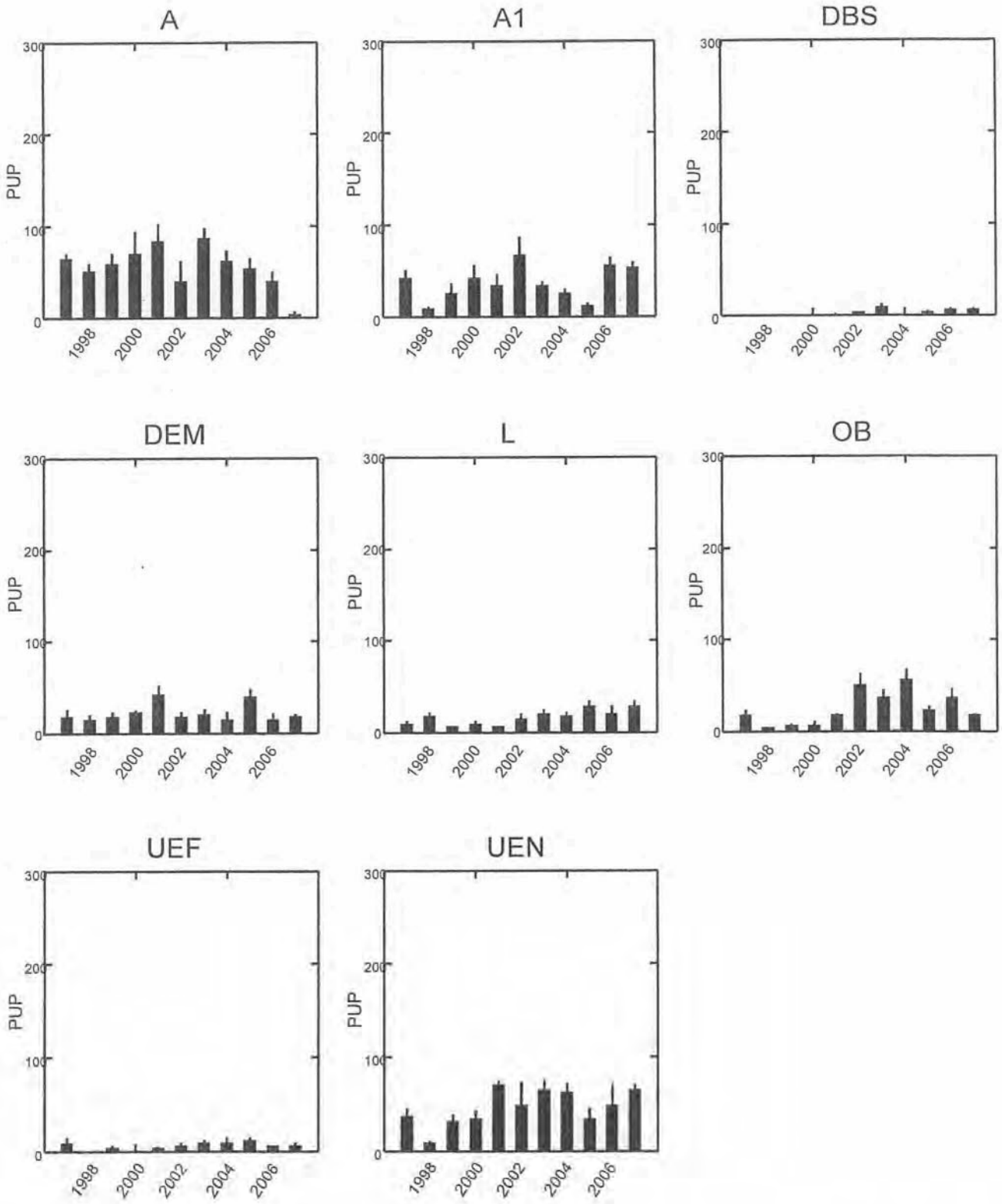


Fig. 2. Mean (SE) **adult** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

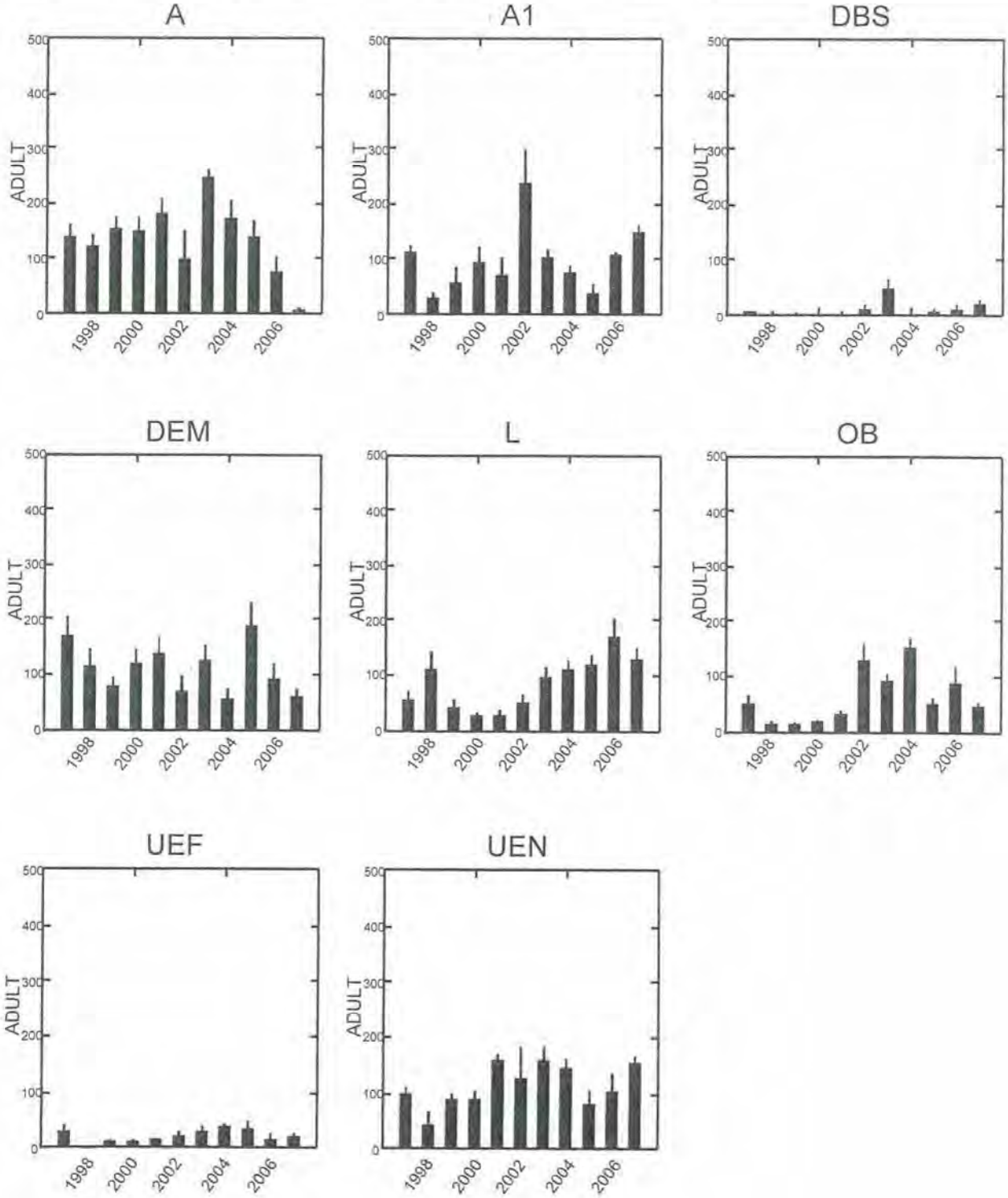
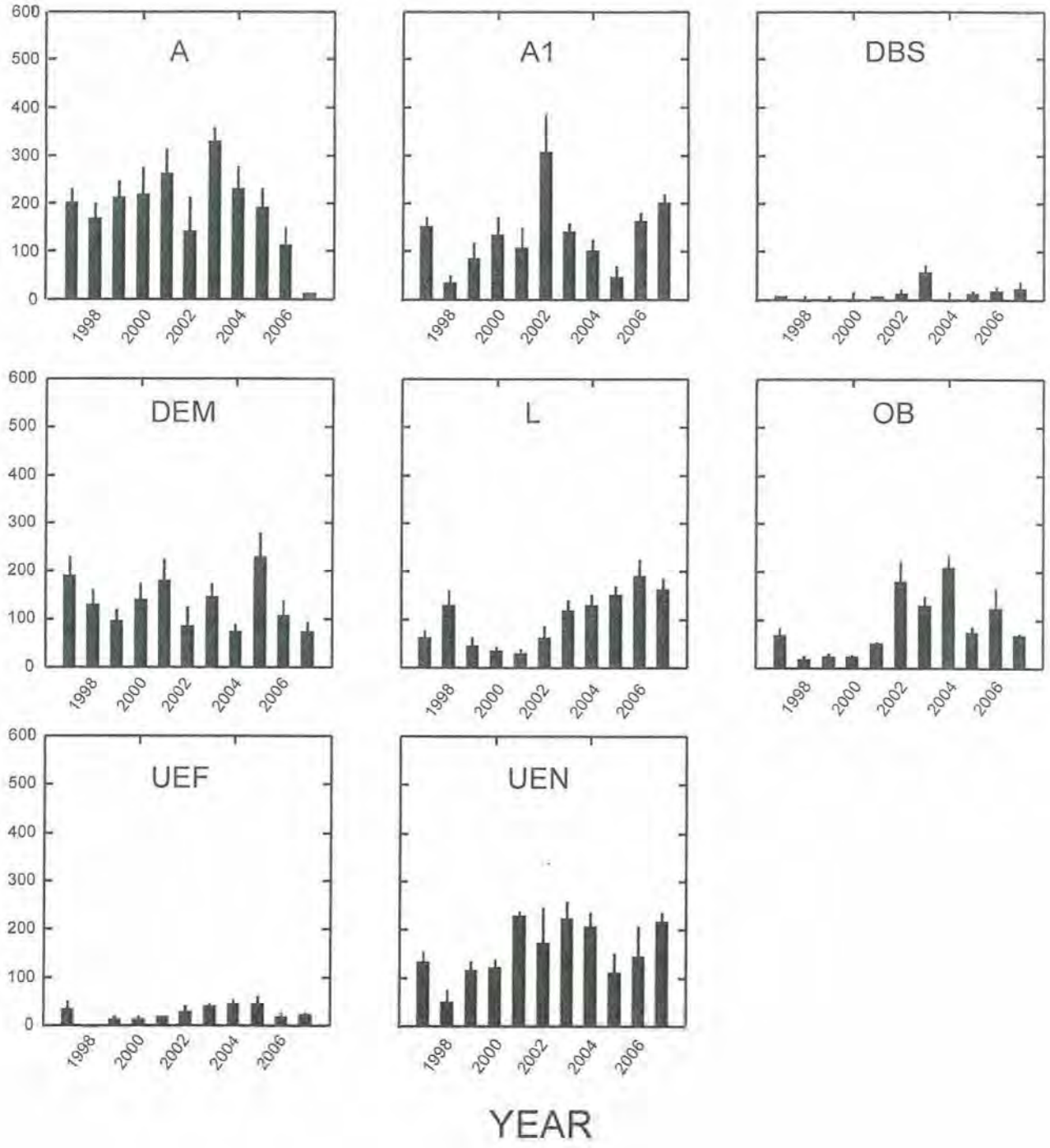


Fig 3. Mean (SE) **total** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.



APPENDIX F

"Daryl Boness"
<mmsci@megalink.net>
10/16/2008 08:56 AM

To <Ben_Becker@nps.gov>
cc "Marine Mammal Science"
<marinemammalscience@gmail.com>
bcc
Subject Decision on "Modeling the effects of El Niño, density dependence,and disturbance on harbor seal counts..."

History: This message has been replied to.

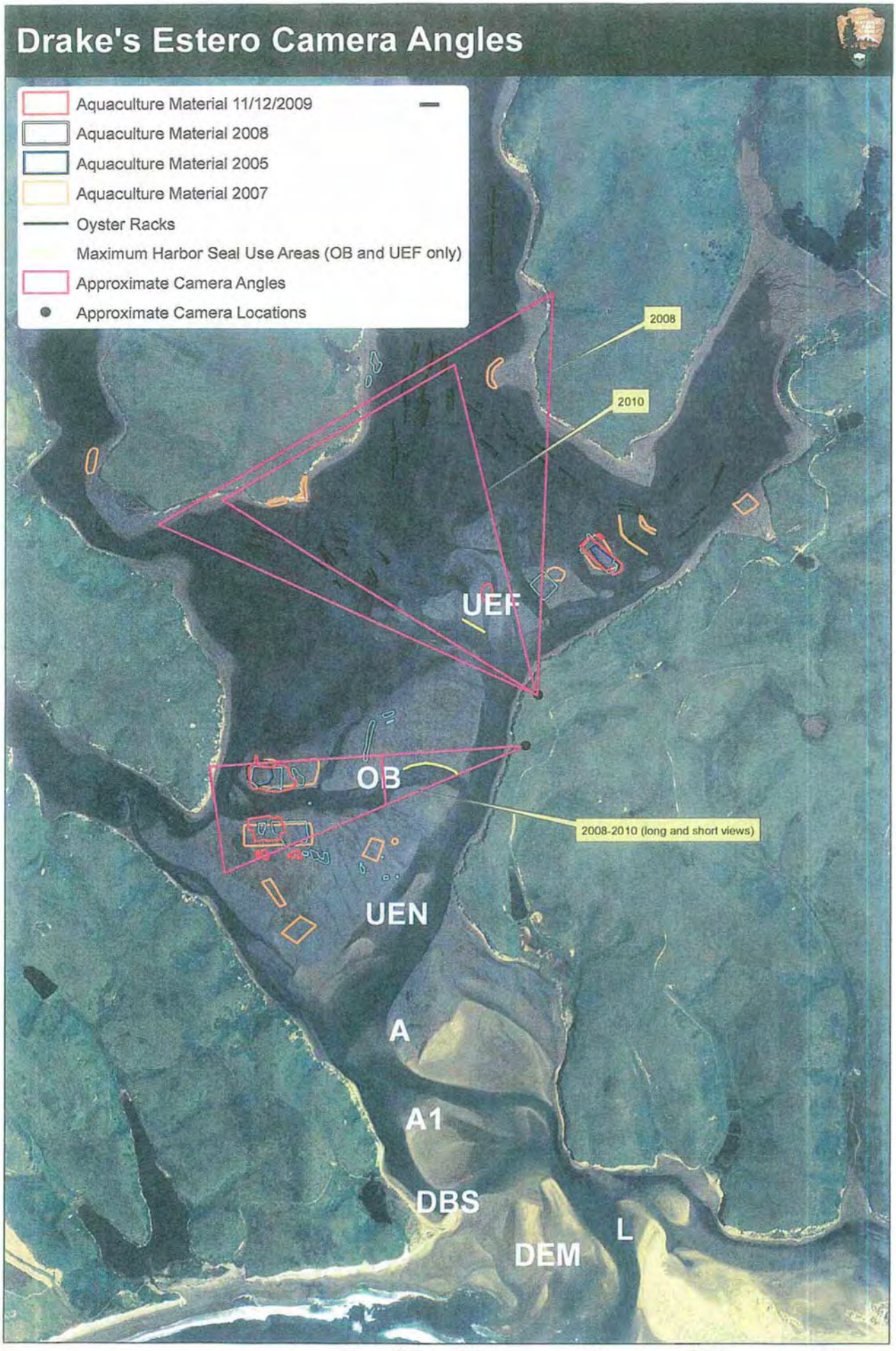
Dear Dr. Becker:

I have now received input from some of the original reviewers and Associate Editor on your replies to the concerns and questions raised by Dr. Corey Goodman (and others with similar points being made) concerning your in press paper entitled "Modeling the effects of El Niño, density dependence, and disturbance on harbor seal counts in Drakes Estero, California: 19972007." I have also spoken (or emailed) with Dr. Susan Roberts of the NRC and Dr. Tom Moore of the California Fish & Game. I am satisfied that there is no basis for considering pulling your paper from Marine Mammal Science for ethical grounds (scientific misconduct). The reviews I received based on your responses to Dr. Goodman's questions and your new analyses suggest there is no need to even revise your manuscript before publication should be allowed. I concur with the reviewers that the paper should be allowed to move forward with publication, but I also believe it would be best to include the updated information and improved analyses that you have proposed in your emails to me. In the revised paper, you should acknowledge the questioned data point and at least note that the conclusions would not change whether this point is included or not. Since you have information available on the 2008 harbor seal and oyster harvest levels I would also like to see you include in the discussion a statement about how this might affect your conclusions. It would be helpful if you identified in the revised paper where you have made the substantive changes as you indicate you will in your email replies.

I will process your revised paper as quickly as possible once I receive it. I appreciate your cooperation in this unusual situation regarding your paper that was accepted for publication in Marine Mammal Science.

Sincerely,

Daryl J. Boness
Editor
Marine Mammal Science

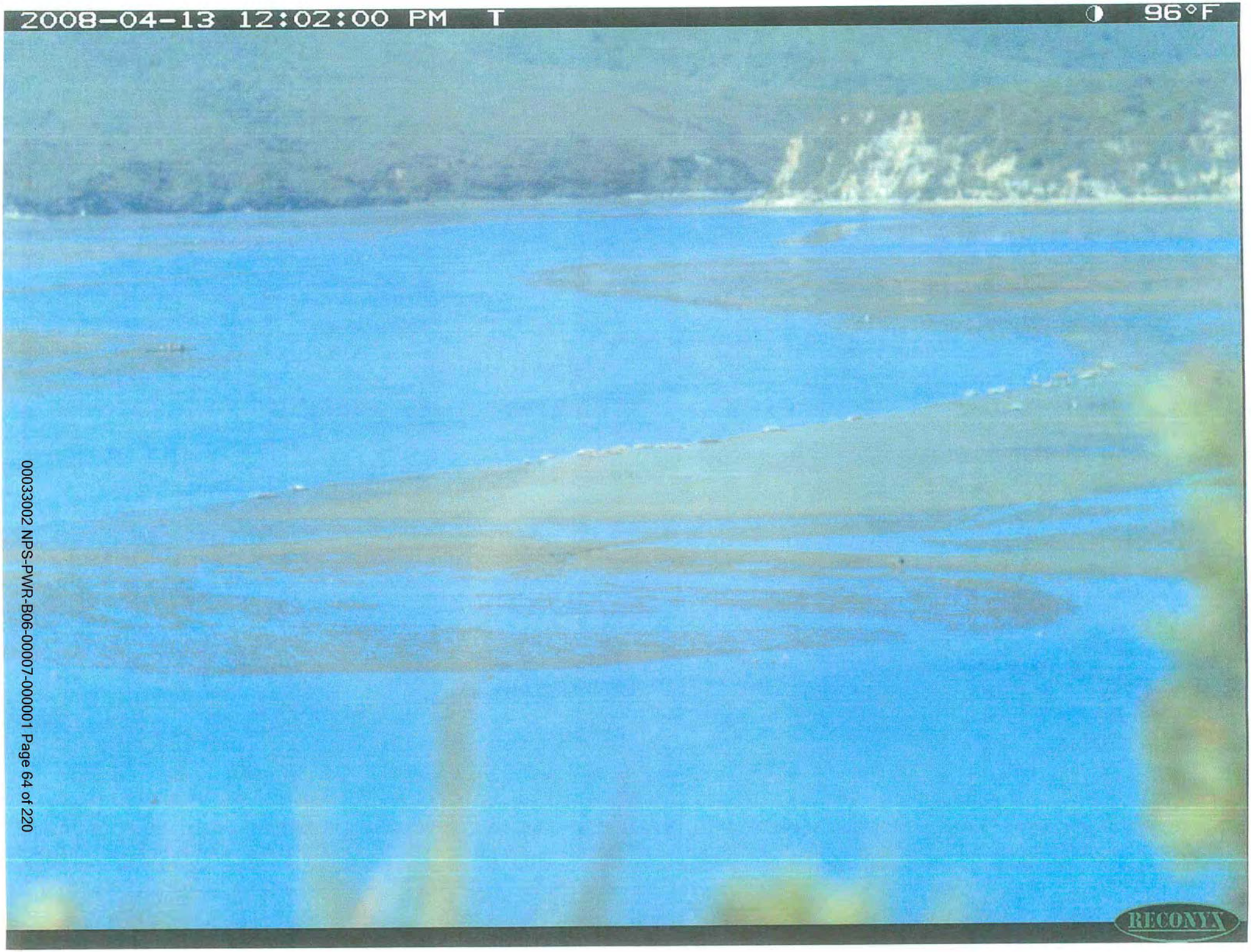

Drake's Estero Camera Angles
Aquaculture Material 11/12/2009
Aquaculture Material 2008
Aquaculture Material 2005
Aquaculture Material 2007
Oyster Racks
Maximum Harbor Seal Use Areas (OB and UEF only)
Approximate Camera Angles
Approximate Camera Locations
2008
2010
UEF
OB
2008-2010 (long and short views)
UEN
A
A1
DBS
DEM
L
0
250
500
1,000
1,500
2,000
Meters

2010-05-07 3:05:00 PM T
80°F
RECON

2009-06-25 10:36:00 AM T

66°F

RECENT



00033002 NPS-PWR-B06-00007-000001 Page 64 of 220

WWW.RECONYX.COM
76°F
12:00:12 PM 22-05-2007

Dave Press/GOGA/NPS
06/16/2010 04:58 PM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc
bcc
Subject camera samples

History: This message has been forwarded.

Here are four sample photos. Two are facing OB, with one taken in 2008 and one taken in 2009. The 2008 image has a kayak which flushed seals from the sandbar. The other two face UEF, with one taken in 2008 and one taken in 2010.

Hope this is what you need.

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

00033002 NPS-PWR-B06-00007-000001 Page 67 of 220

2009-06-25 10:36:00 AM T

66°F

RECON

00033002 NPS-PWR-B06-00007-000001 Page 69 of 220

WWW.RECONYX.COM

Dave Press/GOGA/NPS
06/16/2010 04:58 PM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc
bcc
Subject camera samples

History: This message has been forwarded.

Here are four sample photos. Two are facing OB, with one taken in 2008 and one taken in 2009. The 2008 image has a kayak which flushed seals from the sandbar. The other two face UEF, with one taken in 2008 and one taken in 2010.

Hope this is what you need.

Dave

IMG_2193.JPG

IMG_0003.JPG

IMG_0037.JPG

T0004101.JPG

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

00033002 NPS-PWR-B06-00007-000001 Page 72 of 220

2009-06-25 10:36:00 AM T
66°F

00033002 NPS-PWR-B06-00007-000001 Page 74 of 220

00033002 NPS-PWR-B06-00007-000001 Page 75 of 220

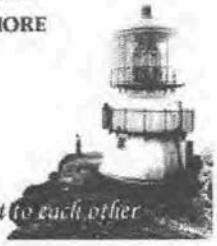
Cicely Muldoon
06/14/2010 10:50 PDT

To: David Graber/SEKI/NPS@NPS
cc: "Ben Becker" <Ben_Becker@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, George Turnbull/OAKLAND/NPS, Sarah Allen/PORE/NPS@NPS, Gordon White/PORE/NPS, John A
Subject: Re: Fw: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

He sent the same message, essentially, to us. Let's keep to one point of contact for clarity, and funnel all responses back through me -let's talk about this at today's 3 pm call (which you might not be able to make Dave...foxes sound more fun...), and we'll respond from here. thx

c

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other



David Graber/SEKI/NPS

David Graber/SEKI/NPS
06/14/2010 10:41 AM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>, George Turnbull/OAKLAND/NPS
cc "Ben Becker" <Ben_Becker@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, Sarah Allen/PORE/NPS
Subject Fw: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

Ex 5 [redacted] Whoever wrote the briefing statement--and it's quite well written and cogent--to me is irrelevant. It's an NPS response Ex 5 [redacted] Or perhaps Ex 5 You may wish to advise how I respond ...or don't respond. Ex 5 Ex 5 [redacted]

Sent from my BlackBerry
David Graber
Chief Scientist
Pacific West Region
National Park Service
559.565.3173 Sequoia
559.679.5999 Mobile

----- Original Message -----
From: Corey Goodman [corey.goodman@ Ex 6 [redacted]
Sent: 06/13/2010 08:21 PM MST
To: David Graber
Cc: David Weiman <agresources@erols.com>; Kevin Lunny <kevin@ Ex 6 [redacted]
Tim Ragen <tragen@mmc.gov>
Subject: the May 1, 2009 Briefing Statement "Response to Goodman's January 18,

2009 Letter to NRC"

Dear Dave,

Thanks very much for attending the June 7 MMC meeting on disputed NPS harbor seal disturbance data attributed to DBOC.

At the meeting on Monday, when I brought up the May 1 2009 "Briefing Statement" document ("Response to Goodman's January 18, 2009 Letter to NRC"), David Press claimed that it had been made public last May because it had been given to both the National Academy of Sciences and to me on May 1 2009. Kevin has since checked with Dr. Susan Roberts at the NRC/NAS and she stated that the document was never given to the NAS. Moreover, the document was never given to Kevin or to me. When I asked the group who the authors were, everyone remained silent.

During a break, I took you aside and asked you who requested the document, who wrote it, and where it was sent. You said that you knew nothing about the document and had no idea who wrote it or where it was sent. You said that I should consider the authors the National Park Service.

Would you please tell me as soon as possible who requested the May 1 2009 Briefing Statement, who wrote it, who edited it, who took responsibility for it, and to whom it was submitted.

Thanks very much.

Corey

Corey Goodman, Ph.D.
corey.goodman@[redacted]

David Graber

06/14/2010 13:41 EDT

To: "Cicely Muldoon" <Cicely_Muldoon@nps.gov>, George Turnbull/OAKLAND/NPS
cc: "Ben Becker" <Ben_Becker@nps.gov>, "Dave Press" <Dave_Press@nps.gov>, Sarah Allen/PORE/NPS
Subject: Fw: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

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Ex 5 You may wish to advise how I respond ...or don't respond. Ex 5
Ex 5

Sent from my BlackBerry
David Graber
Chief Scientist
Pacific West Region
National Park Service
559.565.3173 Sequoia
559.679.5999 Mobile

----- Original Message -----
From: Corey Goodman [corey.goodman Ex 6
Sent: 06/13/2010 08:21 PM MST
To: David Graber
Cc: David Weiman <agresources@erols.com>; Kevin Lunny <kevin Ex 6
Tim Ragen <tragen@mmc.gov>
Subject: the May 1, 2009 Briefing Statement "Response to Goodman's January 18, 2009 Letter to NRC"

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Would you please tell me as soon as possible who requested the May 1 2009 Briefing Statement, who wrote it, who edited it, who took responsibility for it, and to whom it was submitted.

Thanks very much.

Corey

Corey Goodman, Ph.D.
corey.goodman[redacted]
Ex 6

David Graber/SEKI/NPS
06/14/2010 10:45 AM

To Cicely Muldoon/OAKLAND/NPS@NPS
cc
bcc
Subject Re: reply to your email concerning the oyster farm

Total lie. I don't know what Blum wrote, but I was very clear and repeated myslef that the camera was there to observe seals and their behavior. Period.

Sent from my BlackBerry
David Graber
Chief Scientist
Pacific West Region
National Park Service
559.565.3173 Sequoia
559.679.5999 Mobile
Cicely Muldoon

----- Original Message -----
From: Cicely Muldoon
Sent: 06/13/2010 10:37 PM PDT
To: David Graber
Subject: Fw: reply to your email concerning the oyster farm

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to each other

---- Forwarded by Cicely Muldoon/OAKLAND/NPS on 06/13/2010 10:36 PM ----

Corey Goodman
<corey.goodman@[redacted]
06/13/2010 09:48 PM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>
cc Tim Ragen <tragen@mmc.gov>, David Weiman <agresources@erols.com>, Kevin Lunny <kevin@[redacted]
Subject reply to your email concerning the oyster farm

Hi Cicely,

Thanks for your note of June 9. Sorry for the delay in responding, but I've been traveling for work and am writing this from out of town.

I regret that you found the tone of my email divisive. That was not my intent. It is obvious we share a strong desire to resolve this very difficult situation at the Seashore. I seek to be as honest and transparent with you as I can, and unfortunately, emails have a tendency to feel less conversational and more harsh than face-to-face conversations. So I again request that you and I sit down together soon over coffee to discuss face-to-face both the history of this issue as I have experienced it, and our perspectives on what has happened. I truly believe that with we can only move forward by talking to each other openly, honestly, and frequently - and that in doing that, we can chart a path for a shared future.

Until we are able to meet, please allow me to explain the source of my frustration regarding our meeting last Monday June 7. What we discovered in the twenty-four hours leading up to that meeting was not encouraging. Moreover, the answers given by your employees and colleagues to my questions on Monday (even preventing me at times from finishing my comments), and what they told the local media in the following days, is also not very encouraging. By suggesting that you "clear the air," as I did at the end of my previous email, I am trying to suggest what I believe is the only path forward -- one based on trust and truth. As the new Superintendent, you are in a unique position to change the way the Seashore reacts to difficult questions and errors once they are found. This is your opportunity to seize the moment.

Cicely, I confess that I am feel an even greater loss of trust in the Park now, given the recent discoveries about undisclosed cameras, secret documents, and errors in the database. I do not know how we can move past these discoveries if we cannot discuss them openly and fully, and if we continue to experience such serious breaches of trust. Please, lets sit down together, get to know where the other is coming from, and start to lay the groundwork for getting through issues like this in a better way than we have in the past.

After our meeting on Monday, Dave Graber said to Andrea Blum (reporter for the West Marin Citizen) that one purpose of the camera was to catch oyster farm disturbances, and that there was no reason for NPS to tell Lunny about its existence. Do you agree with his statement? Is this your PRNS policy that hidden cameras aimed at ranchers or farmers are acceptable? How do you feel that your employees never mentioned at our meeting on Monday that there were two -- and not one -- cameras aimed at that region? Finally, how do you feel about their unwillingness to tell me who wrote the May 1 2009 document, or where it was sent? Is this the path forward? Is this trust and truth?

If Kevin Lunny and I seem a little concerned on Monday, it is because we learned these things within the 24 hours prior to our meeting. It was only on Sunday morning at 10 am -- less than 24 hours before our meeting -- that I read for the first time the May 1, 2009 "Briefing Statement". I was surprised by what I read.

First, in that secret document (the May 1, 2009 "Briefing Statement", never given to me), I discovered many false and misleading statements made by PRNS employees in this secret document aimed at discrediting my assertions in response to my January 18 2009 public document on disturbance events given to the National Academy of Sciences (and the NPS; NAS ultimately sent my document to DOI Secretary Salazar in February and said it was his responsibility and not NAS's to investigate a claim of scientific misconduct). For example, you heard me cite one of those false claims on Monday -- a claim that David Press and David Graber immediately said they did not make, even though it is in the document as clear as can be -- namely, that even if Lunny's payroll records of employee time clock records show that workers were not working at the time of a disturbance, they might still have been out fishing after hours. I asked your colleagues whether they really thought that Lunny's workers were fishing in shallow water (six inches) with dense eelgrass and throwing out or hauling in oyster bags after hours for free? That is what NPS officials told the Inspector General several years ago. That is what NPS scientists wrote in the May 1, 2009 document. Your colleagues denied making such a claim. Please look at the "Briefing Statement" and the IG report.

Second, I discovered, at the bottom of the second page of Appendix A, the existence, at least in 2008, of a remote camera photographing the oyster beds and lateral channel every minute from 7 am to 7 pm. I immediately called Kevin that morning and confirmed that he did not know about the secret camera. Last Monday we learned that the camera has been photographing Kevin's oyster bags and boats every minute from 7 am to 7 pm for the past 2 1/2 years. Only a few days later did we learn that there are indeed two cameras in that vicinity.

When I asked your scientists about the May 1 2009 document on Monday, David Press held it up

and said that it was made public on May 1 2009. I asked to whom it was sent. He said it was submitted to the National Academy of Sciences and given to me. Kevin has since confirmed with Dr. Susan Roberts at NRC/NAS that the document was never submitted to the NAS. After all, their final report was issued just a few days later. Moreover, I asked David Press who wrote it, and he refused to answer. Neither Ben nor Sarah answered either. Everyone remained silent. Who are the authors? Who revised it? Who took charge? And who asked them to write this 33 page document aimed at rebutting my document? And to whom was it given? No one would answer. I took Dave Graber aside during one of our breaks and asked him the same questions. He claimed to have no knowledge of the document, did not know who wrote it, and did not know where it was distributed. Graber suggested I should ask you, which is what I did, and you said you would get me the information.

I asked you on Monday if you would find the answers to these questions about the secret document, and you said you would. I then followed up by email to you and asked again. You called my email divisive, but you did not commit to find out the requester, authors, and audience for this document. Would you please commit to finding out these answers as soon as possible? This will help clear the air.

In addition, when I brought up the camera, no one answered that there were indeed two cameras. Moreover, Sarah claimed that this camera was aimed at wildlife. As I said to you on Monday, if you and I wanted to maximize the view of harbor seals, we could find a half dozen better locations to place and aim the camera. Kevin and I have carefully examined the handful photos we have been given thus far, and, as pointed out in the map he sent you, the camera was not aimed at maximizing photos of harbor seals, but rather was aimed at maximizing the view of Kevin's oyster bags and boats in the lateral channel. Some of the photos do not even include any harbor seal haul-out sites at the lip of the deep main channel, but rather are focused on the lateral channel and oyster bags.

When the Marine Mammal Commission went out to the observation spot (on the west side of Drakes Estero) on Monday February 22 with both NPS officials and local media, at least three different people at that meeting remember (and have independently told me about) one of the MMC panel members pointing across to the east side of Drakes Estero and saying that the NPS should either have volunteers or a camera in that location because it would present a better view of the oyster bags and boats. NPS officials remained silent. We now know that the MMC panel member was pointing to precisely the location of the two cameras. Why wasn't the MMC panel told? Why wasn't the NAS panel told two years earlier? Why were we given this dubious answer on Monday that the camera is pointed at the seals when that is not its major or maximized view?

Cicely -- you say I am being divisive. To the contrary, I am trying to get answers to a troubling document and hidden camera that Kevin and I learned about less than 24 hours before our meeting. How can we trust the future when these sorts of things have been going on over the past year?

Let me repeat what I wrote to you last week. I have heard terrific things about you from lots of

people that I trust and admire. I want to work with you to move forward. You have inherited a messy situation. It was created by the past Superintendent. My advice: don't take ownership of a bad situation by allowing NPS employees to give false answers or hide the truth. You have the opportunity to clear the air -- by telling us that you will investigate the cameras, that you will share all of the photos, and that under your watch, ranchers and farmers will not be secretly photographed. Moreover, you have the opportunity to clear the air -- by behaving totally differently from the previous PRNS administration, by telling us who requested the May 1 2009 document, who wrote it, who revised it, and who submitted it and to where in the government or elsewhere it was sent.

Taking these actions would be a sign of great leadership and would go a long way to ending the divisive history and pointing to a collaborative future based on trust and truth. I am prepared to work with you. As a first step, why don't we get together soon.

Best wishes,

Corey

On Jun 9, 2010, at 1:38 PM, cicely_muldoon@nps.gov wrote:

> Hi Corey -
>
> Thanks for the note. I thought it was a positive and productive meeting on Monday, and was glad to have a chance to hear the discussion and reach resolution on how to address each data point. Dave and Sarah have already been faster than I at getting back in touch, and I know that Dave is burning the images you request onto a CD this afternoon, and that Sarah is attempting to reach the volunteer who made reference to digital images on the data sheet. I will see what I can find out about last year's briefing paper and get back in touch.
>
> You talked at the Monday meeting about how divisive this issue has been in the community. I agree, and believe we all have a real opportunity to change the tone of the discussion, acknowledging where we disagree, and doing so without rancor or malice. I confess the tenor of your message concerns me, as it seems to perpetuate the divisive tone that we are all committed to moving beyond. I look forward to discussing this further with you.
>
> Thanks,
>
> Cicely

(Embedded image moved to file: pic28318.gif)

Corey Goodman
<corey[redacted]
[redacted]

To
Cicely Muldoon
06/08/2010 02:08 PM <Cicely_Muldoon@nps.gov>

cc
Kevin Lunny
<kevin@[redacted] David Weiman <agresources@erols.com>

Subject
thank you and request

Dear Cicely,

It was a pleasure meeting you yesterday. I had heard great things about you from a number of people that I greatly trust and respect, and so I have great hopes for your tenure at PRNS to help heal the wounds in our community caused by your predecessor, and to find the right balance between the Seashore, the Park visitors, and the agricultural use of some of the lands. I look forward to working with you and supporting you at the Seashore in this endeavor.

Thanks also for attending the meeting yesterday. At some point soon, I would like to get together with you privately to give you some historical perspective on the Drakes Estero issue -- and the misuse of science -- so that you better understand what I discovered, why I did so, and what I have learned over the past four years. I worry that you are hearing only one side, and that side is biased. It would be healthy for you to hear a perspective that doesn't come from Dave Graber and others within the NPS. It would be valuable for you to get out of the NPS and hear the story from my perspective, as a National Academy of Sciences member and local resident who became involved at the request of Supervisor Steve Kinsey. Most of what I have said has been validated by the National Academy of Sciences panel, the Inspector General, and the Marine Mammal Commission.

As I mentioned to you yesterday when we talked after the meeting, I have four specific requests.

First, concerning the May 1, 2009 "Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC", would you please find out and tell me (i) who requested this document (i.e., why it was written), (ii) who wrote it (all of the authors please), and (iii) to whom it was sent and distributed. Naturally, I was surprised recently to discover this document, over one year after it was written and distributed. It contains many misleading statements, misrepresentations, and false arguments, all aimed at blunting a document I had given to the NRC and of course provided to the NPS. I hope that, in the future under your administration, documents coming from the PRNS will be authored, will be distributed to the relevant parties, and that if they attack the work of an individual, they will not be kept secret from that individual but rather will be shared to allow a fair critique. It should make you wonder why the folks who created this document didn't want me to see it. At a later date, I will share my critique of it with you.

Second, concerning the secret camera that has been focused on the lateral channel and Lunny's oyster beds for the past 2 1/2 years (without ever telling Lunny or the public), would you please immediately send to me the digital photos (at full resolution) from 12 noon to 1:15 pm on March 14, 2008, and the digital photos from March 23, 2008 (as cited in the "Briefing Statement") for a one hour period including 30 minutes before and after the claimed images of a DBOC boat present on Drakes Estero. Please don't be surprised if in the near-term I submit a FOIA request for access to all of the photos, but for the moment, these two dates are key. Thanks for getting these photos from the two key dates for me now.

Third, would you please send me the couple of digital photos that in the December 10, 2008 disturbance report, Sue Van Der Wal says she gave to Sarah Allen.

Fourth, I have some advice and a request concerning the secret camera photographing Lunny's oyster beds and oyster workers at UEN and OB and the lateral channel for the past 2 1/2 years. As I told you yesterday, this is very provocative to our community. You said that you thought that this camera was simply being used for wildlife photographs. The timing after the Neubacher assertions in 2007 and controversy, the positioning of the camera pointing right at Lunny's operation, and the location of the camera hidden in thorns and vines, suggests that it was set up to optimize the observation of homo sapiens and not harbor seals. PRNS officials and scientists have had many opportunities to reveal the existence of this camera and the digital photographs, and they have never done so. The community is likely to respond very poorly to this revelation. I encourage

you to make a strong statement to the community assuring them that under your administration, you will never use any photographic or listening device to spy on any of the ranchers or farmers within the Seashore. If you simply say that this camera is aimed at wildlife, you will regret such a statement as the photographs themselves, and their use in the May 1, 2009 "Briefing Statement", reveal the true intent -- the focus is on the lateral channel and the oyster beds, and is not optimized to get as many harbor seal haul-out sites as possible. I would recommend that you say that the hidden nature of this camera disturbs you -- as is the fact that Lunny was never told -- and that you will investigate its purpose and history, and that you will assure the agricultural community that you will not allow spying on ranchers and farmers.

Best wishes,

Corey

Dr. Corey S. Goodman
Ex 6
[redacted]

Corey Goodman
<corey.goodman@[Ex 6]
06/09/2010 02:32 PM

To Dave_Press@nps.gov
cc David Weiman <agresources@erols.com>, Cicely Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny <kevin@[Ex 6] Tim Ragen
bcc
Subject Re: photographs

Thanks,
Corey

On Jun 9, 2010, at 2:31 PM, Dave_Press@nps.gov wrote:

> FYI - the images went out with today's mail.
>
> Dave
> _____
> David Press
> Ecologist / Data Manager
> San Francisco Area Network
> Inventory and Monitoring Program
> 415-331-0168
> 415-331-5530 (FAX)
>
>
> |---------+------------------------------>
> | | Corey Goodman |
> | | <corey.goodman@[Ex |
> | | Ex 6 |
> | | |
> | | 06/09/2010 12:55 |
> | | PM MST |
> |---------+------------------------------>
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>
> |
>
|
> | To:
> Dave_Press
> @nps
> .gov
>
|
> | cc: David Weiman <agresources@erols.com>, Cicely
> Muldoon <Cicely_Muldoon@nps.gov>, Kevin Lunny
> | <kevin@[Ex 6] Tim Ragen
> <
> tragen
> @mmc
> .gov>
> | Subject: Re:
> photographs
>
|
>>

> |
>> | Subject:
>> photographs
>>
> |
>>>
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---|
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>>
>>
>>
>>
>> David,
>>
>> This is a reminder and request to please send us the following
>> digital
>> photographs from the camera focused on the UEN and OB oyster beds and
>> lateral channel. After the close of our meeting on Monday, and after
>> most folks had already left, you came back with a single B&W print of
>> one photo from March 14, 2008 and said you had now looked through the
>> series of photos with a boat in the lateral channel. You said you
>> would email these photos to the attendants of the meeting, since
>> these
>> are the photos that I had requested in the morning. Please send us
>> ASAP by email the full set of photos containing any sign of the boat
>> from 12 noon to 1:15 pm on March 14, 2008.
>>
>> Second, in the "Briefing Statement" document of May 1, 2009, you
>> write
>> that you have photos of a DBOC boat on Drakes Estero on Sunday March
>> 23, 2008. Please send that entire series as well, including the full
>> range of photos showing that boat.
>>
>> Please send all of these photos at the full resolution that you have.
>> I believe that is 3.1 megapixels.
>>
>> Thanks very much. If you want to send the photos on a DVD, my
>> address
>> is: Ex 6 [redacted] Hopefully you can send them by
>> multiple emails. You need only send them to me on our side of the
>> table and I will distribute to Kevin and Dave.
>>
>> Thanks again,
>>
>> Corey
>>
>>
>>
>>
>>
>
>
>

Corey Goodman
<corey.goodman@[redacted]
06/09/2010 06:37 AM

To David Press <dave_press@nps.gov>

cc Kevin Lunny <kevin@[redacted] David Weiman <agresources@erols.com>, Tim Ragen <tragen@mmc.gov>, Cicely Muldoon <Cicely_Muldoon@nps.gov>

bcc

Subject photographs

David,

This is a reminder and request to please send us the following digital photographs from the camera focused on the UEN and OB oyster beds and lateral channel. After the close of our meeting on Monday, and after most folks had already left, you came back with a single B&W print of one photo from March 14, 2008 and said you had now looked through the series of photos with a boat in the lateral channel. You said you would email these photos to the attendants of the meeting, since these are the photos that I had requested in the morning. Please send us ASAP by email the full set of photos containing any sign of the boat from 12 noon to 1:15 pm on March 14, 2008.

Second, in the "Briefing Statement" document of May 1, 2009, you write that you have photos of a DBOC boat on Drakes Estero on Sunday March 23, 2008. Please send that entire series as well, including the full range of photos showing that boat.

Please send all of these photos at the full resolution that you have. I believe that is 3.1 megapixels.

Thanks very much. If you want to send the photos on a DVD, my address is: [redacted] Hopefully you can send them by multiple emails. You need only send them to me on our side of the table and I will distribute to Kevin and Dave.

Thanks again,

Corey

Corey Goodman
<corey.goodman@[redacted]
06/08/2010 02:08 PM

To Cicely Muldoon <Cicely_Muldoon@nps.gov>
cc Kevin Lunny <kevin@[redacted] David Weiman
<agresources@erols.com>
bcc
Subject thank you and request

History: This message has been replied to and forwarded.

Dear Cicely,

It was a pleasure meeting you yesterday. I had heard great things about you from a number of people that I greatly trust and respect, and so I have great hopes for your tenure at PRNS to help heal the wounds in our community caused by your predecessor, and to find the right balance between the Seashore, the Park visitors, and the agricultural use of some of the lands. I look forward to working with you and supporting you at the Seashore in this endeavor.

Thanks also for attending the meeting yesterday. At some point soon, I would like to get together with you privately to give you some historical perspective on the Drakes Estero issue -- and the misuse of science -- so that you better understand what I discovered, why I did so, and what I have learned over the past four years. I worry that you are hearing only one side, and that side is biased. It would be healthy for you to hear a perspective that doesn't come from Dave Graber and others within the NPS. It would be valuable for you to get out of the NPS and hear the story from my perspective, as a National Academy of Sciences member and local resident who became involved at the request of Supervisor Steve Kinsey. Most of what I have said has been validated by the National Academy of Sciences panel, the Inspector General, and the Marine Mammal Commission.

As I mentioned to you yesterday when we talked after the meeting, I have four specific requests.

First, concerning the May 1, 2009 "Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC", would you please find out and tell me (i) who requested this document (i.e., why it was written), (ii) who wrote it (all of the authors please), and (iii) to whom it was sent and distributed. Naturally, I was surprised recently to discover this document, over one year after it was written and distributed. It contains many misleading statements, misrepresentations, and false arguments, all aimed at blunting a document I had given to the NRC and of course provided to the NPS. I hope that, in the future under your administration, documents coming from the PRNS will be authored, will be distributed to the relevant parties, and that if they attack the work of an individual, they will not be kept secret from that individual but rather will be shared to allow a fair critique. It should make you wonder why the folks who created this document didn't want me to see it. At a later date, I will share my critique of it with you.

Second, concerning the secret camera that has been focused on the lateral channel and Lunny's oyster beds for the past 2 1/2 years (without ever telling Lunny or the public), would you please immediately send to me the digital photos (at full resolution) from 12 noon to 1:15 pm on March 14, 2008, and the digital photos from March 23, 2008 (as cited in the "Briefing Statement") for a one hour period including 30 minutes before and after the claimed images of a DBOC boat present on Drakes Estero. Please don't be surprised if in the near-term I submit a FOIA request for access to all of the photos, but for the moment, these two dates are key. Thanks for getting these photos from the two key dates for me now.

Third, would you please send me the couple of digital photos that in the December 10, 2008 disturbance report, Sue Van Der Wal says she gave to Sarah Allen.

Fourth, I have some advice and a request concerning the secret camera photographing Lunny's oyster beds and oyster workers at UEN and OB and the lateral channel for the past 2 1/2 years. As I told you yesterday, this is very provocative to our community. You said that you thought that this camera was simply being used for wildlife photographs. The timing after the Neubacher assertions in 2007 and controversy, the positioning of the camera pointing right at Lunny's operation, and the location of the camera hidden in thorns and vines, suggests that it was set up to optimize the observation of homo sapiens and not harbor seals. PRNS officials and scientists have had many opportunities to reveal the existence of this camera and the digital photographs, and they have never done so. The community is likely to respond very poorly to this revelation. I encourage you to make a strong statement to the community assuring them that under your administration, you will never use any photographic or listening device to spy on any of the ranchers or farmers within the Seashore. If you simply say that this camera is aimed at wildlife, you will regret such a statement as the photographs themselves, and their use in the May 1, 2009 "Briefing Statement", reveal the true intent -- the focus is on the lateral channel and the oyster beds, and is not optimized to get as many harbor seal haul-out sites as possible. I would recommend that you say that the hidden nature of this camera disturbs you -- as is the fact that Lunny was never told -- and that you will investigate its purpose and history, and that you will assure the agricultural community that you will not allow spying on ranchers and farmers.

Best wishes,

Corey

Dr. Corey S. Goodman
Ex 6 [redacted]

Sarah Allen/PORE/NPS
05/01/2009 05:04 PM

To David Graber/SEKI/NPS@NPS
cc "Ben Becker" <Ben_Becker@nps.gov>
bcc
Subject Re: Draft final response to Goodman letter to NRC

No edits are needed unless you see something that MUST be changed. Thi is just reference for you.

Sarah

How is the mother doing?

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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Sarah Allen/PORE/NPS
05/01/2009 04:33 PM

To Jon Jarvis/OAKLAND/NPS@NPS, David Graber/SEKI/NPS@NPS
cc Ben Becker/PORE/NPS@NPS, Don Neubacher/PORE/NPS@NPS, Dave Press/GOGA/NPS@NPS
bcc
Subject Draft final response to Goodman letter to NRC

Dear Jon and Dave:

Here is the draft final response that we assembled including a 1 page briefing statement, the main body of the response and supporting documentation.

Best regards,

Sarah

NPS Response to Goodman NRC May 2009.pdf

Sarah G. Allen, Ph.D.
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Point Reyes National Seashore
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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Briefing Statement - National Park Service Response to Goodman's January 18, 2009 Letter to NRC
May 1, 2009

This briefing statement addresses allegations and criticisms put forth in a January 18, 2009 letter from Dr. Goodman to the National Research Council (NRC). There are additional documents in support of this rebuttal. Dr. Goodman has made several accusations that fall into three categories: falsified data, manipulated and withheld information, and not following NPS protocols. His accusations are based on a number of assumptions, little data and faulty analyses. Here, we refute the accusations with sound data and scientific analyses.

Allegations of falsified data

The allegation of falsified data on April 29, 2007 is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when sandbars are submerged and that seals are not disturbed by sources > 300 ft away. This is no supporting evidence for these allegations.

- Seals regularly hover over and rest on sandbars in Drakes Estero and elsewhere before the sandbars are exposed by falling tides. Also, disturbances of seals documented by NPS were recorded during the *breeding* season when females and pups are commonly on the sandbars. Dr. Goodman used incomplete tidal data for his analyses and analyzed tidal effects during January when seals are less common at the site.
- Dr. Goodman implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service recommends generally a distance of 300 ft for not disturbing marine mammals; however, the published literature is replete with information on harbor seals disturbed at greater distances.

Allegations of manipulated and withheld data

The record of Dr. Becker's communications to the NRC and the editor of the Journal of Marine Mammal Science (MMS) demonstrates clearly that NPS did not manipulate data or mislead either the NRC (in his presentation to the NAS panel in September 2008 and in the final published paper in MMS which he shared with them) or the editor of MMS (in correspondence back and forth in final preparation of the paper). In the process of revising the paper, Dr. Becker found additional disturbances in the database that were missed during the first version of the paper but those omissions were rectified and fully explained to both the NRC and the MMS editor.

Allegations of NPS failing to follow protocols and QA/QC

Dr. Goodman challenged the validity of the survey on April 29, 2007 because he states that it did not meet the protocol criteria of the pinniped monitoring program based on tide height and the experience of the volunteers. The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, *disturbance* data are not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. First year observers, all of who must attend trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether a disturbance occurs in poor weather conditions or at a high or low tide. Nevertheless, the volunteers in question had at least one previous year of experience which Dr. Goodman did not recognize from the pinniped database, and their count data met the protocol for tide level.

We note that in previous letters from Dr. Goodman that he criticized the NPS statistical modeling techniques. His critiques were closely examined by editors and peer reviewers at MMS and were flatly rejected. He now primarily focuses on data handling and alleges NPS falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of both the editors of MMS and the DOI Inspector General that there was no evidence of scientific misconduct. Separately, the NRC refused to consider his allegations of scientific misconduct.

National Park Service Response to
Goodman's January 18, 2009 Letter to NRC
May 1, 2009

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Goodman to the National Research Council (NRC). We are not addressing all of the allegations in the letter because many of them were presented in earlier letters of Dr. Goodman that we previously rebutted. Because Dr. Goodman's letter addresses many themes and frequently revisits them in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Several of the short responses below are supported by additional referenced documents that are attached in appendices.

1. Allegation that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 and on numerous other pages in his letter to the NRC that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."

The allegation of falsified data on April 29, 2007 is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, that DBOC generally does not operate on Sundays, and that several volunteers and NPS staff separately fabricated disturbance data on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

- Assumption that seals do not use submerged sandbars (Goodman Letter, pages 7-12) Seals (especially mothers with pups) regularly hover over and rest on sandbars in Drakes Estero before they are exposed by falling tides, and this is a common behavior of harbor seals elsewhere. NPS has time stamped images of seals on the sandbars at similar falling tides during the 2008 *breeding* season in Drakes Estero. Furthermore, the disturbances documented by NPS were recorded during the breeding season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January, the time of the "experiment" that Goodman cited in his letter. See **Appendix A** regarding tidal comparisons.

- Assumption that seals are not disturbed beyond the 300 foot Protective Zone (Goodman Letter, page 6) Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft

(190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Assumption that DBOC does not operate on Sundays (Goodman Letter, page 5) The April 29, 2007 disturbances occurred on a Sunday, however, Dr. Goodman states that DBOC does not normally operate on Sundays. We do not know at what frequency that DBOC boats operate on weekends; however, the DOI OIG investigation reports from an interview with the Chief Ranger of Point Reyes National Seashore that "Smith said that it was not uncommon for DBOC employees to take boats out into the estero after hours to fish." (see page 26 of the DOI-OIG report July 2008). The NPS harbor seal monitoring database also reports DBOC activity in Drakes Estero on Sunday, May 11, 2007. In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, also a Sunday.

- Assumption of improbability of disturbances (Goodman Letter, pages 6-7) Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. There is no basis for Dr. Goodman to have assumed this, and subsequently discounting the events as logistically impossible is unclear. Possibly, the boat staged its operations from a barge moored within Drakes Estero, which is a common practice.

- Assumption that there are no other DBOC disturbance records (Goodman Letter, page 5) Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

- Assumption that the count occurred on April 29 at 3:15 PM (Goodman Letter, page 7) Dr. Goodman used a different time at which the volunteers conducted their full count of Drakes Estero from what is in the pinniped database. The database and datasheet clearly document that the data were collected at 2:15 PM. However, apparently based on a note on the photocopied datasheet Dr. Goodman assumes that the data were collected at 3:15 PM in his letter.

  "Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15. If

the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?"

The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which incorrectly supported his claims that earlier disturbances could not have occurred.

2. Allegation that 2003 disturbance data were covertly manipulated among versions of the MMS paper:

Dr. Goodman states on page 16 in his letter to the NRC that:

"The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II."

During preparation for the first Marine Mammal Science (MMS) journal submission, Becker inadvertently overlooked the 2003 disturbances. The datum (one disturbance) was in the dataset that D. Press, the NPS data manager, provided to Becker preparing the first MMS manuscript. While preparing for the NRC presentation on September 4, 2008, Becker realized his error of omission, and ***therefore, included an asterisk by the 2003 data with "possible disturbance" on the NRC presentation*** **(see Appendix B)**. Additionally, in Becker's Sept. 22, 2008 letter to the MMS editor, he clearly included this one disturbance in an analysis on page 8 (that particular analysis was not used in the final paper).

Then, after the NRC meeting, when revising the MMS paper in late September, 2008, and after the first letter was sent to MMS, D. Press found an additional disturbance event in the comments section of the data sheet for that the 2003 survey day. In sum, there were two actual disturbances in 2003. Becker incorporated both into the final paper which he shared with NRC as soon as it was accepted by the editor of MMS. The MMS editor himself read through and made minor editorial corrections on the near final copy of the paper with the corrected two disturbances in it. Thus, communications to both the NRC (in the presentation and in the final paper) and the MMS editor (in correspondence back and forth) clearly demonstrate that the NPS was openly exchanging information.

3. Allegation that NPS withheld information from the MMS editor.

Dr. Goodman states on page 19 that

"In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:

"For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the

2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis""

Goodman's allegation is incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. The editor approved, and it was included in the final paper. See attached email to the MMS editor in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly with the MMS Editor, who in addition to reviewing them himself, passed them on to the Associate Editor of MMS and the two original peer reviewers. Thus, the notion that we cherry-picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the DOI Inspector General report. The MMS editor also corresponded directly with the NRC and The California Department of Fish and Game. We also offered to the MMS Editors our raw data and NPS pinniped database, so they could conclude for themselves whether the datasets were credible, that our handling of the data was appropriate, and whether Dr. Goodman's allegations had any merit.

Dr. Goodman also alleges that by our performing the correlations without some of the disturbances in order to show their robustness of the correlations, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement (quoted above) to show that even if some disturbance data are questioned, the positive correlation still exists when those data are not considered. Dr. Goodman had previously disputed only the NPS Trip Report of April 26, 2007 conducted by S. Allen. To demonstrate the robustness of the analyses to small sample size, we removed several disturbances, including the April 26 survey.

4. Inclusion of the 1996-1999, and 2008 disturbance data in the second paper.

Dr. Goodman states on page 2 that:

"In Becker II (the second revised version of the Becker et al. paper), Becker cherry-picked the data by arbitrarily going back to 1996 (instead of just 2000) to claim six oyster related disturbances in 1996 (and none in 1997-1999). Four of those six disturbances were fabricated."

We incorporated more years at the suggestion of Dr. Goodman's comments to the NRC and MMS in September of 2008. There is no cherry-picking as we included all appropriate data. The 1996-1999 data were not in the database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission. Similarly, we had not looked closely at the 2008 disturbance data prior to the first submission, but revisited it for the revision.

On page 2 of his report, Dr. Goodman asserts that we falsified disturbance records in 1996 to improve our statistical results and create a more dramatic graph.

The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidentally included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *possible* disturbances. We regret this error but it nonetheless does not alter the statistics or conclusions in any way. We will inform the Editor of MMS of our error and seek his guidance on whether a correction is warranted.

Nevertheless, the removal of two disturbances in 1996 does not change any conclusions or patterns described in the paper (see **Appendix D**). 1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remain exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is inconsistent with the facts and the analyses.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that "*many fishing and recreational motorboats enter the estero*" on page 17 of his letter is not supported by park records including law enforcement case reports, harbor seal monitoring field notes and park staff observations.

Finally, cherry-picking is alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero because some of lower estero haul-out sites are attached to the mainland). On November 12, we provided the NRC with a justification for solely analyzing the mariculture related disturbances and we explained in the MMS paper. See **Appendix E.**

5. Allegation that NPS did not follow stated QA/QC protocols:

Dr. Goodman states on page 12 that:

"April 29, 2007: Disturbance Survey Violated NPS Protocols."

Dr. Goodman challenged the validity of the survey based on tide height and the experience of the volunteers on April 29, 2007.

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level.

Dr. Goodman appears to have misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers are entered into the database and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database itself, which remain important NPS records.

Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

- poor visibility
- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regard to weather conditions

In addition, for the purposes of the Becker et al. paper, we limited the count data used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. This is clearly outlined in methods section of the MMS paper. We have confidence that our first year observers, all of who must attend trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

- Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leite) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007 (page 15). This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least one year of prior experience in our program before including their data for analysis.

6. Statement that the MMS paper title is incorrect.

Dr. Goodman states on page 25 that:

"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data only from 1997-2007, as the title describes. As is clearly explained in the paper, we include disturbance (but not *count*) data from 1996 and 2008. This data is not modeled but only used to report disturbance patterns. Count data were not complete enough to pass QA/QC protocols for 1996, and we did not model 2008 data since it was after reaffirmed guidelines that DBOC avoid seal areas during the breeding season. In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page 19 that:

> *"Becker told us that "This correlation is highly robust to sample size." As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation."*

Contrary to Dr. Goodman's assertion, the S-plus statistical software user's manual indicates that:

> *"Because both Kendall's and Spearman's methods are based on ranks, they are not so sensitive to outliers and non normality as the standard Pearson estimate."* (Insightful 2003).

Furthermore, in the MMS paper, our demonstration of the removal of several disturbances with continuing significance proves that the test is not succumbing to the effects of a "single anecdotal observation". Other correlation tests show similar results. Specifically, Pearson correlations (although not appropriate) and Kendall's Tau (which is an appropriate test).

Dr. Goodman also indicates that we must have gone back to the 1996 data only to get a stronger correlation (Page 22). However, if only considering the disturbance rate from 2000 – 2008, the P value is similar ($P < 0.03$), and the Spearman correlation is actually higher ($rs = 0.69$) than the full time series. Thus, there is no basis for the allegation that we cherry picked data (omission or commission) to improve our statistical results.

8. Conclusion

We note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques

were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of both the editors of Marine Mammal Science and the DOI Inspector General that there was no evidence of scientific misconduct (see **Appendix F**). Separately, the National Research Council refused to consider his allegations of scientific misconduct. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent allegations of scientific misconduct.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

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APPENDIX A

Appendix A
NPS Review of Tidal Patterns and Harbor Seal Behavior in Drakes Estero

On January 18, 2009, Dr. Goodman submitted a document to the National Research Council entitled "New Information Shows that the National Park Service Committed Scientific Misconduct in the Documents it Presented to Your Panel".

Dr. Goodman devotes much of this document to discrediting harbor seal data collected in Drakes Estero on April 29, 2007. On this date, volunteers noted two disturbances by Drakes Bay Oyster Company (DBOC) when workers in a motorboat dropped oyster bags on a sandbar. Dr. Goodman challenged the validity of the April 29 survey based in part on the tide chart for that day and subsequent analysis of tidal patterns in Drakes Estero. Dr. Goodman concluded that no such disturbances could have occurred on April 29, 2007 because the tide was too high.

The April 29 survey began at 9:30 AM and concluded at 3:15 PM, as noted on the datasheet for that day. The harbor seal monitoring program standardizes its tides to San Francisco (Golden Gate Bridge), and the low tide for April 29 was 1.46 ft at 4:25 PM. The first DBOC disturbance occurred at 12:50 PM from DBOC's motorboat. The observers noted that at sandbar UEN, "mom and pup flushed when boat accelerated toward Bull Point from N. end of OB channel after throwing out bags." The second DBOC disturbance, again at sandbar UEN, occurred at 1:40 PM when the "boat returned, threw more bags, left again." The observers conducted the first and only full count of the harbor seals in Drakes Estero at 2:15 PM, documenting a total of 751 harbor seals. The events of the April 29 survey are summarized in Table 1.

Table 1. Summary of significant events on April 29, 2007. Low tide is standardized to San Francisco (Golden Gate Bridge).

Time	Time before low tide	Survey Event
9:30 AM	6 h 55 m	Start of observations.
12:50 PM	3 h 35 m	First DBOC disturbance at sandbar UEN.
1:40 PM	2 h 45 m	Second DBOC disturbance at sandbar UEN.
2:15 PM	2 h 10 m	Complete harbor seal count.
3:15 PM	1 h 10 m	End of observations.

DBOC attempted to better understand how the tides may have looked on April 29, 2007 by asking John Hulls of the Point Reyes Light newspaper to conduct an experiment. Mr. Hulls selected tides on January 1 and 2, 2009 and measured the high tide at sandbar OB to determine that there was an approximate 1.3 hr lag compared to the Point Reyes NOAA buoy tide chart. More importantly, Mr. Hulls measured the tidal heights at which the very highest points on UEN and OB first rose above the water, which were at +3.0 ft and +2.0 ft, respectively. Based on Mr. Hulls' observations in January 2009, Dr. Goodman went back to April 29, 2007 and concluded that the sandbars in Drakes Estero must have been underwater at the time of the disturbance events on that date and, therefore, no seals could have been present to be disturbed.

Dr. Goodman and Mr. Hulls missed several important points in their attempts to 1) model the tides at subsites OB and UEN in Drakes Estero and 2) subsequently predict harbor seal use of these subsites at certain tide levels. We find Mr. Hulls' experiment without merit and find it unreasonable for Dr. Goodman to discredit the April 29, 2007 survey based on an incomplete investigation of tidal and seal haul-out relationships.

Mr. Hulls and Dr. Goodman failed to recognize common harbor seal behavior which invalidates their conclusions that there were no harbor seals present to disturb on April 29, 2007. Researchers of harbor seals at Point Reyes and elsewhere have noted the presence of seals hovering nearby and over the haul out sites before sandbars are exposed by low tide and after sandbars are submerged by rising tides. This is particularly important for females with pups where they can nurse their pups in shallow waters. Flushing harbor seals from a submerged sandbar is entirely possible, and can be especially detrimental during the pupping season.

In regards to the tide experiment, we believe that a sample size of two dates is too small to develop these types of tidal predictions. Second, coastal winds and barometric pressure, which may affect tidal water level, were not taken into account. There can be a marked difference between the observed water level and predicted tidal water level due to winds and barometric pressure along coastal California (Largier et al. 1993). Lastly, it is incorrect to assume that the sandbar heights and configurations did not change between 2007 and 2009. The sandbars naturally shift on a seasonal and annual basis, and larger scale shifts may dominate for several years. In summary, tidal modeling and developing tidal predictions is a sophisticated science that must incorporate a variety of atmospheric, hydrographic and oceanographic driving forces. The NPS relies on our colleagues at NOAA, USGS, and university experts for this type of guidance.

The NPS has conducted its own review of the April 29, 2007 survey and associated tides because of the questions raised by Dr. Goodman. However, the NPS review of the survey took a different approach than Dr. Goodman and Mr. Hulls. We identified six dates during the peak breeding season in 2008 that closely match the tide chart for the April 29 survey. Table 2 shows that the dates selected (April 17-19, 2008 and May 2-4, 2008) more closely match April 29, 2007 than the tides selected by Mr. Hulls for study on January 1 and 2, 2009. Harbor seal use of Drakes Estero, particularly in the middle estero where the April 29 disturbances occurred, is reduced in January, and we felt that it was more appropriate to select dates during the harbor seal breeding season for comparison. Harbor seals haul out more often and for longer time periods during the breeding and molt seasons from March 1 to July 31.

For the six dates selected by NPS for review (Table 2), the NPS examined date and time stamped photographs taken of Drakes Estero by remote camera. The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images every minute from 7:00 AM to 7:00 PM. The camera view encompassed the "lateral" channel with sandbar OB in the foreground.

Examination of the photo series for the selected dates shows that for a low tide similar to that on April 29, 2007, the OB sandbar becomes exposed at the low tide between approximately 3.5 and 2.5 hours prior to the low tide for San Francisco (Table 3).

Table 2. NOAA low tide data for April 29, 2007 and a series of dates selected for study by NPS and DBOC. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Low Tide Time	Low Tide Height	Type
April 29, 2007	4:25 PM	1.46 ft	Original Survey
April 17, 2008	4:22 PM	0.89 ft	This Study
April 18, 2008	4:56 PM	1.28 ft	This Study
April 19, 2008	5:29 PM	1.68 ft	This Study
May 2, 2008	3:30 PM	1.01 ft	This Study
May 3, 2008	4:13 PM	1.37 ft	This Study
May 4, 2008	4:56 PM	1.74 ft	This Study
January 1, 2009	8:16 AM	2.82 ft	DBOC Study
January 2, 2009	9:17 AM	2.51 ft	DBOC Study

Table 3. Time that harbor seals are first observed at sandbar OB and time that OB is just exposed by the falling low tide on six dates chosen for review by NPS. The time before the low tide is included in parentheses. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Time of First Harbor Seals	Time Sandbar First Exposed	Low Tide Time	Low Tide Height
April 17, 2008	12:23 PM (3h 59m)	1:17 PM (3h 5m)	4:22 PM	0.89 ft
April 18, 2008	2:01 PM (2h 55m)	2:15 PM (2h 41m)	4:56 PM	1.28 ft
April 19, 2008	1:43 PM (3h 46m)	2:25 PM (3h 4m)	5:29 PM	1.68 ft
May 2, 2008	11:52 AM (3h 38m)	11:58 AM (3h 32m)	3:30 PM	1.01 ft
May 3, 2008	12:54 PM (3h 19m)	13:05 PM (3h 8m)	4:13 PM	1.37 ft
May 4, 2008	2:18 PM (2h 38m)	2:40 PM (2h 16m)	4:56 PM	1.74 ft

In summary, the NPS concludes that subsite UEN may have been slightly underwater at the time this subsite was first disturbed at 12:50 PM on April 29, 2007, which occurred about 3.5 hours before the low tide (Table 1). However, if we accept the findings of Dr. Goodman and Mr. Hulls, who conclude that the UEN sits 1 ft higher than OB, then based on the NPS photographs, subsite UEN would have been well exposed by the time of the first disturbance.

In regards to harbor seal use of the sandbars, on each of the six dates selected by the NPS, harbor seals are clearly seen in the photographs using the OB sandbar *before* the sandbar is actually exposed by the low tide (Table 3). On April 17, 2008, for example, seals were present on the sandbar 40 minutes before it was first exposed by the low tide. By the time the OB sandbar was just exposed, up to a dozen harbor seals could already be seen resting on the sandbar. If Mr. Hulls had conducted his tidal experiment in Drakes Estero at the correct time of year, he too would likely have observed this pattern of harbor seal behavior and drawn different conclusions about the validity of the April 29, 2007 disturbances.

Although our review indicates that the UEN sandbar may have been underwater at 12:50 PM on April 29, 2007, the disturbance record for that day remains reliable based on our review of tidal data and seal behavior at that site. By the time the second DBOC disturbance occurred on April 29, 2007 at 1:40 PM and the complete harbor seal count occurred at 2:15 PM, the sandbars were, without question, well exposed. Although Dr. Goodman insists that "swimming harbor seals cannot be flushed off of a sandbar that is underwater", we have photographic documentation to the contrary.

To illustrate the findings of our inquiry, Figures 1-3 depict sandbar exposure and harbor seal presence at sandbar OB on a falling tide. Although we do not have similar images taken of sandbar UEN, we believe that these photographs provide supporting evidence that the April 29, 2007 survey was accurate for both disturbance and count data.

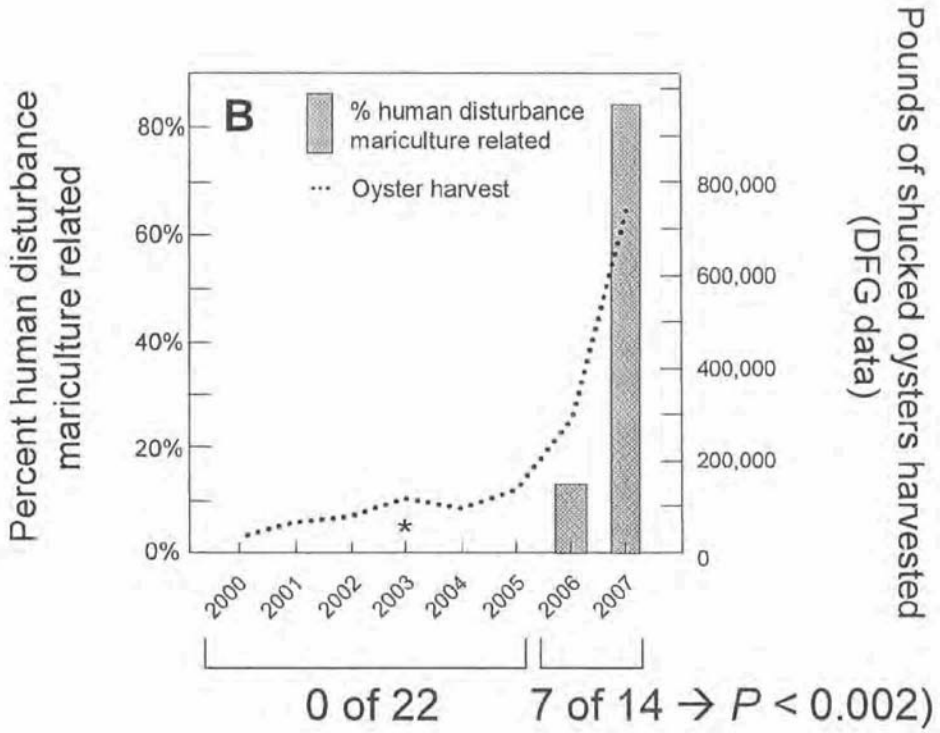
Figure 1. Harbor seals present on sandbar OB prior to exposure of the sandbar to the falling tide. Photograph taken at 12:47 PM on April 17, 2008, 3 hours and 35 minutes prior to a low tide of 0.89 ft at San Francisco. The first disturbance on April 29, 2007 also occurred 3 hours and 35 minutes before the low tide of 1.46 ft.

Figure 2. Harbor seals present on sandbar OB on the falling tide. Note paired heads of seals which are likely females with pups. Photograph taken at 2:44 PM on April 19, 2008, 2 hours and 45 minutes prior to a low tide of 1.68 ft at San Francisco. The second disturbance on April 29, 2007 also occurred 2 hours and 45 minutes before the low tide of 1.46 ft.

Figure 3. Harbor seals present on sandbar OB on the falling tide. Photograph taken at 1:20 PM on May 2, 2008, 2 hours and 10 minutes prior to a low tide of 1.01 ft at San Francisco. The full count on April 29, 2007 also occurred 2 hours and 10 minutes before the low tide of 1.46 ft.

APPENDIX B

Increase in percentage of human-related disturbance in upper estero (OB, UEN, UEF) due to mariculture: 2000 - 2007



- High statistical power ($1-\beta > 0.91$ at $\alpha = 0.05$)
- No mariculture related disturbances in middle-lower estero
- Human disturbance is less frequent in upper estero (~1-2/subsite/yr) than the middle-lower estero (~5 subsite/yr)

** Possibly one disturbance in 2003*

APPENDIX C

Dear Dr. Boness,

Below is an outline of the substantive changes to ms #2668 discussed with either you or proposed by us and accepted by the reviewers. Please note that I used the previous MMS copy edited version as a starting point, hence the formatting style. Because of this, footnotes appear at the end of the document as endnotes. I have listed the most substantive changes in **bold.**

Introduction:

No substantive changes

Methods:

1. **We now use the updated oyster harvest value for 2007.**
2. **Lines 174-185: We now include disturbance data for 1996 – 2008. Previous paper only had 2000-2007. Count data modeled for 1997-2007 (as before) but we discuss 1996 and 2008 data in the discussion.**
3. **Lines 207 – 212: Description of new tests used to analyze disturbance data as proposed in previous MMS correspondence.**
4. Lines 219-240: Clarified data handling.
5. Lines 257-265: Clarified density dependence data used in models.
6. **Lines 266-275: Description of how we look at density dependence on a daily basis but also investigate effect on an annual mean basis. Description of how we model oyster harvest in the same year, but also investigate 1-year lag.**
7. Lines 303-307: Description of regression tree methods.

Results:

1. Lines 312-318: Shortened first paragraph
2. **Lines 319-329: Results of *oyster harvest vs. disturbance* correlation and rank tests. These are all now based on disturbance *rate* rather than *frequency*. We illustrate here that omitting up to nine of the disturbances (including the one in 2006 and 2/3 of those 2007) still would result in a significant increase in disturbance with increase in oyster harvest. Also see Figure 2B. We also note that this includes on lines 325-326:** "including two disturbances on one day in 2007 that the mariculture company challenged". Please let us know if this is OK or if you have a different idea for this statement. Alternatively, we could leave the parenthetical statement out and just leave the part that illustrates dropping many of the disturbance events still results in a significant relationship.
3. Lines 333-351: New GLM results using updated 2007 oyster harvest value and no time lag for oyster harvest. All model rankings are similar to previous paper.
4. Lines 355-364: GLM analyses also redone to test 1-year vs no year lag effects of oyster harvest, and using density dependence as a daily or annual value. All results were robust to these different approaches with Oyster always being

important in the best models. We focus on same year oyster harvest values, though.

5. Lines 366-373: UEN best model (although weak fit) includes oyster harvest.
6. Lines 374-381: We now report a regression tree that corroborates GLM models. Tree shows lower counts with higher oyster harvest. This replaces prior 2002-2004 to 2005-2007 2-sample tests (t-test, Wilcoxon) comparisons in previous version.

Discussion:

1. Shortened first paragraph.
2. Lines 463-476: Discussion of potential reasons why lower performance of predictive model (OB model predicting UEF) when oyster harvest is high.
3. Lines 527-532: Discussion of middle-lower estero counts related to density dependent effects at upper subsites.
4. Lines 546-553: Presentation of unmodeled 1996 count data at OB and how it is low during the highest oyster harvest and the highest disturbance rate during the study period.
5. **Lines 554-577: Discussion of how small increase in 2008 subsite OB count data is consistent with restricted mariculture activity near the subsite due to a new (for 2008) California Coastal Commission guideline, and how disturbances subsequently dropped to only 1 in that year. We also suggest that this operational shift may weaken the simple use of "oyster harvest" as a proxy for modeling counts in the upper estero beyond 2007. Nonetheless, the modeling for 1997-2007 is unaffected.**

References:

1. Added Allen *et al.* 1989 (ENSO effects os seals) and Bejder *et al.* 2006 (Disturbance causing local redistribution of Dolphins).

Tables:

1. We have removed table 1, as figure 2B now illustrates these patterns and tests. We indicate in the results that human disturbance rates are higher in middle-lower estero.
2. Table 1 (Table 2 in previous version): updated with all new models, rankings are essentially the same.
3. Table 2 (Table 3 in previous version): updated with new best model coefficients.

Figures:

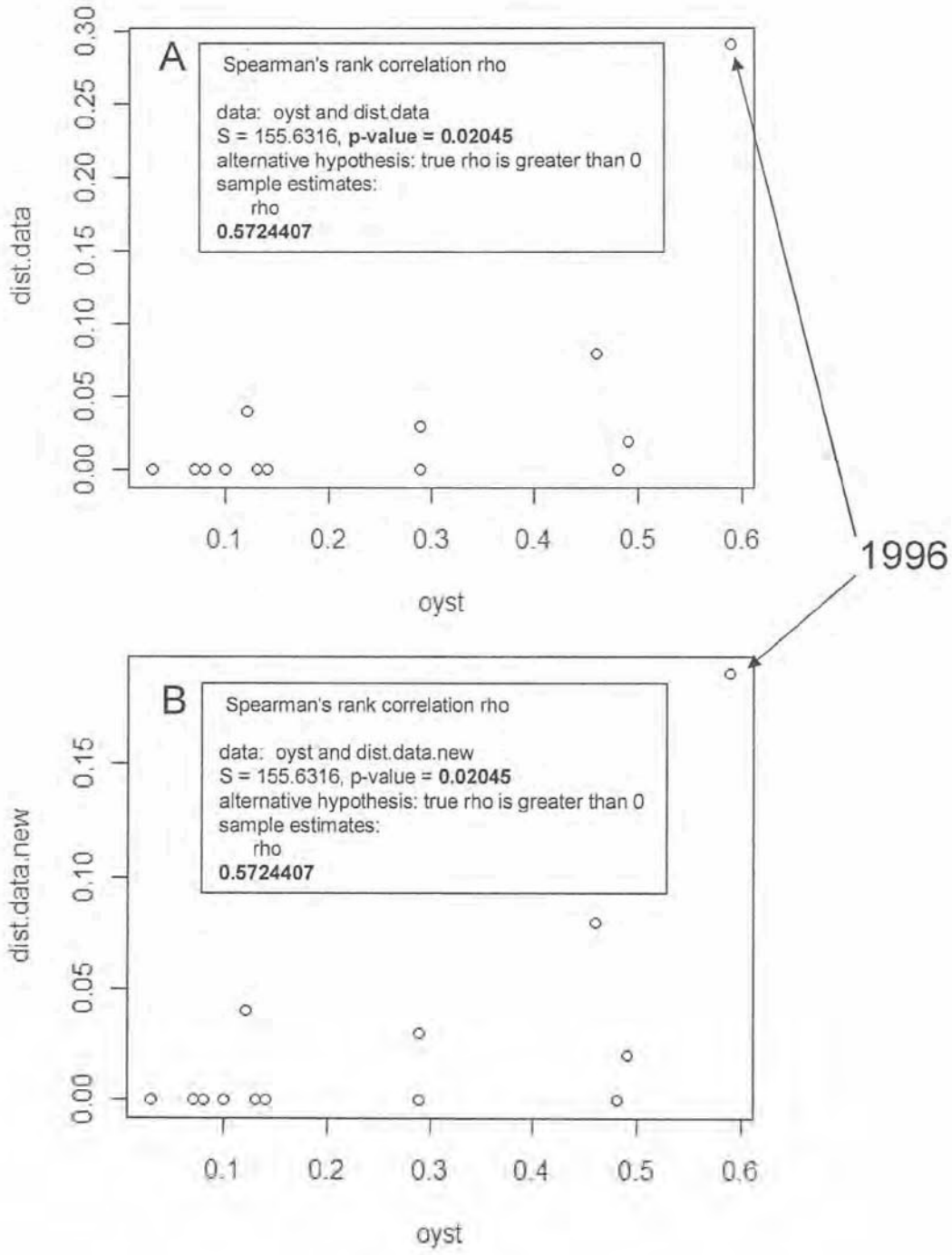
1. Figure 2A: Now has corrected 2007 oyster harvest value.
2. Figure 2B: New, as proposed to reviewers in previous MMS correspondence. Replaces previous figure 2A.
3. Figure 3A: Similar to previous figure 3A, but is a scatter plot rather than a bar chart.
4. Figure 4: Regression tree replaces bar chart showing recent declines at OB. The new model is described in the text.

5. Figure 5: Drakes Estero Panel has been redone. There was a scaling problem (software bug) in the previous version when drawing multiple panels at the same scale that showed~15-20% fewer seals than reality at only drakes estero. We also added black bars to the Drakes Estero panel to indicate count pattern for the middle-lower estero used for density-dependence calculations.

00033002 NPS-PWR-B06-00007-000001 Page 116 of 220

APPENDIX D

Appendix D. (A) Original plot used in MMS paper with 6 disturbances in 1996 and (B) corrected plot with 4 disturbances in 1996. Note that 1996 is still by far the highest point, which is why the statistics have *no difference* between datasets. Note that the y-axis scale changes between plots. In the first version (MMS paper), we accidently counted two *potential* disturbances as *actual* disturbances. "Oyst" is annual lbs. oysters harvested x 10^{-6}. See text for details.



APPENDIX E

11/12/2008

To: National Research Council, Panel of Mariculture in Drakes Estero.

From: Ben Becker, David Press, Sarah Allen; Point Reyes National Seashore.

Re: Rationale for *not* modeling disturbances and counts in the entire Drakes Estero.

Becker, Press and Allen (MMS, in press) only modeled and considered disturbances in the upper estero (near oyster harvest activities) for the following reasons.

1. Subsites A, A1, OB, and UEN are the primary pupping sites for the Estero (see Figure 1). Thus, with one (and perhaps 2, OB and UEN) important pupping subsite potentially impacted by oyster harvest activities, this merited further investigation. Processes at subsite A were clearly related to attachment to the mainland. A1 was increasing (perhaps due to displacement from other sites such as A or others).

2. Plots of all 8 subsites in Drakes Estero from 1997 – 2007 indicate that the only subsites which experienced a significant decline since 2004 were subsites OB, UEF, and A (Figs 1-3). Subsite A was clearly reduced after attachment to the mainland in or around 2004 which resulted in several coyote predation events. Subsites OB and UEF had no other apparent changes other than proximity to increased oyster activities/harvest. DEM had a decline in 2006-2007, but had high inter-annual variation during the entire time series. Variation at DEM was likely because of changes in size and proximity to mainland due to wave action and tides at the mouth of the estero. Subsite L increased over time (especially in adult use), potentially related to increased visitor education on avoiding seal disturbance at the Limantour Beach access.

3. There was a clear and significant (proportions test or Fisher's exact test) increase in mariculture related disturbances in the upper estero (OB, UEF, UEN). During March-May of 2000-2004, anthropogenic, non-airplane disturbances were limited to one kayak, one clammer, and one oyster related. Then from March-May, 2005-2007, all anthropogenic, non-airplane disturbances, were related to mariculture with one in 2006 and six in 2007. This increase in mariculture related disturbances coincided with a decrease in adult and pups seals counts at subsite OB (and UEF), which warranted further investigation.

4. It is essential to model density-dependence. However, if considering all subsites, then it would not be possible to use the lower-middle estero as a control for density-dependence since all counts could not be assumed independent of the other seven sites (seals do of course move around and a loss at one site would likely result in an increase at another site). Furthermore, other regional colony data prior to 2000 had not been fully compiled before preparation of the manuscript. Nonetheless, local density-dependence (lower-middle estero) is more desirable since it more likely to reflect local processes in the estero because it (1) eliminates other confounding factors such as disturbance effects at other colonies, and (2) is closer, more similar habitat.

5. Modeling all sites and linking to mariculture would be a form of data dredging (several reviewers indicated this). We chose instead to follow an *a priori* multiple competing hypotheses approach.

6. Modeling disturbances without *a priori* hypotheses can be misleading because disturbance events require both a disturbance source *and* the presence of seals to disturb. This is illustrated clearly at subsite A: as the island attached to the mainland and seals began to abandon the subsite after 2004, disturbances also decreased.

Three figures follow

Fig 1. Mean (SE) seal **pups** at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

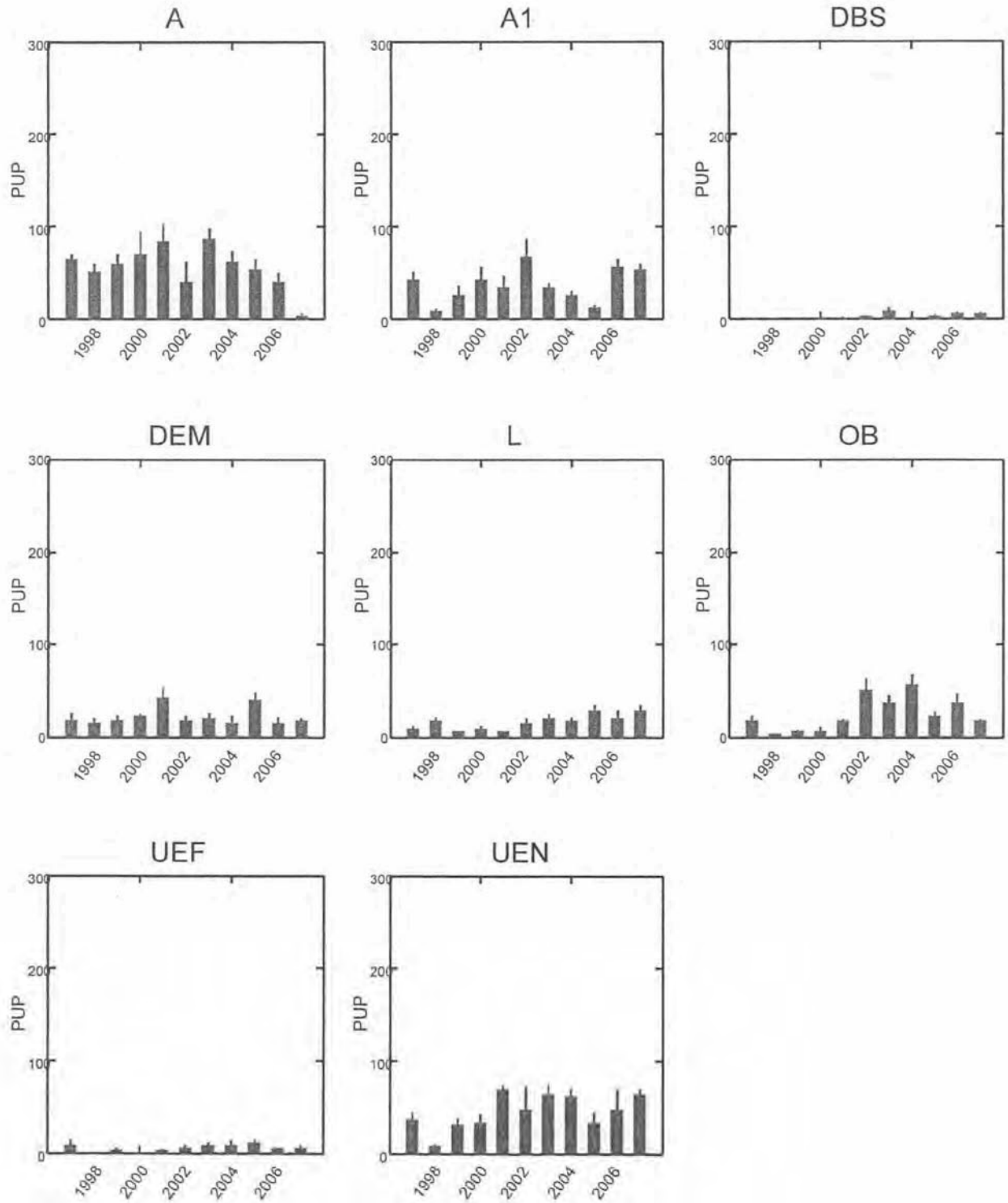


Fig. 2. Mean (SE) **adult** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

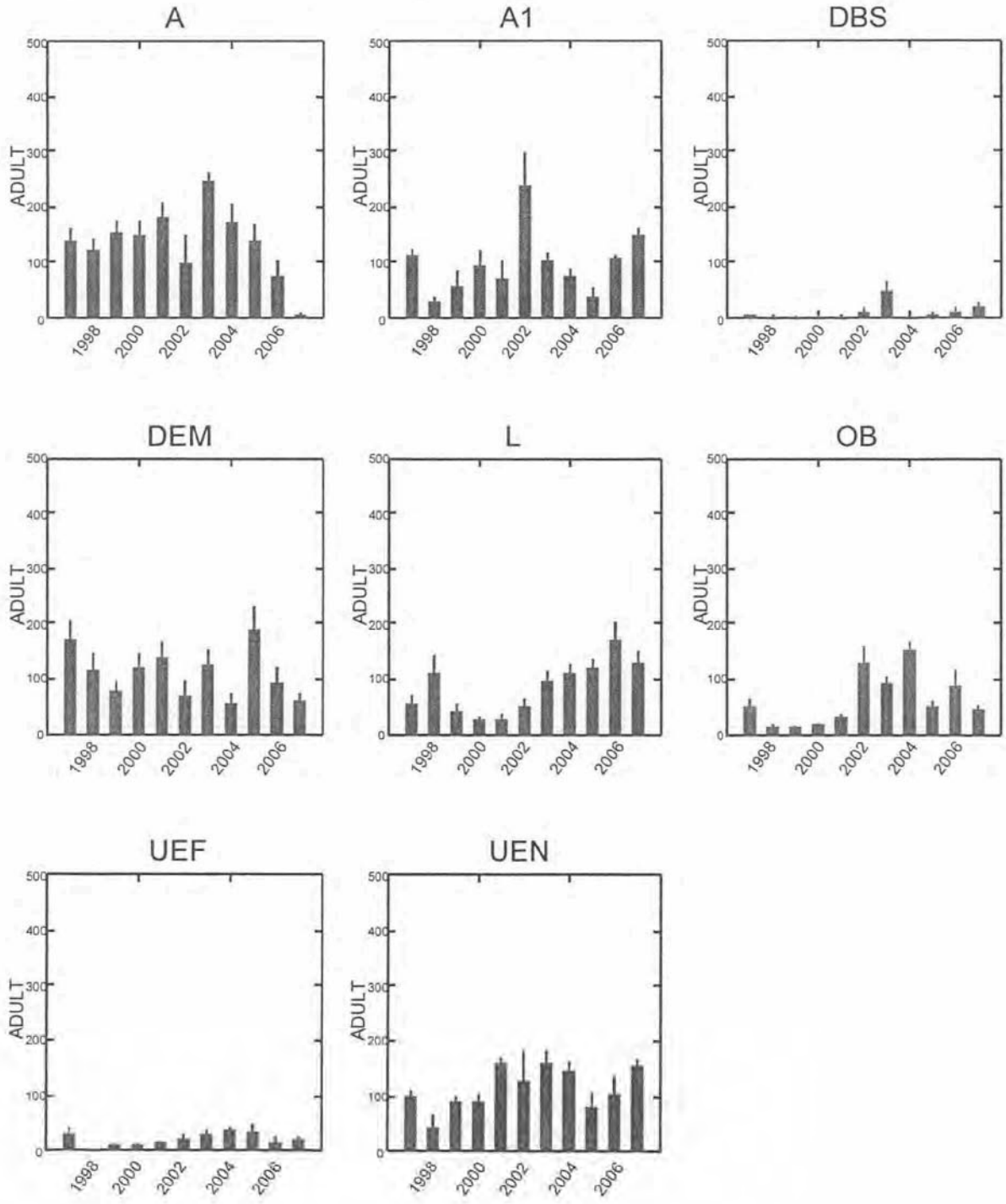
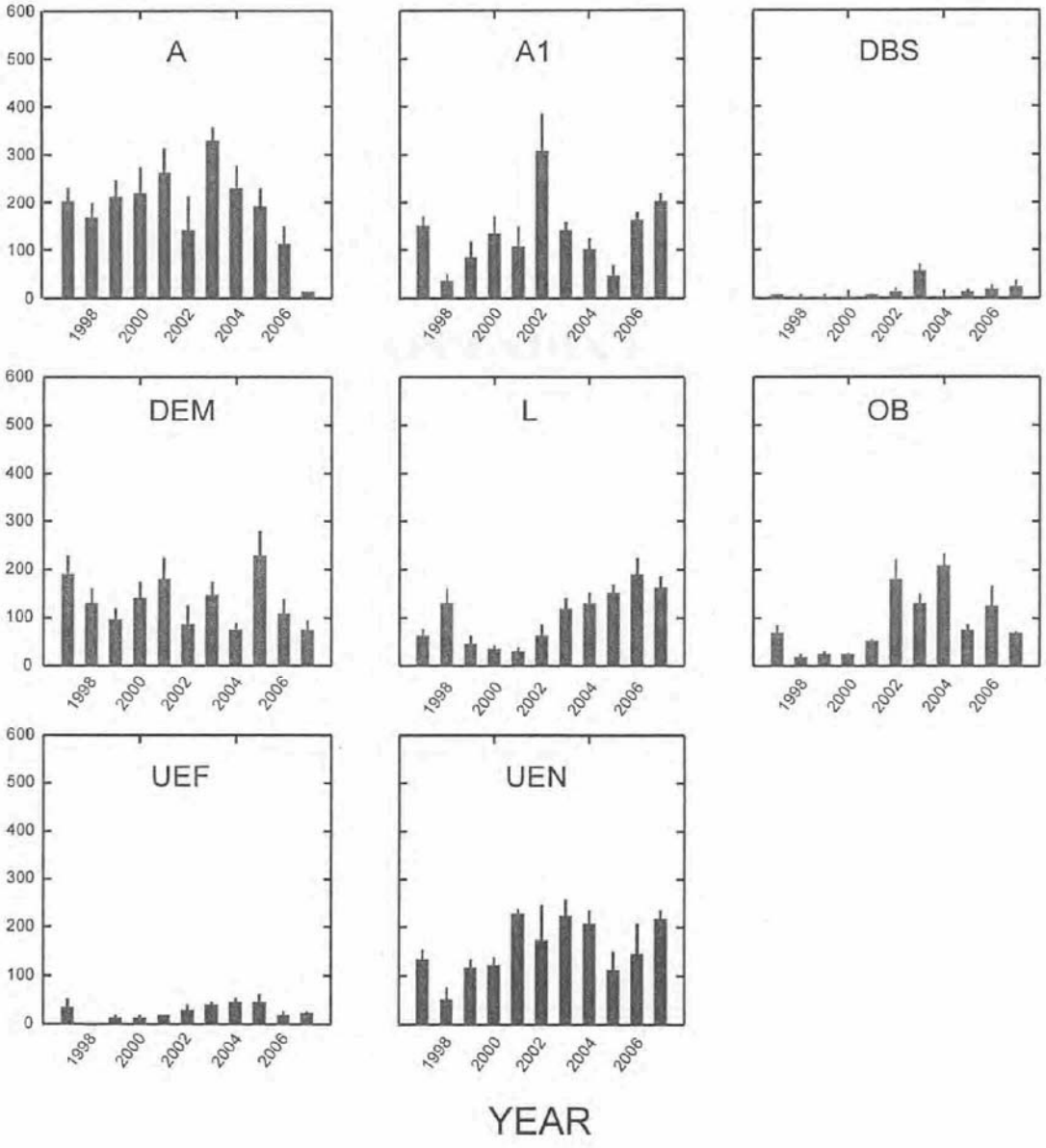


Fig 3. Mean (SE) **total** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.



"Daryl Boness"
<mmsci@megalink.net>
10/16/2008 08:56 AM

To <Ben_Becker@nps.gov>
cc "Marine Mammal Science"
<marinemammalscience@gmail.com>
bcc
Subject Decision on "Modeling the effects of El Niño, density dependence,and disturbance on harbor seal counts..."

History: This message has been replied to.

Dear Dr. Becker:

I have now received input from some of the original reviewers and Associate Editor on your replies to the concerns and questions raised by Dr. Corey Goodman (and others with similar points being made) concerning your in press paper entitled "Modeling the effects of El Niño, density dependence, and disturbance on harbor seal counts in Drakes Estero, California: 19972007." I have also spoken (or emailed) with Dr. Susan Roberts of the NRC and Dr. Tom Moore of the California Fish & Game. I am satisfied that there is no basis for considering pulling your paper from Marine Mammal Science for ethical grounds (scientific misconduct). The reviews I received based on your responses to Dr. Goodman's questions and your new analyses suggest there is no need to even revise your manuscript before publication should be allowed. I concur with the reviewers that the paper should be allowed to move forward with publication, but I also believe it would be best to include the updated information and improved analyses that you have proposed in your emails to me. In the revised paper, you should acknowledge the questioned data point and at least note that the conclusions would not change whether this point is included or not. Since you have information available on the 2008 harbor seal and oyster harvest levels I would also like to see you include in the discussion a statement about how this might affect your conclusions. It would be helpful if you identified in the revised paper where you have made the substantive changes as you indicate you will in your email replies.

I will process your revised paper as quickly as possible once I receive it. I appreciate your cooperation in this unusual situation regarding your paper that was accepted for publication in Marine Mammal Science.

Sincerely,

Daryl J. Boness
Editor
Marine Mammal Science

Dave Press/GOGA/NPS
05/01/2009 10:52 AM

To: Sarah Allen/PORE/NPS@NPS, Ben Becker/PORE/NPS@NPS
cc:
bcc:
Subject: Fw: Response to Allegations

Here are the response documents that we may release. I am working on locating the Word versions. Ben - any thoughts on where those ended up??

Dave

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

----- Forwarded by Dave Press/GOGA/NPS on 05/01/2009 10:51 -----

Don Neubacher
04/30/2009 15:45 PDT

To: Dave Press/GOGA/NPS@NPS, George Turnbull/OAKLAND/NPS@NPS
cc: Jon Jarvis/OAKLAND/NPS@NPS
Subject: Response to Allegations

Dave and Ben are reviewing text one last time.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

----- Forwarded by Don Neubacher/PORE/NPS on 04/30/2009 03:45 PM -----

Dave Press/GOGA/NPS
02/09/2009 03:53 PM

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject: draft documents

Don,
Here are our draft responses as of Monday afternoon.

Dave

Goodman_response_Feb_2009-DRAFT_CompleteFinal.pdf DRAFT Goodman Response Briefing.pdf

---

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

Don Neubacher
04/30/2009 15:45 PDT

To: Dave Press/GOGA/NPS@NPS, George Turnbull/OAKLAND/NPS@NPS
cc: Jon Jarvis/OAKLAND/NPS@NPS
Subject: Response to Allegations

Dave and Ben are reviewing text one last time

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
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—— Forwarded by Don Neubacher/PORE/NPS on 04/30/2009 03:45 PM ——

Dave Press/GOGA/NPS
02/09/2009 03:53 PM

To Don Neubacher/PORE/NPS@NPS
cc
Subject draft documents

Don,
Here are our draft responses as of Monday afternoon.

Dave

Goodman_response_Feb_2009-DRAFT_CompleteFinal.pdf DRAFT Goodman Response Briefing.pdf

---

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)

Ben Becker/PORE/NPS
02/06/2009 11:36 AM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject quote

New quote for section 4

Dr. Goodman states on page 2 that:

"In Becker II (the second revised version of the Becker et al. paper), Becker cherry-picked the data by arbitrarily going back to 1996 (instead of just 2000) to claim six oyster related disturbances in 1996 (and none in 1997-1999). Four of those six disturbances were fabricated"

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
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Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

Ben Becker/PORE/NPS
02/06/2009 11:30 AM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject small change

I made a small changes to part 2 after looking at my correspondence with MMS. see attached.

-ben

Goodman_response_Feb_2009-DRAFT_SA_DG_BB_edit_v2 1.doc

Ben Becker, Ph.D.
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- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Corey Goodman to the National Research Council (NRC). Because the letter addresses many themes and frequently revisits themes in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Several of the short responses below are supported by additional referenced documents that are attached in appendices.

Ben Becker
David Press
Sarah Allen

1. Allegation that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 and on numerous other pages in his letter to the NRC that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."

The allegation of falsified data is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, that DBOC generally does not operate boats on Sundays, and that several volunteers and NPS staff separately Ex 5 fabricated data on disturbances on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

- Assumption that seals do not use submerged sandbars. (Page xx) Ex 5 Ex 5 Ex 5 Seals (especially mothers with pups) regularly hover over sandbars in Drakes Estero before they are exposed by rising or falling tides, and this is a common behavior of harbor seals. Furthermore, the disturbances documented by NPS were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January when DBOC conducted their "experiment" that Goodman cited in his letter.

- Assumption that seals are not disturbed beyond the 300 foot Protective Zone (Page xx)- Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service generally recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft

(190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Assumption that DBOC does not operate on Sundays. Dr. Goodman states that DBOC does not normally operate on Sundays (Page xx). We do not know at what frequency that DBOC boats operate on weekends; however, the DOI OIG investigation reports that DBOC personnel did not log in boat use when they used the boat in Drakes Estero for recreational fishing (see page xx of the DOI-OIG report. In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, a Sunday (see Appendix XX).

Ex 5 [redacted]

- Assumption of improbability of disturbances (Page xx)- Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. Why Dr. Goodman made this assumption, and subsequently discounted the events as logistically impossible is unclear.

- Assumption that there are no other DBOC disturbance records (Page xx)- Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

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  "Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15. If the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?"

  The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which Ex 5 [redacted] supported his claims that earlier disturbances could not have occurred.

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Dr. Goodman states on page 16 in his letter to the NRC stated that:

> *"The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II."*

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Then, after the NRC meeting and when revising the MMS paper in late September, 2008, after the first letter was sent to MMS, [redacted] Press found an additional disturbance event in the comments section of the data sheet for that survey day. In sum, there were two actual disturbances in 2003. Becker incorporated both into the final paper which he shared with NRC as soon as it was accepted by the editor of MMS. Then the MMS editor himself read through and made minor editorial corrections on the near final copy of the paper with the corrected two disturbances in it. [redacted]

Ex 5

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Dr. Goodman states on page 19 that:

> *"In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:*
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> *"For example, there was still a significant positive correlation … of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis""*

Goodman's allegation is incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. The editor approved, and it was included in the final paper. See attached email to the MMS editor in **Appendix C** of this correspondence.

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Dr. Goodman also [redacted] leges that by our performing the correlations without some of the disturbances to show their robustness to sample size, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement (quoted above) [redacted] Goodman had previously [redacted] dis[redacted](b)(5) only the NPS Trip Report of April 26, 2007 conducted by S. Allen. To demonstrate the robustness of the analyses to smaller sample sizes, we removed several disturbances, including the April 26 survey.

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We incorporated more years at the urging of Dr. Goodman [redacted] comments to the NRC and MMS in September of 2008. There is no cherry-picking as we included ~~ALL~~ all appropriate data. The 1996-1999 data were not in the previous database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission. Similarly, we had not looked closely at the 2008 disturbance data prior to the first submission, but revisited it for the revision.

On page 2 of his report, Dr. Goodman asserts that we falsified disturbance records in 1996 to improve our statistical results and create a more dramatic graph.

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"*April 29, 2007: Disturbance Survey Violated NPS Protocols.*"

Dr. Goodman makes several assumptions regarding NPS protocols which are incorrect.

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Ex 5

Ex 5

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Ex 5 [redacted]

Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

- poor visibility
- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regards to weather conditions

- Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007 (Page xx). This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least on year of prior experience in our program before including their data for analysis.

- A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. This is clearly outlined in methods section of the MMS paper. Ex 5 [redacted]

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"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data only from 1997-2007, as the title describes. As is clearly explained in the paper, we include disturbance (but not *count*) data from 1996 and 2008. This data is not modeled but only used to report disturbance patterns. Count data were not complete enough to pass QA/QC protocols for 1996, and we did not model 2008 count data since it was after reaffirmed guidelines that the oyster company avoid seal areas during the breeding season. In fact, eliminating disturbance data that we had available (e.g. 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

Ex 5 [redacted]

Ex 5 [redacted]

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page 19 that:

> "Becker told us that *"This correlation is highly robust to sample size."* As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation."

Contrary to Dr. Goodman's assertion, the S-plus statistical software user's manual indicates that:

> "Because both Kendall's and Spearman's methods are based on ranks, they are not so sensitive to outliers and non normality as the standard Pearson estimate." (Insightful 2003).

Furthermore, in the MMS paper, our demonstration of the removal of several disturbances with continuing significance proves that the test is not succumbing to the effects of a "single anecdotal observation". Other correlation tests show similar results. Specifically, Pearson correlations (although not appropriate) and Kendall's Tau (which is an appropriate test).

Dr. Goodman also indicates that we must have gone back to the 1996 data only to get a stronger correlation (Page 22). However, if only considering the disturbance rate from 2000 – 2008, the P value is similar ($P < 0.03$), and the Spearman correlation is actually higher ($r_s = 0.69$) than the full time series. Thus, there is no basis for the allegation that we cherry picked data (omission or commission) to improve our statistical results.

In conclusion, we note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr.

Goodman's statements misguided as evidenced by the conclusions by the independent groups the Marine Mammal Science and the DOI Inspector General that there was no evidence of scientific misconduct. Separately, the National Research Council refused to consider his allegations of scientific misconduct. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent allegations of scientific misconduct.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

INSIGHTFUL. 2003. S-PLUS 6 for Windows Guide to Statistics, Volume 1, Insightful Corporation, Seattle, WA.

JOHNSON, A., AND A. ACEVEDO-GUTIERREZ. 2007. Regulation compliance by vessels and disturbance of harbor seals (Phoca vitulina).Canadian Journal of Zoology 85:290294.

SURYAN R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, Phoca vitulina richardii, to disturbance. Fisheries Bulletin 97:332–339.

Ben Becker/PORE/NPS
02/06/2009 09:59 AM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject Re: draft

Hi Sarah,

see my edits, mostly needs for page numbers and a correct quote from goodman.

thanks,

-ben

Goodman_response_Feb_2009-DRAFT_SA_DG_BB_edit_v2.doc

Ben Becker, Ph.D.
Director and Marine Ecolcgist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

Sarah Allen/PORE/NPS

Sarah Allen/PORE/NPS
02/06/2009 07:07 AM

To Ben Becker/PORE/NPS@NPS
cc sarah_allen@nps.gov, dave_press@nps.gov
Subject Re: draft

here is my recent update - the highlighted areas need to be completed by dave, you or myself - I think you

are finished and it is just dave and I that have to put in page numbers, images etc.

you might look at it one more time with a clear hear?

Thanks
[attachment "Goodman_response_Feb_2009-DRAFT_SA_DG_BB_edit.doc" deleted by Ben Becker/PORE/NPS]

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Corey Goodman to the National Research Council (NRC). Because the letter addresses many themes and frequently revisits themes in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Several of the short responses below are supported by additional referenced documents that are attached in appendices.

Ben Becker
David Press
Sarah Allen

1. Allegation that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 and on numerous other pages in his letter to the NRC that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."

The allegation of falsified data is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, that DBOC generally does not operate boats on Sundays, and that several volunteers and NPS staff separately Ex 5 fabricated data on disturbances on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

- Assumption that seals do not use submerged sandbars. (Page xx) Ex 5 Ex 5 Ex 5 Seals (especially mothers with pups) regularly hover over sandbars in Drakes Estero before they are exposed by rising or falling tides, and this is a common behavior of harbor seals. Furthermore, the disturbances documented by NPS were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January when DBOC conducted their "experiment" that Goodman cited in his letter.

- Assumption that seals are not disturbed beyond the 300 foot Protective Zone (Page xx)_Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service generally recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft

(190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Assumption that DBOC does not operate on Sundays. Dr. Goodman states that DBOC does not normally operate on Sundays (Page xx). We do not know at what frequency that DBOC boats operate on weekends; however, the DOI OIG investigation reports that DBOC personnel did not log in boat use when they used the boat in Drakes Estero for recreational fishing (see page xx of the DOI-OIG report. In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, a Sunday (see Appendix XX).

Ex 5 [redacted]

- Assumption of improbability of disturbances (Page xx)- Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. Why Dr. Goodman made this assumption, and subsequently discounted the events as logistically impossible is unclear.

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Furthermore, in the MMS paper, our demonstration of the removal of several disturbances with continuing significance proves that the test is not succumbing to the effects of a "single anecdotal observation". Other correlation tests show similar results. Specifically, Pearson correlations (although not appropriate) and Kendall's Tau (which is an appropriate test).

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In conclusion, we note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions by the independent groups the Marine Mammal Science and the DOI Inspector General that there was no evidence of scientific misconduct. Separately, the National Research Council refused to consider his allegations of scientific misconduct. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their

own conclusions about our analyses and interpretation. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent allegations of scientific misconduct.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

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Sarah Allen/PORE/NPS
02/06/2009 07:07 AM

To Ben Becker/PORE/NPS@NPS
cc sarah_allen@nps.gov, dave_press@nps.gov
bcc
Subject Re: draft

History: This message has been replied to.

here is my recent update - the highlighted areas need to be completed by dave, you or myself - I think you are finished and it is just dave and I that have to put in page numbers, images etc.

you might look at it one more time with a clear head?

Thanks

Goodman_response_Feb_2009-DRAFT_SA_DG_BB_edit.doc

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Corey Goodman to the National Research Council (NRC). Because the letter addresses many themes and frequently revisits themes in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Several of the short responses below are supported by additional referenced documents that are attached in appendices.

Ben Becker
David Press
Sarah Allen

1. Allegation that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 and on numerous other pages in his letter to the NRC that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described."

The allegation of falsified data is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, that DBOC does not operate on Sundays, and that several volunteers and NPS staff separately Ex 5 data on disturbances on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

- Assumption that seals do not use submerged sandbars. (Page xx) Ex 5 Ex 5 Ex 5 Seals (especially mothers with pups) regularly hover over sandbars in Drakes Estero before they are exposed by rising or falling tides, and this is a common behavior of harbor seals. Furthermore, the disturbances documented by NPS were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January when DBOC conducted their "experiment" that Goodman cited in his letter.

- Assumption that seals are not disturbed beyond the 300 foot Protective Zone (Page xx)- Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service generally recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft

(190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Assumption that DBOC does not operate on Sundays. Dr. Goodman states that DBOC does not normally operate on Sundays (Page xx). We do not know at what frequency that DBOC boats operate on weekends; however, the DOI OIG investigation reports that DBOC personnel did not log in boat use when they used the boat in Drakes Estero for recreational fishing (see page xx of the DOI-OIG report. In addition, NPS has time stamped images of a DBOC boat present on Drakes Estero on March 23, 2008, a Sunday (see Appendix XX).

- Assumption of improbability of disturbances (Page xx)- Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. Why Dr. Goodman made this assumption, and subsequently discounted the events as logistically impossible is unclear.

- Assumption that there are no other DBOC disturbance records (Page xx)- Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

- Assumption that count occurred on April 29 at 3:15 - Dr. Goodman used a different start time at which the volunteers conducted their full count of Drakes Estero from what is in the pinniped database. The database and datasheet clearly document that the data were collected at 2:15 PM. However, apparently based on a note on the photocopied datasheet Dr. Goodman assumes that the data were collected at 3:15 PM in his letter (Page 7).

  "Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15. If the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?"

  The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which falsely supported his claims that earlier disturbances could not have occurred.

2. Allegation that disturbance data Ex 5 [redacted]

Dr. Goodman states on page 16 in his letter to the NRC stated that:

> *"The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II."*

During preparation for the first Marine Mammal Science (MMS) journal submission, Becker inadvertently overlooked the 2003 disturbances. The datum (one disturbance) was in the dataset that D. Press, the NPS data manager, provided to Becker preparing the first MMS manuscript. While preparing for the NRC presentation on September 4, 2008, Becker realized his error of omission, and ***therefore, included an asterisk by the 2003 data with "possible disturbance" on the NRC presentation*** **(see Appendix B)**. Then, after the NRC meeting and when revising the MMS paper in late September, 2008, Becker and D. Press found an additional disturbance event in the comments section of the data sheet for that survey day. In sum, there were two actual disturbances in 2003. Becker incorporated both into the final paper which he shared with NRC as soon as it was accepted by the editor of MMS. Ex 5 [redacted]

3. Allegation that NPS withheld information from the MMS editor.

Dr. Goodman states on page 19 that

> *"In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:*
>
> *"For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis""*

Goodman's allegation is incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. The editor approved, and it was included in the final paper. See attached email in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly with the MMS Editor, who in addition to reviewing them himself, passed them on to the Associate Editor of MMS and the two original peer reviewers. Thus, the notion that we cherry-picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the DOI Inspector General report. The MMS editor also corresponded directly with the NRC and The California Department of Fish and Game. We also offered to the MMS Editors our raw data and NPS pinniped database, so

they could conclude for themselves [redacted] of Dr. Goodman's allegations [redacted]

Dr. Goodman also suggests that by our performing the correlations without some of the disturbances to show their robustness to sample size, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement (quoted above) [redacted] Goodman had previously disputed only the NPS Trip Report of April 26, 2007 conducted by S. Allen. To demonstrate the robustness of the analyses to small sample size, we removed several disturbances, including the April 26 survey.

4. Inclusion of the 1996-1999, and 2008 disturbance data in the second paper.

Dr. Goodman states [redacted]

We incorporated more years at the urging of Dr. Goodman [redacted] There is no cherry-picking as we included ALL appropriate data. The 1996-1999 data were not in the previous database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission

[redacted]

On page 2 of his report, Dr. Goodman asserts that we falsified disturbance records in 1996 to improve our statistical results and create a more dramatic graph.

The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidentally included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *possible* disturbances. We regret this error but it nonetheless does not alter the statistics or conclusions in any way. We will inform the Editor of MMS of our error and seek his guidance on whether a correction is warranted.

Nevertheless, the removal of [redacted] disturbance in 1996 does not change any conclusions or patterns described in the paper (see **Appendix D**). 1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remain exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is inconsistent with the facts and the data.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company

motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that "*many fishing and recreational motorboats enter the estero*" on page 17 of his letter is not supported by park records including law enforcement case reports, harbor seal monitoring field notes and park staff observations.

Finally, cherry-picking is alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero because the lower estero haul-out sites are attached to the mainland). On November 12, we provided the NRC with a justification for solely analyzing the mariculture related disturbances and we explained in the MMS paper: See **Appendix E.**

5. Allegation that NPS did not follow stated QA/QC protocols:

Dr. Goodman states on page 12 that:

"April 29, 2007: Disturbance Survey Violated NPS Protocols."

Dr. Goodman makes several assumptions regarding NPS protocols which are incorrect.

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. Ex 5 [redacted] Ex 5 [redacted]

  In addition, for the purposes of the Becker et al. paper, we limited the count data used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

- Dr. Goodman appears to have misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers is entered into the database and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database itself, which remain important NPS records.

  Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or

"no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

- poor visibility
- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regards to weather conditions

- Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007 (Page xx). This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least on year of prior experience in our program before including their data for analysis.

- A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. Ex 5 [redacted] Ex 5 [redacted] We have confidence that our first year observers, all of ~~wh ch~~ who must attend ~~our~~ trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

6. Statement that the MMS paper title is incorrect.

Dr. Goodman states on page 25 that

"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data only from 1997-2007, as the title describes. As is clearly explained in the paper, we include disturbance (but not *count*) data from 1996 and 2008. This data is not modeled but only used to report disturbance patterns. Count data were not complete enough to pass QA/QC protocols for 1996, and we did not model 2008 data since it was after reaffirmed guidelines that the oyster company avoid seal areas during the breeding season. In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

Ex 5 [redacted]

Ex 5 [redacted]

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page 19 that:

> "Becker told us that "*This correlation is highly robust to sample size.*" As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation."

Contrary to Dr. Goodman's assertion, the S-plus statistical software user's manual indicates that:

> "Because both Kendall's and Spearman's methods are based on ranks, they are not so sensitive to outliers and non normality as the standard Pearson estimate." (Insightful 2005)

Dr. Goodman also indicates that we must have gone back to the 1996 data only to get a stronger correlation (Page 22). However, if only considering the disturbance rate from 2000 – 2008, the P value is similar ($P < 0.03$), and the Spearman correlation is actually higher ($r_s = 0.69$) than the full time series. Thus, there is no basis for the allegation that we cherry picked data to improve our statistical results.

In conclusion, we note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions by the independent groups the Marine Mammal Science and the DOI Inspector General that there was no evidence of scientific misconduct. Separately, the National Research Council refused to consider his allegations of scientific misconduct. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent allegations of scientific misconduct.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

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Sarah Allen/PORE/NPS
02/06/2009 05:57 AM

To Ben Becker/PORE/NPS@NPS
cc
bcc
Subject Re: draft

Hi Ben:

Thanks for working on this last night after already working all day on it!

I do want to connect with you on a few points this morning. I would like to talk to you around 8:30-9 at the office - would that work for your schedule?

Thanks

Sarah

Ben Becker/PORE/NPS
02/06/2009 12:18 AM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject draft

Hi Sarah,

I made small changes here and there and left notes where I made bigger changes for you to look at. Let me know what else I can do.

thanks,

-Ben

Goodman_response_Feb_2009-DRAFT_SA-BB-edit.doc

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

DRAFT Goodman Response Feb 5, 2009 - FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.
Prepared by Ben Becker, Dave Press, and Sarah Allen

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Corey Goodman to the National Research Council (NRC). Because his letter addresses many themes and frequently revisits them, we have reorganized what we believe are the salient points and address them in turn below. Each short response below is supported by additional referenced documents that are attached.

1. Allegations that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on Page 2 in his letter to the NRC that:

> *"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."*

The allegation of falsified data is based on several incorrect assumptions. Dr Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, and that several volunteers and NPS staff separately Ex 5 data on disturbances on several days of field observations. There is no supporting evidence for these allegations and we refute them with actual data.

Ex 5 [redacted]

Ex 5 [redacted] Seals (especially mothers with pups) regularly hover over sandbars in Drakes Estero before they are exposed by rising or falling tides, and this is a common behavior of harbor seals elsewhere. Furthermore, the disturbances documented by NPS were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during the January "experiment" that Goodman cited in his letter.

Improbability of Disturbances - Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. Why Dr. Goodman made this assumption, and subsequently discounted the events as logistically impossible, is difficult to understand.

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information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft (190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

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The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which falsely supported his claims that earlier disturbances could not have occurred.

2. Allegation that disturbance data were fabricated:

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> *"The 2003 disturbance data changed from Becker I to Becker II with no comment about why these data were missed in Becker I or how they were found for Becker II."*

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Dr. Goodman states Ex 5

Ex 5

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poor observer quality of *all* survey participants
other comments noted on the datasheet, especially in regards to weather conditions

The Volunteers' Experience - Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007. This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least one year of prior experience in our program before including their data for analysis.

A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the

additional above QA/QC procedures on the disturbance data. Ex 5 Ex 5 Ex 5 Ex 5

We have confidence that our first year observers, all of which must attend our trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

Ex 5 **he MMS paper title is incorrect**

Dr. Goodman states on page 25 that

"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data only from 1997-2007, as the title describes. As is clearly explained in the paper, we include disturbance (but not *count*) data from 1996 and 2008. This data is not modeled but only used to report disturbance patterns. Count data were not complete enough to pass QA/QC protocols for 1996, and we did not model 2008 data since it was after reaffirmed guidelines that the oyster company avoid seal areas during the breeding season. In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

Ex 5

Ex 5

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page 19 that:

> "Becker told us that *"This correlation is highly robust to sample size."* As framed by Becker, this may be technically correct given that he cherry-picked both the data he included and the data that he excluded, but it is highly misleading. It is not because the data are so strong, but rather because this kind of correlation (in this case using 1-tailed Spearman ranks test) is a weak test, and can be driven by a single anecdotal observation."

Contrary to Dr. Goodman's assertion, the S-plus statistical software user's manual indicates that:

> "Because both Kendall's and Spearman's methods are based on ranks, they are not so sensitive to outliers and nonnormality as the standard Pearson estimate." (Insightful 2003).

Dr. Goodman also indicates that we must have gone back to the 1996 data only to get a stronger correlation (P. 22). However, if only considering the disturbance rate from 2000 – 2008, the P value is similar ($P < 0.03$), and the Spearman correlation is actually higher ($r_s = 0.69$) than the full time series. Thus, there is no basis for the allegation that we cherry picked data to improve our statistical results.

Ex 5

In conclusion, we note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions of the independent groups Marine Mammal Science and the Inspector General that there was no evidence of scientific misconduct. Separately, the National Research Council refused to consider his allegations of scientific misconduct. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent pattern of attacks on our scientific credibility. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the Park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

Literature Cited

INSIGHTFUL. 2003. S-PLUS 6 for Windows Guide to Statistics, Volume 1. Insightful Corporation, Seattle, WA.

JOHNSON, A., AND A. ACEVEDO-GUTIERREZ. 2007. Regulation compliance by vessels and disturbance of harbor seals (*Phoca vitulina*). Canadian Journal of Zoology 85:290-294.

SURYAN, R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, *Phoca vitulina richardii*, to disturbance. Fisheries Bulletin 97:332–339.

Sarah Allen/PORE/NPS
02/05/2009 07:37 PM

To Ben Becker/PORE/NPS@NPS
cc
bcc
Subject another paragraph for the end

History: This message has been replied to.

We stand by our procedures and methodology, which are scientifically sound. While we welcome critiques of our scientific studies, the pattern of Dr. Goodman's attacks is concerning insofar as it suggests that his primary goal is not to improve the scientific methodology used by the Park, but rather to cast doubt on the credibility of particular individuals. We value the hard work of the Park volunteers, and are saddened to see their veracity questioned in so untoward a manner. We will continue to defend the integrity of our scientific studies and programs.

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Sarah Allen/PORE/NPS
02/05/2009 06:48 PM

To Ben Becker/PORE/NPS@NPS
cc
bcc
Subject update

I attach the update with Graber's comments

Goodman_response_Feb_2009 DRAFT_SAedit.doc

Sarah G. Allen, Ph.D.
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DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.

This document addresses the allegations and criticisms put forth in a January 18, 2009 letter from Dr. Corey Goodman to the National Research Council (NRC). Because the letter addresses many themes and frequently revisits themes in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Each short response below is supported by additional referenced documents that are attached.

Ben Becker
David Press
Sarah Allen

1. Allegations that NPS falsified data on harbor seal disturbance events.

Dr. Goodman states on page 2 in his letter to the NRC dated that

"Simply said, NPS presented you with false science. It is physically impossible for the disturbance events to have taken place as described..."

The allegation of falsified data is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, and that several volunteers and NPS staff separately [Ex 5] data on disturbances on several days of field observations. There is no supporting evidence for these allegation and we refute them with actual data.

- NPS has time stamped images of seals hauled out at similar falling tides during the 2008 *breeding* season in Drakes Estero. Seals (especially mothers with pups) regularly hover over sandbars in Drakes Estero before they are exposed by rising or falling tides, and this is a common behavior of harbor seals elsewhere. Furthermore, the disturbances documented by NPS were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during the January "experiment" that Goodman cited in his letter.

- Improbability of Disturbances - Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the volunteers never stated in their field notes that the boat returned to the dock and then came back between the disturbance events. Why Dr. Goodman made this assumption, and subsequently discounted the events as logistically impossible, [Ex 5]

- DBOC Disturbance Records - Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007

documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

- 300 foot Protective Zone - Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service generally recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft (190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Time of April 29 Count - Dr. Goodman used a different start time at which the volunteers conducted their full count of Drakes Estero from the data in the pinniped database. The database and datasheet clearly document that the data was collected at 2:15 PM. However, apparently based on a note on the photocopied datasheet Dr. Goodman assumes that the data were collected at 3:15 PM in his letter on page 7.

  "Based upon the tide chart with appropriate lag correction, it would have been difficult if not impossible for them to count seals on UEN and OB until 15:15. If the tide was too high and they couldn't count the seals on UEN or OB until 15:15, then how could they record a disturbance at 12:50?"

  The field data sheet from the survey on April 29, 2007 reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which falsely supported his claims that earlier disturbances could not have occurred.

2. Allegation that disturbance data Ex 5 [redacted]

Dr. Goodman states on page 16 in his letter to the NRC dated that

Ex 5 [redacted]

During preparation for the first Marine Mammal Science (MMS) journal submission, Becker inadvertently overlooked the 2003 disturbances. The datum (one disturbance) was in the dataset that D. Press, the NPS data manager, provided to Becker preparing the first MMS manuscript. While preparing for the NRC presentation on September 4, 2008, Becker realized his error of omission, and ***therefore, included an asterisk by the 2003***

data with "possible disturbance" on the NRC presentation **(see Appendix B)**. Then, after the NRC meeting and when revising the MMS paper in late September, 2008, Becker and D. Press found an additional disturbance in the comments section of the data sheet for that survey day. In sum, there were two actual disturbances in 2003. Becker incorporated both into the final paper which he shared with NRC as soon as it was accepted by the editor of MMS.

3. Allegation that NPS withheld information from the MMS editor.

Dr. Goodman states on page xx that

> *"In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:*
>
> *"For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis""*

Goodman's allegation is incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. The editor approved, and it was included in the final paper. See attached email in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly with the MMS Editor, who in addition to reviewing them himself, passed them on to the Associate Editor of MMS and the two original peer reviewers. Thus, the notion that we cherry-picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the DOI Inspector General report. The MMS editor also corresponded directly with the National Research Council and The California Department of Fish and Game. We also offered to the MMS Editors our raw data and NPS pinniped database, so they could conclude for themselves [Ex 5] of Dr. Goodman's allegations. [Ex 5]

Dr. Goodman also suggests that by our performing the correlations without some of the disturbances to show their robustness to sample size, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement (quoted above) [Ex 5] [Ex 5] Goodman had previously disputed only the NPS Trip Report of April 26, 2007 conducted by S. Allen. To demonstrate the robustness of the analyses to small sample size, we removed several disturbances, including the April 26 survey.

4. Inclusion of the 1996-1999, and 2008 disturbance data in the second paper.

Dr. Goodman states Ex 5 [redacted]

Ex 5 [redacted]

We incorporated more years at the urging of Dr. Goodman himself. There is no cherry-picking as we included ALL data. The 1996-1999 data were not in the previous database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission

The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidently included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *possible* disturbances. We regret this error but it nonetheless does not alter the statistics or conclusions in any way. We will inform the Editor of MMS of our error and seek his guidance on whether a correction is warranted.

Nevertheless, the removal of Ex 5 [redacted] isturbance in 1996 does not change any conclusions or patterns described in the paper (see **Appendix D**). 1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remain exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is inconsistent with the facts and the data.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that "*many fishing and recreational motorboats enter the estero*" on page 17 of his letter is not supported by park records including law enforcement case reports, harbor seal monitoring field notes and park staff observations.

Finally, cherry-picking is alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero because the lower estero haul-out sites are attached to the mainland). On November XX, we provided the NRC with a justification for solely analyzing the mariculture related disturbances and we explained in the MMS paper: See **Appendix E.**

5. Allegation that NPS did not follow stated QA/QC protocols:

Dr. Goodman states on page 12 that:

"April 29, 2007: Disturbance Survey Violated NPS Protocols."

Dr. Goodman makes several assumptions regarding NPS protocols which are incorrect.

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. Ex 5 [redacted] Ex 5

  In addition, for the purposes of the Becker et al. paper, we limited the count data used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

- Dr. Goodman appears to have misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers is entered into the database, and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database itself, which remain important NPS records.

  Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

  - poor visibility
  - not all subsites were surveyed
  - poor observer quality of *all* survey participants
  - other comments noted on the datasheet, especially in regards to weather conditions

- The Volunteers' Experience - Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007. This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January

2008. In short, the Leites did meet our criteria of having at least on year of prior experience in our program before including their data for analysis.

- A key point that Dr. Goodman misrepresents is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. Ex 5 Ex 5 We have confidence that our first year observers, all of which must attend our trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

6. Allegation that the MMS paper title is incorrect.

Dr. Goodman states on page 25 that

"Becker cherry-picked the 1996 data, but never changed their title or abstract, which still begins with 1997."

The paper clearly models data from 1997-2007, as the title describes. We include disturbance data from 1996 and 2008 Ex 5 Ex 5 Ex 5 In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking. Ex 5

7. Application of Spearman ranks test to test for correlation between disturbance rate and oyster harvest:

Dr. Goodman states on page x that:

Ex 5

Spearman rank tests are ranks tests, and therefore, are *less* susceptible to outliers than traditional parametric correlations, which is why we used them. Problems can arise at very small sample sizes ($n < 10$), and it is wise to perform Monte Carlo simulations at these sample sizes, but we do not consider a time series of 1996 – 2008 (13 years) an issue. Nonetheless, using Spearman tests on these sample sizes is standard practice.

In conclusion, we note that in previous iterations of his statements, Dr. Goodman criticized our statistical modeling techniques, which are all standard professional practice. His critiques were closely examined by editors and peer reviewers at MMS and flatly rejected. He now primarily focuses on data handling and alleges we falsified data that were independently collected by several different volunteers and NPS staff. We find Dr. Goodman's statements misguided as evidenced by the conclusions by the independent groups the Marine Mammal Science and the Inspector General that there was no evidence

of scientific misconduct. Separately, the National Research Council refused to consider his allegations of scientific misconduct. Nevertheless, we treat with utmost seriousness Dr. Goodman's persistent pattern of attacks on our scientific credibility. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was available to several different groups, including Dr. Goodman and the NRC. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions about our analyses and interpretation.

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SURYAN R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, Phoca vitulina richardii, to disturbance. Fisheries Bulletin 97:332–339.

David Graber /SEKI/NPS
02/05/2009 05:24 PM

To Sarah Allen/PORE/NPS@NPS
cc Ben Becker/PORE/NPS@NPS, Don Neubacher/PORE/NPS
bcc
Subject Re: for review

Sarah --

Here is your response back with my *suggested* edits. They are mostly to make it easier to understand, to make the meaning more precise, Ex 5 [redacted] Ex 5 [redacted]

As I said on the phone, after final editing, convert this to a pdf and add the appendices to the back. Be sure each appendix is clearly referenced in the main text. Each time you refer to a Goodman allegation or charge in his letter, reference the page number(s) in your response so Bert has some hope at connecting one with the other.

Ex 5 [redacted]

If you need to talk to me about this tonight, call me at home Ex 6 [redacted] Ex 6 [redacted]

d

Goodman_response_Feb_2009-DMG gloss.doc

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Sarah Allen/PORE/NPS

Sarah Allen /PORE/NPS
02/05/2009 03:21 PM

To David Graber/SEKI/NPS@NPS, Bill Jackson/FTCOLLINS/NPS@NPS
cc Don Neubacher/PORE/NPS@NPS
Subject for review

See attached for review - You can call me anytime tonite or tomorrow - Ex 6 [redacted] Ex 6 [redacted]

[attachment "App-A_tide_response.doc" deleted by David Graber/SEKI/NPS] [attachment "App-B_Becker_NRC_Sept_2

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DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

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Ben Becker
David Press
Sarah Allen

1. Regarding the allegation that April 29th, 2007 disturbance events must have been falsified. The allegation of falsified data is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, and that several volunteers and NPS staff separately Ex 5 on disturbances on several days of field observations. The NPS refutes these assumptions with actual data on seal behavior both at Drakes Estero and elsewhere.

- Ex 5 Ex 5 Seals (especially mothers with pups) regularly hover over sandbars before they are exposed by rising or falling tides, and this is a common behavior of harbor seals. Furthermore, the NPS documented disturbances were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during the January "experiment" that Goodman cited. There is no basis for this allegation based on NPS images, the attached **Appendix A**, and seasonality of the "experiment", and well known seal behavior. See **Appendix A** for analysis and images.

- Improbability of Disturbances - Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the Leites never indicated that the boat returned to the dock and then came back between the disturbance events. Why Dr. Goodman made this assumption, and subsequently discounted the events as logistically impossible, is difficult to understand.

- DBOC Disturbance Records - Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

- 300 foot Protective Zone - Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service generally recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft (190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft

- Time of April 29 Count - Dr. Goodman used a different start time at which the volunteers conducted their full count of Drakes Estero from the data in the pinniped database. The database and datasheet clearly document that the data were collected at 2:15 PM. However Ex 5 based on a note on the photocopied datasheet which Dr. Goodman Ex 5 decided that the data must have been collected at 3:15 PM. The note in its entirety reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which falsely supported his claims that earlier disturbances could not have occurred.

2. Regarding 2003 disturbance data changes: During preparation for the first Marine Mammal Science (MMS) journal submission, Becke Ex 5 inadvertently overlooked the 2003 disturbances. The datum (one disturbance) was in the dataset that D. Press, the NPS data manager, provided to Becker preparing the first MMS manuscript. Becker realized his error of omission while preparing for the NRC presentation on Sept 4, 2008 and ***therefore included an asterisk by the 2003 data with "possible disturbance" on the NRC presentation*** (see Appendix B). Ex 5 Ex 5

Ex 5

Ex 5

Ex 5

3. Regarding the allegation that NPS withheld information from the MMS editor, Dr. Goodman wrote:

> "In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:
>
> *"For example, there was still a significant positive correlation ... of disturbance rate with oyster harvest even when* ***removing the 2006 disturbance, four of the 2007 disturbances*** *(including two disturbances on one day in 2007 that the mariculture company challenged), and* ***four of the 1996 disturbances*** *(nine total) from the analysis"*

This Goodman's allegation is [redacted] incorrect. We sent the editor this sample paragraph before final re-acceptance of the paper. He approved, and it was included in the final paper. See attached email in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly to the Marine Mammal Science Editor, who in addition to reviewing them himself, passed them on to the Associate Editor and two original peer reviewers. Thus, the notion that we cherry- picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the Inspector General report, and the editor corresponded with the National Research Council and The California Department of Fish and Game. We also offered to the Marine Mammal Science Editors ~~to review our raw~~ data and NPS pinniped database, so they could conclude for themselves [redacted] of Dr. Goodman's allegations. [redacted]

Dr. Goodman also suggests that by performing the correlations without some of the disturbances to show their robustness to sample size, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement [redacted] Goodman had previously disputed only the NPS Trip Report disturbance observation as false and to demonstrate the robustness of the analyses to small sample size, we removed several disturbances.

4. Regarding inclusion of the 1996-1999, and 2008 disturbance data in the second paper: We simply incorporated more years at the urging of Dr. Goodman himself. There is no cherry picking as we included ALL data. The 1996-1999 data were not in the database upon preparation of the first version of the MMS paper, but we were able to compile and access it for the revised second submission.

The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidently included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *potential* disturbances. We regret this error but it nonetheless does not ~~impact~~ alter the statistics or conclusions, ~~in any way.~~ We will inform the editor of MMS of our error (which in no way changes any conclusions or patterns described in the paper) and seek his guidance on whether a correction is warranted.

Ex 5 [redacted]

1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remains exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is completely inconsistent with the facts and the data.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that many fishing and recreational motorboats enter the estero is not supported by park records including law enforcement records, harbor seal monitoring records and park staff observations.

Further, cherry-picking is again alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero, since those lower estero haul-out sites are attached to the mainland). On November XX, we provided the NRC with justification for solely analyzing the mariculture related disturbances: See **Appendix E.**

Ex 5 [redacted]

5. Regarding the allegation of not following NPS and our stated QA/QC protocols: Dr. Goodman makes several assumptions regarding NPS protocols which are incorrect.

Ex 5 [redacted]

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. Ex 5 [redacted]

  In addition, for the purposes of the Becker et al. paper, we limited the count data we used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

- Dr. Goodman ~~has~~ appears to have misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers is entered into the database, and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database itself, which remain important NPS records.

  Ex 5 [redacted]

  Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

  - poor visibility

- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regards to weather conditions

- The Volunteers' Experience - Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007. This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least on year of prior experience in our program before including their data for analysis.

- A key point that Dr. Goodman misrepresen[Ex 5] that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data[Ex 5] [Ex 5] We have confidence that our first year observers, all of which must attend our trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is[Ex 5] irrelevant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

6. Regarding the allegation that the MMS paper title is incorrect. The paper clearly models data from 1997-2007, as the title describes. We include disturbance data from 1996 and 2008[Ex 5] [Ex 5] In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

[Ex 5]

[Ex 5]

7. Regarding use of a Spearman ranks test to test for correlation between disturbance rate and oyster harvest-[Ex 5]

[Ex 5]

In closing, we note that in previous iterations of his statements, Dr. Goodman[Ex 5] ~~critiqued~~criticized our statistical modeling techniques, which are all standard[Ex 5] professional practice. His critiques were closely[Ex 5] examined by editors and peer reviewers at Marine Mammal Science and flatly rejected. He now primarily focuses on data handling and alleges ~~weations of~~ falsified data that were independently collected by

several different volunteers and NPS staff. Ex 5 Ex 5 [redacted] we find misguided as evidenced by the independent groups Marine Mammal Science and the Inspector General rejecting the vast majority of his allegations and the National Research Council's refusal to consider his allegations of scientific misconduct), we would like to point out the persistent pattern of attacks on our scientific credibility that we treat with utmost seriousness. Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was Ex 5 available to several different groups, including Dr. Goodman and the National Research Council. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data: the raw data is are available for these groups to see and arrive at their own conclusions on our analyses and interpretation.

JOHNSON, A., AND A. ACEVEDOGUTIERREZ. 2007. Regulation compliance by vessels and disturbance of harbor seals (Phoca vitulina).Canadian Journal of Zoology 85:290294.

SURYAN R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, Phoca vitulina richardii, to disturbance. Fisheries Bulletin 97:332–339.

Bill Jackson/FTCOLLINS/NPS
02/06/2009 08:15 AM

To Sarah Allen/PORO/NPS@NPS
cc
bcc
Subject A clean Try

Sarah:

As I figured, c3Portal is down again, which is why I'm replying from home email.

I've attached the Becker, Press, Allen "Response to Goodman" manuscript with a few pretty minor editorial suggestions in "track changes." Based upon my read of the Goodman January 18th memo to Susan Roberts (and the Lunny letter to Roberts), I think you've produced a very credible point-by-point rebuttal to most of the acqusations. I also think the paper will be very useful to both Bert and Dan in getting perspective on these latest allegations. Ex 5 [redacted] Ex 5 [redacted] I do have a couple of general comments, below:

As follow-up to my earlier question, I think it will be very important to figure out who you're trying to communicate this information to. Ex 5 [redacted] Ex 5 [redacted] Basically, the Response to Goodman paper sticks to clarifying/explaining the facts, but it would need to be transmitted to the NAS under a cover letter that restates the NPS committment to a credible independent review of what is scientifically known about the interactions between oyster mariculture and natural ecology of Drakes Estero, and other estuaries. Ex 5 [redacted] Ex 5 [redacted] Ex 5 [redacted] Ex 5 [redacted]

Ex 5 [redacted]

Yikes, it's late and I'm rambling. I'm not sure any of this is very useful, but it's time to push the send button. Let's talk tomorrow.

Bill

PORE GoodmanResponse_2-06-09_bj.doc

Bill Jackson
Chief, Water Resources Division
Natural Resource Program Center
National Park Service
970-225-3503
970-214-5870 (cell)

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.

This document addresses the allegations and criticisms put forth in a 01/18/2009 letter from Dr. Corey Goodman to the National Research Council (NRC). Because the letter addresses many themes and frequently revisits themes in a non-linear fashion, we have reorganized what we believe are the salient points and address them in turn below. Each short response below is supported by additional referenced documents that are attached.

Ben Becker
David Press
Sarah Allen

1. Regarding the allegation that April 29th, 2007 disturbance events must have been falsified. The allegation of falsified data is based on several incorrect assumptions. Dr. Goodman assumes that the seals do not use the site when the sandbars are submerged, that seals are not disturbed by sources > 300 ft away, and that several volunteers and NPS staff separately [redacted] on disturbances on several days of field observations. The NPS refutes these assumptions with actual data on seal behavior both at Drakes Estero and elsewhere.

- NPS has time stamped images of seals hauled out at similar falling tides during the 2008 *breeding* season in Drakes Estero. Seals (especially mothers with pups) regularly hover over sandbars before they are exposed by rising or falling tides, and this is a common behavior of harbor seals. Furthermore, the NPS documented disturbances were recorded during the *breeding* season when females and pups are commonly on these sandbars. Seals use these sandbars less frequently during January the time of the ~~the January~~ "experiment" that Goodman cited. There is no basis for this allegation based on NPS images, the attached **Appendix A**, and seasonality of the "experiment", and well known seal behavior. See **Appendix A** for analysis and images.

- Improbability of Disturbances - Dr. Goodman discounts the two April 29 disturbance events partly because they occurred so close together (50 minutes) that the boat would not have had enough time to return to the dock, pick up more bags, and then travel back to sandbar UEN. In fact, the Leitos never indicated that the boat returned to the dock and then came back between the disturbance events. There is no basis for ~~Why~~ Dr. Goodman to have assumed this ~~made this assumption~~, and subsequently discounted the events as logistically impossible [redacted]

  DBOC Disturbance Records - Dr. Goodman incorrectly states that as of April 29, 2007 there were no data documenting disturbances to harbor seals by DBOC. In fact, the database contains unambiguous records from April 26, 2007 documenting disturbances at multiple sites. An additional disturbance occurred the previous year on May 6, 2006.

- 300 foot Protective Zone - Dr. Goodman states that DBOC agreed to a 300 foot protective zone, and therefore, implies that seals could not be disturbed at distances greater than 300 ft. The National Marine Fisheries Service generally recommends a distance of 300 ft (100m) for not disturbing marine mammals; however, there is ample information in the published literature that documents harbor seals being disturbed at greater distances. Johnson and Gutierrez (2007) document power boats disturbing harbor seals in Washington at an average distance of 625 ft (190.5 m) and as far as 1217 ft (371 m). Suryan and Harvey (1999) in another study in Washington document that 25% of disturbances to harbor seals occurred at a distance of 656-984 ft (200-300 m). Aircraft at high altitude also disturb harbor seals depending upon the amount of noise generated by the aircraft. It is not unreasonable that harbor seals in Drakes Estero were disturbed by boat noise generated at distances greater than 300 ft.

- Time of April 29 Count - Dr. Goodman used a different start time at which the volunteers conducted their full count of Drakes Estero from the data in the pinniped database. The database and datasheet clearly document that the data wereas collected at 2:15 PM. However, based on a note on the photocopied datasheet which Dr. Goodma[Ex 5] decided that the data must have been collected at 9:15 PM. The note in its entirety reads, "poor tide – counted when could – had to leave at 3:15." Dr. Goodman mistakenly concluded that the volunteers could not count the harbor seals until 3:15 PM, which incorrect[Ex 5] supported his claims that earlier disturbances could not have occurred.

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[Ex 5]

3. Regarding the allegation that NPS withheld information from the MMS editor, Dr. Goodman wrote:

> "In his (Becker's) statement in the results section of his paper on lines 319-329, he told us one important fact that he did not tell the Editor in his cover letter when he wrote:
>
> *"For example, there was still a significant positive correlation . . . of disturbance rate with oyster harvest even when removing the 2006 disturbance, four of the 2007 disturbances (including two disturbances on one day in 2007 that the mariculture company challenged), and four of the 1996 disturbances (nine total) from the analysis"*

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

This allegation is absolutely incorre[Ex 5] We sent the editor this sample paragraph before final re-acceptance of the paper. He approved, and it was included in the final paper. See attached email in Appendix C of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly to the Marine Mammal Science Editor, who in addition to reviewing them himself, passed them on to the Associate Editor and two original peer reviewers. Thus, the notion that we cherry picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the Inspector General report, and the editor corresponded with the National Research Council and The California Department of Fish and Game. We also offered to the Marine Mammal Science Editor to review our raw data and NPS pinniped database, so they could conclude for [Ex 5]
[Ex 5]

Dr. Goodman also suggests that by performing the correlations [Ex 5] without some of the disturbances, [Ex 5] to show their robustness of the correlations to sample size, we are acknowledging that these disturbances are false. This is incorrect. After discussion with the MMS editor, we chose to include this statement [Ex 5]
[Ex 5]
[Ex 5] Dr. Goodman had previously disputed only the NPS Trip Report disturbance observations as false and to demonstrate the robustness of the analyses to small sample size, [Ex 5]
[Ex 5]

4. Regarding inclusion of the 1996-1999, and 2008 disturbance data in the second paper: We simply incorporated more years at the suggestion/urging of Dr. Goodman ~~himself~~. There is no cherry picking as we included ALL data. The 1996-1999 data were not in the database upon preparation of the first MMS paper, but we were able to compile and access it for the second submission.

The NPS pinniped database indicates four disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidently included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *potential* disturbances. We regret this error but it nonetheless does not impact the statistics or conclusions in any way. We will inform the editor of MMS of our error [Ex 5]
[Ex 5] and seek his guidance on whether a correction is warranted.

1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remains exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our

statistics or create a more dramatic graph is completely inconsistent with the facts and the data.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that many fishing and recreational motorboats enter the estero is not supported by park records including law enforcement records, harbor seal monitoring records and park staff observations.

Further, cherry picking is again alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero, since those lower estero haul-out sites are attached to the mainland). On November XX, we provided the NRC with justification for solely analyzing the mariculture related disturbances: See Appendix E.

5. Regarding the allegation of not following NPS and our stated QA/QC protocols: Dr. Goodman makes several assumptions regarding NPS protocols which are incorrect

Ex 5 [redacted]

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level Ex 5 [redacted]

  In addition, for the purposes of the Becker et al. paper, we limited the count data we used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

- Dr. Goodman has misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers are is entered into the database, and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database, which remain important NPS records.

  Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the

following reasons:

- poor visibility
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- The Volunteers' Experience - Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007. This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least one year of prior experience in our program before including their data for analysis.

- A key point that Dr. Goodman misunderstands is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. Recording and cataloging disturbances is essential to managing harbor seals within Point Reyes National Seashore. We have confidence that our first year observers, all of whomwhich must attend our trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is insignificant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

6. Regarding the allegation that the MMS paper title is incorrect: The paper clearly models data from 1997-2007, as the title describes. We include disturbance data from 1996 and 2008[Ex 5 redacted] [Ex 5 redacted] In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

7. Regarding use of a Spearman ranks test to test for correlation between disturbance rate and oyster harvest: Spearman rank tests are ranks tests thatand are *less* susceptible to outliers than traditional parametric correlations, which is why we used them. Problems can arise at very small sample sizes ($n < 10$), and it is wise to perform Monte Carlo simulations at these sample sizes, but we do not consider a time series of 1996 – 2008 (13 years) an issue. Nonetheless, using Spearman tests on these sample sizes is standard practice.

In closing, we note that in previous iterations of his statements, Dr. Goodman[Ex 5 redacted] critiqued our statistical modeling techniques, which are all standard[Ex 5 redacted] His

critiques were closely reviewed by editors and peer reviewers at Marine Mammal Science and flatly rejected. He now primarily focuses on data handling and allegations of falsified data that were independently collected by several different volunteers and NPS staff.

Ex 5

[redacted]

Ex 5

[redacted]

Ex 5

[redacted]

Ex 5

[redacted]

Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was held by several different groups, including Dr. Goodman and the National Research Council. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data are available for these groups to see and arrive at their own conclusions on our analyses and interpretation.

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SURYAN R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, Phoca vitulina richardii, to disturbance. Fisheries Bulletin 97:332–339.

Bill Jackson/FTCOLLINS/NPS
02/06/2009 07:58 AM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject Fw: Some Comments

Bill Jackson
Chief, Water Resources Division
Natural Resource Program Center
National Park Service
970-225-3503
970-214-5870 (cell)

—— Forwarded by Bill Jackson/FTCOLLINS/NPS on 02/06/2009 08:57 AM ——

billjanej@[Ex 5]
02/06/2009 04:54 AM
GMT

To sarah_allen@nps.gov
cc: bill_jackson@nps.gov
Subject: Some Comments

Sarah:

As I figured, c3Portal is down again, which is why I'm replying from home email.

I've attached the Becker, Press, Allen "Response to Goodman" manuscript with a few pretty minor editorial suggestions in "track changes." Based upon my read of the Goodman January 18th memo to Susan Roberts (and the Lunny letter to Roberts), I think you've produced a very credible point-by-point rebuttal to most of the acqusations. I also think the paper will be very useful to both Bert and Dan in getting perspective on these latest allegations. [Ex 5] [Ex 5] I do have a couple of general comments, below:

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Ex 5 [redacted]

Ex 5 [redacted]

Ex 5 [redacted]

Yikes, it's late and I'm rambling. I'm not sure any of this is very useful, but it's time to push the send button. Let's talk tomorrow.

Bill

Goodman_response_Feb_2009-DRAFT_BJedits.doc

Don Neubacher/PORE/NPS
02/05/2009 04:49 PM

To Bill Jackson/FTCOLLINS/NPS@NPS
cc David Graber/SEKI/NPS@NPS, Sarah Allen/PORE/NPS@NPS
bcc
Subject Re: for review

Ex 5 [redacted]

final would have a cover. In this text, we cover both the misconduct allegations and clarify points regarding NPS research. Note the file to start with is on the far right.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Bill Jackson/FTCOLLINS/NPS

Bill Jackson/FTCOLLINS/NPS
02/05/2009 04:30 PM

To Sarah Allen/PORE/NPS
cc David Graber/SEKI/NPS@NPS, Don Neubacher/PORE/NPS@NPS
Subject Re: for review

Sarah: I've received the draft "Goodman Response" and 5 appendices and will start reading. A couple questions. Ex 5 [redacted]

Ex 5 [redacted] Second, to whom is this being sent (and who will be sending it?); will there me some sort of "cover" or transmittal letter? Bill

Bill Jackson
Chief, Water Resources Division
Natural Resource Program Center
National Park Service
970-225-3503
970-214-5870 (cell)

George Turnbull/OAKLAND/NPS
04/29/2009 04:27 PM

To Holly Bundock/OAKLAND/NPS@NPS, Jon Jarvis/OAKLAND/NPS@NPS
cc
bcc
Subject Fw: for internal review only--Goodman Response

---- Forwarded by George Turnbull/OAKLAND/NPS on 04/29/2009 04:26 PM ----

Don Neubacher/PORE/NPS
02/05/2009 04:33 PM

To George Turnbull/OAKLAND/NPS@NPS, Jon Jarvis/OAKLAND/NPS@NPS
cc
Subject for internal review only--Goodman Response

We are finalizing our draft response to the new allegations. Any thoughts? We Ex 5 [redacted]

Ex 5 [redacted]

Last file on right is the first one to read. Jon can we talk tomorrow?

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
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The National Park Service cares for special places saved by the American people so that all may experience our heritage.

---- Forwarded by Don Neubacher/PORE/NPS on 02/05/2009 04:31 PM ----

Sarah Allen/PORE/NPS
02/05/2009 03:21 PM

To David Graber/SEKI/NPS@NPS, Bill Jackson/FTCOLLINS/NPS@NPS
cc Don Neubacher/PORE/NPS@NPS
Subject for review

See [redacted] for review - You can call me anytime tonite or tomorrow - my home phone is Ex 6 [redacted] and Ex 6 [redacted]

App-A_tide_response.doc App-B_Becker_NRC_Sept_2008_slide 6.pdf App-C_Becker_MMS_letter_10-24-08.pdf App-D_dist plots new.pdf App-E_Rel

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

DRAFT Goodman Response Feb 5, 2009 FOR INTERNAL REVIEW ONLY – PRE DECISIONAL

NPS Response to Goodman 01/18/2009 Letter to NRC.

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David Press
Sarah Allen

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> *"For example, there was still a significant positive correlation … of disturbance rate with oyster harvest even when **removing the 2006 disturbance, four of the 2007 disturbances** (including two disturbances on one day in 2007 that the mariculture company challenged), and **four of the 1996 disturbances** (nine total) from the analysis""*

This allegation is absolutely [redacted] We sent the editor this sample paragraph before final re-acceptance of the paper. He approved, and it was included in the final paper. See attached email in **Appendix C** of this correspondence.

Furthermore, we addressed each one of Dr. Goodman's September 2008 criticisms directly to the Marine Mammal Science Editor, who in addition to reviewing them himself, passed them on to the Associate Editor and two original peer reviewers. Thus, the notion that we cherry picked data or misled the reviewers in any way is incorrect. In fact, we pointed the reviewers and editor to the Inspector General report, and the editor corresponded with the National Research Council and The California Department of Fish and Game. We also offered to the Marine Mammal Science Editor to review our raw data and NPS pinniped database [redacted] themselves [redacted] of Dr. Goodman's allegations. [redacted]

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The NPS pinniped database indicates **four** disturbances in 1996. Due to Dr. Goodman's query, we have realized that we accidently included two *potential* disturbances from 1996 in our calculations since they had a "disturbance = "Yes" entered in the database. In fact, there were 4 oyster related disturbances and 2 oyster related *potential* disturbances. We regret this error but it nonetheless does not impact the statistics or conclusions in any way. We will inform the editor of MMS of our error [redacted] and seek his guidance on whether a correction is warranted.

1996 is still the year with highest rate of disturbance, and the significance and correlation of the oyster harvest-disturbance rate remains exactly the same since we used ranks tests for the analysis. See **Appendix D** for original and new plots. Thus, Dr. Goodman's allegation that we purposely increased the number of disturbances in 1996 to "help" our statistics or create a more dramatic graph is completely inconsistent with the facts and the data.

We assume Dr. Goodman only counts two disturbances in 1996 (rather than four) because he characterizes two of the motorboat related disturbances as non-oyster related while we consider these to be oyster related. As is well known, only oyster company motor boats are allowed in the Estero without special permission and this closure has been in effect since the early 1990s. Goodman's statement that many fishing and recreational motorboats enter the estero is not supported by park records including law enforcement records, harbor seal monitoring records and park staff observations.

Further, cherry picking is again alleged because we did not analyze other disturbance sources in the estero (other than to note the relative frequency of human related disturbance is higher in the lower estero, since those lower estero haul-out sites are attached to the mainland). On November XX, we provided the NRC with justification for solely analyzing the mariculture related disturbances: See **Appendix E.**

5. Regarding the allegation of not following NPS and our stated QA/QC protocols: Dr. Goodman makes several assumptions regarding NPS protocols which are incorrect.

- The MMS paper clearly states that *count* data were filtered for date, observer experience, tide and weather. However, the disturbance data were not subject to these criteria. Disturbances can be recorded at any tide, weather, or observer experience level. Ex 5 [redacted] Ex 5

  In addition, for the purposes of the Becker et al. paper, we limited the count data we used to surveys collected on days with a 2.0 ft tide or less. For our analyses, we extracted the maximum count per survey, and we checked to ensure that the count occurred at a reasonable time in relation to the low tide time.

- Dr. Goodman has misunderstood NPS procedures for reviewing harbor seal data prior to analysis. All data that we receive from volunteers is entered into the database, and prior to analyzing and reporting the data, we review the *count* data to see if any of the surveys were of potentially poor quality and should be discarded from our analysis. Records are never discarded from the database, which remain important NPS records.

  Each survey is evaluated and assigned a "HighQualityCount?" value of "yes" or "no". A survey may be of poor quality and assigned a value of "no" for the following reasons:

  - poor visibility

- not all subsites were surveyed
- poor observer quality of *all* survey participants
- other comments noted on the datasheet, especially in regards to weather conditions

- The Volunteers' Experience - Dr. Goodman asserted that the volunteers (Mr. and Mrs. Leites) who surveyed on April 29, 2007 did not have more than one year of survey experience and that their first survey was on March 24, 2007. This is in fact the date of their first survey in *Drakes Estero*. The Leites, however, began volunteering with our program in April of 2006, spending most of their time at Bolinas Lagoon and Duxbury Reef. In addition, March 24 was not their first survey of the 2007 monitoring season. The databases that store these surveys were delivered to Dr. Goodman in his FOIA requests dated August 2007 and January 2008. In short, the Leites did meet our criteria of having at least on year of prior experience in our program before including their data for analysis.

- A key point that Dr. Goodman misunderstands is that although we review each disturbance record in the database for accuracy against the paper data sheet, we do not enforce the additional, above QA/QC procedures on the disturbance data. Recording and cataloging disturbances is essential to managing harbor seals within Point Reyes National Seashore. We have confidence that our first year observers, all of which must attend our trainings, have the ability to observe, for example, a motorboat flushing harbor seals off a sandbar. Furthermore, it is insignificant whether or not that disturbance occurs in poor weather conditions or at a high or low tide.

6. Regarding the allegation that the MMS paper title is incorrect. The paper clearly models data from 1997-2007, as the title describes. We include disturbance data from 1996 and 2008 Ex 5 [redacted] Ex 5 In fact, eliminating disturbance data that we had available (e.g., 1996 and 2008) would actually be cherry picking. It is difficult to see how including all available data is cherry picking.

7. Regarding use of a Spearman ranks test to test for correlation between disturbance rate and oyster harvest: Ex 5 [redacted] Ex 5 [redacted]

In closing, we note that in previous iterations of his statements, Dr. Goodman heavily critiqued our statistical modeling techniques, which are all standard modern practice. His critiques were closely reviewed by editors and peer reviewers at Marine Mammal Science and flatly rejected. He now primarily focuses on data handling and allegations of falsified data that were independently collected by several different volunteers and NPS staff. Ex 5 [redacted]

Ex 5 [redacted]

Ex 5 [redacted] Lastly, during the preparation of the MMS paper and NRC presentations, the database we were working with was held by several different groups, including Dr. Goodman and the National Research Council. We also offered it to the editor of Marine Mammal Science. Thus, there is no basis for the allegation that we are manipulating data; the raw data is available for these groups to see and arrive at their own conclusions on our analyses and interpretation.

JOHNSON, A., AND A. ACEVEDOGUTIERREZ. 2007. Regulation compliance by vessels and disturbance of harbor seals (Phoca vitulina).Canadian Journal of Zoology 85:290294.

SURYAN R. M., AND J. T. HARVEY. 1999. Variability in reactions of Pacific harbor seals, Phoca vitulina richardii, to disturbance. Fisheries Bulletin 97:332–339.

11/12/2008

To: National Research Council, Panel of Mariculture in Drakes Estero.

From: Ben Becker, David Press, Sarah Allen; Point Reyes National Seashore.

Re: Rationale for *not* modeling disturbances and counts in the entire Drakes Estero.

Becker, Press and Allen (MMS, in press) only modeled and considered disturbances in the upper estero (near oyster harvest activities) for the following reasons.

1. Subsites A, A1, OB, and UEN are the primary pupping sites for the Estero (see Figure 1). Thus, with one (and perhaps 2, OB and UEN) important pupping subsite potentially impacted by oyster harvest activities, this merited further investigation. Processes at subsite A were clearly related to attachment to the mainland. A1 was increasing (perhaps due to displacement from other sites such as A or others).

2. Plots of all 8 subsites in Drakes Estero from 1997 – 2007 indicate that the only subsites which experienced a significant decline since 2004 were subsites OB, UEF, and A (Figs 1-3). Subsite A was clearly reduced after attachment to the mainland in or around 2004 which resulted in several coyote predation events. Subsites OB and UEF had no other apparent changes other than proximity to increased oyster activities/harvest. DEM had a decline in 2006-2007, but had high inter-annual variation during the entire time series. Variation at DEM was likely because of changes in size and proximity to mainland due to wave action and tides at the mouth of the estero. Subsite L increased over time (especially in adult use), potentially related to increased visitor education on avoiding seal disturbance at the Limantour Beach access.

3. There was a clear and significant (proportions test or Fisher's exact test) increase in mariculture related disturbances in the upper estero (OB, UEF, UEN). During March-May of 2000-2004, anthropogenic, non-airplane disturbances were limited to one kayak, one clammer, and one oyster related. Then from March-May, 2005-2007, all anthropogenic, non-airplane disturbances, were related to mariculture with one in 2006 and six in 2007. This increase in mariculture related disturbances coincided with a decrease in adult and pups seals counts at subsite OB (and UEF), which warranted further investigation.

4. It is essential to model density-dependence. However, if considering all subsites, then it would not be possible to use the lower-middle estero as a control for density-dependence since all counts could not be assumed independent of the other seven sites (seals do of course move around and a loss at one site would likely result in an increase at another site). Furthermore, other regional colony data prior to 2000 had not been fully compiled before preparation of the manuscript. Nonetheless, local density-dependence (lower-middle estero) is more desirable since it more likely to reflect local processes in the estero because it (1) eliminates other confounding factors such as disturbance effects at other colonies, and (2) is closer, more similar habitat.

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5. Modeling all sites and linking to mariculture would be a form of data dredging (several reviewers indicated this). We chose instead to follow an *a priori* multiple competing hypotheses approach.

6. Modeling disturbances without *a priori* hypotheses can be misleading because disturbance events require both a disturbance source *and* the presence of seals to disturb. This is illustrated clearly at subsite A: as the island attached to the mainland and seals began to abandon the subsite after 2004, disturbances also decreased.

Three figures follow

Fig 1. Mean (SE) seal **pups** at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

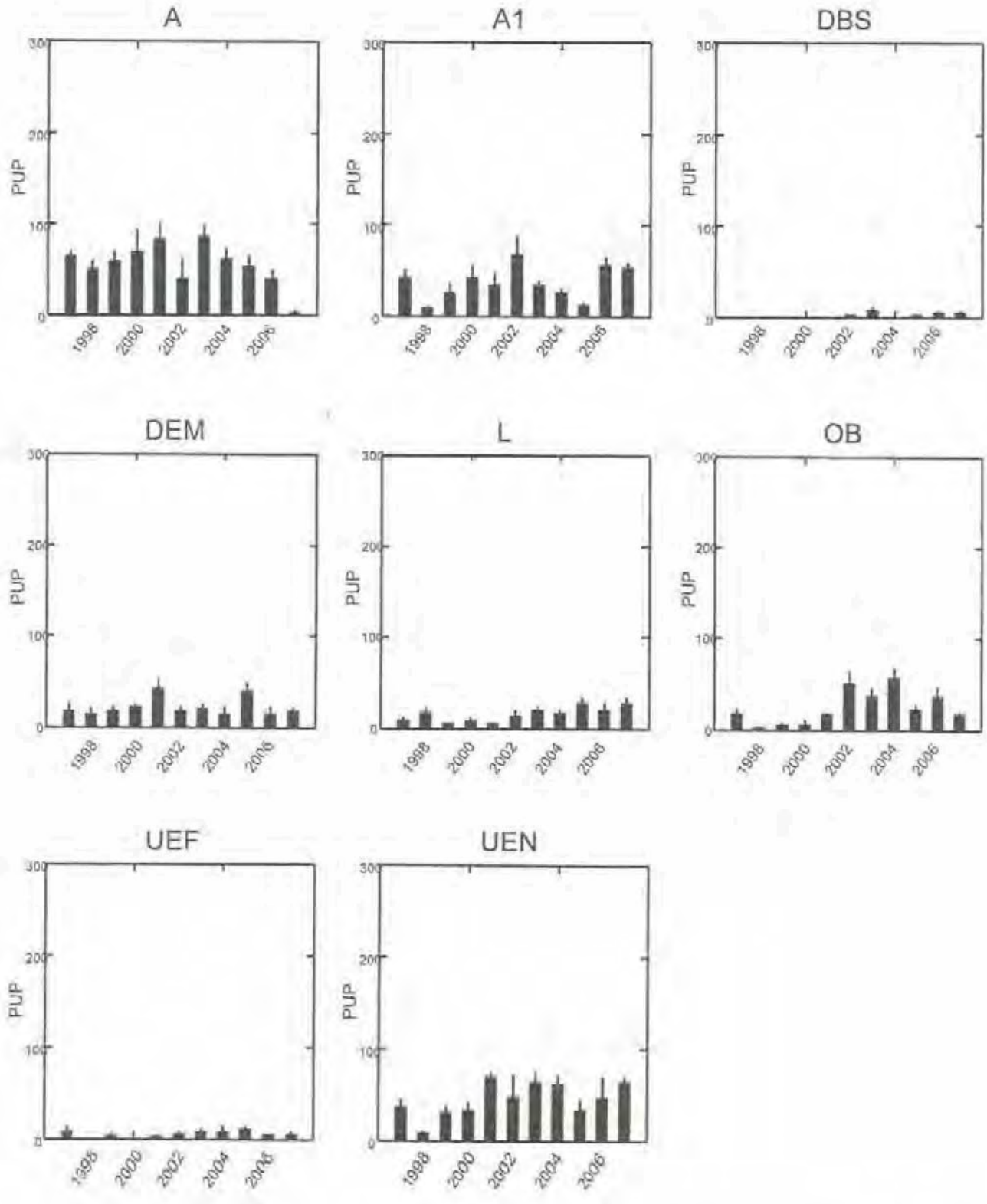


Fig. 2. Mean (SE) **adult** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.

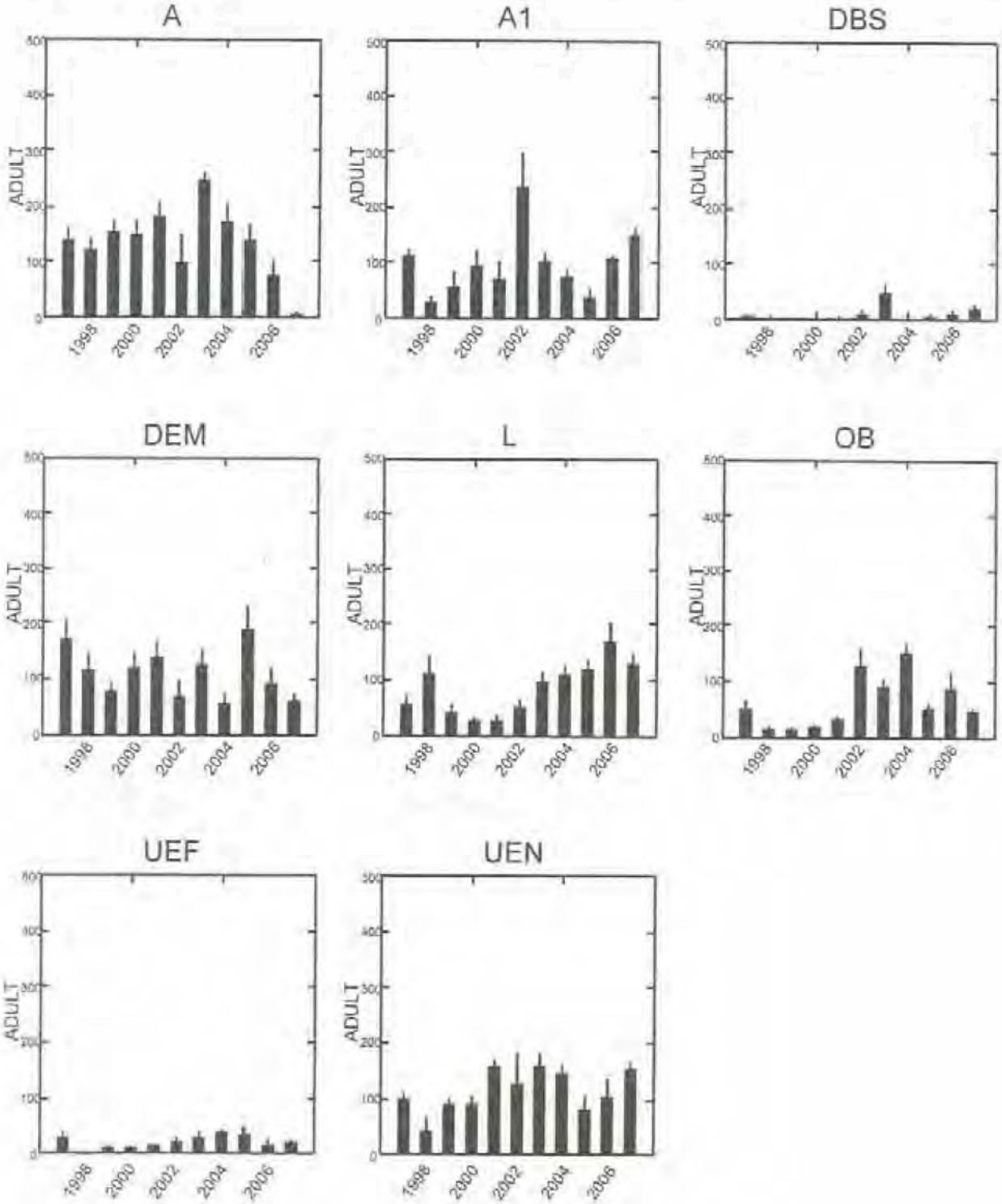
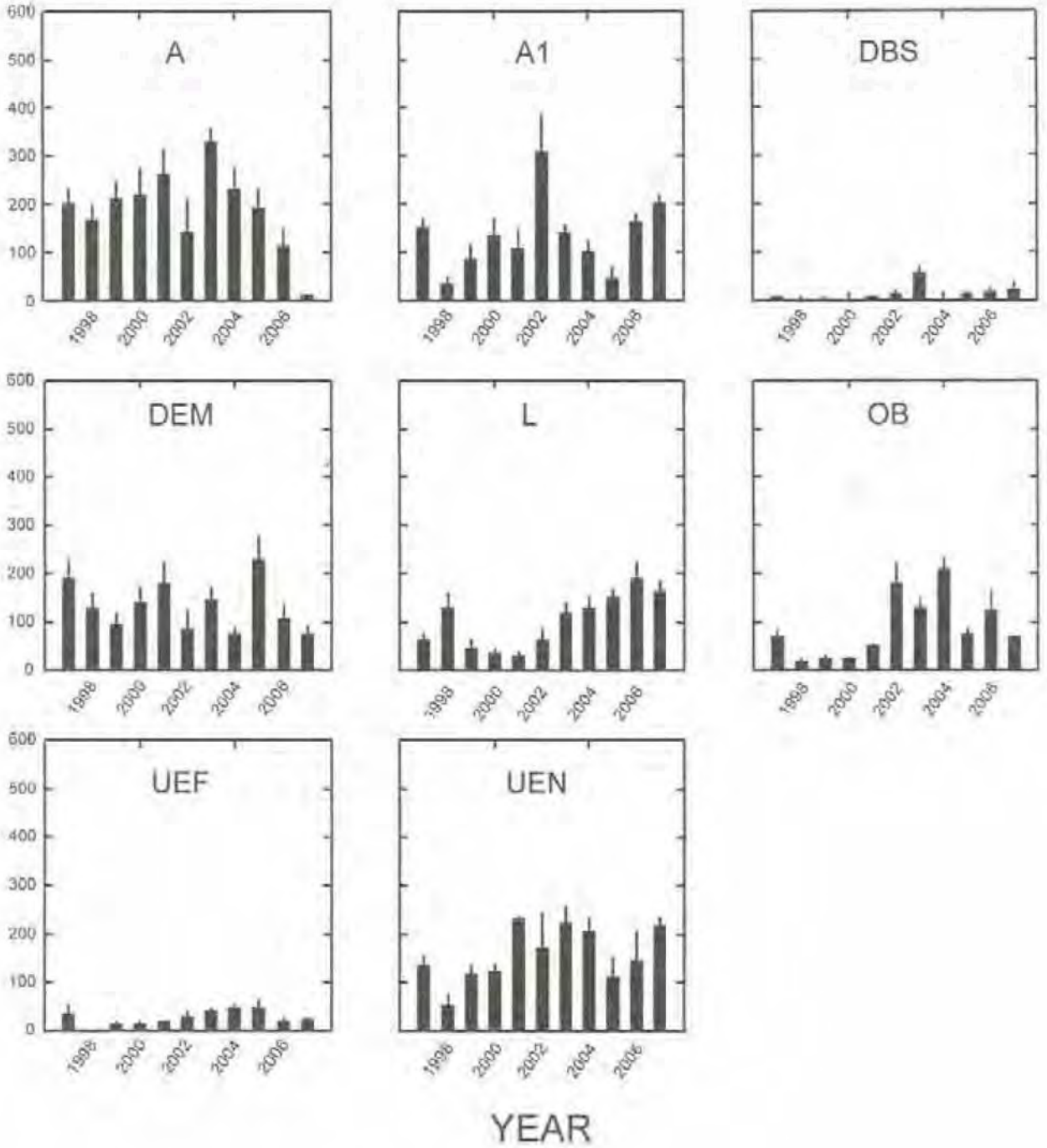
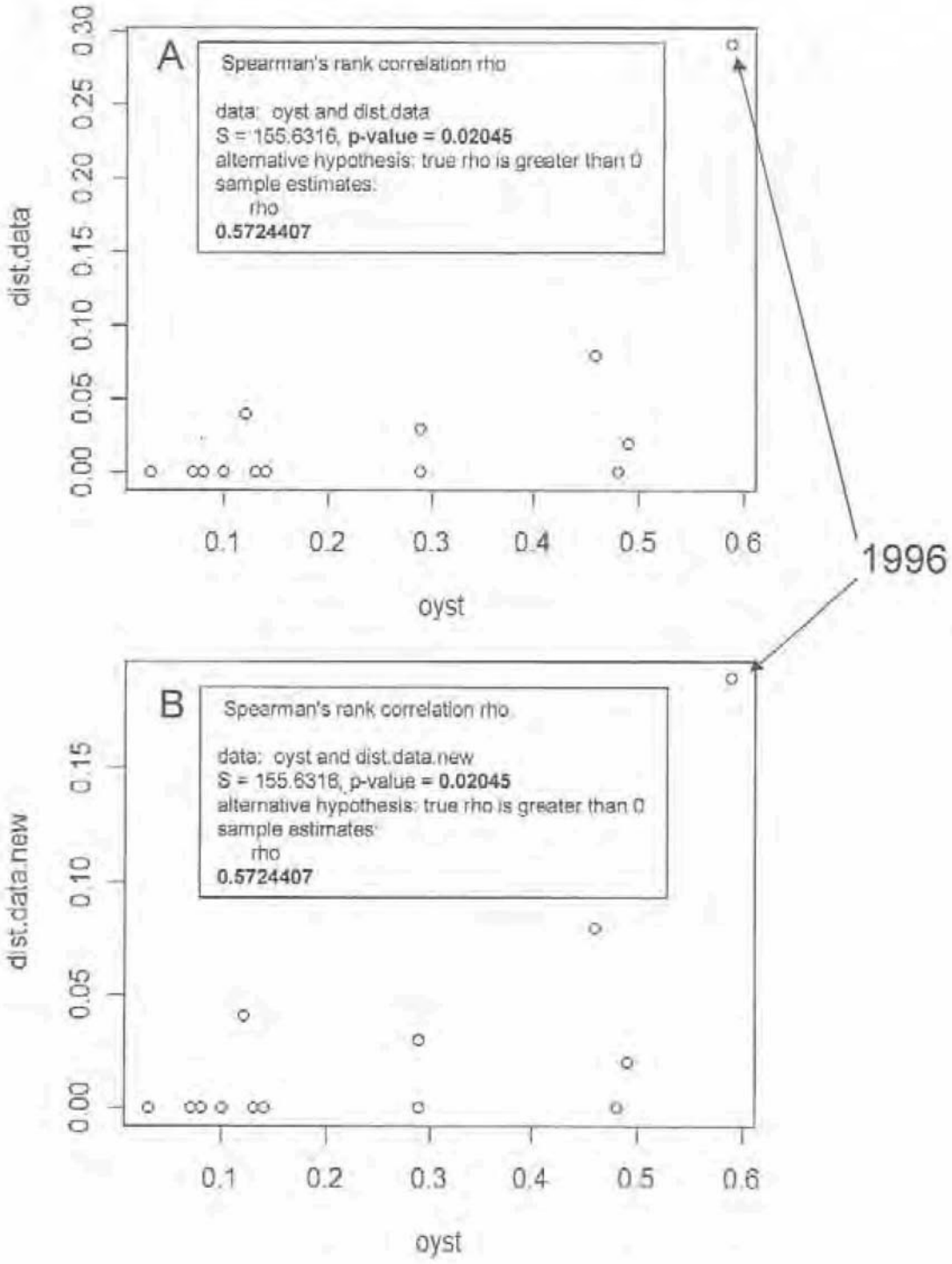


Fig 3. Mean (SE) **total** seals at subsites in Drakes Estero during April 15 – May 15 of each year from 1997 - 2007.



Appendix D. (A) Original plot used in MMS paper with 6 disturbances in 1996 and (B) corrected plot with 4 disturbances in 1996. Note that 1996 is still by far the highest point, which is why the statistics have *no difference* between datasets. Note that the y-axis scale changes between plots. In the first version (MMS paper), we accidently counted two *potential* disturbances as *actual* disturbances. "Oyst" is annual lbs. oysters harvested x 10^{-6}. See text for details.



Dear Dr. Boness,

Below is an outline of the substantive changes to ms #2668 discussed with either you or proposed by us and accepted by the reviewers. Please note that I used the previous MMS copy edited version as a starting point, hence the formatting style. Because of this, footnotes appear at the end of the document as endnotes. I have listed the most substantive changes in **bold.**

Introduction:

No substantive changes

Methods:

1. **We now use the updated oyster harvest value for 2007.**
2. **Lines 174-185: We now include disturbance data for 1996 – 2008. Previous paper only had 2000-2007. Count data modeled for 1997-2007 (as before) but we discuss 1996 and 2008 data in the discussion.**
3. **Lines 207 – 212: Description of new tests used to analyze disturbance data as proposed in previous MMS correspondence.**
4. Lines 219-240: Clarified data handling.
5. Lines 257-265: Clarified density dependence data used in models.
6. **Lines 266-275: Description of how we look at density dependence on a daily basis but also investigate effect on an annual mean basis. Description of how we model oyster harvest in the same year, but also investigate 1-year lag.**
7. Lines 303-307: Description of regression tree methods.

Results:

1. Lines 312-318: Shortened first paragraph
2. **Lines 319-329: Results of *oyster harvest vs. disturbance* correlation and rank tests. These are all now based on disturbance *rate* rather than *frequency*. We illustrate here that omitting up to nine of the disturbances (including the one in 2006 and 2/3 of those 2007) still would result in a significant increase in disturbance with increase in oyster harvest. Also see Figure 2B. We also note that this includes on lines 325-326:** "including two disturbances on one day in 2007 that the mariculture company challenged". Please let us know if this is OK or if you have a different idea for this statement. Alternatively, we could leave the parenthetical statement out and just leave the part that illustrates dropping many of the disturbance events still results in a significant relationship.
3. Lines 333-351: New GLM results using updated 2007 oyster harvest value and no time lag for oyster harvest. All model rankings are similar to previous paper.
4. Lines 355-364: GLM analyses also redone to test 1-year vs no year lag effects of oyster harvest, and using density dependence as a daily or annual value. All results were robust to these different approaches with Oyster always being

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important in the best models. We focus on same year oyster harvest values, though.

5. Lines 356-373: UEN best model (although weak fit) includes oyster harvest.
6. Lines 374-381: We now report a regression tree that corroborates GLM models. Tree shows lower counts with higher oyster harvest. This replaces prior 2002-2004 to 2005-2007 2-sample tests (t-test, Wilcoxon) comparisons in previous version.

Discussion:

1. Shortened first paragraph.
2. Lines 463-476: Discussion of potential reasons why lower performance of predictive model (OB model predicting UEF) when oyster harvest is high.
3. Lines 527-532: Discussion of middle-lower estero counts related to density dependent effects at upper subsites.
4. Lines 546-553: Presentation of unmodeled 1996 count data at OB and how it is low during the highest oyster harvest and the highest disturbance rate during the study period.
5. **Lines 554-577: Discussion of how small increase in 2008 subsite OB count data is consistent with restricted mariculture activity near the subsite due to a new (for 2008) California Coastal Commission guideline, and how disturbances subsequently dropped to only 1 in that year. We also suggest that this operational shift may weaken the simple use of "oyster harvest" as a proxy for modeling counts in the upper estero beyond 2007. Nonetheless, the modeling for 1997-2007 is unaffected.**

References:

1. Added Allen *et al.* 1989 (ENSO effects os seals) and Bejder *et al.* 2006 (Disturbance causing local redistribution of Dolphins).

Tables:

1. We have removed table 1, as figure 2B now illustrates these patterns and tests. We indicate in the results that human disturbance rates are higher in middle-lower estero.
2. Table 1 (Table 2 in previous version): updated with all new models, rankings are essentially the same.
3. Table 2 (Table 3 in previous version): updated with new best model coefficients.

Figures:

1. Figure 2A: Now has corrected 2007 oyster harvest value.
2. Figure 2B: New, as proposed to reviewers in previous MMS correspondence. Replaces previous figure 2A.
3. Figure 3A: Similar to previous figure 3A, but is a scatter plot rather than a bar chart.
4. Figure 4: Regression tree replaces bar chart showing recent declines at OB. The new model is described in the text.

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5. Figure 5: Drakes Estero Panel has been redone. There was a scaling problem (software bug) in the previous version when drawing multiple panels at the same scale that showed~15-20% fewer seals than reality at only drakes estero. We also added black bars to the Drakes Estero panel to indicate count pattern for the middle-lower estero used for density-dependence calculations.

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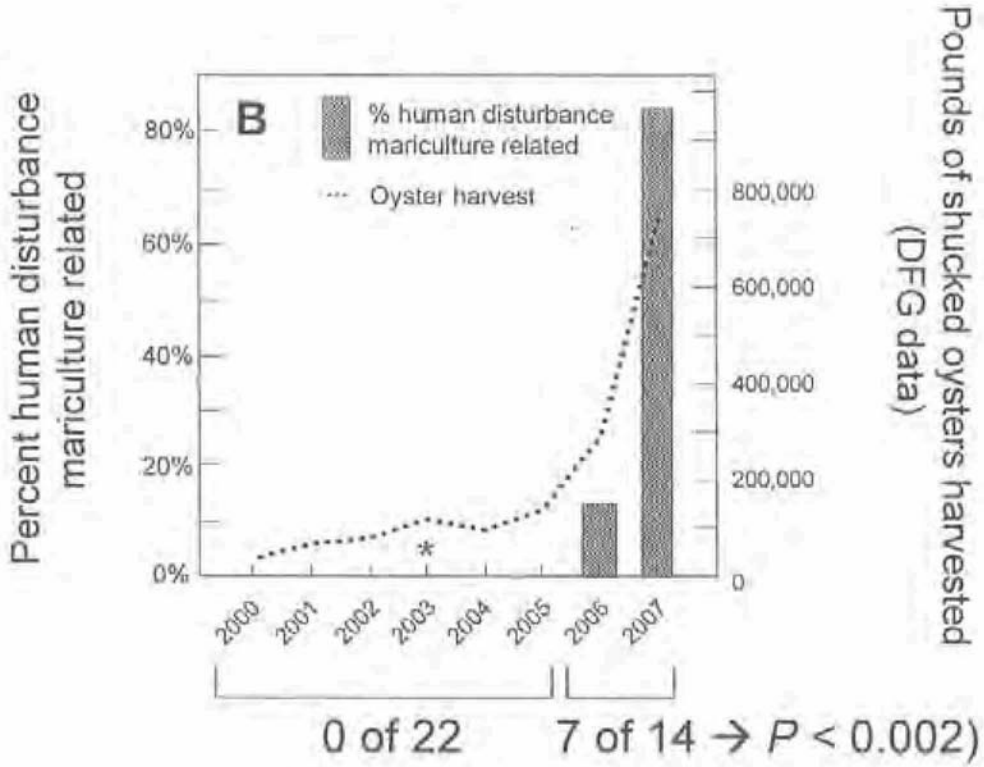
Increase in percentage of human-related disturbance in upper estero (OB, UEN, UEF) due to mariculture: 2000 - 2007



- High statistical power ($1-\beta > 0.91$ at $\alpha = 0.05$)
- No mariculture related disturbances in middle-lower estero
- Human disturbance is less frequent in upper estero (~1-2/subsite/yr) than the middle-lower estero (~5 subsite/yr)

* *Possibly one disturbance in 2003*

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Appendix A. On January 18, 2009, Dr. Corey Goodman submitted a document to the National Academy of Sciences entitled "New Information Shows that the National Park Service Committed Scientific Misconduct in the Documents it Presented to Your Panel".

Dr. Goodman devotes much of this document to discrediting harbor seal data collected in Drakes Estero on April 29, 2007. On this date, volunteers noted two disturbances by Drakes Bay Oyster Company (DBOC) when workers dropped oyster bags at a growing site from their motorboat. Dr. Goodman challenged the validity of the April 29 survey based in part on the tide chart for that day and subsequent analysis of tidal patterns in Drakes Estero. Dr. Goodman concluded that no such disturbances could have occurred on April 29, 2007 because the tide was too high.

The April 29 survey began at 9:30 AM and concluded at 3:15 PM, as noted in the comments on the datasheet for that day. The harbor seal monitoring program standardizes its tides to San Francisco (Golden Gate Bridge), and the low tide for April 29 was 1.46 ft at 4:25 PM. The first DBOC disturbance occurred at 12:50 PM from DBOC's motorboat. The observers noted that at sandbar UEN, "mom and pup flushed when boat accelerated toward Bull Point from N. end of OB channel after throwing out bags." The second DBOC disturbance, again at sandbar UEN, occurred at 1:40 PM when the "boat returned, threw more bags, left again." The observers conducted the first and only full count of the harbor seals in Drakes Estero at 2:15 PM, documenting a total of 751 harbor seals. The events of the April 29 survey are summarized in Table 1.

Table 1. Summary of significant events on April 29, 2007. Low tide is standardized to San Francisco (Golden Gate Bridge).

Time	Time before low tide	Survey Event
9:30 AM	6 h 55 m	Start of observations.
12:50 PM	3 h 35 m	First DBOC disturbance at sandbar UEN.
1:40 PM	2 h 45 m	Second DBOC disturbance at sandbar UEN.
2:15 PM	2 h 10 m	Complete harbor seal count.
3:15 PM	1 h 10 m	End of observations

DBOC attempted to better understand how the tides may have looked on April 29, 2007 by asking John Hulls of the Point Reyes Light newspaper to conduct an experiment. Mr. Hulls selected tides on January 1 and 2, 2009 and measured the high tide at sandbar OB to determine that there was an approximate 1.3 hr lag compared to the Point Reyes NOAA buoy tide chart. More importantly, Mr. Hulls measured the tidal heights at which the very highest points on UEN and OB first rose above the water, which were at +3.0 ft and +2.0 ft, respectively. Based on Mr. Hulls' observations in January 2009, Dr. Goodman went back in time to April 2007 and concluded that the sandbars in Drakes Estero must have been underwater at the time of the April 29 disturbance events.

Ex 5 [redacted] Dr. Goodman and Mr. Hulls missed several important points in their attempts to model the tides at subsites OB and UEN in Drakes Estero. First, two dates is a very small sample size from which to develop these types of tidal predictions. Second, coastal winds and barometric pressure, which may affect tidal water level, were not taken into account. Lastly, it is incorrect to assume that the sandbar heights and configurations did not change between 2007 and 2009. The sandbars naturally shift on a seasonal and, annual basis, and larger scale shifts may dominate for several years.

Tidal modeling and developing tidal predictions is a fairly sophisticated science that must incorporate a variety of atmospheric, hydrographic and oceanographic driving forces. The NPS relies on our colleagues at NOAA, USGS, and university experts for this type of guidance. We find Mr. Hulls' experiment without merit and find it unreasonable for Dr. Goodman to discredit the April 29, 2007 survey based on the incomplete tidal modeling of Mr. Hulls.

The NPS has conducted its own review of the April 29, 2007 survey and associated tides because of the questions raised by Dr. Goodman. However, the NPS review of the survey took a different approach than Dr. Goodman and Mr. Hulls. We identified six dates during the peak breeding season in 2008 that closely match the tide chart for the April 29 survey. Table 2 shows that the dates selected (April 17-19, 2008 and May 2-4, 2008) more closely match April 29, 2007 than the tides selected by Mr. Hulls for study on January 1 and 2, 2009. Harbor seal use of Drakes Estero, particularly in the middle estero where the April 29 disturbances occurred, is limited in January, and we felt that it was more appropriate to select dates during the harbor seal breeding season for comparison. Harbor seals haul out more often and for longer time periods during the breeding and molt seasons from March 1 to July 31.

Table 2. Low tide data for April 29, 2007 and a series of dates selected for study by NPS and DBOC. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Low Tide Time	Low Tide Height	Type
April 29, 2007	4:25 PM	1.46 ft	Original Survey
April 17, 2008	4:22 PM	0.89 ft	This Study
April 18, 2008	4:56 PM	1.28 ft	This Study
April 19, 2008	5:29 PM	1.68 ft	This Study
May 2, 2008	3:30 PM	1.01 ft	This Study
May 3, 2008	4:13 PM	1.37 ft	This Study
May 4, 2008	4:56 PM	1.74 ft	This Study
January 1, 2009	8:16 AM	2.82 ft	DBOC Study
January 2, 2009	9:17 AM	2.51 ft	DBOC Study

For the six dates selected by NPS for review (Table 2), the NPS examined date and time stamped photographs taken of Drakes Estero by remote camera. The remote camera was on-site at Drakes Estero for the majority of the 2008 breeding season, capturing images

every minute from around 7 AM to 7 PM. The camera view encompassed the "lateral" channel with sandbar OB in the foreground.

Examination of the photo series for the selected dates shows that for a low tide similar to that on April 29, 2007, the OB sandbar becomes exposed at the low tide between approximately 3.5 and 2.5 hours prior to the low tide for San Francisco (Table 3).

Table 3. Time that harbor seals are first observed at sandbar OB and time that OB is just exposed by the falling low tide on six dates chosen for review by NPS. The time before the low tide is included in parentheses. Tides are standardized to San Francisco (Golden Gate Bridge).

Date	Time of First Harbor Seals	Time Sandbar First Exposed	Low Tide Time	Low Tide Height
April 17, 2008	12:23 PM (3h 59m)	1:17 PM (3h 5m)	4:22 PM	0.89 ft
April 18, 2008	2:01 PM (2h 55m)	2:15 PM (2h 41m)	4:56 PM	1.28 ft
April 19, 2008	1:43 PM (3h 46m)	2:25 PM (3h 4m)	5:29 PM	1.68 ft
May 2, 2008	11:52 AM (3h 38m)	11:58 AM (3h 32m)	3:30 PM	1.01 ft
May 3, 2008	12:54 PM (3h 19m)	13:05 PM (3h 8m)	4:13 PM	1.37 ft
May 4, 2008	2:18 PM (2h 38m)	2:40 PM (2h 16m)	4:56 PM	1.74 ft

Therefore, the NPS concludes that subsite UEN may have been slightly underwater at the time this subsite was first disturbed at 12:50 PM on April 29, 2007, which occurred about 3.5 hours before the low tide (Table 1). However, if we were to follow the logic of Dr. Goodman and Mr. Hulls, who conclude that the UEN sits 1 ft higher than OB, then based on our photographs, subsite UEN would have been well exposed by the time of the first disturbance.

In regards to harbor seal use of the sandbars, on each of the six dates selected by the NPS, harbor seals are clearly seen in the photographs using the OB sandbar *before* the sandbar is actually exposed by the low tide (Table 3). On April 17, 2008, for example, seals were present on the sandbar 40 minutes before it was first exposed by the low tide. By the time the OB sandbar was just exposed, up to a dozen harbor seals could already be seen resting on the sandbar. If Mr. Hulls had conducted his tidal experiment in Drakes Estero at the correct time of year, he too would likely have observed this pattern of harbor seal behavior and drawn different conclusions about the validity of the April 29 disturbances.

Ex 5 [redacted]

In summary, although our review indicates that the UEN sandbar may have been underwater at 12:50 PM on April 29, 2007, the disturbance record for that day remains reliable based on our review of tidal data and seal behavior at that site. Although Dr. Goodman insists that "swimming harbor seals cannot be flushed off of a sandbar that is underwater", we have photographic documentation to the contrary. By the time the second DBOC disturbance occurred on April 29, 2007 at 1:40 PM and the complete harbor seal count occurred at 2:15 PM, the sandbars were, without question, well exposed.

To illustrate the findings of our inquiry, Figures 1-3 depict sandbar exposure and harbor seal presence at sandbar OB on a falling tide. Although we do not have similar images taken of sandbar UEN, we believe that these photographs provide solid evidence that the April 29, 2007 survey was accurate.

Figure 1. Harbor seals present on sandbar OB prior to exposure of the sandbar to the falling tide. Photograph taken at 12:47 PM on April 17, 2008, 3 hours and 35 minutes

prior to a low tide of 0.89 ft at San Francisco. The first disturbance on April 29, 2007 also occurred 3 hours and 35 minutes before the low tide .

Figure 2. Harbor seals present on sandbar OB on the falling tide. Note paired heads of seals which are likely females with pups. Photograph taken at 2:44 PM on April 19, 2008, 2 hours and 45 minutes prior to a low tide of 1.68 ft at San Francisco. The second disturbance on April 29, 2007 also occurred 2 hours and 45 minutes before the low tide.

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Figure 3. Harbor seals present on sandbar OB on the falling tide. Photograph taken at 1:20 PM on May 2, 2008, 2 hours and 10 minutes prior to a low tide of 1.01 ft at San Francisco. The full count on April 29, 2007 also occurred 2 hours and 10 minutes before the low tide.

Major points on the use of wildlife cameras at Point Reyes National Seashore

- Wildlife observation cameras are not new to Point Reyes National Seashore: the park has used them over the years for inventory and monitoring, research, and management. This has included cameras on harbor seals, elephant seals, elk, and wildlife in general. The park also used remote cameras extensively after the Vision Fire in 1995, and most recently on the Giacomini Wetland restoration project.

- Cameras are a common tool used in wildlife management/study everywhere. At least 30 parks use cameras. For example, at Santa Monica Mountains National Recreation Area, the animal ecology team uses around 60-70 infrared cameras to detect and monitor wildlife while at Yellowstone National Park, six cameras were used last winter to collect data on bison movement along travel corridors. Use of cameras in parks is widespread.

- The Drakes Estero cameras were put out to understand why there was a drop in harbor seal numbers at the OB site and UEF site (these are seal pupping sites within Drakes Estero) and to document if there were disturbances that might help explain the drop in numbers.

- The cameras - in Drakes Estero and elsewhere - are camouflaged to protect against vandalism, theft, and accidental disturbance by cattle, wildlife, birds, etc.

Timeline of camera use

  - 2010: there is one camera at Drakes Estero right now being used by a student from San Francisco State University for her Master's thesis focused on harbor seals and disturbance. Note: this camera is no longer collecting data Ex 5 [redacted] Ex 5 [redacted]

  - 2009: one camera focused on the OB haul out site

  - 2008: there were two cameras at Drakes Estero, aimed at seal haul out sites in the upper estero, referred to as OB and UEF (see attached map) - these are two major harbor seal haul out areas that have shown the largest declines in seal numbers. These declines are documented in two peer reviewed scientific papers; one published in 2009, one to be published in 2010.

  - 2007: there was one camera focused primarily on the OB site.

  - Pre-2007/late 1990's: cameras, both still and video, have been used at Drakes Estero and other sites within the park for wildlife monitoring and inventory, and for other scientific purposes.

- The allegations that these cameras were not focused on haul out sites is incorrect - the images have seal haul out sites in the foreground; they can show, when present, boats in the

background - any boat would show up, kayak, oyster boat, or whatever is out there. Attached is an image that shows a kayak. This camera - when functioning - would pick up any disturbance.

- The cameras were active during the breeding season, generally February-July. They are not active the other times of the year.

- Images from the cameras have not yet been analyzed in any depth - a handful of images have been used publicly: in the Marine Mammal Commission meeting that happened at the park in February 2010, and in a briefing statement prepared at the park this time last year (May 2009), in response to Dr. Corey Goodman's letter to the National Research Council.

- An additional note: the briefing statement, which references the cameras, has been posted since at least January 29, 2010 on the publicly accessible Marine Mammal Commission web site. The NPS provided the May 2009 briefing statement to the Marine Mammal Commission on December 23, 2009.

Ann Nelson/PORE/NPS
07/30/2010 07:44 AM

To
cc
bcc
Subject Fw: CDFG Letter

Cicely Muldoon/PORE/NPS
07/22/2010 01:55 PM

To Natalie Gates/PORE/NPS, George Turnbull/OAKLAND/NPS, Brannon Ketcham/PORE/NPS@NPS, Gordon White/PORE/NPS, John A Dell'Osso/PORE/NPS, Suzanne.Carlson@exchange.sol.dol.gov
cc
Subject Fw: CDFG Letter

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment

---- Forwarded by Cicely Muldoon/PORE/NPS on 07/22/2010 01:54 PM ----

"Kevin Lunny" <kevin@drakesbayoyster.com>
07/22/2010 01:50 PM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc "Nancy Lunny" <nancy@drakesbayoyster.com>
Subject CDFG Letter

Dear Cicely,

Attached is our response to your letter to Fish and Game.

I left a message on you voice mail. I wanted to talk to you before I sent this to you. Please give me a call after you have had a chance to read our letter.

Thank you,

Kevin 20100722 DBOC to Cicely Muldoon.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard
Inverness, CA 94937
(415) 669-1149
kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

July 22, 2010

Cicely Muldoon
Superintendent
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94937

Dear Cicely,

We were surprised to receive a copy of a letter from your office, dated June 28, 2010, to John McCamman, Director, California Department of Fish and Game (CDFG), regarding our mariculture leases with the State of California. We wish we could have responded sooner, but we did not receive a copy of the letter until July 15, 2010, two weeks after-the-fact.

1. DBOC submitted its request to the California Department of Fish & Game first, per the terms of the Special Use Permit approved by the National Park Service in 2008

At the outset, we want to respond to the concern voiced in your letter that DBOC should have submitted its requests to modify the boundaries of its lease and to alter mariculture use in Lease No. M-438-01 to include Olympia oysters and purple-hinged rock scallops to the National Park Service (NPS) first before contacting CDFG. The process outlined in your letter is contrary to the process outlined in the Special Use Permit (SUP) that NPS issued in 2008. Section 4(b)(vi) of the SUP states,

> Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

This provision clearly spells out a procedure, followed by DBOC in this instance, for DBOC to first seek to modify leases with CDFG and then once any modification is approved by CDFG, to seek approval by NPS. This process makes good sense because CDFG has special expertise with

mariculture activities, an expertise NPS lacks. The correct process is outlined in the SUP, and we followed it.

Given the above, the suggestion in your letter that NPS should "make a determination" about our proposed modifications to the lease before any consideration by CDFG is inappropriate. The process your letter suggests violates the express terms of the SUP that your office approved. Not only that, but the added delay will impose significant costs on DBOC.

2. DBOC's request does not involve an expansion of use

Our request to address the lease boundary corrects an error that was made many decades ago when a prior survey inadvertently excluded portions of Bed 6 that were already under cultivation from the lease area. The oyster racks in this area have been in production since at least the 1950s. We are proposing to correct the lease boundary to include this area and to remove an equal amount of area from the lease in the vicinity of where the harbor seals haul out. The net effect is to increase the buffer zone for harbor seals from 300 feet as recommended by the Marine Mammal Act to 500 to 1000 feet. The boundary change would not result in any expansion of use.

We have also requested authorization from CDFG to cultivate Olympia oysters and Purple Hinged Rock Scallops within Lease No. M-438-01. Both species are indigenous to Drakes Estero and can be found today under natural conditions. In fact, Purple Hinges Rock Scallops are already authorized for cultivation within Lease No. M-438-02. No new culture methods will be required to cultivate Olympia oysters or Rock Scallops. Nor will there be any expansion in production, as the Olympia oysters and Rock Scallops will displace Pacific oysters currently under cultivation.

We are particularly excited by the prospect of cultivating Olympia oysters. Olympia oysters are the only native oysters on the Pacific coast. If given approval, DBOC will operate the only hatchery of Olympia oysters in California.

*****

We note that your letter seeks to improve communication and coordination with CDFG about the leases in Drake's Estero. We trust you wish to improve communication and coordination with DBOC as well. During your recent visit to the Estero on July 14, 2010, we felt as if progress had been made in that regard. Indeed, during your visit we discussed the requests we had submitted to CDFG. You can therefore understand why we found your letter disappointing, given that it mischaracterizes the facts and disregards the process the SUP so very clearly spells out. We respectfully request that you withdraw your letter to John McCamman.

Sincerely,

Kevin Lunny Nancy Lunny

Cicely Muldoon/PORE/NPS
07/28/2010 08:34 AM

To Ann Nelson/PORE/NPS
cc
bcc
Subject Fw: 7/26/10 Letter Regarding NPS Camera Data

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
1 Bear Valley Road
Point Reyes Station, CA 94956
phone (415) 464-5101
cicely_muldoon@nps.gov
Commitment to mission is commitment to ...

---- Forwarded by Cicely Muldoon/PORE/NPS on 07/28/2010 08:34 AM ----

"Kevin Lunny" <kevin@drakesbayoyster.com>
07/26/2010 09:06 AM

To <Cicely_Muldoon@nps.gov>
cc "'Lunny, Nancy'" <nancy@drakesbayoyster.com>
Subject 7/26/10 Letter Regarding NPS Camera Data

Hi Cicely,

Corey and I are still anxious to meet with you to go over the photographic data.

Kevin 20100726 DBOC to Cicely Muldoon.pdf

Drakes Bay Oyster Company

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kevin@drakesbayoyster.com
nancy@drakesbayoyster.com

July 26, 2010

Cicely Muldoon
Superintendent
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94937

Dear Cicely,

On June 6, 2010, we became aware of the 2008 hidden camera at Drakes Estero. On June 7, NPS confirmed the existence of one camera. A few days later NPS reported the existence of two cameras to a local newspaper reporter. On June 22, by email to the Marine Mammal Commission (MMC) and to us (DBOC), you reported that the first camera was installed in 2007, which was not previously reported or known (and not mentioned in the May 1, 2009 NPS Briefing Statement or at the June 7, 2010 MMC meeting). And on June 30, also by email to MMC and us, you informed us that this camera was installed for the first time on May 5, 2007.

Both NPS Regional officials and members of your staff told the local press that the purpose of the camera(s) was "*to improve seal observations and reduce disturbances at the different sites.*" (West Marin Citizen, "Hidden cameras discovered observing Drakes Estero")

In the four years of this NPS experiment, the cameras have taken approximately 250,000 photographs, all focused on, among other things, key oyster growing areas in Drakes Estero and key channels used by oyster boats going to and from the oyster growing regions.

According to NPS records from the Inventory and Monitoring Harbor Seal Database, as reported to the MMC and DBOC, there are only two disturbance events recorded that allege disturbance from DBOC workers, boats or oyster activities during part of four harbor seal pupping seasons from May 5, 2007 to the presence – one on May 8, 2007 and the other on March 14, 2008.

Since cameras were placed to look at disturbances beginning May 5, 2007, the following is asked regarding the two disturbance events of May 8, 2007 and March 14, 2008:

(1) Did any of the following:
- (a) Jon Jarvis
- (b) David Graber
- (c) Don Neubacher
- (d) Sarah Allen
- (e) David Press
- (f) Ben Becker
- (g) Unnamed student(s)

(h) and/or others at DOI and/or NPS including, but not limited to the Office of the Solicitor

request, prepare, or receive any reports, memorandums, summaries, emails, analyses, evaluations and/or other materials or documents regarding the harbor seal disturbance events of May 8, 2007 or March 14, 2008? If so, for each person or category of person identified above, please provide copies of all documents, emails, and materials.

(2) Who analyzed the photographs from May 8, 2007 or March 14, 2008? Who compared the photographs to the disturbance events as recorded on the observer Disturbance forms?

(3) What instructions were given to the reviewer of the photographs? What were they looking for? What comparisons did they make? Identify all who participated in the review. Provide the review documents, emails and materials.

(4) How was the review conducted? If the photographs were enlarged or manipulated in any fashion, please describe in detail and provide all documentation.

(5) Did the analysis lead to reviews, comparisons or analyses of NPS harbor seal observer's Disturbance Reports for the disturbance events on May 8, 2007 or March 14, 2008? If so, please provide it, along with all documents and materials, including emails, related to the review.

(6) To whom did the reviewer submit, circulate or otherwise provide these review(s)?

(7) Finally, did NPS share this information with anyone outside Interior and/or NPS and/or the Point Reyes National Seashore? If so, please identify the recipients and provide copies of (a) transmittal letters or other documents; and, (b) copies of the materials furnished.

This letter is focused on two disturbance dates – May 8, 2007 and March 14, 2008. By our estimate, this request involves, at most, about 50 of the approximately 250,000 photographs from the NPS Drakes Estero harbor seal photographic data files.

NPS has alleged that DBOC disturbed seals during this period. NPS has testified, published and used the data from these disturbances in peer-reviewed papers and other documents. At no time did NPS discuss or review these data or resulting documents with DBOC or the Lunny family prior to making public allegations and/or publishing this information in one form or another. DBOC, in the MMC process, is attempting to analyze the NPS allegations, review them, and understand them. These questions – and requested information and documentation – represent an effort on our part to validate these claims or demonstrate that they are not correct.

We request that every effort be made to provide full and complete answers. And, we further request that this information be expedited. As referenced at our recent meeting, and in other correspondence, we have obligations to the MMC and cannot fulfill those obligations absent the requested information.

Thank you.

Kevin Lunny Nancy Lunny

Cicely Muldoon/PORE/NPS
07/20/2010 09:33 AM

To "Kevin Lunny" <kevin@drakesbayoyster.com>, "'Nancy Lunny'" <nancy@drakesbayoyster.com>
cc tragen@mmc.gov, agresources@erols.com
bcc Ann Nelson/PORE/NPS
Subject Re: NPS 06/28/10 Letter to Fish and Game

Dear Kevin and Nancy:

First, let me thank you for spending the time to give me a tour of the oyster operation last Wednesday. It was good to meet one on one. It is clear that your passion for and knowledge of the oyster farm runs deep.

A few thoughts in response to your letter from this Sunday. I am copying Tim, as the Marine Mammal Commission is referenced, and as we all share a hope for improved communications. David, I'm copying you as well, as your signature block appears at the bottom of the letter signed by Kevin and Nancy.

I regret that you find our letter to CDFG so objectionable, it was certainly not intended to be, and I welcome further discussion on this. Although the park was not copied on your proposal, I thought as a matter of courtesy I should cc you on our response. We spoke last week of the complexity of permitting operations within the Estero. I would welcome a way to at least synchronize our approaches and to ensure we all understand where we are in the process.

In spite of your assertion, I fully support Tim Ragen's efforts to change the tone of this discussion, respect one another's viewpoints, stand down from independent courses of action, and pursue an adaptive management approach. Defining a collaborative approach among Estero stakeholders seems like a good place to start. We all care deeply about this extraordinary public resource, and share, I firmly believe, a commitment to its health. As I mentioned last Wednesday, a clear path to resolving the future of the Estero is in everybody's interest.

My sincere hope is that we can forge a positive working relationship, in spite of any differences we may have about the issues that surround the Estero. We have to start from a place of respecting one another's outlook on this very complex issue, finding those places on which we can agree, and defining how we can work together. Long after the current issues are behind us, and the lawyers and lobbyists have left the discussion, we will still be neighbors. Kevin, I thought you said it eloquently early on in our discussion last Wednesday, when you spoke of well intended people on both sides of this issue trying to do the right thing. I couldn't agree more. To me, this seems like a fundamental basis for a more positive discussion.

Sincerely,

Cicely

Cicely Muldoon, Superintendent
POINT REYES NATIONAL SEASHORE
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phone (415) 464-5101
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Commitment to mission is commitment

"Kevin Lunny" <kevin@drakesbayoyster.com>

"Kevin Lunny" <kevin@drakesbayoyster.com>
07/17/2010 06:34 PM

To "Cicely Muldoon" <Cicely_Muldoon@nps.gov>
cc "'Nancy Lunny'" <nancy@drakesbayoyster.com>
Subject NPS 06/28/10 Letter to Fish and Game

Cicely,

The NPS letter of June 28 to California Department of Fish and Game was received earlier today.

By this letter, you accomplish two things. First, you ratify Don Neubacher's approach to business here at Point Reyes -- needlessly impose delays, drive up costs and maximize conflict. Second, you unilaterally reject the efforts of Tim Ragen and the Marine Mammal Commission to improve the way business has been conducted and to improve relations.

Remarkably, you have now positioned NPS to oppose efforts to enhance the native oyster here in Drakes Estero.

The errors and distortions contained in the NPS letter will be addressed next week.

On Wednesday at the oyster farm, you offered words of cooperation. By this letter, you withdrew them.

Deeply saddened,

Kevin Lunny Nancy Lunny

David M. Weiman
Agricultural Resources
635 Maryland Ave., N.E.
Washington, D.C. 20002
(202) 546-5115
(202) 546-4472 fax
agresources@erols.com

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes Station, California 94956

IN REPLY REFER TO:
L1425

June 28, 2010 7/7/10

Jim McCamman, Director
California Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, California 95814

Dear Director McCamman:

It has come to our attention that the Drakes Bay Oyster Company (DBOC) has proposed alterations to their leases within Drakes Estero. This includes expansion of mariculture use in Drakes Estero Lease No. M-438-01 (the "lease") to include the cultivation of Olympia oysters (*Ostrea concaphila)*, and purple-hinged rock scallops (*Crassadoma gigantean*), and a request for a collecting permit for these two species within Drakes Estero. In addition, we understand that DBOC has requested to modify the boundaries of their existing lease. We are concerned that these requests have not also been made to NPS, whose authorization would be needed to implement any of these proposed expansions. To date, no specific information or maps regarding these proposed alterations has been provided to the National Park Service (NPS). The NPS requests that, prior to consideration of these proposals by the CDFG, the NPS be allowed to make a determination regarding whether the NPS would authorize this expansion of DBOC's activities. We would also welcome the opportunity to discuss with you and your staff ways in which we can improve communication and coordination of our consideration of these issues.

In his letter of May 15, 2007 to the NPS, CDFG Director L. Ryan Broddrick wrote the following, regarding the oyster operation in Drakes Estero:

"The 2004 lease renewal is expressly contingent upon the aquaculture facility's compliance with the 1972 grant reservation and, after its expiration, with any special use permit that PRNS may issue in its discretion. The reservation requires compliance with all applicable health and safety laws and, specifically, with all rules and regulations of the National Park Service. Conversely, the renewal imposes an additional requirement of compliance with all other applicable laws, which reasonably includes those of the National Park Service and of PRNS in particular. For these reasons, we believe the mariculture operation in Drakes Estero is properly within the primary management authority of the PRNS, not the Department."

The DBOC currently operates under a National Park Service Special Use Permit (SUP) signed in April 2008. Under the terms of the SUP, the DBOC "will not introduce species of shellfish

beyond those described in the existing leases..." Any modifications to the existing CDFG leases may not be implemented without the prior written approval the NPS. We are also concerned with new information that the DBOC is requesting to alter the boundary of the shellfish growing leases in Drakes Estero. The SUP boundaries are drawn to match the boundaries of the CDFG lease areas. This request has not been submitted to the NPS, and we are concerned that any CDFG recommendation or action on this proposal would make the CDFG lease areas inconsistent with the SUP.

As the new Superintendent at Point Reyes, I would like to work with you and your staff to improve communications and develop an effective process to evaluate proposed modifications related to the leases within Drakes Estero. I am happy to meet with you and your staff at your earliest convenience to discuss these issues. In the meantime, the NPS respectfully requests that you postpone any consideration of these proposals until we have had a chance to make a determination regarding the proposed modifications.

Sincerely,

ACTING

Cicely A. Muldoon
Superintendent

Cc: Kirsten Ramey, CDFG
Cassidy Teufel, CCC
Kevin Lunny, DBOC

************** -COMM. JOURNAL- ****************** DATE JUL-07-2010 ***** TIME 13:22 ********

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-POINT REYES NATL SEASHORE-

** -POINT REYES NS - ***** - 415 663 8132- **********

Point Reyes
National Seashore

1 Bear Valley Road
Point Reyes Station, CA
94956

415-464-5100 phone
415-663-8132 fax
Administration Office

Point Reyes National Seashore Fax

To: Jim McCamman
Fax number: 916 653 7387
From: Cicely Muldoon, Supt.
Date: 7.7.10
Pages to follow: 2
Subject: Drakes Bay Oyster Co lease expansion request.

7/12/10 NOTE

I mistakenly sent letter out with incorrect date. Letter was finalized and sent on July 7 2010.

Gordon

GORDON WHITE
PT REYES NAT SEASHORE

EXPERIENCE YOUR AMERICA
The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Drakes Bay Oyster Company

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nancy@drakesbayoyster.com

COPY

July 1, 2010

Dear Secretary Salazar,

We were heartened and gratified to hear your recent statement at the Great Outdoors Conference about our family being able to continue to operate the Drakes Bay Oyster Farm. We can relate to your story about growing upon a ranch, working the fields, tending cattle, and believing in the stewardship and conservation values that have been passed on by American farmers. We feel the same way.

When Kevin was growing up on a ranch overlooking Drakes Estero, the oyster farm was a fixture in the West Marin and Point Reyes Station communities. As an animal science major in college, Kevin took a course in aquaculture. Years later, our family was privileged to acquire the oyster farm. The oyster farm is compatible with our commitment to practicing sustainable agriculture. For example, we were the first Point Reyes National Seashore ranch to raise certified grass fed and organic beef, and our land management practices are certified by Salmon Safe.

We have poured our time, money and hearts into turning the oyster farm around, correcting at great expense a number of environmental problems that had developed during the years prior to our involvement. Working with others in the field and the California Department of Fish and Game, we have developed new methods for raising spat (young oysters) at the facility to reduce the likelihood of harmful nonnative species infiltrating Drakes Estero. We've also donated oyster shells to aid in restoration of San Francisco Bay.

This year's appropriation bill for the Department of the Interior states that you are authorized to extend our use of the shoreside facilities needed to support the offshore cultivation of shellfish, which is done pursuant to leases with the California Department of Fish and Game that expire in 2029. People who value mariculture are rallying around the oyster farm in support of realizing the "Drakes Estero Mariculture Interpretive Center" suggested in National Research Council study of the impact of our farm on the Estero. Your extending our lease is pivotal to making this vision a reality.

You are in our thoughts and have our heartfelt sympathy as you deal with the tragic environmental disaster in the Gulf of Mexico. While we would like to meet with you personally to discuss the future of the oyster farm, we understand that may not be realistic at this moment. In the alternative, our attorneys at Latham & Watkins LLP and we would appreciate an early opportunity to sit down with a senior member of your staff to discuss the future of the oyster farm in Drakes Estero.

Sincerely,

Kevin Lunny

Nancy Lunny

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LATHAM&WATKINS LLP

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File No. 502976-0000

July 6, 2010

The Honorable Ken Salazar
Secretary
Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

Re: Special Use Permit for Drakes Bay Oyster Company

Dear Secretary Salazar:

I am writing to you on behalf of Kevin and Nancy Lunny ("the Lunnys"), owners of the Drakes Bay Oyster Company ("DBOC"), to request that you enable DBOC to continue to occupy and utilize the buildings and lands on the shores of Drakes Estero, located within Point Reyes National Seashore ("PRNS"), a unit of the National Park Service ("NPS").

DBOC is a family business operated by the Lunny family, fourth and fifth generation farmers and long-term Point Reyes residents who have lived at the historic "G" Ranch, overlooking Drakes Estero. Since acquiring the business in 2004, the Lunnys have been operating a sustainable, environmentally-friendly local business that provides jobs for the community and gives visitors to PRNS a valuable cultural and historic experience.

We were encouraged to hear of your recent statement at the Great Outdoors Conference that DBOC would continue to operate within PRNS. As you acknowledged, the oyster farm has existed in PRNS for many years. In fact, commercial oyster production has taken place within Drakes Estero for over seventy years—since the early 1930s, approximately three decades before Congress established PRNS in 1962. DBOC now produces both oysters and clams as part of its operations and is the last operating oyster cannery in the State of California.

As background, and as discussed in more detail below, DBOC operates under both State and Federal permits. With respect to the former, DBOC cultivates shellfish on the bottomlands in Drakes Estero pursuant to leases from the California Department of Fish and Game, which were renewed for 25 years in 2004, and thus expire in 2029. As to the latter, DBOC operates under a Reservation of Use and Occupancy ("RUO") executed in 1972 between NPS and the previous owners of the oyster farm and under several ancillary special use permits issued by NPS. The RUO and the other permits expire in 2012; however, the RUO contains a renewal

clause, which provides for the issuance of a special use permit that would "run concurrently with and...terminate upon expiration of the State water bottom allotments...."

Questions have been raised regarding the legal authority of NPS to issue a special use permit that would allow DBOC to continue operating past 2012, given that Drakes Estero was designated "potential wilderness" in 1976, pursuant to the Point Reyes Wilderness Act, Public Law 95-544. Notably though, the designation of Drakes Estero as "potential wilderness" was never meant to preclude the continued operations of DBOC. As is evident from relevant legislative history and environmental reviews, Drakes Estero was designated as "potential wilderness" rather than wilderness because of the understanding that oyster cultivation would continue, in light of California's retained interest in leasing the bottomlands for shellfish cultivation.

Moreover, and importantly, in October of 2009 Congress expressly authorized the Department of the Interior to issue DBOC a special use permit to continue its operations past 2012. As this letter describes, and given Congress's recent directive, there are multiple important reasons to issue such a permit, including the rich history of oyster farming in Drakes Estero and the myriad cultural, recreational, educational and ecological benefits DBOC provides.

I. RICH HISTORY OF MARICULTURAL OPERATIONS IN DRAKES ESTERO

Oyster farming has enjoyed a long history in Drakes Estero. The Miwok Indians were the original "oyster-farm operators," with their harvesting of native shellfish beginning thousands of years ago. In fact, their ancient oyster middens are still present in the estero. Commercial oyster farming began in the estero in the 1930s, with the original allotment recorded in the name of David C. Drier on January 18, 1934 for the purpose of growing oysters.[1] Although several transfers occurred during those early years, for most of its commercial history, the estero was farmed by Johnson's Oyster Company. In 2004, the Lunny family purchased the farm from Johnson's Oyster Company and have sought to adopt many of the same sustainable practices used by the Miwoks in order to conserve the important natural resources of the area.

This long history of maricultural operations has been routinely recognized as a valid and important use of Drakes Estero. The legislative history of the Point Reyes National Seashore Act, for example, is replete with references to both the history and legacy of oyster farming and the important benefits it provides to PRNS. For instance, during congressional hearings on the establishment of PRNS, former NPS Director Conrad Wirth explained that the "[e]xisting commercial oyster beds and an oyster cannery at Drakes Estero...should continue under national seashore status because of their public values. The culture of oysters is an interesting and unique industry which presents exceptional educational opportunities for introducing the public, especially students, to the field of marine biology."[2] Comments made during the Senate hearings

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[1] *See* NPS, Environmental Assessment/Initial Study Joint Document, Johnson Oyster Company, Marin County, Point Reyes National Seashore, at 8 (May 1998).

[2] NPS, Conrad L. Wirth, Director, Report on the Economic Feasibility of the Proposed Point Reyes National Seashore at 20 (1961), included in the Hearings Before the Subcommittee on Public Lands of the Committee on

on the proposed PRNS legislation echoed this view: "[t]his proposed legislation provides a balanced use between the public and private interests concerned [because] the oyster and commercial fisheries would be able to continue operation and provide both recreation and economic value to the seashore."[3]

In the early 1970s, when Congress began considering designating wilderness areas within PRNS, the importance of the oyster operations was affirmed. Senator John Tunney, who introduced the PRNS wilderness legislation, reiterated that "[e]stablished private rights of landowners and leaseholders will continue to be respected and protected. The existing agriculture and aquaculture uses can continue."[4] Similarly, Representative John Burton underscored that the legislation's intent was to "preserve the present diverse uses of the Seashore," including the commercial oyster operations in Drakes Estero.[5] The Department of Interior itself recommended that an express wilderness designation would be inappropriate: "Commercial oyster farming operations take place in this estuary and the reserved rights by the State on tidelands in this area make this acreage inconsistent with wilderness."[6]

Until very recently, NPS consistently agreed with these conclusions and appeared supportive of the continued use of Drakes Estero for maricultural operations. The RUO itself, for example, contains a renewal clause, which provides that "[u]pon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property...."[7]

Additionally, in the Final Environmental Impact Statement prepared by NPS evaluating the potential impacts associated with designating certain PRNS lands as wilderness, NPS discussed the "oyster-farm operation" and noted that while removing the oyster farm might remove human activities from the estero, there would be a "loss of some compensating values. Besides its economic benefits to the community, the farm has decided interpretive importance as a popular 'living exhibit,' where visitors have the unique opportunity to observe the operation

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Interior and Insular Affairs, U.S. Senate, 87th Congress, First Session on S.486, A Bill to Establish The Point Reyes National Seashore in the State of California and for Other Purposes (Mar. 28, 29, and 31, 1961).

3 Hearings Before the Subcommittee on Public Lands of the Committee on Interior and Insular Affairs, U.S. Senate, 87th Congress, First Session on S.476, A Bill to Establish The Point Reyes National Seashore in the State of California and for Other Purposes at 17 (Mar. 28, 29, and 31, 1961).

4 Hearings on S.1093 and S.2472 Before the Subcommittee on Parks and Recreation of the Committee on Interior and Insular Affairs, 94th Cong. 271 (1976).

5 *Id.* at 272-73.

6 Letter dated September 8, 1976, from John Kyl, Assistant Secretary of the Interior, to U.S. Representative James A. Haley, Chairman, Committee on Interior and Insular Affairs, House of Representatives, U.S. House Report No. 94-1680, 94 U.S. Code and Congressional News 5593.

7 JOC Grant Deed to the United States, Exh. C, § 11 (Nov. 9, 1972). The clause, in fact, only requires that the special use permit "run concurrently with and will terminate upon the expiration of the State water bottom allotments...." Those "State water bottom allotments" refer to a renewable lease issued by the California Department of Fish and Game, which has granted DBOC the right to cultivate oysters in Drakes Estero through 2029. California Department of Fish & Game Amendment No. 2 to Indenture of Lease, M-438-01 (Dec. 2, 2005). Accordingly, issuance of a SUP that would "run concurrently with" the State water bottom allotments would be consistent with the state authorizations and would allow the oyster farm to continue operating through 2029.

and to purchase freshly grown oysters. These are appropriate purposes at Point Reyes, a recreational-category park."[8]

NPS continued to recognize the value of the oyster operations in its 1980 PRNS General Management Plan (still in effect), which includes the following management objectives: "[t]o monitor and improve maricultural operations, in particular the oyster farm operation in Drakes Estero," and "[t]o monitor and support productive land uses and activities [including maricultural activities] which are consistent with historic patterns."[9] As recently as 1998, NPS conducted an environmental assessment pursuant to the National Environmental Policy Act ("NEPA") of the potential impacts of improving and substantially expanding the oyster farm operations. Although the planned expansion did not take place because of funding shortfalls, NPS' support of the project demonstrates the agency's recognition that oyster farm operations are a valid use of PRNS land.[10]

II. DBOC IS A BENEFICIAL USE OF PRNS

Recently, some questions have been raised regarding the types of environmental impacts oyster farming may be having on Drakes Estero. In 2006 and 2007, for example, PRNS staff prepared and released several versions of a report entitled *Drakes Estero: A Sheltered Wilderness Estuary* that purported to evaluate the impacts of DBOC on Drakes Estero and erroneously concluded that oyster farming is having an adverse ecological impact on PRNS resources. This effort to portray DBOC as having detrimental impacts appeared to be part of an attempt to "eliminate" DBOC as a "non conforming use" so that Drakes Estero and the surrounding tract of land could be converted to wilderness status. Indeed, PRNS staff took the position that they were legally precluded from issuing a special use permit to DBOC to extend operations past 2012 because of the "potential wilderness" designation.[11] However, there is no such restriction on NPS' authority.[12] Moreover, NPS has allowed non conforming uses in other potential wilderness areas.[13]

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[8] *See* NPS, Final Environmental Statement FES 74-18, Proposed Wilderness: Point Reyes National Seashore, California, at 56 (Apr. 23, 1974).

[9] NPS, General Management Plan: Point Reyes National Seashore, at 2-3 (Sept. 1980).

[10] *See, e.g.*, Letter from Don Neubacher, Superintendent, PRNS, to Bank of Oakland (Nov. 22, 1996) (explaining the relationship between the oyster farm and NPS and noting that NPS is "genuinely excited about the planned changes" to the oyster farm and "pledge[s] to work with the Johnsons and the Bank of Oakland to make the project successful"); *see also* Thomas Yeatts, Point Reyes Light, *Park Planned Big New Oyster Plant* (Aug. 2, 2008) (documents obtained by the newspaper indicate that, beginning in 1996, "Point Reyes National Seashore (PRNS) staff developed a plan to renovate the Johnson Oyster Company's rickety buildings and septic system, and proposed new two-story development").

[11] *See, e.g.*, Field Solicitor Opinion Re: Point Reyes Wilderness Act (Feb. 26, 2004) (concluding that the Wilderness Act, the Point Reyes Wilderness Act, and NPS Management Policies mandate that NPS convert potential wilderness, such as Drakes Estero, to wilderness status "as soon as the non conforming use can be eliminated").

[12] For clarification, we disagree with NPS' legal interpretation that any law precludes the agency from allowing DBOC to continue operating past 2012. There is no mandate found in any applicable law or guidance that

From the outset it should be noted that since purchasing the farm in 2004, the Lunnys have dedicated significant time and resources to cleaning up the oyster farm and resolving past violations of law that had occurred during their predecessor's operations. *See, e.g.*, Peter Jamison, Point Reyes Light, *Park Service to Close Historic Oyster Farm* (June 15, 2007) (discussing DBOC's cleanup and quoting PRNS spokesman John Dell'Osso, "Kevin [Lunny] has done a fantastic job of cleaning up. Everything we've asked him to do, he's done."). The Lunnys remain committed to continuing those cleanup efforts and ensuring that DBOC is operated in a sustainable, environmentally-friendly manner.[14] As such, the family—along with their many supporters in western Marin County environmental and agricultural circles—was disheartened by the NPS report, which appeared to, among other things, overlook the many beneficial effects of oyster culture operations on the environment.[15]

In order to help resolve the debate regarding the scope of impacts of DBOC and the availability of scientific analysis, the National Academy of Sciences ("NAS") agreed to help clarify the scientific issues regarding maricultural activities and produced two reports. The first report, which was released in May of 2009, assessed the adequacy of the claimed scientific bases for NPS staff's preliminary conclusions in their Drakes Estero reports, and evaluated the

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would require NPS to convert "potential wilderness" to wilderness on a particular timetable. The Wilderness Act, for example, does not use the phrase "potential wilderness," much less define when "potential wilderness" must become actual wilderness, if ever. NPS management policies, director's orders, and reference manuals are all silent with respect to a specific timetable for conversion and only provide that, once "non conforming uses" have ceased, NPS will publish a Federal Register notice to change the designation from potential wilderness to wilderness. *See* NPS Reference Manual #41 at Appendix H, Wilderness Preservation and Management (1999). There is no requirement, however, mandating that NPS ensure that such operations cease by a certain date, and there has been no environmental review of the impact of removing the oyster cultivation operation in Drakes Estero.

[13] Examples of non conforming uses that NPS has allowed in other potential wilderness areas include: i) operation of motorized boats in potential wilderness areas of Grand Canyon National Park; ii) public use of Five High Sierra camps and the Ostrander ski hut in potential wilderness areas of Yosemite Valley; iii) operation by Southern California Edison of hydroelectric dams in potential wilderness areas of Sequoia-Kings Canyon National Park; and iv) use of roads in Cumberland National Seashore located in potential wilderness. As discussed below, the oyster farm provides greater cultural, recreational, educational and ecological benefits than these examples of non conforming uses.

[14] Prior to the Lunny family's ownership, the oyster farm had suffered from a degree of deterioration that led to a number of violations of law, including the Coastal Development Act, and enforcement actions by the California Coastal Commission ("CCC"). The Lunnys are working with the CCC to resolve those violations and ensure that DBOC's operations fully comply with all applicable local, state, and federal regulations. Additionally, an incident recently occurred at the farm in which clam-growing equipment was inadvertently placed into a Harbor Seal Protection Area. The Lunnys immediately took steps to rectify this mistake and are implementing processes to ensure that such mistakes do not occur in the future. Moreover, many of NPS' allegations that the oyster farm adversely impacts harbor seals have since been retracted at very recent Marine Mammal Commission ("MMC") hearings. Like the NAS, the MMC has become involved specifically to resolve the debate surrounding the oyster farm's impact on harbor seals. The MMC has held a series of panel hearings, and is working on a report that is due out in the near future.

[15] The Department of Interior's Inspector General investigated the various versions of the NPS Report and found that scientific inaccuracies undermined NPS' conclusions regarding the oyster farm's ecological impact on Drakes Estero.

available data specifically regarding the impact of DBOC's maricultural activities.[16] The second report, which was released in February of 2010, broadly addresses best management practices and performance standards to enhance the overall benefits of shellfish mariculture and minimize any negative ecological effects.[17]

The first NAS report reasonably concluded that "there is a lack of strong scientific evidence that shellfish farming has major adverse ecological effects on Drakes Estero at the current (2008-2009) levels of production and under current (2008-2009) operational practices, including compliance with restrictions to protect eelgrass, seals, water-birds, and other natural resources." NAS 2009 Report at 6. The report goes on to discuss some of the over-looked beneficial effects that DBOC is having on the estero, including: (i) the potential that oyster culture in Drakes Estero is replacing the important "filtering capacity and biogeochemical processing that was lost in the mid-19th century and subsequent decades with the overharvest and functional elimination of the native Olympia oyster" (*id.* at 68); (ii) the possible beneficial effects on eelgrass in the area, given that eelgrass has approximately doubled in Drakes Estero from 1991 to 2007 (*id.*); (iii) the positive economic impact for the region—including employment, tax revenue, and local food production (*id.* at 64); and (iv) the positive visitor experience, given that DBOC "preserves a piece of local and regional culture and history" (*id.* at 65).

As noted above, the oyster farm provides significant ecological benefits to Drakes Estero. DBOC's oysters are helping to "restor[e] an historic baseline ecosystem" by acting as a proxy for native oysters. *Id.* at 22; *see also* NAS 2010 Report at 13-14. The oysters are also known as "ecosystem engineers" and "foundation species" (NAS 2009 Report at 18) that bolster the ecosystem's resilience against abnormal events like phytoplankton blooms or sedimentation from storm water run-off (*id.* at 22, 23).[18]

In addition to the work done by the oysters, the Lunnys themselves are committed to conserving and protecting PRNS. For example, DBOC is the only oyster farm in California to produce and hatch its own seeds on site, greatly reducing the risk of introducing contaminants and invasive species. And it employs an environmentally-friendly off-bottom "hanging culture" method, used by less than 5% of U.S. oyster farmers due to the labor-intensive hand harvesting required. The Lunnys are also dedicated to educating others about conservation and the environment. The oyster farm offers free tours to the public to inform them about the history of oyster farming in PRNS, oysters' value as a beneficial source of protein, coastal ecosystems, and the nature and efficacy of organic sustainable farming. Similarly, the oyster farm offers its

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[16] *See* National Academy of Sciences, National Research Council, Shellfish Mariculture in Drakes Estero, Point Reyes National Seashore, California (2009) ("NAS 2009 Report").

[17] *See* National Academy of Sciences, National Research Council, Ecosystem Concepts for Sustainable Bivalve Mariculture (2010) ("NAS 2010 Report").

[18] The second NAS report provides further detailed discussion of the general ecosystem services that bivalves perform. NAS 2010 Report at 10-11. In fact, these ecosystem services are so significant that the report recommends quantifying their economic value, as well as developing policies to encourage restoration of bivalves in more ecosystems so they can improve and benefit from these services. *See id.*

facilities to researchers and participates in research on native oysters, estuarine biodiversity, and human health protection.

For all these reasons, many of PRNS' 2.5 million annual visitors flock to DBOC, which carries on the long-standing tradition of oyster farming in Drakes Estero and remains as the last operating oyster cannery in the State. With its cultural, recreational, educational and ecological benefits, the oyster farm undoubtedly "enhances visitors' experience in the estero." *Id.* at 65.

By contrast, should the oyster farm be shut down, the community would be adversely impacted in significant ways. Not only would PRNS lose the numerous visitors for whom DBOC is a destination, but the oyster farm employees who have specialized skills would lose their livelihood, and the low-income housing that DBOC provides for their employees would be demolished. This in turn would effect the local ranches, where many of DBOC's employees' family members work. Furthermore, removing the oysters could have an adverse effect on the Drakes Estero ecology, including its water quality.

Both NAS reports ultimately affirm that there is no ecological justification to deny DBOC a special use permit. And given that Congress has expressly authorized NPS to issue a special use permit, there is no legal justification either. NPS should issue DBOC a special use permit to continue its operations past 2012.[19]

III. NPS AUTHORITY TO ISSUE A SPECIAL USE PERMIT FOR CONTINUED OPERATIONS PAST 2012

In October of 2009, Congress provided a definitive answer to the legal question of whether NPS has the authority to issue a special use permit to DBOC to continue operating past 2012. The answer was a resounding yes.

Specifically, Congress directed that:

> Prior to the expiration on November 30, 2012 of the Drake's Bay Oyster Company's Reservation of Use and Occupancy and associated special use permit ('existing authorization') within Drake's Estero at Point Reyes National Seashore, notwithstanding any other provision of law, the Secretary of the Interior *is authorized to issue a special use permit with the same terms and conditions as the existing authorization*, except as provided herein, for a period of 10 years from November 30, 2012: Provided, That such extended authorization is subject to annual payments to the United States based on the fair market value of the use of the Federal property for the duration of such renewal. The Secretary shall take

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[19] As you know, Senator Dianne Feinstein contacted you when the first NAS report was issued and expressed her concern that NPS had "exaggerated the effects of the oyster population on the Estero's ecosystem" and appeared to be continuing to ignore the potential beneficial impacts of maricultural operations. *See* Letter from Dianne Feinstein to the Honorable Ken Salazar (May 5, 2009). We agree with Sen. Feinstein's conclusion that the NAS report "does not present any compelling ecological reason for refusing to renew the Drakes Bay Oyster Company lease in 2012."

into consideration recommendations of the National Academy of Sciences Report pertaining to shellfish mariculture in Point Reyes National Seashore before modifying any terms and conditions of the extended authorization.

Department of the Interior, Environment, and Related Agencies Appropriations Act, 2010, Pub. L. No. 111-88 § 124 (2009) (emphasis added).

As such, now that the second NAS report has been issued, DBOC respectfully requests that NPS provide a proposed special use permit to DBOC incorporating the same terms and conditions under which DBOC currently operates, including an appropriate annual fee.

Thank you very much for your attention to this matter. We understand that Will Shafroth, Deputy Assistant Secretary for Fish, Wildlife and Parks, recently visited DBOC on February 4, 2010. The Lunnys would be happy to host you, Secretary Salazar, and any other interested Department of Interior officials on a tour of the oyster farm, and/or provide any follow-up information requested. We look forward to meeting with you and your staff to discuss this matter in further detail, and will be in touch to set this up. If you have any questions or would like additional information, please do not hesitate to reach me at (415) 395-8136.

Best regards,

Karl Lytz M.B.

Karl S. Lytz
of LATHAM & WATKINS LLP

cc: The Honorable Dianne Feinstein
Will Shafroth, Deputy Assistant Secretary for Fish, Wildlife and Parks
Jonathan Jarvis, Director, National Park Service
George Turnbull, Acting Regional Director, Pacific West Region, National Park Service
Cicely Muldoon, Superintendent, Point Reyes National Seashore

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Statement of Principles
Regarding NEPA evaluation for
Special Use Permit for Drakes Bay Oyster Company

- The Parties are NPS and Drakes Bay Oyster Company (DBOC). For the purposes of this document, DBOC consists of the owners of DBOC and its representatives.
- Parties will have at least one in-person meeting prior to public scoping. Prior to the initial meeting, NPS will advise DBOC of any scientific, technical, or other information that the NPS believes should be considered during the NEPA process. NPS agrees to consider in good faith any additional information DBOC believes is appropriate for consideration. If NPS determines that any of the information submitted by DBOC is not necessary or relevant to the NEPA process, NPS will explain its rationale in the scoping report, the NEPA documents, or the administrative record for the NEPA process. DBOC will endeavor to provide all such information to the NPS at this initial meeting.
- If the NPS needs information regarding DBOC's operations, DBOC will provide timely responses to NPS requests for such information.
- NPS, in cooperation with DBOC, will prepare a schedule for completing NEPA review. Such schedule will include specific target dates for scoping, public hearings (if appropriate), the release of the EA for public comment, the public comment period, and the issuance of the FONSI or the initiation of an EIS. If NPS determines that an EIS is necessary, the same coordination efforts set forth herein will also apply in the preparation of the EIS.
- NPS will consider DBOC's interests in applying for and receiving a special use permit in developing the purpose and need for the NEPA document.
- DBOC shall prepare a description of their operations for NEPA evaluation, which NPS shall consider in good faith. NPS will consult in good faith with DBOC on the purpose and need of the project as needed, particularly during impact analysis, to assist in improving the preferred alternative to avoid, mitigate or otherwise address any adverse impacts.
- After the National Academy of Sciences produces its first report (specific to Drakes Estero) and NPS and DBOC meet and confer in good faith regarding same, the NPS will begin preparing the those portions of the NEPA document concerning off-shore activities, including sections concerning the affected environment, alternatives, environmental consequences, and mitigation measures, unless otherwise agreed to by the Parties. Notwithstanding the foregoing, NPS may begin preparing those portions of the NEPA document concerning offshore activities that analyze air quality, cultural resources and the socioeconomic environment.
- NPS agrees to consult with DBOC in good faith in the design of any further scientific or technical studies to assist in NEPA evaluation of the project.
- As part of public scoping, DBOC may provide comments regarding proposed alternatives, and the NPS will consider such comments.
- DBOC may provide formal comments during the public comment period for the NEPA document.

- DBOC will not be required to cover the cost of preparing the NEPA document. If there is litigation regarding NEPA compliance, it will not trigger the indemnification requirements set forth in the Special Use Permit.
- The Parties will exert best efforts to effectuate the principles set forth herein.
- The Parties will enter into a Memorandum of Understanding or similar agreement consistent with the principles set forth herein as soon as practicable. The NEPA actions contemplated by the principles set forth herein shall be initiated after the Parties enter into the Memorandum of Understanding or similar agreement. Notwithstanding the foregoing, NPS may initiate the contemplated NEPA actions if the Parties are unable to enter into a Memorandum of Understanding or similar agreement within sixty (60) days of the date of this Statement of Principles; provided, however than any such actions shall be consistent with this Statement of Principles and the Parties will continue to make best efforts to enter into a Memorandum of Understanding or similar agreement.

IT IS SO AGREED:

Drakes Bay Oyster Company

By: _____ Dated: 4/22/08
Kevin Lunny

National Park Service

By: _____ Dated: 4/17/2008
Jonathan B. Jarvis
Regional Director
Pacific West Region

LEGAL_US_W # 58722736.1

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service
Special Use Permit

Name of Use: Aquaculture

Date Permit Reviewed 2008
Reviewed 20
Reviewed 20
Expires November 30, 2012

Long Term X
Short Term

Permit # MISC-8530-6000-8002
Type Park Code No. #
Point Reyes National Seashore

Drakes Bay Oyster Company
17171 Sir Francis Drake Blvd.
Inverness, CA 94937
(415) 669-1149

is hereby authorized for a period ("Term") commencing on April ____, 2008 ("Commencement Date") and terminating on November 30, 2012 ("Expiration Date") to use the following described land, improvements, and waters in the following area:

the lands and improvements at Drakes Bay Estero at the former Johnson's Oyster Site consisting of approximately 1.1 acres of land and improvements designated as the "SUP Area" on the map attached hereto as Exhibit B ("Drake's Estero Oysters – SUP & ROP"); the waters designated as the "SUP Area" on the map attached hereto as Exhibit A ("Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area"); the land designated as the "Well Area" on the map attached hereto as Exhibit D ("Drakes Bay Oyster Company Well Area"); and the land designated as the "Sewage Area" on the map attached hereto as Exhibit E ("Drakes Bay Oyster Company Sewage Area"). Collectively, the areas so designated shall be referred to as the "Premises." The Premises governed by this Permit do not include the area designated as the ROP Area on the map attached hereto as Exhibit B.

For the purpose(s) of:

Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit B for the purpose of processing shellfish, the interpretation of shellfish cultivation to the visiting public, and residential purposes reasonably incidental thereto. Use of the area designated as the "SUP Area" on the map attached hereto as Exhibit A for the purpose of shellfish cultivation. Use of the area designated as the "Well Area" on the map attached hereto as Exhibit D for the purpose of supplying water for the Drakes Bay Oyster Company facilities using Permittee well, pump, and pipelines. Use of the area designated as the "Sewage Area" on the map attached hereto as Exhibit E for the purpose of use and maintenance of existing sewage pipeline and sewage leachfield to service the Drakes Bay Oyster Company facilities. Collectively, the uses set forth in this paragraph shall be referred to as the "Permitted Uses."

Authorizing legislation or other authority (RE – DO-53): 16 U.S.C. 1, 1a-1, 3 & 459c; the Reservation of Use and Occupancy.

NEPA & NHPA Compliance: NEPA compliance pending

PERFORMANCE BOND:	Required	Not Required X	Amount:	
LIABILITY INSURANCE:	Required X	Not Required	Amount: As set forth in Article 15 of this Permit.	

ISSUANCE of this Permit is subject to the terms, covenants, obligations, and reservations, expressed or implied herein and to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of **$2,800.00** per year, plus an amount to be determined by appraisal for the use of the Sewage Area and the Well Area including water use.

PERMITTEE: Kevin Lunny (Signature) Drakes Bay Oyster Co. (Organization) 4/22/08 (Date)

Authorizing Official: George T Turnbull (Signature) George Turnbull, Deputy Regional Director 4/22/08 (Date)

CONDITIONS OF THIS PERMIT

1) DEFINITIONS

As used in this Permit, the following terms shall have the following meanings:

a) "Agency" means any agency, department, commission, board, bureau, office or other governmental authority having jurisdiction.

b) "Applicable Laws" includes, without limitation all present and future statutes, regulations, requirements, Environmental Requirements, guidelines, judgments, or orders of any Agency or judicial body, whether now existing or hereafter established, relating to or affecting the Premises or the use or occupancy of the Premises.

c) "Commencement Date" is as defined on the Cover Page of this Permit.

d) "Cyclic Maintenance" means (i) the performance by Permittee of all repairs, maintenance, or replacement-in-kind necessary to maintain the Premises and the existing improvements thereon in good order, condition, and repair; (ii) housekeeping and routine and periodic work scheduled to mitigate wear and deterioration without materially altering the appearance of the Premises; (iii) the repair or replacement-in-kind of broken or worn-out elements, parts or surfaces so as to maintain the existing appearance of the Premises; and (iv) scheduled inspections of all building systems on the Premises.

e) "Default" means Permittee's failure to keep and perform any of the Provisions of this Permit.

f) "Environmental Requirements" means, without limitation, all standards or requirements relating to the protection of human health or the environment such as:

a. standards or requirements pertaining to the reporting, permitting, management, monitoring, investigation or remediation of emissions, discharges, releases, or threatened emissions, releases or discharges of Hazardous Materials into the air, surface water, groundwater, or land;

b. standards or requirements relating to the manufacture, handling, treatment, storage, disposal, or transport of Hazardous Materials; and

c. standards or requirements pertaining to the health and safety of employees or the public.

g) "Expiration Date" is as defined on the Cover Page of this Permit.

h) "Hazardous Materials" means, without limitation, any material or substance, whether solid, liquid, or gaseous in nature,

a. the presence of which requires reporting, permitting, management, monitoring, investigation or remediation under any Environmental Requirement;

b. that is or becomes defined as a "hazardous waste," "extremely hazardous waste," "restricted hazardous waste," "hazardous substance," "pollutant," "discharge," "waste," "contaminant," or "toxic contaminant" under any Environmental Requirement, or any above-ground or underground storage containers for the foregoing;

c. that is toxic, explosive, corrosive, flammable, infectious, radioactive, reactive, carcinogenic, mutagenic, or otherwise hazardous to human health or the environment and is or becomes regulated under any Environmental Requirement;

d. that contains gasoline, diesel fuel or other petroleum hydrocarbons or derivatives or volatile organic compounds, or is an above-ground or underground storage container for same;

e. that contains polychlorinated biphenyls (PCBs), asbestos, asbestos-containing materials or urea formaldehyde foam insulation; or

f. that contains radon gas.

i) "Hazardous Materials Occurrence" means any use, generation, treatment, keeping, storage, transport, release, disposal, migration, or discharge of any Hazardous Materials from, on, under or into the Premises or Point Reyes National Seashore ("Point Reyes") that causes any environmental contamination.

j) "Improvements or Alterations" means any construction that does not fall within the definition of Cyclic Maintenance.

k) "NPS" means the management officials in charge of the administration and operation of Point Reyes, including the Superintendent or his/her designee(s).

l) "Park" means, without limitation, all lands, waters and structures within the legislative boundaries of the Point Reyes National Seashore, all natural and cultural resources within such boundaries, and any other property within such boundaries belonging to Point Reyes. As appropriate given the context, this term also includes the visiting public and/or Point Reyes employees.

m) "Permit" means this instrument which contains those certain termination and revocation provisions as provided for herein.

n) "Permitted Uses" is as defined on the Cover Page of this Permit.

o) "Personal Property" means all furniture, fixtures, equipment, appliances and apparatus placed on the Premises that neither are attached to nor form a part of the Premises. Personal Property also includes any trailers, modular units, and/or temporary structures owned by Permittee.

p) "Point Reyes" means Point Reyes National Seashore.

q) "Premises" is as defined on the Cover Page of this Permit.

r) "Provision" shall mean any term, agreement, covenant, condition or provision of this Permit or any combination of the foregoing.

s) "ROP" or "Reservation of Use and Occupancy" means the Reservation of Use and Occupancy purchased by the Permittee in 2005. In 1972 the United States of America purchased Johnson Oyster Company's property, subject to a Reservation of Use and Occupancy on approximately 1.5 of those acres for a period of forty (40) years. This Reservation of Use and Occupancy expires on November 30, 2012.

t) "SUP" means this Permit.

u) "Term" is as defined on the Cover Page of this Permit.

v) "Termination Date" means the Expiration Date or such earlier date as this Permit is terminated or revoked pursuant to any Provision of this Permit.

2) GENERAL CONDITIONS

a) The Permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all Applicable Laws.

b) Permit and Approvals – Except as otherwise provided in this Permit, Permittee shall be responsible for obtaining, at its sole cost and expense, all necessary permits, approvals or other authorizations relating to Permittee's use and occupancy of the Premises.

c) Damages - The Permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the Permittee is authorized to make of the land and areas described In this Permit.

d) Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this Permit or derive, either directly or indirectly any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company if the Permit be for the benefit of such corporation.

e) Assignment and Subletting - This Permit may not be transferred or assigned without the consent of the Permitter, in writing. Permittee shall not sublet the Premises or any part thereof or any property thereon, nor grant any interest, privilege or license whatsoever in connection with this Permit without the prior written approval of the Permitter.

f) Revocation - This Permit may be terminated upon Default or at the discretion of the Permitter.

g) The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(4)]

3) USE OF PREMISES

a) Permittee is authorized to use the Premises only for the Permitted Uses.

b) Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage and the use of loudspeakers or sound or light apparatus that could disturb park visitors and wildlife outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

c) The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Article 3 is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit and that Permitter may inspect the premises at any time.

d) This Permit is subject to the right of the NPS to establish trails and other improvements and betterments over, upon, or through the Premises and further to the use by travelers and others of such established or existing roads and trails. The Permittee understands that occasional park visitors are authorized to walk, use non-motorized watercraft, or hike in the various areas included in this Permit even though no trails are formally established.

e) Permitter reserves the right for Permitter, its employees, contractors and agents to enter and to permit any Agency to enter upon the Premises for the purposes of inspection, inventory or when otherwise deemed appropriate by the Permitter for the protection of the interests of Permitter, including Permitter's interests in any natural or cultural resources located on, in or under the Premises.

f) Permitter reserves the right at any time to close to travel any of its lands, to erect and maintain gates at any point thereon, to regulate or prevent traffic of any kind thereon, to prescribe the methods of use thereof, and to maintain complete dominion over the same; provided, however, that at all times during the Term, Permitter shall provide Permittee and Permittee's invitees with reasonable access to the Premises subject only to interruptions caused by necessary maintenance or administrative operations or by matters beyond Permitter's control.

g) Permittee hereby waives any claim for damages for any injury, inconvenience to or interference with Permittee's use and occupancy of the Premises, any loss of occupancy or quiet enjoyment of the Premises, or any other loss occasioned by Permitter's exercise of its rights under this Article 3 except to the extent that the damages, expenses, claims or suits result from the willful misconduct or gross negligence of Permitter, its employees, contractors or agents; provided, further, that Permitter shall be liable only to the extent such claims are allowed

under the Federal Tort Claims Act.

h) Members of the general public visiting the Drakes Bay Oyster Company operation may park in the adjacent NPS parking area and walk over to the SUP or ROP areas.

i) While Permittee is permitted to use and operate motorized watercraft in Drakes Estero for the purpose of conducting daily business operations, which can include occasional inspections required by Agencies, no other use of Permittee's motorized watercraft is authorized. No motorized watercraft may enter the designated wilderness boundary (See "Existing Wilderness" on map attached hereto as Exhibit A). To protect water quality in the Estero, any additional or replacement boat motors obtained by Permittee must be four stroke motors.

j) Due to a lack of adequate parking space and restroom facilities for the public, barbecuing is not permitted in the Special Use Permit Area. To comply with this paragraph, Permittee will not encourage barbecuing in the SUP Area. Picnic tables will be provided by the NPS at the adjacent parking area.

k) Unauthorized discharge into the estuary is prohibited. This prohibition includes any discharge from processing facilities. Notwithstanding the foregoing, discharge of oyster wash water from dock and from hatchery operations is allowed if authorized by relevant Agencies.

l) In order to ensure public health and safety, Permittee will ensure that Permittee and Permittee's officers, agents, employees, and contractors comply with Applicable Laws regarding pets, including the NPS regulation at 36 C.F.R. § 2.15.

m) In order to ensure public health and safety, Permittee shall allow all appropriate Federal, State and/ or County agencies; including the United States Department of Health and Human Services, the State of California Department of Health Services and Marin County Community Development Agency Environmental Health Services, to conduct inspections on a routine basis.

4) SPECIAL PERMIT CONDITIONS

a) If Permittee and Permitter disagree about an issue related to this Permit, they will first make a good faith effort to resolve such issue at the Park level. If they are unable to resolve the issue at the Park level, Permittee may request a review of the issue by the Regional Director.

b) Based upon the findings of an independent science review and/or NEPA compliance, Permitter reserves its right to modify the provisions of this Article 4. Permitter further reserves its right to incorporate new mitigation provisions based upon the findings of an independent science review.

i) Production of all shellfish species shall be capped at the "current production level" as determined under the California Coastal Commission Consent Order No. CCC-07-CD-04.

ii) No additional aquaculture racks and/or cultivation infrastructure will be constructed without the prior approval of the Permitter. Operation, repair, and maintenance of infrastructure currently being used for oyster cultivation is permitted.

iii) Permittee and Permitter acknowledge the importance of eelgrass within the ecology of the estuary. Permittee will not place bags for shellfish production onto eelgrass.

iv) Within sixty (60) days following the signing of this interim Permit, Permittee will submit for National Park Service approval a boating operations plan, which will indicate dedicated navigation routes, chosen to minimize impacts to eelgrass beds when accessing aquaculture racks and/or cultivation equipment.

v) To minimize the chances of introducing invasive species or pathological microorganisms to Drake's Estero, Permittee will only import shellfish in the form of larvae and seed. Within 30 days of the Commencement Date, Permittee shall produce sufficient evidence, for the review and approval of the Permitter, that larvae and seed from outside sources have been certified by the California Department of Fish and Game ("CDFG")

to be free of pathogens. If the Permitter determines that the documentation is insufficient, Permittee shall cease from importing larvae within 30 days of receiving notification of the determination from the Permitter.

vi) Permittee will not introduce species of shellfish beyond those described in the existing leases from the CDFG. Permittee may seek to conform and/or modify these leases with the CDFG. Any modifications approved by CDFG will be considered by Permitter on a case-by-case basis, and Permittee may not implement any such modifications without the prior written approval of the Permitter.

vii) Permittee must avoid disturbance to marine mammals and marine mammal haul-out sites. The Marine Mammal Protection Act, 16 U.S.C. 1361 et seq., includes a prohibition against any act of pursuit, torment or annoyance that has the potential to injure or disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. The National Oceanic and Atmospheric Administration (NOAA) recommends maintaining a distance of at least 100 yards to avoid disturbance to seals. Permittee will maintain a distance of at least 100 yards from hauled out seals throughout the year. Permitter will monitor marine mammal populations in Drakes Estero. In addition, during the pupping harbor seal closure period, March 1-June 30, the designated wilderness area (outside of Permit area) is closed to all boats. Permittee will follow "Drakes Estero Aquaculture and Harbor Seal Protection Protocol" attached hereto as Exhibit C. If required by CDHS, watercraft may use the Main Channel identified in Exhibit C during the pupping harbor seal closure period only to access CDHS's sentinel monitoring station for marine biotoxins. Boats shall be operated at low speed, near the eastern shore, to minimize chance of disturbance to harbor seals. No other use of the Main Channel is authorized during the pupping harbor seal closure period.

c) Permittee's agreement to the provisions of this Permit does not waive Permittee's ability to take contrary positions with regard to similar provisions with other Agencies.

5) ACCEPTANCE OF PREMISES

a) Prior to entering into this Permit, Permittee has made a thorough, independent examination of the Premises and all matters relevant to Permittee's decision to enter into this Permit, and Permittee is thoroughly familiar with all aspects of the Premises and is satisfied that they are in an acceptable condition and meet Permittee's needs, provided that Permittee and Permitter acknowledge that certain repairs are necessary to comply with Applicable Laws. Permittee will make such repairs at its sole cost and expense in compliance with Applicable Laws.

b) Permittee expressly agrees to use and occupy the Premises and all improvements thereon in their existing "AS IS" condition "WITH ALL FAULTS" and acknowledges that in entering into this Permit, Permittee does not rely on, and Permitter does not make, any express or implied representations or warranties as to any matters including, without limitation, the suitability of the soil or subsoil; any characteristics of the Premises or improvements thereon; the suitability of the Premises for the approved use; the economic feasibility of Permittee's use and occupancy of the Premises; title to the Premises; the presence of Hazardous Materials in, on, under or in the vicinity of the Premises; or any other matter. Permittee has satisfied itself as to such suitability and other pertinent matters by Permittee's own inquiries and tests into all matters relevant to determining whether to enter into this Permit and Permittee hereby accepts the Premises.

6) CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

a) Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Article 3, "Use of the Premises."

b) Permittee shall not undertake any Improvements or Alterations to the Premises (including installation of temporary equipment or facilities) without the prior written approval of Permitter.

c) As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans and any other relevant data for Permitter's approval.

d) Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable

Laws, including but not limited to general planning, building, and environmental laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

e) Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

f) Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

g) Permittee shall not construct any Improvements or Alterations outside the boundaries of the Premises.

h) Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

i) All lumber utilized at the site will be processed in compliance with current laws and regulations regarding wood treatments. This includes lumber utilized in assembly and repair of aquaculture racks.

j) As set forth in Article 17, title to any Improvements or Alterations to the Premises shall be and remain solely in the Permitter.

7) TREATMENT OF REFUSE

a) Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

b) Permittee will make best efforts to remove debris associated with aquaculture production operations including wood from racks, plastic spacers, unused shellfish bags, shellfish shells, and any other associated items.

8) PESTICIDE AND HERBICIDE USE

a) The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest and vegetation problems. The goal of IPM is to use the least-toxic, effective methods of controlling pests and vegetation. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter, a request for the use of pesticide(s) or herbicide(s) and shall not use any pesticide(s) or herbicide(s) until Permittee has received an express written authorization therefor from Permitter.

b) Permittee shall manage, treat, generate, handle, store and dispose of all pesticides and herbicides in accordance with Applicable Laws, including reporting requirements.

9) FIRE PREVENTION AND SUPPRESION

a) Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

10) EXCAVATION, SITE AND GROUND DISTURBANCE

a) Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of the Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to the Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities.

b) If approval of activities referenced above in Section10(a) is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

c) No soil disturbance of any kind may occur in the vicinity of a known archeological site, without the presence of an NPS archeological monitor.

11) NONPOINT SOURCE POLLUTION

a) The Permittee shall comply with all Applicable Laws regarding non-point source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

b) Except as set forth in Section 3(k) of this Permit, no discharge into the estuary is permitted. This prohibition includes any discharge from processing facilities.

12) TREE AND VEGETATION REMOVAL

a) The Permittee may not remove tree(s) or vegetation unless expressly approved in writing by the Permitter. The Permittee shall provide specific plans to the Permitter for desired tree(s) and vegetation removal during the annual meeting or in writing during the Term of this Permit.

b) Removal of non-native invasive vegetation such as non-native thistles, trimming and vegetation removal around structures is permissible.

13) WILDLIFE PROTECTION

a) Wildlife is an integral part of Point Reyes National Seashore and must be managed in accordance with all Applicable Laws, including but not limited to NPS laws, regulations, and policies.

b) Permittee shall not engage in any activity that purposely causes harm or destroys any wildlife. Conversely, Permittee shall not engage in any activity that purposely supports or increases populations of non-native or invasive animal species, except for the cultivation of the shellfish species authorized by this Permit.

c) On a case by case basis, the Permitter will evaluate incidences of depredation caused by Permittee and choose a course of action. The nature of the course of action will be determined by the extent and frequency of the damage, the wildlife species, and park-wide management objectives.

14) HAZARDOUS MATERIALS; ENVIRONMENTAL HEALTH AND SAFETY

a) In connection with this Permit, Permittee, its officers, agents, employees and contractors, shall not use, generate, sell, treat, keep, or store any Hazardous Materials on, about, under or into the Premises or elsewhere in Point Reyes except in compliance with all Applicable Laws and as approved in writing by Permitter. However, Permittee shall not be obligated to obtain Permitter's approval to use, keep, or generate Hazardous Materials as necessary for the normal operation or maintenance of vehicles or for standard household cleaners. Permittee agrees to be responsible for timely acquisition of any permit(s) required for its Hazardous Materials-related activities, and shall provide to the Permitter, upon request, inventories of all such Hazardous Materials and any supporting documentation, including but not limited to material safety data sheets, uniform waste manifest forms, and/or any other pertinent permits.

b) Permittee, its officers, agents, employees and contractors, shall not release, discharge or dispose of any Hazardous Materials from, on, about, under or into the Premises or elsewhere in Point Reyes, except as authorized by Applicable Laws.

c) If Permittee knows of or reasonably suspects or receives notice or other communication concerning any past,

ongoing, or potential violation of Environmental Requirements in connection with the Premises or Permittee's activities, Permittee shall immediately inform Permitter and shall provide copies of any relevant documents to Permitter. Receipt of such information and documentation shall not be deemed to create any obligation on the part of the Permitter to defend or otherwise respond to any such notification.

d) If any Hazardous Materials Occurrence is caused by, arises from, or is exacerbated by the activities authorized under this Permit or by the use of the Premises by Permittee, its officers, agents, employees or contractors, Permittee shall promptly take all actions at its sole cost and expense as are required to comply with Applicable Laws and to allow the Premises and any other affected property to be used free of any use restriction that could be imposed under Applicable Laws; provided that, except in cases of emergency, Permitter's approval of such actions shall first be obtained.

e) The Permitter shall have the right, but not the duty, at all reasonable times and, except in the case of emergency, following at least twenty-four (24) hours advance notice to Permittee, to enter and to permit any Agency, public or private utilities and other entities and persons to enter upon the Premises, as may be necessary as determined by the Permitter in its sole discretion, to conduct inspections of the Premises, including invasive tests, to determine whether Permittee is complying with all Applicable Laws and to investigate the existence of any Hazardous Materials in, on or under the Premises. The Permitter shall have the right, but not the duty, to retain independent professional consultants to enter the Premises to conduct such inspections and to review any final report prepared by or for Permittee concerning such compliance. Upon Permittee's request, the Permitter will make available to Permittee copies of all final reports and written data obtained by the Permitter from such tests and investigations. Permittee shall have no claim for any injury or inconvenience to or interference with Permittee's use of the Premises or any other loss occasioned by inspections under this Section 14(e). Notwithstanding the foregoing, neither Permittee nor Permitter shall be required to provide a report under this Section 14(e) if such report is protected by attorney-client privilege.

f) Should Permittee, its officers, agents, employees or contractors, fail to perform or observe any of the obligations or agreements pertaining to Hazardous Materials or Environmental Requirements for a period of thirty (30) days (or such longer period of time as is reasonably required) after notice, then Permitter shall have the right, but not the duty, without limitation of any other rights of Permitter under this Permit, personally or through its agents, consultants or contractors to enter the Premises and perform the same. Permittee agrees to reimburse Permitter for the costs thereof and to indemnify Permitter as provided for in this Permit.

g) Permittee understands and acknowledges that the Premises may contain asbestos and lead-based paint. If Permittee performs any Improvements or Alterations, Permittee shall comply with all Environmental Requirements related to asbestos and lead-based paint and shall solely bear all costs associated therewith. Nothing in this Permit shall be construed to require Permittee to remove asbestos or lead-based paint unless Environmental Requirements require such removal.

h) Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments, and expenses, including without limitation, consultant fees and expert fees, that arise during or after the Term as a result of any violation of any Environmental Requirement in connection with this Permit or any Hazardous Materials Occurrence in connection with this Permit.

i) The provisions of this Article 14 shall survive any termination or revocation of this Permit. Article 15 (Insurance) of this Permit shall not limit in any way Permittee's or Permitter's obligations under this Article 14.

15) INSURANCE

a) Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's

insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

b) From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

c) All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

d) All insurance policies required herein shall contain a loss payable clause approved by the Permitter which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

e) Property Insurance: At a minimum, the Permittee shall be required to purchase Basic Form Actual Cash Value (replacement cost less depreciation) insurance coverage for all residence on the Premises. Within thirty days of issuance of the Permit, the Permittee shall submit a report from a reputable insurance company which provides a full range of options for insurance coverage on all nonresidential structures on the Premises. Within thirty days of receipt of this report, the Permitter, in its sole discretion, will review and specify the type and level of insurance coverage which shall be required. The Permitter will provide the Permittee written notification of insurance requirements and the Permittee shall be required to have the specified level(s) of insurance in place within thirty days of such notification. The cost of the insurance will be deducted from the appraised fair market value for the Premises; this adjustment and the insurance requirements will be addressed in an amendment to the Permit. Permittee shall, in the event of damage or destruction in whole or in part to the Premises, use all proceeds from the above described insurance policies to repair, restore, replace or remove those buildings, structures, equipment, furnishings, betterments or improvements determined by the Permitter, in Permitter's sole discretion, to be necessary to satisfactorily discharge the Permittee's obligations under this Permit.

f) Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $1,000,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

g) Permittee shall also obtain the following additional coverage:

   i) Automobile Liability – To cover all owned, non-owned, and hired vehicles in the amount of $300,000.00.

   ii) Workers' Compensation – The amount shall be in accordance with that which is required by the State of California.

16) INDEMNITY

a) In addition to the indemnification contained in Article 14, Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgments and expenses and the like incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee's obligations hereunder shall include, but not be limited to, the burden and

expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by Permitter), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgments, penalties or other sums due against the United States.

b) Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

c) This Article 16 shall survive any termination or revocation of this Permit. The provisions of Article 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Article 16.

17) PROPERTY INTEREST

a) This Permit shall vest in Permittee no property interest in the Premises or in the improvements thereon. Title to real property and improvements thereon, including any Improvements or Alterations constructed by Permittee, shall be and remain solely in Permitter. Except as provided in Paragraph 3(g), Permittee shall have no claim for any compensation or damages for the Premises, the improvements thereon, or any Improvements or Alterations constructed by the Permittee.

b) Nothing in this Permit shall give or be deemed to give Permittee an independent right to grant easements or other rights-of-way over, under, on, or through the Premises.

c) Permitter hereby retains the sole and exclusive right to oil, gas, hydrocarbons, and other minerals (of whatsoever character) in, on, or under the Premises.

18) RENTS, TAXES AND ASSESSMENTS

a) The annual rental rate for this Permit shall be established by Permitter and is set forth on the Cover Page of this Permit.

b) The annual rent under this Permit is payable in advance on a semi-annual basis. Therefore, Permittee hereby agrees to pay fifty percent of the annual rate on or before November with the remaining fifty percent payable on or before May of each year during the Term.

c) Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

d) Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19) CYCLIC MAINTENANCE

a) Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the maintenance of all fences, buildings, and other improvements upon the Premises. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

b) Specific maintenance requirements may be negotiated with Permittee each year as outlined in Article 21 (Annual Meeting).

c) Docks and Fences shall be maintained in good condition and shall be timely repaired in conformance with Applicable Laws. Abandoned fences and other decrepit improvements shall be removed from the Premises and shall be disposed of outside the Park or as directed by Permitter after review and approval by the NPS Historian.

d) New lighting under Permittee's control of the Premises shall be redesigned to protect and preserve the night sky/darkness and minimize light pollution in Drakes Estero.

e) Parking areas shall be maintained in a safe condition and no new roads or truck trails shall be established without prior written permission of the Permitter. The main entrance road from Sir Francis Drake Boulevard to the SUP Area will be maintained by the NPS. The Park will respond in a timely manner to Permittee and/or visitor complaints regarding the condition of the main entrance road. Notwithstanding the foregoing, Permitter may enter into a road maintenance contract with Permittee.

f) Existing water reservoirs shall be maintained in a safe and secure condition to prevent washouts and erosion and no new reservoirs shall be constructed or established without prior written approval of the Permitter.

g) Permittee shall maintain the water, well, pump and all pipelines within the Premises. Permittee shall replace or repair any damage or loss of the water system within the Premises.

h) Permittee shall maintain the sewage pipeline and sewage leachfield in the "Sewage Area."

i) Permittee shall be responsible for removing slash buildup around fences or other facilities within the Premises so as to prevent fire and egress hazards. Permittee shall also be responsible for removing litter and trash from the Premises.

20) COMPLIANCE WITH APPLICABLE LAWS; NEPA, NHPA

a) General Compliance: As provided for in this Permit, Permittee at its sole cost and expense shall promptly comply with all Applicable Laws as required by law. Permittee shall immediately notify Permitter of any notices received by or on behalf of Permittee regarding any alleged or actual violation(s) of or non-compliance with Applicable Laws. Permittee shall, at its sole cost and expense, promptly remediate or correct any violation(s) of Applicable Laws.

b) National Environmental Policy Act and National Historic Preservation Act: Where activities undertaken by Permittee relate to the preparation of compliance documents pursuant to the National Environmental Policy Act ("NEPA") or the National Historic Preservation Act ("NHPA"), Permittee shall supply all necessary information to Permitter and any Agency in a timely manner. Permitter will pay for the preparation of NEPA or NHPA documents. If there is litigation regarding NEPA or NHPA compliance, it will not trigger the indemnification requirements of Article 16.

21) ANNUAL MEETING

a) The Parties shall meet annually each year during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit..

22) PENALTY

a) At the option of the Permitter, Permitter may, in lieu of voiding and terminating this Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such case, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provision shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

23) SURRENDER AND VACATE THE PREMISES, RESTORATION

a) At the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and repair any damage

resulting from such removal. Subject to the approval of the Permitter, Permittee shall also return the Premises to as good order and condition (subject to ordinary wear and tear and damage that is not caused directly or indirectly by Permittee) as that existing upon the Effective Date.

b) All Permittee's Personal Property shall remain the property of Permittee. However, if after the conclusion of Permittee's authorization to use the Premises for the Permitted Uses, Permittee shall fail satisfactorily to remove Permittee's Personal Property and so repair the Premises, then, at the Permitter's sole option, after notice to Permittee, Permittee's Personal Property, shall either become the property of the Permitter without compensation therefore, or the Permitter may cause it to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

24) LIMITATION ON EFFECT OF APPROVALS

a) All rights of Permitter to review, comment upon, approve, inspect or take any other action with respect to the use and occupancy of the Premises by Permittee, or any other matter, are expressly for the benefit of Permitter and no other party. No review, comment, approval or inspection, right or exercise of any right to perform Permitter's obligations, or similar action required or permitted by, of, or to Permitter under this Permit, or actions or omissions of Permitter's employees, contractors, or other agents, or other circumstances shall give or be deemed to give Permitter any liability, responsibility or obligation for, in connection with, or with respect to the operation of the Premises, nor shall any such approval, actions, information or circumstances relieve or be deemed to relieve Permittee of its obligations and responsibilities for the use and occupancy of the Premises as set forth in this Permit.

25) WAIVER NOT CONTINUING

a) The waiver of any Default, whether such waiver be expressed or implied, shall not be construed as a continuing waiver, or a wavier of or consent to any subsequent or prior breach of the same or any other provision of this Permit. No waiver of any Default shall affect or alter this Permit, but each and every Provision of this Permit shall continue in full force and effect with respect to any other then existing or subsequent Default.

26) LIENS

a) Permittee shall have no power to do any act or to make any contract that may create or be the foundation for any lien, mortgage or other encumbrance upon the reversion, fee interest or other estate of the Permitter or of any interest of the Permitter in the Premises. If any such lien shall at anytime be filed against the Premises or any portion thereof, Permittee shall cause the Permitter to be discharged from the lien.

27) HOLDING OVER

a) This Permit shall terminate upon the Termination Date and any holding over by Permittee after the Termination Date shall not constitute a renewal of this Permit or give Permittee any rights under this Permit or in or to the Premises.

28) NOTICES

a) Any notice or other communication required or permitted under this Permit shall be in writing and shall be delivered by hand or certified mail with return receipt requested. Notices and other communications shall be addressed as follows:

If to Permitter:

Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

If to Permittee:

Mr. Kevin Lunny
Drakes Bay Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

29) NO PARTNERSHIP OR JOINT VENTURE

a) Permitter is not for any purpose a partner or joint venturer of Permittee in the development or operation of the Premises or in any business conducted on the Premises. Permitter shall not under any circumstances be responsible or obligated for any losses or liabilities of Permittee.

30) ANTI-DEFICIENCY ACT

a) Permittee and Permitter agree that nothing contained in this Permit shall be construed as binding Permitter to expend, in any fiscal year, any sum in excess of the appropriation made by Congress for that fiscal year in furtherance of the subject matter of this Permit, or to involve Permitter in any contract or other obligation for the future expenditure of money in excess of such appropriations.

31) COMPLIANCE WITH EQUAL OPPORTUNITY LAWS

a) Permittee agrees that in undertaking all activities pursuant to this Permit, Permittee will comply with all Applicable Laws relating to non-discrimination.

32) ENTIRE AGREEMENT AND AMENDMENT

a) This instrument, together with the exhibits hereto, all of which are incorporated in this Permit by reference, constitutes the entire agreement between Permitter and Permittee with respect to the subject matter of this Permit and supersedes all prior offers, negotiations, oral and written. This Permit may not be amended or modified in any respect whatsoever except by an instrument in writing signed by Permitter and Permittee.

33) NO PAYMENTS BY PERMITTER

a) Under no circumstances or conditions, whether now existing or hereafter arising, and whether or not beyond the present contemplation of the Parties, shall Permitter be expected or required to make any payment of any kind whatsoever with respect to the Premises or be under any obligation or liability except as expressly set forth in this Permit.

34) NO THIRD PARTY BENEFICIARIES

a) Except as expressly set forth in this Permit, this Permit shall not be deemed to confer upon any person or entity, other than the parties to this Permit as expressly set forth in this Permit, any third party beneficiary status, any right to enforce any Provision of this Permit, or any other right or interest.

35) NO PREFERENTIAL RENEWAL AND RELOCATION ASSISTANCE

a) Permittee hereby agrees that Permittee is not a concessioner and that the provisions of law regarding National Park Service concessionaires do not apply to Permittee. No rights shall be acquired by virtue of this Permit entitling Permittee to claim benefits under the Uniform Relocation Assistance and Real Property Acquisition

Policies Act of 1970, Public Law 91-646.

36) SEVERABILITY

a) In case any one or more of the provisions of this Permit shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision of this Permit, and this Permit shall be construed as if such invalid, illegal or unenforceable provisions had not been contained in this Permit.

37) EXHIBITS

a) Each of the exhibits referenced in this Permit is attached hereto and incorporated herein.

38) TIME OF THE ESSENCE

a) Time is hereby expressly declared to be of the essence of this Permit and of each and every Provision of this Permit.

39) HEADINGS

a) Article, Section and Subsection headings in this Permit are for convenience only and are not to be construed as a part of this Permit or in any way limiting or amplifying the Provisions of this Permit.

40) PERMIT CONSTRUED AS A WHOLE

a) The language in all parts of this Permit shall in all cases be construed as a whole according to its fair meaning and not strictly for or against either Permitter or Permittee. The Parties acknowledge that each party and its counsel have reviewed this Permit and participated in its drafting and therefore that the rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed or applied in the interpretation of this Permit.

41) MEANING OF TERMS

a) Whenever the context so requires, the neuter gender shall include the masculine and the feminine, and the singular shall include the plural and vice versa.

42) FEDERAL LAW

a) The laws of the United States shall govern the validity, construction and effect of this Permit.

LIST OF EXHIBITS

EXHIBIT A: Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

EXHIBIT B: Map – Drake's Estero Oysters – SUP & ROP

EXHIBIT C: Drakes Estero Aquaculture and Harbor Seal Protection Protocol

EXHIBIT D: Map – Drakes Bay Oyster Company Well Area

EXHIBIT E: Map – Drakes Bay Oyster Company Sewage Area

EXHIBIT A

Map – Drake's Estero Aquaculture & CDFG Leases: NPS Resources and SUP Area

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior

Permit Type

- ROP
- SUP

Oyster Racks

- Active
- Dilapidated

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

Map Location

N
W E
S

0 0.5 Miles

EXHIBIT B

Map – Drake's Estero Oysters – SUP & ROP

Drake's Estero Oysters - SUP & ROP

National Park Service
Point Reyes National Seashore
Marin County, CA

N
W E
S

0 50 100 150 200
Feet

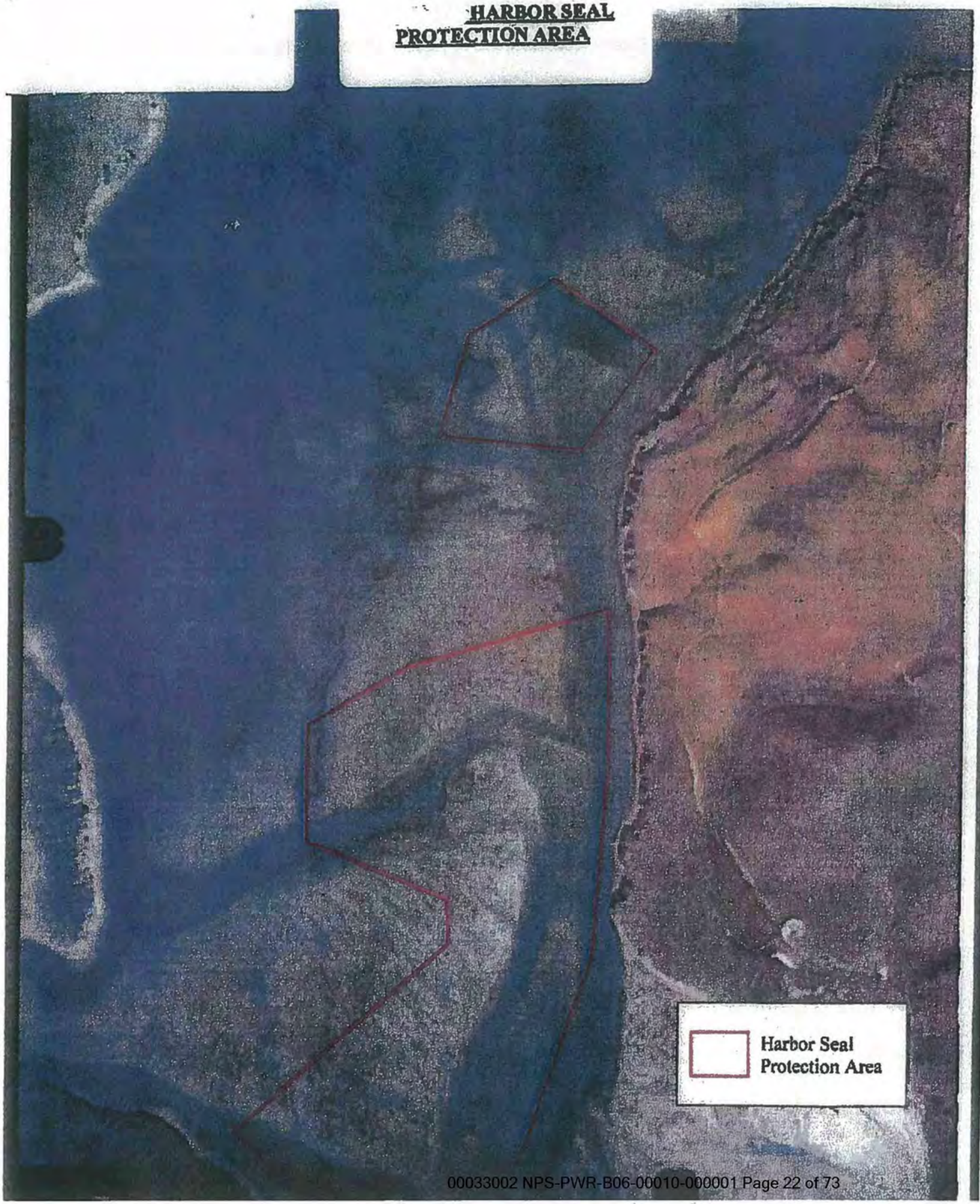
Permit Type

ROP - 1.5 acres

SUP - 1.1 acres

EXHIBIT C

Drakes Estero Aquaculture and Harbor Seal Protection Protocol


HARBOR SEAL
PROTECTION AREA
Harbor Seal
Protection Area

Drakes Estero Aquaculture and
Harbor Seal Protection Protocol

The following items are mutually agreed to for protection of harbor seals in and adjacent to the Harbor Seal Protection Areas identified in the Map, attached hereto and incorporated herein by reference ("Protocol Map"):

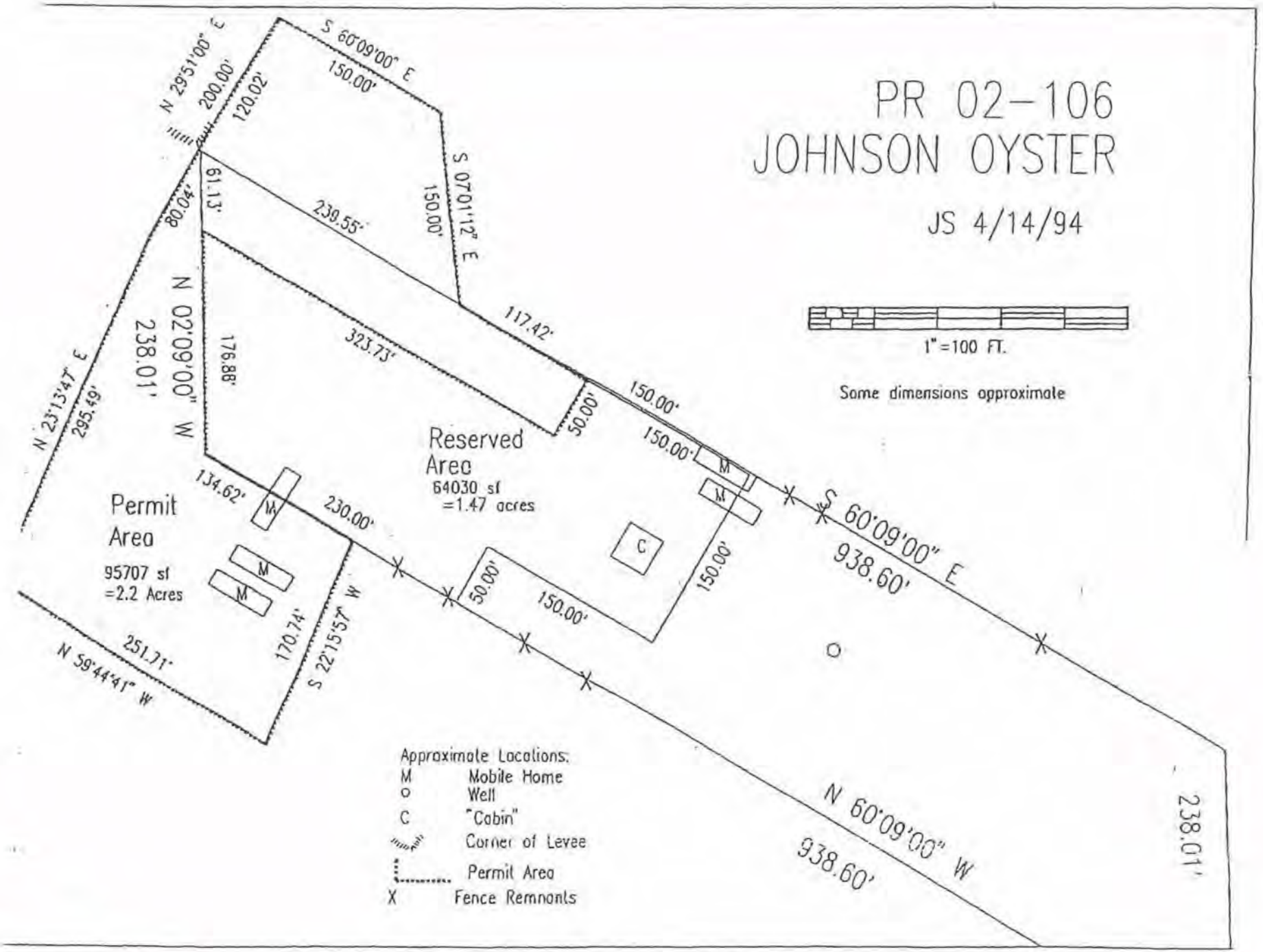
1. During the breeding season, March 1 through June 30, the "Main Channel" and "Lateral Channel" of Drakes Estero will be closed to boat traffic. During the remainder of the year, the Lateral Channel and Main Channel are open to boat traffic outside of the protection zone.

2. During the breeding season, Permittee boats may use the "West Channel" at low speed while maintaining a distance of at least 100 yards from hauled out seals.

3. Throughout the year, all of Permittee's boats, personnel, and any structures and materials owned or used by Permittee shall be prohibited from the harbor seal protection areas identified on the Protocol Map. In addition, all of the Permittee's boats and personnel shall be prohibited from coming within 100 yards of hauled out harbor seals.

EXHIBIT D

Map – Drakes Bay Oyster Company Well Area



00033002 NPS-PWR-B06-00010-000001 Page 25 of 73

EXHIBIT E

Map – Drakes Bay Oyster Company Sewage Area

EXHIBIT
Oyster Farm Leach Field (Approximate Location and Size)
Location Map
National Park Service
Point Reyes National Seashore
Marin County, CA
Oyster Farm Leach Field
0
175
350
525
700 Feet
Plot Date: 1/7/08
S:/GIS/projects1/Range/SpecialParkUses/DBOLeachField.mxd

L1425
Tract 02-106 PORE

March 28, 2005

Mr. Kevin Lunny
17300 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Based on several phone calls we have received this week, we want to reiterate our guidance to you regarding the transfer of the Johnson Oyster Company site to your family. We are sending you this letter to ensure clarity and to avoid any misunderstanding.

1. Demolition and clean-up of the site was authorized in our January 25, 2005 letter. We appreciate your effort to eliminate the accumulated debris along the shoreline.

2. Before any permit may be issued regarding the shoreline access parcel, we require a site plan to review with Marin County and the Coastal Commission. As you know, we have requested this site plan several times in the past month. A site plan with annotation of the building upgrades needed will be used to develop conditions of the permit agreement. At present, without the map, we are unable to determine permit boundaries. Once we have determined permit boundaries, the Park Service will contract an appraiser to determine a fair market rental fee for the use of parklands. Fair market value fees are required by law and policy.

3. Once the site plan is received, park staff will prepare a preliminary environmental screening form required by the National Environmental Policy Act. If no measurable impacts are anticipated, a categorical exclusion from any further compliance will be issued. However, if moderate impacts are anticipated an environmental assessment may be required. At present, we do not believe additional compliance will be necessary.

4. Regarding the septic system, we require verification of approval by the County of Marin that the processing plant wastewater is approved for use. No processing may be conducted onsite until a sewage system is approved by the County of Marin for processing and the building is certified and approved by the State Department of Food and Agriculture.

5. Regarding the transfer of the Reservation and Use Agreement for 1.43 acres of land until 2012, we have reviewed the agreement and the transfer does not require our concurrence. However, we would appreciate a letter that indicates the date when you have accepted the legal responsibility for the Use Agreement.

6. As we have discussed with you, any building upgrades will require standard building construction documents and our approval before the work may be implemented. We do not anticipate any problems if your rehabilitation is within existing building footprints as you've indicated.

7. Regarding the 2012 expiration date and the potential wilderness designation, based on our legal review, no new permits will be issued after that date.

8. The transfer of the water and septic leach field permits were sent to you last week and will be complete when the copies with your signatures are returned to our office.

Most of the above points were covered during my meeting last week with your consultant, Lisa Bush, the Coastal Commission, and Marin County staff. We do not anticipate any major problems, but all of the above are standard requirements that would be required in a similar situation.

We appreciate the work you have done at the site and look forward to working with you in the future.

Sincerely,

/s/

Don L. Neubacher
Superintendent

cc:
Sheila Ryan, California Coastal Commission
Curtis Havel, Marin County Community Development Agency

DLNeubacher:an 03/28/05

L3019

March 21, 2005

Mr. Kevin Lunny
17300 Sir Francis Drake Blvd.,
Inverness, CA 94937

Dear Mr. Lunny:

Enclosed are two copies of two Special Use Permits issued to Johnson's Oyster Company, #MSC 8530-6000-2010 regarding well water and #MSC 8530-6000-2011 regarding a leach field. Please co-sign and date each document as permittee, indicating that you assume all rights and responsibilities under these Special Use Permits. Keep one copy of each permit and return the remaining copies to our office by April 1, 2005.

Please note the expiration date on the face of each permit. Also note the liability insurance requirements clarified in the "conditions of this permit (#15)." A certificate of insurance naming the "United States" as additionally insured should be provided to our office within 30 days from the date of this letter.

Sincerely,

Don L. Neubacher
Superintendent

Enclosures

KEMCKAY:kem 03-21-05

4425
02-106

Johnson Oyster Company
17171 Sir Francis Drake Boulevard PO Box 69 Inverness, CA 94937 415/669-1149

February 23, 2005

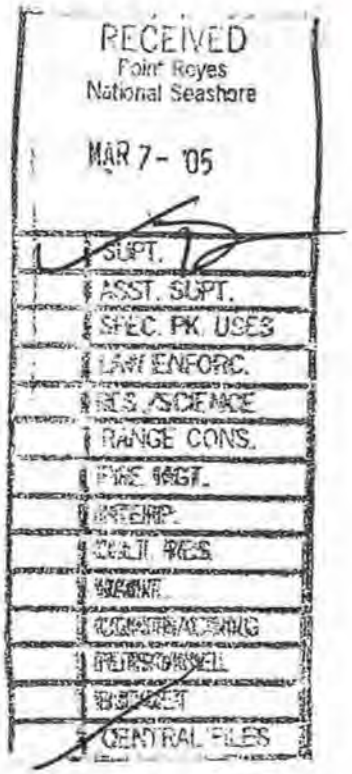
Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes, CA 94956

Don,

I give my authorization to assign all rights, leases and permits to, Drakes Bay Oyster Company, managed by Mr. Kevin Lunny. The shareholders of Johnson Oyster Company voted and approved the sale of its assets to Drakes Bay Oyster Company on January 15, 2005.

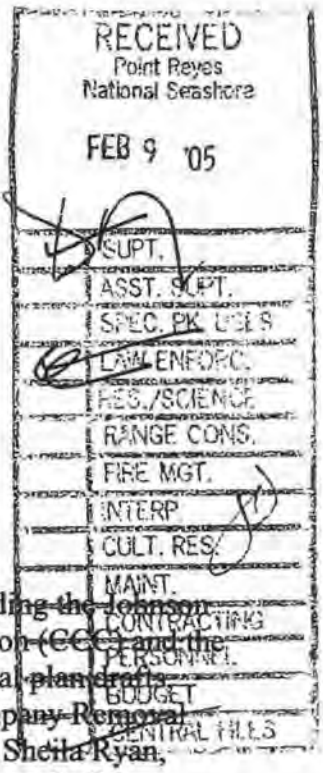
Sincerely,

Tom Johnson
President, Johnson Oyster Company



LA25
02.106

Drakes Bay Oyster Company
17171 Sir Francis Drake Boulevard, P.O. Box 69, Inverness, CA 94937 415/669-1149



February 4, 2005

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

Re: Johnson Oyster Company

Dear Don,

It has been a pleasure working with you over the past four months regarding the Johnson Oyster Company. After meetings with the California Coastal Commission (CCC) and the National Park Service (NPS) beginning in October 2005, and after several plan drafts, both you and the CCC approved a final draft of the Johnson Oyster Company Removal and Restoration Plan on January 6, 2005. At this meeting, both you and Sheila Ryan, CCC's Headquarters Enforcement Officer, agreed to send a letter of approval of the Johnson Oyster Company Removal and Restoration Plan. Sheila Ryan's letter of CCC approval of the plan was received the next day (copy of plan and CCC approval attached).

With this approval, the Lunny family has purchased the assets of the Johnson Oyster Company. The new company owned by the Lunnys, Drakes Bay Oyster Company (DBOC), has performed much of the work required by NPS and the CCC. This letter is to identify the progress to date.

Since this approval date, DBOC has made significant progress toward meeting your demands. Demolition and cleanup operations have been largely completed. To date, more than 1,200 cubic yards of debris has been hauled for disposal and all demolition not requiring county building permits has been accomplished. Specifically, Building B, Building C, addition H, addition on west side of Building J, addition L, addition on east side of West Building K, addition to west side of East Building K are all completely demolished and removed from site. Large amounts of accumulated debris have also been taken from the site. The demolition remaining is dependent on building permits from the County of Marin. Architect William Kirsch is working with the County of Marin to complete the permit process. As soon as these permits are obtained, the required final demolition will be completed.

During our meeting on January 6, 2005, we discussed several issues:

- One of these issues was the final draft of the Removal and Restoration Plan. The only change necessary was to detail more specifically each buildings date of demolition and permit requirements. DBOC complied by the next morning and

the plan was approved. The balance of the agenda for the meeting included several matters, some still needing resolution. (I gave a copy of the agenda to you then and I have attached a copy of the agenda with my notes from our meeting.)

- We asked for permission to use a temporary sales trailer for use during the building repairs. You then responded with a request for a picture of the temporary sales trailer before it is brought on-site. NOTE: At this point, we believe that a temporary sales trailer may not be necessary. We plan to remodel the new sales location without moving to a temporary trailer.

- We also talked about the use of storage containers, as almost all of the existing storage area was to be demolished. You requested to be shown where the containers would be located and how they could be screened from sight.

- I explained that Marin County Environmental Health Services said that they have no jurisdiction on federal land to regulate the retail sales. You mentioned that you would like to ask them again.

- We also discussed residential trailers. DBOC requested approval to demolish the existing dilapidated trailers and replace them with new trailers. NOTE: It may take some time to accomplish this exchange, but the existing trailers are in obvious need of replacement.

- You requested a copy of the consummated lease from the Department of Fish and Game, which I have attached here for your files.

Some review and further follow-up is also necessary for our January 13, 2005 meeting. For your convenience, I have also attached a copy of the agenda that we used during the meeting.

- We reviewed a draft copy of the proposed site plan.

- You suggested that maybe the new restroom could be located between the cannery and the kayakers parking area so that both the cannery employees and the kayakers could share the facility. NOTE: Thank you for sending us the contact information on the restrooms. I have contacted the company and they have sent us comprehensive literature and quotes. We appreciate your offer to possibly share in the cost of the new remote restroom, so that the kayakers can also use it. At the time of our meeting, DBOC assumed this remote restroom facility would meet the ADA requirements for everyone's needs. DBOC has since learned that an ADA restroom would still be required within the cannery. Therefore, it would not be necessary for DBOC to build the remote facility. DBOC would, however, offer to share the cannery facility with the kayakers enjoying Drakes Estero. (This should not be a problem, as the newly constructed septic system has far more capacity than the current system's capacity. The existing system was

designed when there were 12 residential trailers plus the two stick-framed homes on site.)

- I agreed to provide you with a copy of the site plan that we reviewed so that you have your own copy to share with the County departments. NOTE: I have asked Bill Kirsch to send you a copy of the plan.

- I gave you an e-mail from Lisa Bush, suggesting a meeting with several County officials to help in planning. NOTE: I have not heard back from you regarding the suggested meeting with yourself, Lisa Bush and the listed County personnel. Please contact Lisa Bush or myself to help arrange a meeting.

- I have attached a copy of the email I left with you at this same meeting.

- When we discussed the use of a temporary processing trailer, you had concerns about DBOC taking longer to complete the repairs of the existing plant if a temporary trailer were being used. NOTE: I would like to suggest an agreement that the temporary processing facility will need to be removed from site 90 days from the issuance of the building permit to repair the existing processing plant (roof, electrical, and plumbing, as required by the County and the NPS) regardless of whether the work is completed or not.

- During this same meeting, I asked you if we could set up a meeting with Judy Davidoff to discuss the potential wilderness issue. I gave you some possible dates for such a meeting, and you mentioned that it would probably be appropriate to meet with your solicitors in Oakland. You agreed to get back to me with a meeting date. NOTE: I sent you a follow-up email regarding this question. You can respond to me directly, or to Judy Davidoff directly at jdavidoff@steefel.com.

- The PG&E scheduling problem that we discussed has been resolved. Following their action, Building M was demolished and removed from site.

The Lunny family has made significant progress in complying with the outlined demands in the "Requirements and Timelines for Johnson Oyster Farm Operations" (copy attached) prepared by the NPS. Progress is as follows:

1) Obtain and provide copy of NPS of a final inspection permit from Marin County for the septic system that certifies County approval of such system. NOTE: A final inspection has been performed. The system is approved. An operating permit has been applied for as required by the original permit approval. Copies of all documentation will be sent to your office.

2) Remove all fencing and debris from former water disposal pit area (adjacent to retail and processing are) and fill hole with clean material. NOTE: Work described is complete. All debris was hauled to Redwood Sanitary Landfill in Novato for disposal.

3) Clean up properly and dispose of all debris along the shoreline of Drakes Estuary within and adjacent to Johnson Oyster Company operations. NOTE: Work is complete. Further clean up of shoreline may be necessary, as some debris may have been hidden by large amounts of seaweed. DBOC will continue to monitor shoreline for debris.

4) Obtain and provide copy to NPS of applicable retail food establishment permits from the Environmental Health Services (EHS) Division, Marin County. NOTE: DBOC met with Marin County EHS and was told that Marin County does not regulate retail food establishments on federal land. EHS told DBOC that they do not regulate the operations of Drakes Beach Café, or any other location on federal property. DBOC met with Paul Robinson, P.E., Public Health Consultant, NPS, and Michael Hernandez, DHS, regarding this matter. Michael Hernandez mentioned that his department would be regulating the shucking and bottling facility on-site. He also mentioned that it might be convenient to have DHS do the oversight. The exact jurisdiction is not yet determined. Both DHS and NPS agreed to regulate and oversee the retail operation. DBOC is not aware of a specific retail permit that is applicable.

5) Obtain and provide copy to NPS of permit to drill (already drilled) and operate the drinking water well from the EHS Division, Marin County. NOTE: DBOC met with Marin County EHS regarding this matter and was told that EHS has no jurisdiction on federal land and will not regulate the water system. DBOC subsequently met with Paul Robinson, P.E., Public Health Consultant, NPS, Michael Hernandez and Dr. Chang Rae Lee, both of the State of California DHS, to evaluate the well. DHS will regulate the drinking water system. There have now been two Title 22 laboratory evaluations of the well water, approval of the well driller's report and well seal. The water system is now on a weekly sampling program.

6) Obtain inspections of the housing on reservation lands by Marin County, California Public Health Services, and other appropriate agencies. Complete rehabilitation of the housing to meet current health and safety codes and in accordance with the inspections. NOTE: Paul Robinson, P.E., Public Health Consultant, NPS, inspected on-site housing, similar to inspections conducted for employee housing on all PRNS leaseholds. DBOC has received a written report of all deficiencies to be corrected. Corrections requiring permits from the County of Marin have not been completed to date. Bill Kirsch, Architect, is working with the County to obtain permits to complete the repairs.

7) Remove all illegal development as required in the California Coastal Commission Cease and Desist Order dated December 11, 2003. NOTE: All illegal development has been removed except such removal that requires County of Marin permits. Bill Kirsch, Architect, is working with the County of Marin to obtain applicable permits.

8) Obtain and provide copy to NPS of building permits from the appropriate State or County agency, such as Marin County Community Development Agency, for all non-residential structures, if any, to remain on reservation lands, including any offices, outbuildings, structures adjacent to trailers, or retail sales area. NOTE: Bill Kirsch, Architect, is working with the County of Marin on all permits required for all non-residential structures to remain.

9) Submit request for approval to NPS for any buildings proposed to remain on NPS land along with valid applicable building permits from the Marin County Community Development Agency and/or other appropriate agency. NOTE: Bill Kirsch, Architect, is working with the Marin County C.D.A. to obtain building permits for all buildings to remain. Request for approval for buildings to remain will be submitted to NPS as soon as permits are obtained.

10) Complete all rehabilitation of the non-housing structures to meet current codes and regulations in accordance with applicable building permits and approvals. NOTE: Rehabilitation will commence as soon as permits are obtained and NPS approval has been received.

As you know, a large sum of money has been expended to meet NPS demands. As you also know, close of the asset purchase cannot take place until all leases and permits are assigned. The Department of Fish and Game is planning to assign its leases to Drakes Bay Oyster Company by mid-March. Drakes Bay Oyster Company asks that all necessary leases and permits from the National Park Service be assigned to DBOC by Tuesday, March 15th. Please feel free to contact me to discuss any items that may be relevant to the assignment of the leases and permits.

The Lunny family (Drakes Bay Oyster Company) has demonstrated clear sincerity about operating within the guidelines of the County of Marin, the California Coastal Commission, and the National Park Service. Close to $300,000 has been spent to comply with these regulatory agencies since the approval of the Removal and Restoration Plan of January 7, 2005. The Lunny family has been a part of the Point Reyes National Seashore since its inception, and has enjoyed an excellent relationship with park administration from the beginning. We look forward to continuing this relationship into the future, as Drakes Bay Oyster Company carries on the historic operation of oyster production, processing and sales from the shoreline of Drakes Estero, preserving the cultural heritage of the Point Reyes Peninsula.

Sincerely,

Kevin Lunny, President
Drakes Bay Oyster Company

Enclosures: 8
Cc: Judy Davidoff
Sheila Ryan

Form 10-114
Rev. DEC. 99

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use Leachfield

Date Permit Reviewed 2002 05/08
Reviewed 20 __ _____
Reviewed 20 __ _____
Expires 2006 11/30

Long Term X

Short Term ___

Permit # MSC 8530-6000-2011
Region Park Type No. #

POINT REYES NATIONAL SEASHORE
Name of Area

Johnson's Oyster Company of P. O. Box 69, Inverness, CA 94937 (415) 669-1149
Name or Permittee Address Phone

is hereby authorized during the period from (Time 12:01 am day 01 Month December, 2001), through (Time 11:59 pm day 30 Month November, 2006), to use the following described land or facilities in the above named area:

A parcel approximately one (1) acre in size and a four (4) foot-wide underground pipeline route connecting to the Johnson's Oyster Company's processing facilities, as shown on the attached map, "Site Map." The base fee (established in 1999) of $350.00 has been adjusted utilizing the Inflation Calculator to adjust the annual fee to $368.00. An annual billing schedule of $368.00 will be established.

For the purpose(s) of: Continuing the use and maintenance of a sewage pipeline and sewage leachfield (previously authorized by Permit # MSC 8530-00-0003) to service the operation and facilities companion to the reservations and state tidelines lease issued to Johnson's Oyster Company.

Authorizing legislation or other authority (RE - DO-53): 16 U.S.C. §§ 1, 1a-1, & 3

NEPA Compliance: CATEGORICALLY EXCLUDED X EA/FONSI ___ EIS ___ OTHER APPROVED PLANS ___

PERFORMANCE BOND: Required _____ Not Required X Amount $_____

LIABILITY INSURANCE: Required X Not Required _____ Amount $ 500,000.00 per occurrence.

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $ 1,840.00.

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE JOHNSON OYSTER COMPANY — 8-28-02
Tom Johnson (Signature) (Date)

Authorizing Official _____ (Signature), Don L. Neubacher (Superintendent), 8/29/02 (Date)

Additional Authorizing Official (if Required) _____ (Signature), President (Title), 3/25/05 (Date)

CONDITIONS OF THIS PERMI.

1. The permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all applicable laws and regulations of the area.

2. Damages - The permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the permittee is authorized to make of the land described in this permit.

3. Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this permit or derive, either directly or indirectly, any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company, if the permit be for the benefit of such corporation.

4. Assignment - This permit may not be transferred or assigned without the consent of the Superintendent, in writing.

5. Revocation - This permit may be terminated upon breach of any of the conditions herein or at the discretion of the Superintendent.

6. The permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(a)(4)].

7. Permittee will comply with applicable public health and sanitation standards and codes.

8. USE OF PREMISES

A. Permittee intends to use the Premises for: wastewater disposal only. This use and no changes to this designated use shall be permitted.

B. Permittee's use of the Premises shall be in accordance with all of the Provisions contained in this Permit and all Applicable Laws.

C. Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage, the use of loudspeakers or sound or light apparatus that could disturb park visitors outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

D. The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Section "Use of the Premises," is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit.

E. Permittee's use of the land is subject to the right of the NPS to establish trails, roads, and even though no trail is formally established other improvements an betterments over, upon, or through said premises and further to the use by travelers and others of such roads and trails as well as those existing. The Permittee understands that occasional park visitors are authorized to walk or hike on the lands included in this Permit.

9. CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

A. Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Item 8, "Use of Premises."

B. Permittee shall not undertake any Improvements or Alterations to the Premises (including temporary equipment or facilities) without the prior written approval of Permitter.

C. As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans to Permitter for Permitter's approval and shall also submit other relevant data as may be required by Permitter.

D. Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

E. Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

F. Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

G. Permittee shall not construct any Improvements or Alterations outside the boundaries of the assigned Premises.

H. Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

10. TREATMENT OF REFUSE

Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

11. PESTICIDE USE

The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest problems. The goal of IMP is to use the least-toxic, effective methods of controlling pests. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter a request for the use of pesticide(s) and shall not use any pesticide(s) until Permittee has received an express written authorization therefore from Permitter. Permittee shall manage, treat, generate, handle, store and dispose of all pesticides in accordance with Applicable Laws, including reporting requirements.

12. FIRE PREVENTION AND SUPPRESSION

Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

13. EXCAVATION, SITE AND GROUND DISTURBANCE

Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities. If approval is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

14. NONPOINT SOURCE POLLUTION AND SOIL EROSION

Potential sources of nonpoint source pollution associated with this Permit includes soil erosion. The Permittee shall comply with all Applicable Laws regarding nonpoint source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

15. INSURANCE

A. Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

B. From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

C. All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

D. All insurance policies required herein shall contain a loss payable clause approved by the Permitter, which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

E. Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $500,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

16. INDEMNITY

Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgements, and expenses incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee, or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by NPS), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgements, penalties or other sums due against the United States.

Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

This Item 16 shall survive any termination or revocation of this Permit. The provisions of Item 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Item 16.

17. PROPERTY INTEREST

Title to real property and improvements thereon, including any improvements or alterations constructed by Permittee, shall be and remain solely in Permitter.

18. RENTS, TAXES AND ASSESSMENTS

A. The annual rent under this Permit is payable in advance on an annual basis. Therefore, the Permitee hereby agrees to pay $368.00 on or before December of each year during the Term.

B. Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

C. Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19. CYCLIC MAINTENANCE

A. Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the general maintenance of the pipeline upon the Premises.. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

B. Specific maintenance requirements may be negotiated with Permittee each year as outlined in Item 19 (Annual Meeting). Cyclic Maintenance to be accomplished during the Term of this Permit includes, but is not limited to, the following:

1. Permittee shall maintain all pipelines from the main line to the leachfield within the Premises. Permittee shall repair any damage or loss to the pipeline system within the Premises.

2. Permittee shall repair or replace damage to the sewage disposal system within the Premises.

20. ANNUAL MEETING

The Parties shall meet annually in December during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit. Any proposed changes or modifications to this Permit which are required in order to meet National Park Service requirements or objectives, including range management objectives, shall be discussed and negotiated at the Annual Meeting. If National Park Service requirements or objectives require prompt attention, the date for the Annual Meeting may be reasonably changed by Permitter.

21. PENALTY

At the option of the Permitter, Permitter may, in lieu of voiding and terminating the Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such cases, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provisions shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

22. TERM

The term of this Permit begins on December 1, 2001and will expire on November 30, 2006. If Permittee breaches any of the Provisions of this Permit or if Permittee terminates this Permit prior to its Expiration Date, the term of the Permit will end. Six months prior to the expiration date of this Permit, this Permit, or a similar Permit, may be offered to Permittee for an additional five-year period. If a subsequent Permit is not entered into prior to the expiration date, the provision of this Permit regarding Permittee's obligations to surrender and vacate the Premises shall apply.

22. SURRENDER AND VACATE THE PREMISES, RESTORATION

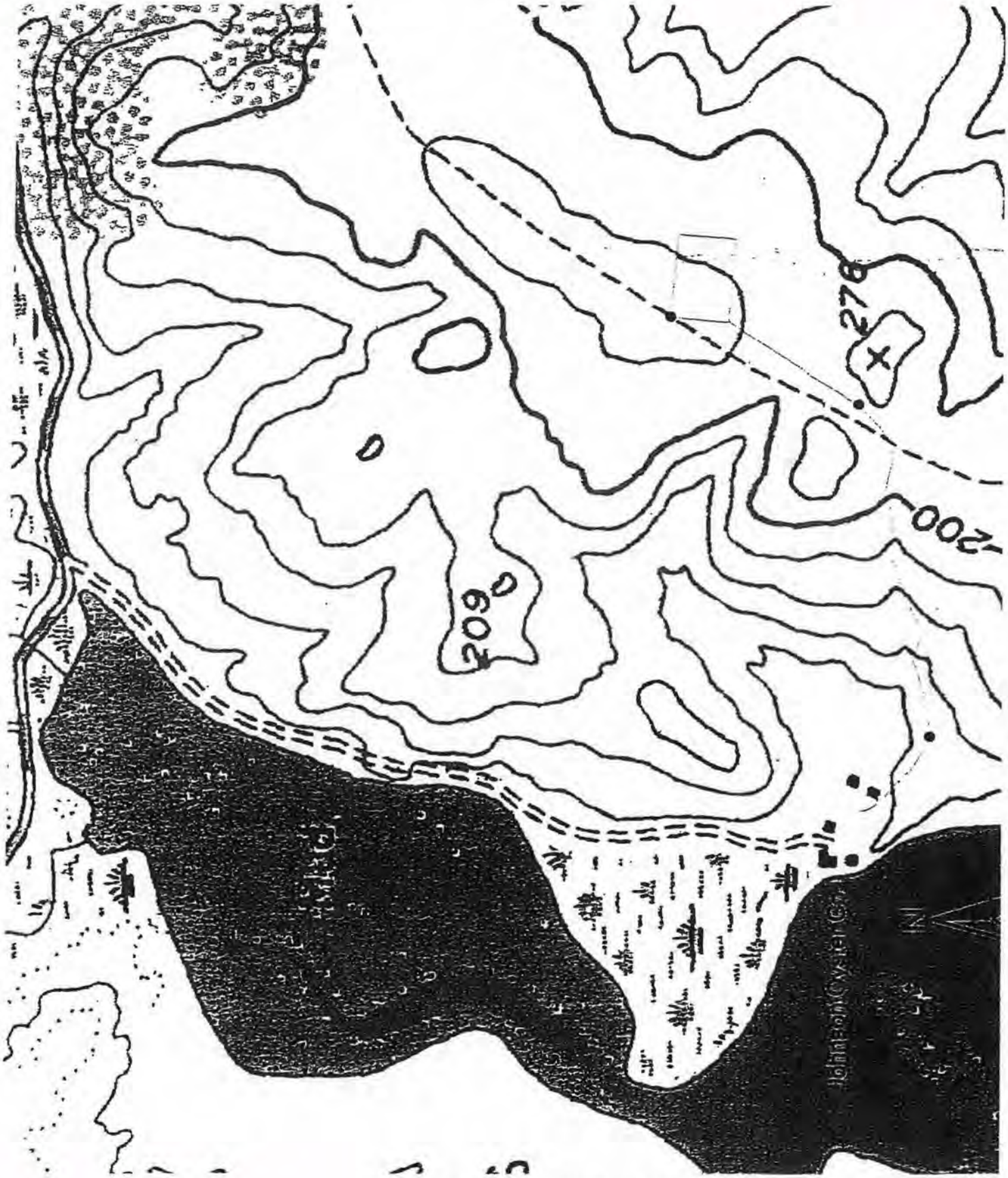
On the Termination Date of this Permit, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and remove any Improvements or Alterations identified by Permitter. Subject to the approval of Permitter, Permittee shall also restore the Premises to a condition at

least equal to that existing at the time this Permit was entered into, normal wear and tear excepted. If Permittee does not remove Permittee's Personal Property, said Improvements or Alterations, then, at

Permitter's option, these items shall either become the property of Permitter without compensation therefore, or Permitter may cause them to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.

EXHIBIT A

SITE LOCATION MAP



Form 10-114
Rev. DEC. 99

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use Water from Well

Date Permit Reviewed 2002 05/08
Reviewed 20 __ _____
Reviewed 20 __ _____
Expires 2006 06/30

Long Term X

Short Term ___

Permit # MSC 8530-6000-2010
Region Park Type No. #

POINT REYES NATIONAL SEASHORE
Name of Area

Johnson's Oyster Company of P. O. Box 69, Inverness, CA 94937 (415) 669-1149
Name or Permittee Address Phone

is hereby authorized during the period from (Time 12:01 am day 01 Month July, 2000), through (Time 11:59 pm day 30 Month June, 2006), to use the following described land or facilities in the above named area:
Continuing the use of the water well drilled by the Permittee on the non-reserved eastern portion of Tract 02-106. The base fee (established by appraisal dated 06/13/94) of $2,124.00 has been adjusted utilizing the Inflation Calculator to adjust the annual fee to $2,500.00. A quarterly billing schedule of $625.00 will be established.
This permit is contingent on a well drilling and well operating permit having been obtained from the Environmental Health Services Division of the Community Development Agency.

For the purpose(s) of: Supplying water for the Johnson's Oyster Company facilities using Permittee well, pump and pipelines (previously authorized by Permit # WRO PORE-6000-501). The electrical supply and all maintenance of the facilities is the responsibility of the Permittee. The location of the well is identified on the attached "Site Map."

Authorizing legislation or other authority (RE - DO-53): 16 U.S.C. §§ 1, 1a-1. & 3

NEPA Compliance: CATEGORICALLY EXCLUDED X EA/FONSI ___ EIS ___ OTHER APPROVED PLANS ___

PERFORMANCE BOND: Required _____ Not Required X Amount $_____

LIABILITY INSURANCE: Required X Not Required _____ Amount $ 500,000.00 per occurrence.

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $ 12,500.00.

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE JOHNSON OYSTER COMPANY — Signature — 8-28-02 Date

Tom Johnson

Authorizing Official — Signature — Don L. Neubacher, Superintendent — 8/29/02 Date

Additional Authorizing Official (if Required) — Signature — President, Title — 3/25/05 Date

CONDITIONS OF THIS PERMIT

1. The permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all applicable laws and regulations of the area.

2. Damages - The permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the permittee is authorized to make of the land described in this permit.

3. Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this permit or derive, either directly or indirectly, any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company, if the permit be for the benefit of such corporation.

4. Assignment - This permit may not be transferred or assigned without the consent of the Superintendent, in writing.

5. Revocation - This permit may be terminated upon breach of any of the conditions herein or at the discretion of the Superintendent.

6. The permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(a)(4)].

7. Permittee will comply with applicable public health and sanitation standards and codes.

8. USE OF PREMISES

A. Permittee intends to use the Premises for: water well, pump and pipelines. This use and no changes to this designated use shall be permitted.

B. Permittee's use of the Premises shall be in accordance with all of the Provisions contained in this Permit and all Applicable Laws.

C. Permittee shall not engage in any activity that may be dangerous or harmful to persons, property, or the Park; that constitutes or results in waste or unreasonable annoyance (including, without limitation, signage, the use of loudspeakers or sound or light apparatus that could disturb park visitors outside the Premises); that in any manner causes or results in a nuisance; or that is of a nature that it involves a substantial hazard, such as the manufacture or use of explosives, chemicals or products that may explode.

D. The Parties hereby acknowledge and agree that Permittee's covenant that the Premises shall be used as set forth in this Section "Use of the Premises," is material consideration for Permitter's agreement to enter into this Permit. The Parties further acknowledge and agree that any violation of said covenant shall constitute a Default under this Permit.

E. Permittee's use of the land is subject to the right of the NPS to establish trails, roads, and even though no trail is formally established other improvements an betterments over, upon, or through said premises and further to the use by travelers and others of such roads and trails as well as those existing. The Permittee understands that occasional park visitors are authorized to walk or hike on the lands included in this Permit.

9. CONSTRUCTION OF IMPROVEMENTS OR ALTERATIONS

A. Permittee may only make those Improvements or Alterations to the Premises that relate to Permittee's use of the Premises as specified in Item 8, "Use of Premises."

B. Permittee shall not undertake any Improvements or Alterations to the Premises (including temporary equipment or facilities) without the prior written approval of Permitter.

C. As a prerequisite to obtaining approval for Improvements or Alterations, Permittee, at Permittee's sole cost and expense, shall submit design plans to Permitter for Permitter's approval and shall also submit other relevant data as may be required by Permitter.

D. Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense.

E. Permittee shall, upon request, furnish Permitter with a true and correct copy of any contract, and any modification or amendment thereof, with Permittee's contractors, architects, or any other consultants, engaged in connection with this Permit.

F. Any Improvements or Alterations undertaken by Permittee shall be performed in a good and workmanlike manner and with materials of a quality and standard acceptable to Permitter. Permittee shall also construct, install and maintain equipment and any construction facilities on the Premises in a safe and orderly manner.

G. Permittee shall not construct any Improvements or Alterations outside the boundaries of the assigned Premises.

H. Permitter in its discretion is entitled to have on the Premises at any time during the construction of Improvements or Alterations an inspector or representative who shall be entitled to observe all aspects of the construction on the Premises.

10. TREATMENT OF REFUSE

Refuse shall be promptly removed from within the boundaries of Point Reyes National Seashore and shall be disposed of in accordance with Applicable Laws.

11. PESTICIDE USE

The National Park Service utilizes Integrated Pest Management ("IPM") to treat pest problems. The goal of IMP is to use the least-toxic, effective methods of controlling pests. Except for normal household purposes, Permittee shall not use any pesticides that do not comply with the IPM program. To this end, Permittee shall submit in writing to Permitter a request for the use of pesticide(s) and shall not use any pesticide(s) until Permittee has received an express written authorization therefore from Permitter. Permittee shall manage, treat, generate, handle, store and dispose of all pesticides in accordance with Applicable Laws, including reporting requirements.

12. FIRE PREVENTION AND SUPPRESSION

Permittee and its employees, agents, and contractors shall, in Permittee's use and occupancy of the Premises, take all reasonable precautions to prevent forest, brush, grass, and structural fires and shall, if safety permits, assist the Permitter in extinguishing such fires on the Premises.

13. EXCAVATION, SITE AND GROUND DISTURBANCE

Permittee shall not cut, remove or alter any timber or any other landscape feature; conduct any mining or drilling operations; remove any sand, gravel or similar substances from the ground or watercourse; commit waste of any kind; or in any manner change the contour or condition of the Premises without the prior written approval of Permitter. Except in emergencies, Permittee shall submit requests to conduct such activities in writing to Permitter not less than sixty (60) days in advance of the proposed commencement date of any such activities. If approval is granted, Permittee shall abide by all the terms and conditions of the approval, including provisions pertaining to archaeological resources.

14. NONPOINT SOURCE POLLUTION AND SOIL EROSION

Potential sources of nonpoint source pollution associated with this Permit includes soil erosion. The Permittee shall comply with all Applicable Laws regarding nonpoint source pollution (including the protection of beneficial uses of waters as designated by the State of California). Further, Permittee's use and occupancy of the Premises shall be designed to minimize, to the greatest extent feasible, non-point source pollution within National Park Service boundaries or on adjacent lands.

15. INSURANCE

A. Permittee shall purchase the types and amounts of insurance described herein before the Commencement Date of this Permit unless otherwise specified. At the time such insurance coverage is purchased, Permittee shall provide Permitter with a statement of Permittee insurance describing the insurance coverage in effect and a Certificate of Insurance covering each policy in effect as evidence of compliance with this Permit. Permittee shall also provide the Permitter thirty (30) days advance written notice of any material change in the Permittee's insurance program hereunder. Permitter shall not be responsible for any omissions or inadequacies in insurance coverage or amounts in the event such coverage or amounts prove to be inadequate or otherwise insufficient for any reason whatsoever.

B. From time to time, as conditions in the insurance industry warrant, the Permitter reserves the right to revise the minimum insurance limits required in this Permit.

C. All insurance policies required by this Permit shall specify that the insurance company shall have no right of subrogation against the United States, except for claims arising solely from the negligence of the United States or its employees, or shall provide that the United States is named as an additional insured.

D. All insurance policies required herein shall contain a loss payable clause approved by the Permitter, which requires insurance proceeds to be paid directly to the Permittee without requiring endorsement by the United States. Insurance proceeds covering any loss of the Premises but not used to replace such losses shall be promptly paid by Permittee to Permitter. The use of insurance proceeds for the repair, restoration or replacement of the Premises shall not give any ownership interest therein to Permittee.

E. Public Liability: The Permittee shall provide Comprehensive General Liability insurance against claims arising from or associated with Permittee's use and occupancy of the Premises. Such insurance shall be in the amount commensurate with the degree of risk and the scope and size of such use and occupancy, but in any event, the limits of such insurance shall not be less than $500,000.00 per occurrence covering both bodily injury and property damage. If claims reduce available insurance below the required per occurrence limits, the Permittee shall obtain additional insurance to restore the required limits. An umbrella or excess liability policy, in addition to a Comprehensive General Liability Policy, may be used to achieve the required limits.

16. INDEMNITY

Permittee shall indemnify, defend, save and hold Permitter, its employees, successors, agents and assigns, harmless from and against, and reimburse Permitter for, any and all claims, demands, damages, injuries, losses, penalties, fines, costs, liabilities, causes of action, judgements, and expenses incurred in connection with or arising in any way out of this Permit; the use or occupancy of the Premises by Permittee, or its officers, agents, employees, or contractors; the design, construction, maintenance, or condition of any Improvements or Alterations; or any accident or occurrence on the Premises or elsewhere arising out of the use or occupancy of the Premises by Permittee or its officers, agents, employees, or contractors. Permittee obligations hereunder shall include, but not be limited to, the burden and expense of defending all claims, suits and administrative proceedings (with counsel reasonably approved by NPS), even if such claims, suits or proceedings are groundless, false or fraudulent, and conducting all negotiations of any description, and paying and discharging, when and as the same become due, any and all judgements, penalties or other sums due against the United States.

Permitter agrees to cooperate, to the extent allowed by law, in the submission of claims pursuant to the Federal Tort Claims Act against the United States by third parties for personal injuries or property damage resulting from the negligent act or omission of any employee of the United States in the course of his or her employment.

This Item 16 shall survive any termination or revocation of this Permit. The provisions of Item 15 (Insurance) of this Permit shall not limit in any way Permittee's obligations under this Item 16.

17. PROPERTY INTEREST

Title to real property and improvements thereon, including any improvements or alterations constructed by Permittee, shall be and remain solely in Permitter.

18. RENTS, TAXES AND ASSESSMENTS

A. The annual rent under this Permit is payable in advance on a quarterly basis. Therefore, the Permittee hereby agrees to pay $625.00 on or before July, October, January and April of each year during the Term.

B. Permittee shall pay the proper Agency, when and as the same become due and payable, all taxes, assessments, and similar charges which, at any time during the Term of this Permit, are levied or assessed against the Premises.

C. Rents due hereunder shall be paid without assertion of any counterclaim, setoff, deduction or defense and without abatement, suspension, deferment or reduction.

19. CYCLIC MAINTENANCE

A. Permittee shall perform all Cyclic Maintenance in accordance with the Provisions of this Permit and at Permittee's sole cost and expense. Permittee is responsible for the general maintenance of the pipeline upon the Premises.. All improvements and facilities used and occupied by Permittee shall at all times be protected and maintained in a safe, sanitary and sightly condition.

B. Specific maintenance requirements may be negotiated with Permittee each year as outlined in Item 19 (Annual Meeting). Cyclic Maintenance to be accomplished during the Term of this Permit includes, but is not limited to, the following:

Permittee shall maintain the water well, pump and all pipelines from the main line to the main structures within the Premises. Permittee shall repair any damage or loss to the water system within the Premises.

20. ANNUAL MEETING

The Parties shall meet annually in December during the Term of this Permit for the purposes of discussing and resolving issues of mutual concern and ensuring that Permittee is complying with the Provisions of this Permit. Any proposed changes or modifications to this Permit which are required in order to meet National Park Service requirements or objectives, including range management objectives, shall be discussed and negotiated at the Annual Meeting. If National Park Service requirements or objectives require prompt attention, the date for the Annual Meeting may be reasonably changed by Permitter.

21. PENALTY

At the option of the Permitter, Permitter may, in lieu of voiding and terminating the Permit, assess a penalty of $50.00 per day for any failure by Permittee to keep and perform any of the Provisions of this Permit. In such cases, Permittee shall be given notice in writing of a grace period (of from one to thirty days) to remedy the situation before a penalty will be assessed. Payment of any penalty under this provision shall not excuse Permittee from curing the Default. This provisions shall not be construed as preventing Permitter from issuing citations or initiating enforcement proceedings under Applicable Laws.

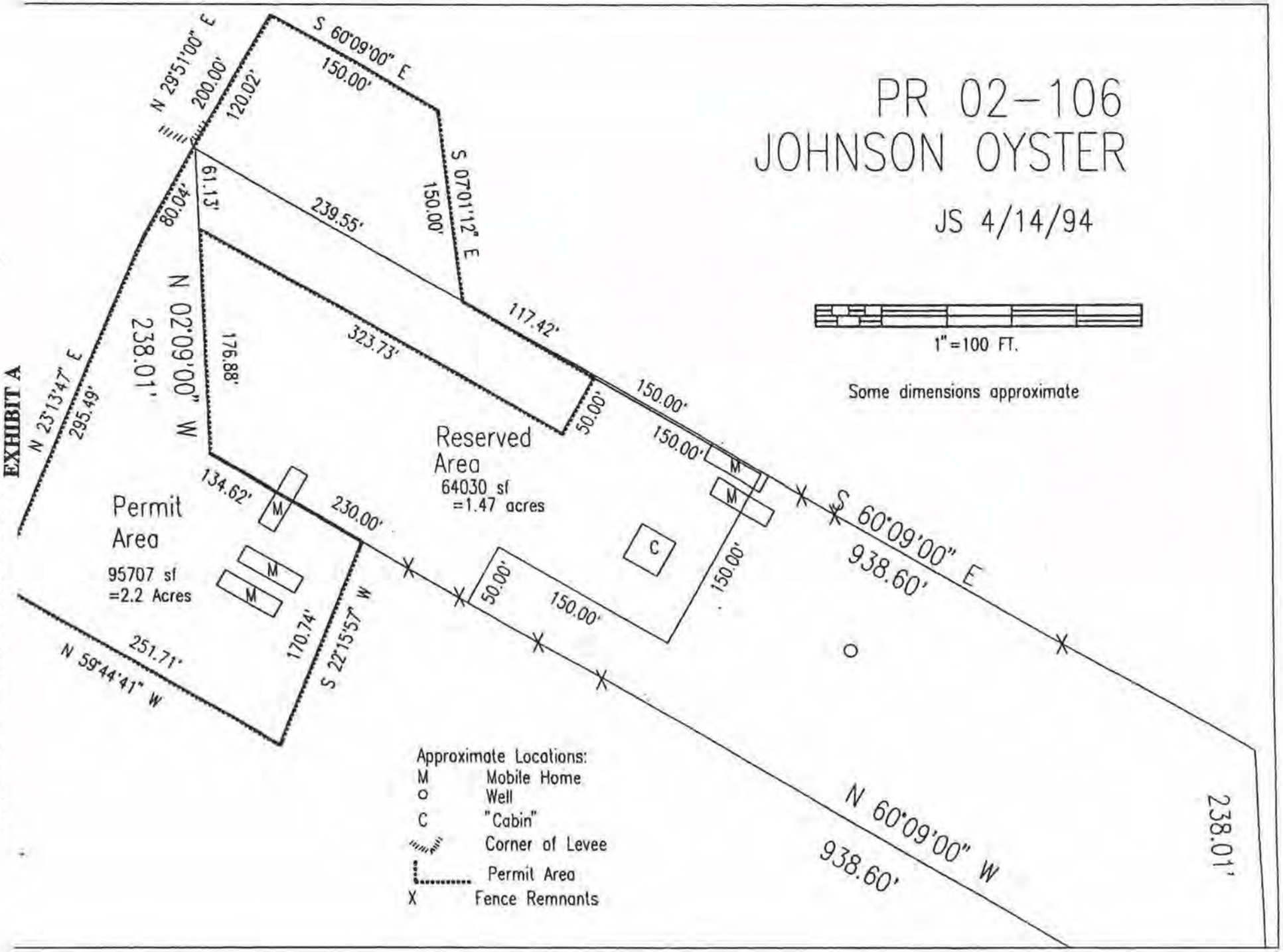
22. TERM

The term of this Permit begins on July 1, 2000 and will expire on June 30, 2006. If Permittee breaches any of the Provisions of this Permit or if Permittee terminates this Permit prior to its Expiration Date, the term of the Permit will end. Six months prior to the expiration date of this Permit, this Permit, or a similar Permit, may be offered to Permittee for an additional five-year period. If a subsequent Permit is not entered into prior to the expiration date, the provision of this Permit regarding Permittee's obligations to surrender and vacate the Premises shall apply.

22. SURRENDER AND VACATE THE PREMISES, RESTORATION

On the Termination Date of this Permit, Permittee shall surrender and vacate the Premises, remove Permittee's Personal Property therefrom, and remove any Improvements or Alterations identified by Permitter. Subject to the approval of Permitter, Permittee shall also restore the Premises to a condition at least equal to that existing at the time this Permit was entered into, normal wear and tear excepted. If Permittee does not remove Permittee's Personal Property, said Improvements or Alterations, then, at

Permitter's option, these items shall either become the property of Permitter without compensation therefore, or Permitter may cause them to be removed and the Premises to be repaired at the expense of Permittee, and no claim for damages against Permitter, its employees, agents or contractors shall be created or made on account of such removal or repair work.



00033002 NPS-PWR-B06-00010-000001 Page 53 of 73

United States Department of the Interior

NATIONAL PARK SERVICE
WESTERN REGION
450 GOLDEN GATE AVENUE, BOX 36063
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

RECEIVED
Point Reyes National Seashore
DEC 21 '73

	SUPT.
	ADM. OFF.
	MAINTENANCE
	INTERPRETATION
	RES. BIOLOGIST
	PROTECTION
	HORSE FARM
	SAFETY
	FILES

L1425(WR)ML
PORE
Tr. 02-106
Johnson Oyster Co.

December 19, 1973

COPY

Memorandum

To: Associate Director, Park System Management

From: Regional Director, Western Region

Subject: Transmittal of Deed Assembly

Vendor: Johnson Oyster Company
Tract No.: 02-106
Area: Point Reyes National Seashore
Deed No.:

The original documents for the subject acquisition are transmitted herewith as follows:

(x) 1. Recorded Instrument of Conveyance
(x) 2. Attorney General's Final Title Opinion
(x) 3. Title Evidence
( ) 4. Administrative Waiver Certificate
(x) 5. Certificate of Inspection and Possession
( ) 6. Articles of Incorporation
( ) 7. Resolution
(x) 8. Other Documents
Vendor's (Seller's) Certificate of Possession (1)
Tenant's Certificate of Possession (6)
Disclaimers (6)
Terms of reservation contained in contract no. CX8000320 73

(Sgd) Howard H. Chapman

Enclosures

cc:
Superintendent, Point Reyes, NS
w/cy Deed and Final Title Opinion

97555

RECORDED AT REQUEST OF
MARIN TITLE GUARANTY CO.
AT 30 MIN. PAST 12 P M.
NOV 30 1972
Official Records of Marin County, Calif.
N. J. Giacomini
FEE $ 6.00 RECORDER

16827

After recording, return to:
NATIONAL PARK SERVICE
WESTERN REGION, DIVISION OF LANDS
450 Golden Gate Avenue, Box 36063
San Francisco, California 94102

109-130-03

46827

POINT REYES NATIONAL SEASHOR
Tract 02-106

BOOK 2634 PAGE 641

GRANT DEED

JOHNSON OYSTER COMPANY, a California corporation, GRANTOR, pursuant to a Resolution of the Grantor's Board of Directors September 2, 1972, in consideration of SEVENTY NINE THOUSAND TWO HUNDRED ($79,200.00) DOLLARS, to it in hand paid, receipt of which is hereby acknowledged, does hereby grant and convey to the UNITED STATES OF AMERICA, and its assigns, GRANTEE, the following described property located in the County of Marin, State of California:

EXHIBIT "A" attached hereto and made a part hereof

TOGETHER WITH all buildings and improvements thereon and all water rights appurtenant thereto and all and singular the tenements, hereditaments and appurtenances thereunto belonging, or in any wise appertaining and the reversion and reversions, remainder and remainders, rents, issues and profits thereof.

The land is conveyed subject to existing easements of record for public roads and highways, public utilities, railroads, ditches and canals.

The land hereinabove conveyed contains 5 acres, more or less, and is being acquired by the Department of the Interior, National Park Service.

THE GRANTOR RESERVES only the following rights and interests in the hereinabove described property: a reservation of use and occupancy for a period of forty (40) years in accordance with the terms of the Offer to Sell Real Property, assigned Contract No. CX8000320?3, signed by the GRANTOR on October 13, 1972, accepted on October 16, 1972, and on file with the National Park Service.

TO HAVE AND TO HOLD the same unto said UNITED STATES OF AMERICA and its assigns, forever.

THE GRANTOR further remises, releases, and forever quitclaims to the UNITED STATES OF AMERICA and its assigns, all right, title, and interest which the GRANTOR may have in the banks, beds, and waters of any streams bordering the land conveyed and also all interest in and to any alleys, roads, streets, ways, strips, gores or railroad rights-of-way abutting or adjoining the land conveyed and in any means of ingress or egress appurtenant thereto.

IN WITNESS WHEREOF, Johnson Oyster Company has caused its corporate name and seal to be hereunto affixed by its duly authorized officer, this 9th day of November, 1972.

JOHNSON OYSTER COMPANY

By Charles W. Johnson
Charles W. Johnson, President

By Milton Simmons
Milton Simmons, Secretary-Treasurer

DOCUMENTARY TRANSFER TAX $ None
Computed on full value of property conveyed,
OR Computed on full value less liens and encumbrances remaining at time of sale.
Albert Fraser
Signature of Declarant or Agent determining tax.
Firm Name Marin Title Guaranty Co.

ACKNOWLEDGMENT

STATE OF California)
) ss.
County of San Francisco)

OFFICIAL REAL
J. M. POHLMANN
NOTARY PUBLIC
PRINCIPAL OFFICE IN
SAN FRANCISCO COUNTY
My Commission Expires April 18, 1976

On this 9 day of November in the year 1972 before me, John M. Pohlmann, a Notary Public of said State, duly commissioned and sworn, personally appeared Charles W. Johnson & Milton T. Simmons and acknowledged to me that such corporation executed the same.
IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

My commission expires:
April 18, 1976

John M. Pohlmann
Notary Public in and for said State

BOOK 2634 FA

STATE OF CALIFORNIA, County of MARIN

On November 9, 1972

before me, the undersigned, a Notary Public, in and for said County and State, personally appeared Charles W. Johnson and Milton Simmons

known to me to be the ~~Vice~~ President and Secretary-Treasurer of the corporation that executed the within instrument, and also known to me to be the persons who executed it on behalf of such corporation and acknowledged to me that such corporation executed the same.

J. M. Pohlmann
Notary Public

OFFICIAL SEAL
J. M. POHLMANN
NOTARY PUBLIC - CALIFORNIA
PRINCIPAL OFFICE IN
SAN FRANCISCO COUNTY
My Commission Expires April 16, 1976

BOOK 6134 PAGE 042

Form 14

PARCEL ONE:

BEGINNING at a point which bears South 43° 25' 25" West 4667.148 feet from the most Easterly corner of that certain parcel of land conveyed by James and Margaret McClure to R.C.S. Communications, Inc. by Deed dated September 28, 1929 and recorded October 15, 1929 in Liber 185 of Official Records, at page 93, Marin County Records; and running thence South 60° 09' East 938.6 feet, South 2° 09' East 238.01 feet, North 60° 09' West 938.6 feet and North 2° 09' West 238.01 feet to the point of beginning

PARCEL TWO:

A RIGHT OF WAY for roadway purposes over a strip of land 14 feet in width, the center line of which is described as follows: BEING that certain property in the County of Marin, State of California, more particularly described as follows: BEGINNING at a point on the Northeasterly boundary line of that certain tract of land conveyed from Edward H. Heims et ux to Larry Jensen et ux, by Deed dated February 2, 1951, distant on said line South 60° 09' East 198.25 feet from the most Northerly corner of said tract; and running thence North 42° 47' West 171.66 feet, North 21° 12' West 107.84 feet, North 4° 48' West 105.70 feet, North 25° 45' East 168.34 feet, North 11° 06' East 96.79 feet, North 6° 29' West 224.11 feet, North 13° 57' West 110.34 feet, North 01° 18' West 91.41 feet, North 22° 51' East 349.15 feet, North 44° 19' East 145.39 feet, North 17° 40' East 137.40 feet, North 04° 58' East 225.42 feet, North 12° 20' East 151.12 feet, North 26° 04' East 173.97 feet, North 11° 55' East 285.05 feet, North 22° 56' East 166.80 feet, North 32° 14' East 170.88 feet, North 53° 27' East 161.26 feet, North 47° 12' East 126.93 feet, North 65° 02' East 76.43 feet, North 45° 17' East 78.38 feet, North 31° 38' East 91.54 feet, North 55° 55' East 99.86 feet and North 35° 11' East 177.94 feet to the Inverness-Pt. Reyes County Road.

EXHIBIT "A"

00033002 NPS-PWR-B06-00010-000001 Page 57 of 73

Office of the Attorney General
Washington, D. C. 20530

December 12, 1973

Honorable Rogers C. B. Morton
Secretary of the Interior
Washington, D. C.

My dear Mr. Secretary:

Re: File No. 33-5-2295-227
Tract No. 02-106
County Marin State California

An examination has been made of the title evidence and related papers pertaining to certain land in which interests have been acquired under authority of existing legislation. The land and estate acquired by the United States are more particularly described in the deed.

The title evidence and accompanying data disclose valid title to be vested in the United States of America subject to the rights and easements noted in Schedule A attached hereto which your Department has advised will not interfere with the proposed use of the land.

The title evidence and related papers have been retained in the files of this Department.

Sincerely yours,

Robert H. Bork

Acting Attorney General

Schedule A

File No.: 33-5-2295-227

Tract No.: 02-106

Project: Point Reyes National Seashore located in Marin County, California

Estate Acquired: Fee simple and easement

Acreage: 5.00

Consideration: $79,200.00

The deed to the United States of America was executed by Johnson Oyster Company, a corporation, on November 9, 1972, filed for record on November 30, 1972, and recorded in Book 2634, at page 641.

The title insurance policy was last satisfactorily certified as of November 30, 1972, by Transamerica Title Insurance Company.

The title is subject to the following:

1. Existing easements of record for public roads and highways, rights of way for railroads, pipelines, public utilities, ditches and canals.

2. Reservation by the grantors of the right to occupy the premises as set forth in the deed to the United States.

(WSC)LW 1
(May 1971)

UNITED STATES
DEPARTMENT OF THE INTERIOR
National Park Service

Johnson Oyster Company
Vendor

02-106
Tract

CX8000032073
Contract No.

Point Reyes
National Seashore
Area

OFFER TO SELL REAL PROPERTY

The undersigned, hereinafter called the Vendor, in consideration of the mutual covenants and agreements herein set forth, offers to sell and convey to the United States of America and its assigns, the fee simple title to the following described land, with the buildings and improvements thereon, and all rights, hereditaments, easements, and appurtenances thereunto belonging, located in the

County of Marin, State of California,

containing 5.00 acres, more or less, more particularly described as follows:

See Exhibit "A" attached hereto and made a part hereof.

(WSC)LW 1
(May 1971)

subject to existing easements for public roads and highways, public utilities, railroads and pipelines, and encumbrances listed on Exhibit "B" attached hereto and made a part hereof.

Excepting and reserving only the following rights and interests in the above described property: as shown on Exhibit "C" attached hereto and made a part hereof.

The terms and conditions of this offer are as follows:

(1) The Vendor agrees that this offer may be accepted by the United States through any duly authorized representative, by delivering, mailing, or telegraphing a notice of acceptance to the Vendor at the address stated below, at any time within three (3) month(s) from the date hereof, whereupon this offer and the acceptance thereof become a binding contract.

(2) The United States of America agrees to pay the Vendor for said land the sum of Seventy Nine Thousand Two Hundred dollars ($ 79,200.00) payable on acceptance of this offer and approval of

00033002 NPS-PWR-B06-00010-000001 Page 61 of 73

the Vendor's title; provided the Vendor can execute and deliver a good and sufficient deed conveying said land with the hereditaments and appurtenances thereunto belonging to the United States of America and its assigns, in fee simple, free and clear of all liens and encumbrances, except those specifically excepted or reserved above, together with all right, title, and interest of the Vendor in and to any streams, alleys, roads, streets, ways, strips, gores, or railroad rights-of-way abutting or adjoining said land.

(3) It is agreed that the United States will defray the expenses incident to the preparation and recordation of the deed to the United States and the procurement of the necessary title evidence.

(4) The Vendor agrees that all taxes, assessments, and encumbrances which are a lien against the land at the time of conveyance to the United States shall be satisfied of record by the Vendor at or before the transfer of title and, if the Vendor fails to do so, the United States may pay any taxes, assessments, and encumbrances which are a lien against the land; that the amount of any such payments by the United States shall be deducted from the purchase price of the land; that the Vendor will, at the request of the United States and without prior payment or tender of the purchase price, execute and deliver the deed to the United States, pay any applicable documentary revenue stamp tax or excise tax, and obtain and record such other curative evidence of title as may be required by the United States.

As soon as possible after the date of payment of the purchase price of this offer or the date of deposit in court of the funds to satisfy the award of compensations in a condemnation proceeding to acquire the real property herein described, whichever is the earliest, the United States hereby agrees to reimburse the Vendor in an amount deemed by the United States to be fair and reasonable for the following expenses incurred by the Vendor in completing this transaction:

(a) Recording fees, transfer taxes and similar expenses incidental to conveying the real property described herein to the United States.

(b) Penalty cost for prepayment of any pre-existing recorded mortgage entered into in good faith encumbering said real property; and

(c) The pro rata portion of real property taxes paid which are allocable to a period subsequent to the date of vesting title in the United States, or the effective date of possession of such real property by the United States, whichever is earlier. The

Vendor agrees to furnish the United States evidence that these items of expenses have been billed to and paid by him, and further agrees that the United States alone shall determine the fairness and reasonableness of the expenses to be paid.

(5) The Vendor agrees that loss or damage to the property by fire or acts of God shall be at the risk of the Vendor until the title to the land and deed to the United States have been accepted by the United States through its duly authorized representative; and, in the event that such loss or damage occurs, the United States may, without liability, refuse to accept the conveyance of the title or it may elect to accept conveyance of title to such property, in which case there shall be an equitable adjustment of the purchase price.

(6) The Vendor agrees that the United States may acquire title to said land by condemnation or other judicial proceedings, in which event the Vendor agrees to cooperate with the United States in the prosecution of such proceedings; agrees that the consideration hereinabove stated shall be the full amount of the award of just compensation, inclusive of interest, for the taking of said land; agrees that any and all awards of just compensation that may be made in the proceeding to any defendant shall be payable and deductible from said amount.

(7) The Vendor further agrees that from the date hereof, officers and accredited agents of the United States shall have, at all proper times, rights and privileges to survey and enter upon said property for all lawful purposes in connection with the acquisition thereof.

(8) It is agreed that the spouse, if any, of the Vendor, by signing below, agrees to join in any deed to the United States and to execute any instrument deemed necessary to convey to the United States any separate or community estate or interest in the subject property and to relinquish and release any dower, curtesy, homestead, or other rights or interests of such spouse therein.

(9) The Vendor represents and it is a condition of acceptance of this offer that no member of or delegate to Congress, or resident commissioner, shall be admitted to or share any part of this agreement, or to any benefits that may arise therefrom; but this provision shall not be construed to extend to any agreement if made with a corporation for its general benefit.

(10) The terms and conditions aforesaid are to apply to and bind the heirs, executors, administrators, successors, and assigns of the Vendor.

(WSC)LW 1
(April 71)

(11) All terms and conditions with respect to this offer are expressly contained herein and the Vendor agrees that no representative or agent of the United States has made any representation or promise with respect to this offer not expressly contained herein.

(12) The Vendor hereby authorizes and directs the United Stat to accomplish payment of the amount specified in paragraph 2 abov by depositing a check in said amount payable to the Marin Title Guaranty Company, escrow agent for the Vendor, 1300 Fourth Street San Rafael, California.

Signed and Delivered this 12th day of October, 1972.

WITNESSES:

VENDORS: Johnson Oyster Company

Witness

Vendor
Charles W. Johnson, President

Witness

Vendor
Milton Simmons, Secretary-Treasurer

Witness

Vendor

Witness

Vendor

Notice of acceptance of this offer is to be sent to:

Mr. Charles W. Johnson, P. O. Box 68, Inverness, California 94937
Name Address City, State, ZIP

ACCEPTANCE OF OFFER TO SELL REAL PROPERTY

The offer of the Vendor contained herein is hereby accepted for and on behalf of the UNITED STATES OF AMERICA.

Date: 10/16/72

By:

Title: CHIEF, DIVISION OF LANDS
[illegible] REGION

Exhibit "A"

That certain real property situate in the County of Marin, State of California, described as follows:

PARCEL ONE:

BEGINNING at a point which bears South 43° 25' 25" West 4667.148 feet from the most Easterly corner of that certain parcel of land conveyed by James and Margaret McClure to R.C.S. Communications, Inc. by Deed dated September 28, 1929 and recorded October 15, 1929 in Liber 185 of Official Records, at page 93, Marin County Records; and running thence South 60° 09' East 938.6 feet, South 2° 09' East 238.01 feet, North 60° 09' West 938.6 feet and North 2° 09' West 238.01 feet to the point of beginning

PARCEL TWO:

A RIGHT OF WAY for roadway purposes over a strip of land 14 feet in width, the center line of which is described as follows: BEING that certain property in the County of Marin, State of California, more particularly described as follows: BEGINNING at a point on the Northeasterly boundary line of that certain tract of land conveyed from Edward H. Heims et ux to Larry Jensen et ux, by Deed dated February 2, 1951, distant on said line South 60° 09' East 198.25 feet from the most Northerly corner of said tract; and running thence North 42° 47' West 171.66 feet, North 21° 12' West 107.84 feet, North 4° 48' West 105.70 feet, North 25° 45' East 168.34 feet, North 11° 06' East 96.79 feet, North 6° 29' West 224.11 feet, North 13° 57' West 110.34 feet, North 01° 18' West 91.41 feet, North 22° 51' East 349.15 feet, North 44° 19' East 145.39 feet, North 17° 40' East 137.40 feet, North 04° 58' East 225.42 feet, North 12° 20' East 151.12 feet, North 26° 04' East 173.97 feet, North 11° 55' East 285.05 feet, North 22° 56' East 166.80 feet, North 32° 14' East 170.88 feet, North 53° 27' East 161.26 feet, North 47° 12' East 126.93 feet, North 65° 02' East 76.43 feet, North 45° 17' East 78.38 feet, North 31° 38' East 91.54 feet, North 55° 55' East 99.86 feet and North 35° 11' East 177.94 feet to the Inverness-Pt. Reyes County Road.

Exhibit "B"

1. Any adverse claim based upon the assertion that some portion of said land is tide or submerged lands, or has been created by artificial means or has accreted to such portions so created.

2. No insurance will be undertaken as to any portion of the herein described property that lies below the line of ordinary high tide as it came to rest from natural means.

3. Conditions regarding the use of Parcel Two herein as contained in an Agreement between Edward H. Heims, et ux and A. L. Jensen, et ux, recorded February 5, 1951, in Book 676 of Official Records at page 382.

The interest of the Heims now vests in the United States of America.

EXHIBIT "C"

Reserving to Vendor, its successors and assigns, a terminable right to use and occupy the above-described property, as delineated on Exhibit "D", attached, together with the improvements situated thereon, for a period of 40 years for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items, the interpretation of oyster cultivation to the visiting public, and residential purposes reasonably incidental thereto, subject to the following:

Definitions

The term "Director" as used herein means the Director of the National Park Service, and includes all his duly authorized, delegated representatives.

The term "Vendor" as used herein means the Johnson Oyster Company, a California Corporation, and its successors and assigns.

1. The premises reserved by Vendor hereunder shall at all times be maintained in a safe, sanitary, and sightly condition, open to reasonable inspection by the Director, and meeting all Federal, State, and County health, sanitation, and safety standards applicable to operation of and residence within areas engaged in the processing and retail sale of oysters.

2. Utility services related to the reserved premises, including but not limited to water, electricity, sanitation, and garbage disposal are the sole responsibility of Vendor. Garbage and debris shall be disposed of by Vendor outside the boundary of the Point Reyes National Seashore. Use of the existing trash and garbage dumps on the reserved premises shall be discontinued and the dumps shall be restored to a natural condition by Vendor.

3. Oyster shells may be disposed of within the boundaries of the Point Reyes National Seashore and may be stockpiled for a reasonable period of time on the premises for use as follows:

a) Upon approval and under an agreement with the Fish and Game Department and other State of California regulatory authorities, some shells may be ground up and deposited uniformily on the water bottom allotments.

b) Some shells may be used for surfacing the road southerly from Sir Francis Drake Highway to the premises including the parking area on the reserved premises and the parking area on the adjacent land under special use by the Vendor. Approval of the Superintendent will be required prior to deposition of shells anywhere else within the Seashore for road surfacing purposes.

c) Some shells may be used for seed purpose in oyster propagation.

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d) Some shells will be maintained to offer as gifts to the visiting public.

4. Vendor shall not commit waste upon the reserved premises and shall at all times maintain them in a neat and sightly condition.

5. A permanent residence shall be maintained upon the reserved property, occupied by a responsible employee of Vendor.

6. Vendor shall abide by all rules and regulations pertaining to National Park System areas.

7. No permanent or temporary structure, sign or other improvement of any type whatsoever shall be erected by Vendor in or upon the reserved premises or improvements without the prior written approval of the Director.

8. Vendor and its employees shall take all reasonable precautions to prevent fires in and about the reserved premises, and shall cooperate with the Director in fire extinguishment in the reserved premises and areas immediately adjacent to the reserved premises.

9. During the term of Vendor's reservation, Vendor shall be solely responsible for all claims arising from use of the reserved premises by visitiors, and shall carry extended coverage liability insurance protecting against such claims in an amount and of a type agreed by the Director, to be sufficient for this purpose.

10. During the term of occupancy, the Vendor shall carry fire and extended coverage insurance to the full insurable value of the improvements. The insured under said fire and extended coverage insurance shall be the Vendor and the United States of America as their interests may appear. In case of loss, the Vendor may replace the improvements with equivalent structures. Should the Vendor elect not to rebuild, all insurance proceeds shall be divided between the United States and the Vendor as their interests may appear.

11. Upon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property for the herein described purposes, provided however, that such permit will run concurrently with and will terminate upon the expiration of State water bottom allotments assigned to the Vendor. Any permit for continued use will be issued in accordance with National Park Service regulations in effect at the time the reservation expires.

12. Upon expiration of Vendor's reservation, or the extended use period by permit, it shall remove all structures and improvements placed upon the premises during the period of its reservation. Any such property not removed from the reserved premises within 90 days after expiration of Vendor's reservation shall be presumed to have been abandoned and shall be

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presumed to have been abandoned and shall become the property of the United States of America, but this shall in no way relieve Vendor of liability for the cost of removal of such property from the reserved premises.

13. Disputes concerning performance under the terms of this reservation shall be determined by the Secretary of the Interior or his duly authorized representative in a manner consistent with due process of law.

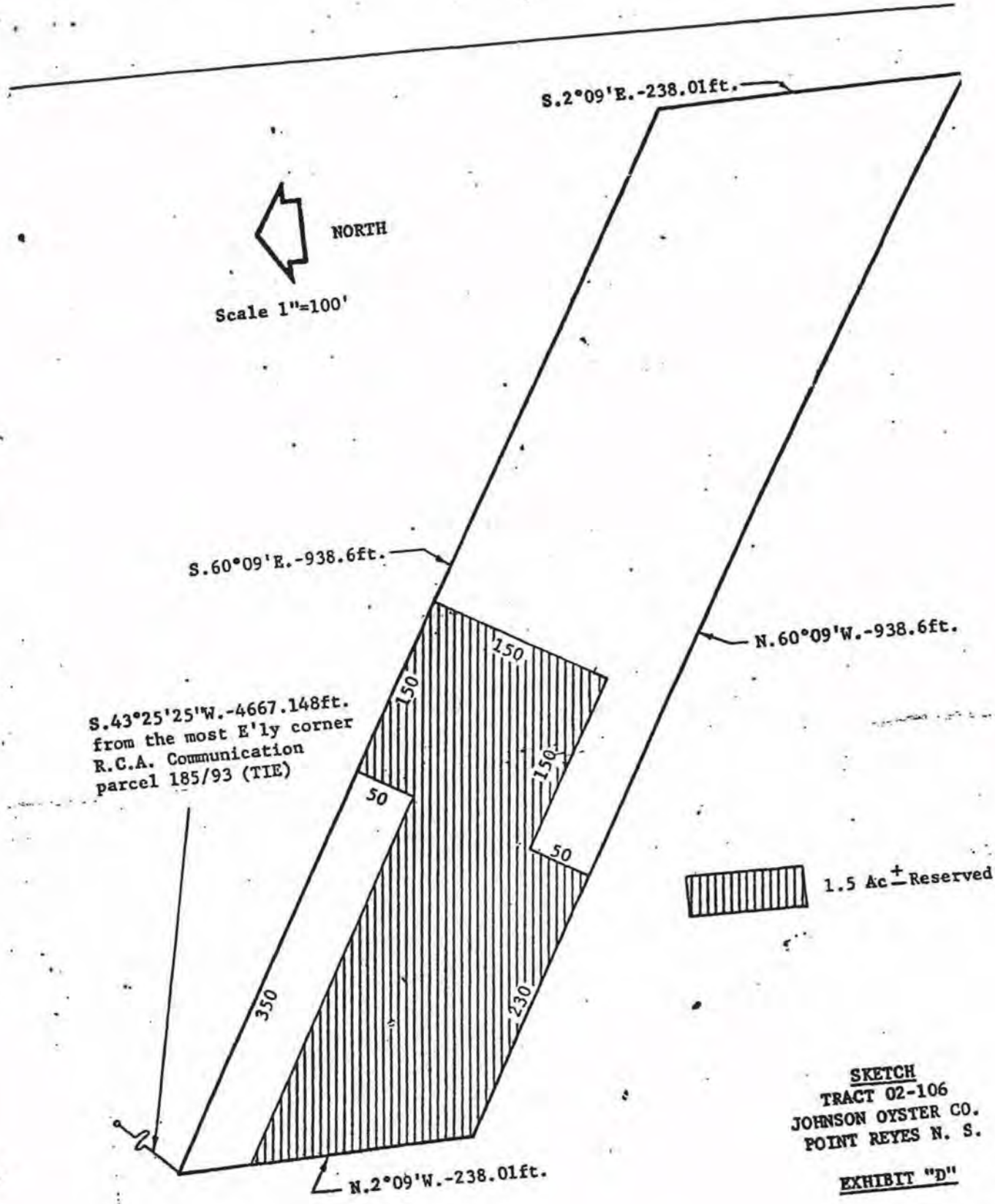
14. Should Vendor elect to dispose of any unused portion of the remainder of its reserved occupancy, the United States of America shall be afforded a right of first refusal to acquire the same.

15. A special use permit will be issued by the Director to Vendor for public interpretation of oyster cultivation by Vendor or adjacent premises, effective concurrently with Vendor's reservation.

16. Vendor shall keep the reserved premises open to the public for the interpretation of oyster cultivation and processing.

17. Vendor, its successors and assigns, shall pay the possessory interest tax during the term of use and occupancy.

18. Vendor cannot conduct a restaurant operation on the premises without prior written approval of the Director.



SKETCH
TRACT 02-106
JOHNSON OYSTER CO.
POINT REYES N. S.

EXHIBIT "D"

<MMS@bos.blackwellpublishing.com>

07/16/2009 01:02 AM

Please respond to <MMS@bos.blackwellpublishing.com>

To <ben_becker@nps.gov>

cc

bcc

Subject Article Status Update - Corrigendum

Dear Dr Ben Becker,

Your article "Corrigendum" is currently at the following stage of production:

Stage 4 (of 4):

The issue containing your article is now published online.

As an author, you now have free online access to your article (see the important note ** below). For access, click on the link in the My Publications area of Author Services. You will be asked to accept the terms and conditions governing the use of your article each time you access it online. Access to the online PDF is considered your e-Offprint or PDF Offprint.

To view the status of your article online please visit: http://authorservices.wiley.com/bauthor and log in using your username (e-mail address) and password++.

If you have any queries regarding the publication of your article, please contact the Production Editor using the journal e-mail address. For convenience, you may reply to this message.

++Please note that if you have previously registered in Author Services and you have also registered in Wiley InterScience, your InterScience password now works in Author Services. The Author Services password will not work. Your username is the e-mail you used to register.

This e-mail alert is for your article in Marine Mammal Science

This is the last e-mail you will receive from Author Services.

**most journals offer this feature; the access policy varies by journal.

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...enhancing your publishing experience

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Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

<MMS@bos.blackwellpublishing.com>

06/11/2009 01:02 AM

Please respond to <MMS@bos.blackwellpublishing.com>

To <ben_becker@nps.gov>

cc

bcc

Subject Article Status Update - Corrigendum

Dear Dr Ben Becker,

Your article "Corrigendum" is currently at the following stage of production:

Stage 3 (of 4): Author corrections have now been received by the publisher. If your journal features EarlyView, there may be a delay after corrections are received before your article appears online.

To view the status of your article online please visit: http://authorservices.wiley.com/bauthor and log in using your username (e-mail address) and password++.

For many journals, you can opt to receive printed offprints by registering with the printer's website; a link is included on the Author Services My Publications page at Stages 2-3 if this service is available for your journal. See http://authorservices.wiley.com/bauthor/offprint.asp for further details.

If you have any queries regarding the publication of your article, please contact the Production Editor using the journal e-mail address. For convenience, you may reply to this message.

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318

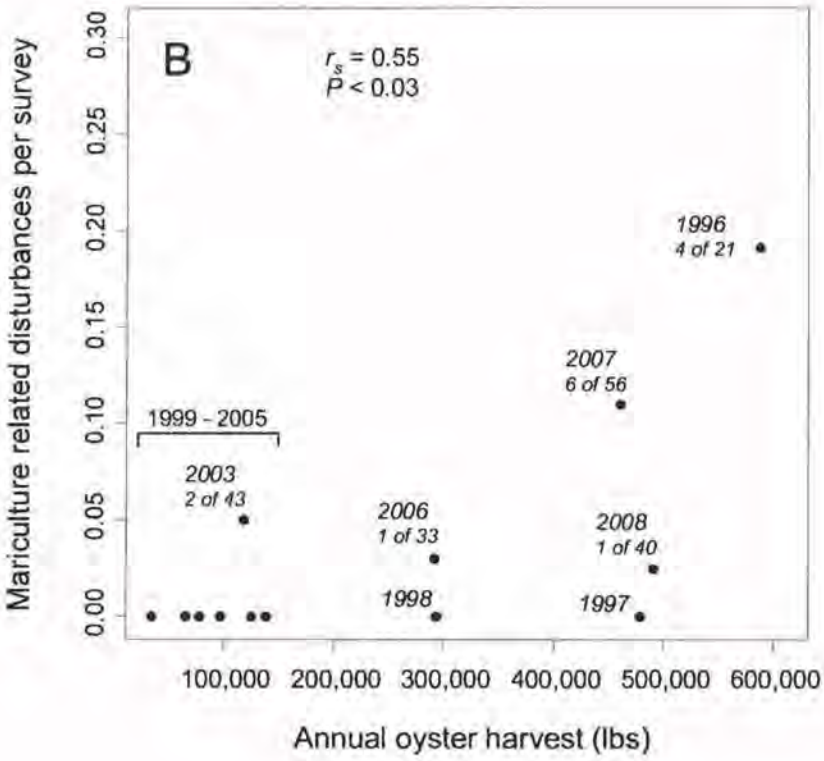
4/13/2009

Erratum Statement for mms_234, Becker et al. 2009: 1-18.

In our recent article "Modeling the effects of El Niño, density-dependence, and disturbance on harbor seal (*Phoca vitulina*) counts in Drakes Estero, California: 1997–2007", Marine Mammal Science 25:1-18, we have become aware of one minor enumeration error. The error was due to accidentally classifying two *potential* seal disturbances as *actual* disturbances. This error does not affect our statistics, results, or conclusions. We present an updated Figure 2B that reflects four disturbances in 1996, rather than six as reported in the original article. The statistical results are unchanged since 1996 is still the year with the highest overall disturbance rate. This error also requires a correction in the Results (p. 8), middle of the second paragraph (lines 6-7) which should read: "…and two of the 1996 disturbances (seven total) from the analysis".

Ben Becker
David Press
Sarah Allen

Point Reyes National Seashore
Point Reyes Station, CA 94956 USA
ben_becker@nps.gov


B
r_s = 0.55
P < 0.03
1996
4 of 21
2007
6 of 56
1999 - 2005
2003
2 of 43
2006
1 of 33
2008
1 of 40
1998
1997
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0.10
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0.20
0.25
0.30
100,000
200,000
300,000
400,000
500,000
600,000
Mariculture related disturbances per survey
Annual oyster harvest (lbs)

Page corrections for MMS_318

Parul,

Please insert the following as new paragraph after line 45. The existing graph can be made smaller if this helps to keep it on one page:

Additionally, on page 15, the California Coastal Commission "reaffirmed (with some modifications)" rather than "imposed" a seal protection zone in 2008.

Ben Becker/PORE/NPS
03/24/2009 01:06 PM

To "Daryl Boness" <mmsci@megalink.net>
cc "Marine Mammal Science" <marinemammalscience@gmail.com>
bcc
Subject Re: Erratum in mms 234 (Jan 2009)? - Becker et al.

Dr. Boness,

Thanks for the reply. In looking through the paper, there would only be one place in the text that required a change (in addition to the replacement of Figure 2B):

in the RESULTS section, middle of the second paragraph now reads:

"four of the 1996 disturbances (nine total)..."

and would be changed to:

"two of the 1996 disturbances (seven total)..."

Thanks for your help with this. Please let me know how to proceed with submitting an erratum.

Sincerely,

-Ben Becker

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

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- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

"Daryl Boness" <mmsci@megalink.net>

"Daryl Boness" <mmsci@megalink.net>

To <Ben_Becker@nps.gov>

03/18/2009 04:32 AM

cc "Marine Mammal Science" <marinemammalscience@gmail.com>

Subject Re: Erratum in mms 234 (Jan 2009)? - Becker et al.

Dear Dr. Becker:

Despite the lack of effect on statistical outcome and conclusions, because of the controversy that has surrounded the implications of your paper, I think it is best to publish an erratum. Is there a need for an change in the bottom of the paper as well, or does the change in the figure and its legend suffice explaining the error?

Sincerely,

Daryl J. Boness
Editor
Marine Mammal Science

----- Original Message -----
From: <Ben_Becker@nps.gov>
To: "Daryl Boness" <mmsci@megalink.net>
Cc: "Marine Mammal Science" <marinemammalscience@gmail.com>; <Sarah_Allen@nps.gov>
Sent: Monday, March 16, 2009 5:25 PM
Subject: Erratum in mms 234 (Jan 2009)? - Becker et al.

Dear Dr. Boness,

It has recently come to our attention that we made a minor data error in our recently published (Jan 2009) article in Marine Mammal Science (Becker, Press and Allen). The error does not change any statistics, conclusions, or patterns in the paper. This error was due to an accidental classification of two "potential seal disturbances" in 1996 as "actual seal disturbances". Thus, the actual number of disturbances in 1996 is four rather than six as was reported in the paper. Attached is a PDF with the original Figure 2B and statistics as well as the updated figure. The statistics are identical between datasets (due to ranks tests) and the new figure simply has a modified y-axis.

Please let me know if you feel this merits an erratum statement or any other action.

Thanks,

Ben Becker

(See attached file: App-D_dist.plots.new.pdf)

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center

<MMS@bos.blackwellpublishing.com>

04/23/2009 01:00 AM

Please respond to <MMS@bos.blackwellpublishing.com>

To <ben_becker@nps.gov>

cc

bcc

Subject Your article to be published in Marine Mammal Science

Dear Author,

We have received your accepted article at the publisher and invite you to enjoy the many benefits available to you: visibility into your article's status during production, publication status alerts, free access to your article once published online (see the important note ** below) and free access for all co-authors and up to 10 colleagues**. If you register your article now, you'll be able to enjoy future benefits too, such as knowing the number of times your article has been viewed online.

Your article may be already well along in production when you receive this message, but you can still enjoy all these author benefits.

Article title: Corrigendum

Journal: Marine Mammal Science

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**most journals offer this feature; the access policy varies by journal.

Best wishes,

The Wiley-Blackwell Author Services Team

318

"Daryl Boness"
<mmsci@megalink.net>
03/18/2009 04:32 AM

To <Ben_Becker@nps.gov>
cc "Marine Mammal Science"
<marinemammalscience@gmail.com>
bcc
Subject Re: Erratum in mms 234 (Jan 2009)? - Becker et al.

History: This message has been replied to.

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Marine Mammal Science

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To: "Daryl Boness" <mmsci@megalink.net>
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Ben Becker

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Ben Becker, Ph.D.

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Ben Becker/PORE/NPS
03/16/2009 02:25 PM

To "Daryl Boness" <mmsci@megalink.net>
cc "Marine Mammal Science" <marinemammalscience@gmail.com>, Sarah Allen/PORE/NPS@NPS
bcc
Subject Erratum in mms 234 (Jan 2009)? - Becker et al.

Dear Dr. Boness,

It has recently come to our attention that we made a minor data error in our recently published (Jan 2009) article in Marine Mammal Science (Becker, Press and Allen). The error does not change any statistics, conclusions, or patterns in the paper. This error was due to an accidental classification of two "potential seal disturbances" in 1996 as "actual seal disturbances". Thus, the actual number of disturbances in 1996 is four rather than six as was reported in the paper. Attached is a PDF with the original Figure 2B and statistics as well as the updated figure. The statistics are identical between datasets (due to ranks tests) and the new figure simply has a modified y-axis.

Please let me know if you feel this merits an erratum statement or any other action.

Thanks,

Ben Becker

App-D_dist.plots new.pdf

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

The Pacific Coast Science and Learning Center is one of 21 Research Learning Centers at National Parks across the country working to increase the effectiveness and communication of research and science through:

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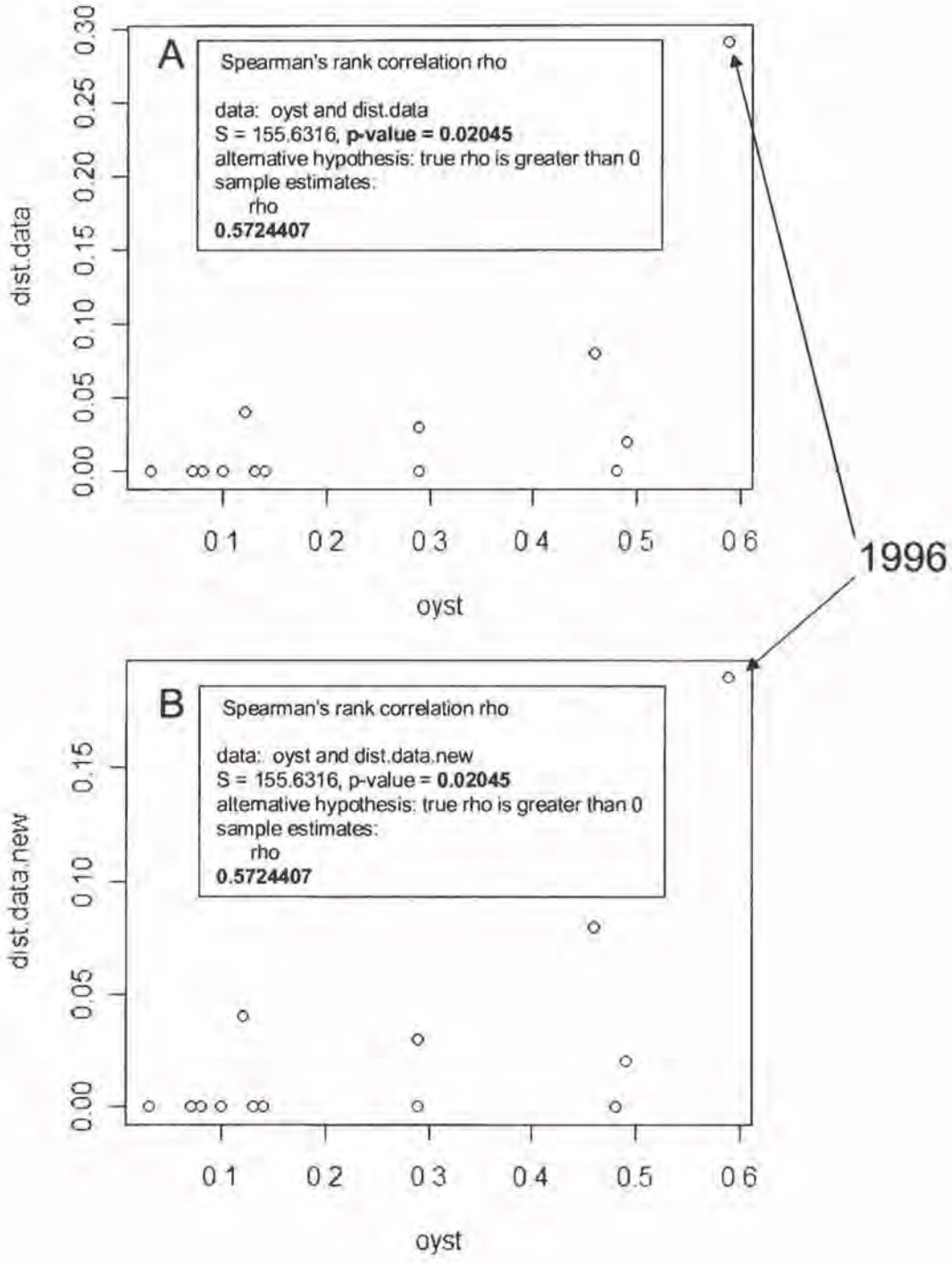
Appendix D. (A) Original plot used in MMS paper with 6 disturbances in 1996 and (B) corrected plot with 4 disturbances in 1996. Note that 1996 is still by far the highest point, which is why the statistics have *no difference* between datasets. Note that the y-axis scale changes between plots. In the first version (MMS paper), we accidently counted two *potential* disturbances as *actual* disturbances. "Oyst" is annual lbs. oysters harvested x 10^{-6}. See text for details.



Sarah Allen/PORE/NPS
11/20/2009 09:46 AM

To Ben Becker/PORE/NPS@NPS
cc
bcc
Subject Re: image

Something is there, so perhaps Dan can check.

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

Sarah Allen/PORE/NPS
11/20/2009 09:14 AM

To Ben Becker/PORE/NPS@NPS
cc
bcc
Subject image

History: This message has been replied to.

Hi:

I down loaded the highest resolution image and recommend that you look at it for any other bag arrays to add to the image. For ewxample, where the boat left from looks like some equiippment.

You could do next week, since we are waiting for Dan to go out. I might ask Dan also to look at this array.

Thanks

Sarah

Sarah G. Allen, PhD
Senior Science Advisor
Point Reyes National Seashore
Point Reyes Station, CA 94956
415-464-5187

Ray DeLeon
<rdeleon@hjw.com>
11/18/2009 05:26 PM

To "Ben_Becker@nps.gov" <Ben_Becker@nps.gov>, Devin Kelley <kelley@hjw.com>
cc "Sarah_Allen@nps.gov" <Sarah_Allen@nps.gov>
bcc
Subject RE: Orthoimagery corrections

Thanks Ben, Sarah

I will post on our FTP site as soon as that is remedied.

~Ray

-----Original Message-----
From: Ben_Becker@nps.gov [mailto:Ben_Becker@nps.gov]
Sent: Wednesday, November 18, 2009 5:10 PM
To: Devin Kelley
Cc: Ray DeLeon; Sarah_Allen@nps.gov
Subject: Re: Orthoimagery corrections

Thanks, Devin and Ray.

We're under a bit of a deadline to process the info, so the sooner the better! It would be best for us to grab from your FTP site since it seems as though ours is not very reliable.

Thanks,

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
http://home.nps.gov/pore/parkmgmt/pcslc.htm

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Devin Kelley
<kelley@hjw.com>

11/18/2009 04:43 PM

To: "ben_becker@nps.gov" <ben_becker@nps.gov>

cc: Ray DeLeon <rdeleon@hjw.com>

Subject: Orthoimagery corrections

Ben,

Thank you for bringing the orthophoto shifting to our attention. We will likely be able to make the necessary corrections for submission via ftp on Thursday. Ray DeLeon (cc'd) will be in touch shortly with an update.

Best regards,
Devin

Devin Kelley
Project Director, Certified Photogrammetrist (ASPRS)
HJW GeoSpatial, Inc.
Office: 510.834.2001 ext. 124
Ex 6
www.hjw.com

sarah allen
Ex 6
11/13/2009 01:25 PM

To Ben Becker <Ex 6
ben_becker@nps.gov
cc
bcc
Subject Fwd: Drake Esteros Fall 2009 Flight

---------- Forwarded message ----------
From: Ray DeLeon <rdeleon@hjw.com>
Date: Fri, Nov 13, 2009 at 10:56 AM
Subject: RE: Drake Esteros Fall 2009 Flight
To: sarah allen Ex 6

Sarah

We were able to fly this site digitally this round. Because we used a digital camera, the photo footprint is not 9"x9" but is rectangular. I am shooting you a small image for your review to make sure that we have captured what you are looking for, and possible more.

Digital shots will result in better color radiometry and will also give you a digital file for reproduction as needed.

Once I get the OK I will make the geo-rectified ortho. Thanks!

~Ray

-----Original Message-----
From: sarah allen [mailto:Ex 6
Sent: Monday, November 09, 2009 10:53 AM
To: Ray DeLeon
Subject: Re: Drake Esteros Fall 2009 Flight

thanks

Sarah

On Mon, Nov 9, 2009 at 10:21 AM, Ray DeLeon <rdeleon@hjw.com> wrote:
> Thanks, I will get you a revised quote with orthorecified price you're your review today.
>
> ~Ray
>
>
> -----Original Message-----
> From: sarah allen [mailto:Ex 6
> Sent: Monday, November 09, 2009 10:20 AM
> To: Ray DeLeon
> Subject: Re: Drake Esteros Fall 2009 Flight
>
> I will hold off on faxcing in case my request changes the quote amount.
>
> Sarah
>
>
>
> On Mon, Nov 9, 2009 at 10:10 AM, Ray DeLeon <rdeleon@hjw.com> wrote:

>> Hi Sarah
>>
>> We can reserve those dates and times for this aerial shot, provided there is good weather. If not, we can push to the later low tides dates you suggested.
>>
>> If you can fax or scan this back to me, I will get that scheduled, Thanks!
>>
>> ~Ray
>>
>>
>> -----Original Message-----
>> From: sarah allen Ex 6
>> Sent: Friday, November 06, 2009 2:01 PM
>> To: Ray DeLeon
>> Subject: Re: Drake Esteros Fall 2009 Flight
>>
>> The day would be preferably on Nov 12 at 3 PM or Nov 13 at 3:30-4PM
>>
>> The next low tide cycle is Nov 30 or Dec 1 at 2:30-3:30PM
>>
>> Thanks!
>>
>> Sarah
>>
>>
>> On Fri, Nov 6, 2009 at 1:37 PM, Ray DeLeon <rdeleon@hjw.com> wrote:
>>> Hi Sarah
>>>
>>>
>>>
>>> I hear it's time to fly again! What date were you thinking for this flight,
>>> I assume it is low tide once again?
>>>
>>>
>>>
>>> Look forward to it. I can send you a quote once I hear back from you,
>>> Thanks!
>>>
>>>
>>>
>>> ~Ray
>>>
>>>
>>
>

0003b-qv.jpg

Ben Becker/PORE/NPS
11/13/2009 12:40 PM

To Sarah Allen/PORE/NPS@NPS
cc
bcc
Subject image

Sarah,

please remember to send the new flyover image.

I'm going through the seal ms again and based on Gary's comments I'm cutting out a lot, which is good.

thanks,

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
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Sarah Allen/PORE/NPS
08/17/2009 02:47 PM

To Ben Becker/PORE/NPS@NPS
cc Ex 6 Don Neubacher/PORE/NPS@NPS
bcc
Subject Re: Drakes Estero aerial photos

Aerial surveys of 500 ft is best if low tide to avoid disturbing seals resting onshore (most are middle to mouth) and lower if high tide. We should check with rangers on flight height in wilderness.

Sarah

---

sarah_allen@nps.gov

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Ben Becker

Ben Becker
08/17/2009 10:53 PDT

To: Ex 6
cc: Sarah Allen/PORE/NPS@NPS, Don Neubacher/PORE/NPS@NPS
Subject: Re: Drakes Estero aerial photos

Hi Ex 6

Sounds good, we can pay a 3rd party as well.

Yes, orthorectifying would be a good idea. We have not done it on the images I sent you.

SARAH, what would be flight restrictions for an eelgrass imaging flyover of Drakes Estero in late August? How high do they need to fly? Any areas/times to avoid?

Thanks,

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
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1 Bear Valley Road
Point Reyes Station, CA 94956

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Ex 6

Ex 6
<Ex 6
08/14/2009 02:53 PM

To Ben_Becker@nps.gov
cc sarah_allen@nps.gov
Subject Re: Drakes Estero aerial photos

Ben,

That's great! I'm working out the details on this end, and will get back to you with an estimate of the cost (but it sounds like it should be under $500, including orthorectification, and most likely payable directly to the company). I understand it is worthwhile to have them orthorectify the image because it will have a high level of accuracy, and once that is done, we can rectify the other photos based on this one. Unless you've already gone through that process.

As for the height the plane will fly, this will depend on the resolution we specify. I need to review the photos you scanned (they are on my home computer) to determine the scale those are at. The methods I've reviewed for seagrass aerial photo analysis recommend a scale of 1:10,000 for general presence/absence, and a finer scale to monitor annual changes. I believe the lens on the camera can also affect the height they fly at.

Can you tell me what the restrictions are for the seals so I can provide this information to the flight company when getting the quote?

I'll try to get in touch with Tom Moore and Ryan Watanabe to see if I can track down any other photos on their end. I think it will be useful for me to take a look at the archives because the photos you provided are from different seasons, and for some years the month is not indicated, so it will help if I can track that down.

I'll let you know once I hear back from Jackie if
we will indeed be able to tag our photos onto the
BML Reserve flight.

Best,
Ex 6

At 1:29 PM -0700 8/14/09, Ben_Becker@nps.gov wrote:
>Hi Ex 6
>
>We can absolutely help with the costs to take a Drakes Estero Image. Let
>me know how much and how you'd like to receive payment (or who we should
>pay). How high does the plane fly? We need to make sure there are no
>issues with seal disturbance during the flight.
>
>I don't know about DFGs images or plans. I imagine Tom Moore or Ryan
>Watanabe would know. But, I haven't heard about any images being taken
>recently.
>
>Regarding the images the park has that I sent you. I spent a few days in
>the park archives looking though all of our aerial photos in our database
>and through the actual images. We sent you everything that had a
>reasonably good image. So, you are welcome to come over to the Archives (I
>could go with you), but I'm pretty sure I have found everything available.
>
>There could be other sources out there besides what we have in the park
>archives, I'll ask our archivist.
>
>Thanks,
>
>-Ben
>
>_____
>
>Ben Becker, Ph.D.
>Director and Marine Ecologist
>Pacific Coast Science and Learning Center
>Point Reyes National Seashore
>1 Bear Valley Road
>Point Reyes Station, CA 94956
>
>tel: 415-464-5247
>fax: 415-868-1202
>ben_becker@nps.gov
>http://home.nps.gov/pore/parkmgmt/pcslc.htm
>_____
>
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>
> To   Ben_Becker@nps.gov
> cc   slwilliams@ucdavis.edu
> bcc
> Subject   Drakes Estero aerial photos
>Ex 6
>
>08/14/2009 12:19 PM MST
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>Hi, Ben,
>
>I'm finally starting to work on the analysis for the eelgrass distribution
>in the Drakes Estero photos that Sarah sent us on DVD. To do this analysis
>requires using a current aerial photo and ground-truthing it around the
>time of the photo. The BML Reserve takes aerial photos of its land
>annually, and this year's flight is fast approaching (August 26th). I spoke
>to Jackie Sones, the Reserve Research Coordinator, about the potential of
>adding a photograph of Drakes Estero to the trip, and it's feasible, but we
>have no money for it. Is this something PRNS might be able to support? I
>haven't looked into the cost yet, but imagine it should be minimal because
>it's likely to be only a few photos, and it's such a small area.
>
>Alternatively, do you know if CDFG continues to take aerial photos of
>Drakes Estero, and what their schedule is? There would be no need to take
>advantage of this survey if CDFG continues to take photos. Do you know if
>CDFG has photos in addition to what you guys have?
>
>Finally, do you know if the PRNS collection of aerial photos contains more
>than those Sarah sent us? The years I have photos from are:1943, 1952,
>1963, 1968, 1969, 1984, 1991, 2005. If so, it would be useful it I could
>come by to check them out. I am trying to select photos from the same
>season to reduce seasonal variability, and although some photos may be of
>poorer quality, there may be small areas within the overall photo that
>could be of use to me.
>
>Also, it would be nice to meet you in person!
>
>Thanks,
>Ex 6

>
>[cc: Susan Williams, slwilliams@ucdavis.edu]
>
>--
>
>Ex 6
>Ecology Graduate Group, UC Davis
>Bodega Marine Laboratory
>PO Box 247
>Bodega Bay, CA 94923-0247
>office Ex 6
>http://www-bml.ucdavis.edu/facresearch/Ex 6

--
Ex 6
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Bodega Bay, CA 94923-0247
office Ex 6
http://www-bml.ucdavis.edu/facresearch/Ex 6

Don Neubacher/PORE/NPS
11/30/2009 04:41 PM

To "Cassidy Teufel" <cteufel@coastal.ca.gov>
cc
bcc
Subject Photo date and site visit date

Aerial photo was taken on 11.12.09 at 3:00 pm by HJW Geospatial. Site visit on 11/29/09.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
"Cassidy Teufel" <cteufel@coastal.ca.gov>

"Cassidy Teufel"
<cteufel@coastal.ca.gov>
11/30/2009 01:34 PM

To <Don_Neubacher@nps.gov>
cc
Subject RE: new maps at three scales

Hi Don,
Around 3pm is fine, I'm back from lunch so feel free to call when you have a chance. I gave Alison an update on the situation and can pass along her thoughts as well.
-Cassidy

-----Original Message-----
From: Don_Neubacher@nps.gov [mailto:Don_Neubacher@nps.gov]
Sent: Monday, November 30, 2009 1:22 PM
To: Cassidy Teufel
Subject: RE: new maps at three scales

Cassidy, can we talk about 3:00 pm? LE has confirmed 800 bags in harbor seal protection area yesterday.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore

Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

"Cassidy Teufel"
<cteufel@coastal.ca.gov>

To <Don_Neubacher@nps.gov>

11/30/2009 12:22 PM

cc

Subject RE: new maps at three scales

Thanks - here's a map of the DFG lease areas (M-438-01 and M-438-02). This clearly shows that the bags are not only within the seal protection area, they are also outside of both aquaculture lease areas.

-----Original Message-----
From: Don_Neubacher@nps.gov [mailto:Don_Neubacher@nps.gov]
Sent: Monday, November 30, 2009 11:19 AM
To: Cassidy Teufel
Subject: new maps at three scales

Please do not forward. LE report coming.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Don Neubacher/PORE/NPS on 11/30/2009 11:19 AM -----

Ben Becker/PORE/NPS

To: Sarah Allen/PORE/NPS@NPS

11/23/2009 11:47 AM

cc: Don Neubacher/PORE/NPS@NPS

Subject: new maps at three scales

(See attached file: oyster_activity_seal_november_2009-closeup2.pdf)(See attached file: oyster_activity_seal_november_2009-map.pdf)(See attached file: oyster_activity_seal_november_2009-overview.pdf)

Ben Becker, Ph.D.
Director and Marine Ecologist
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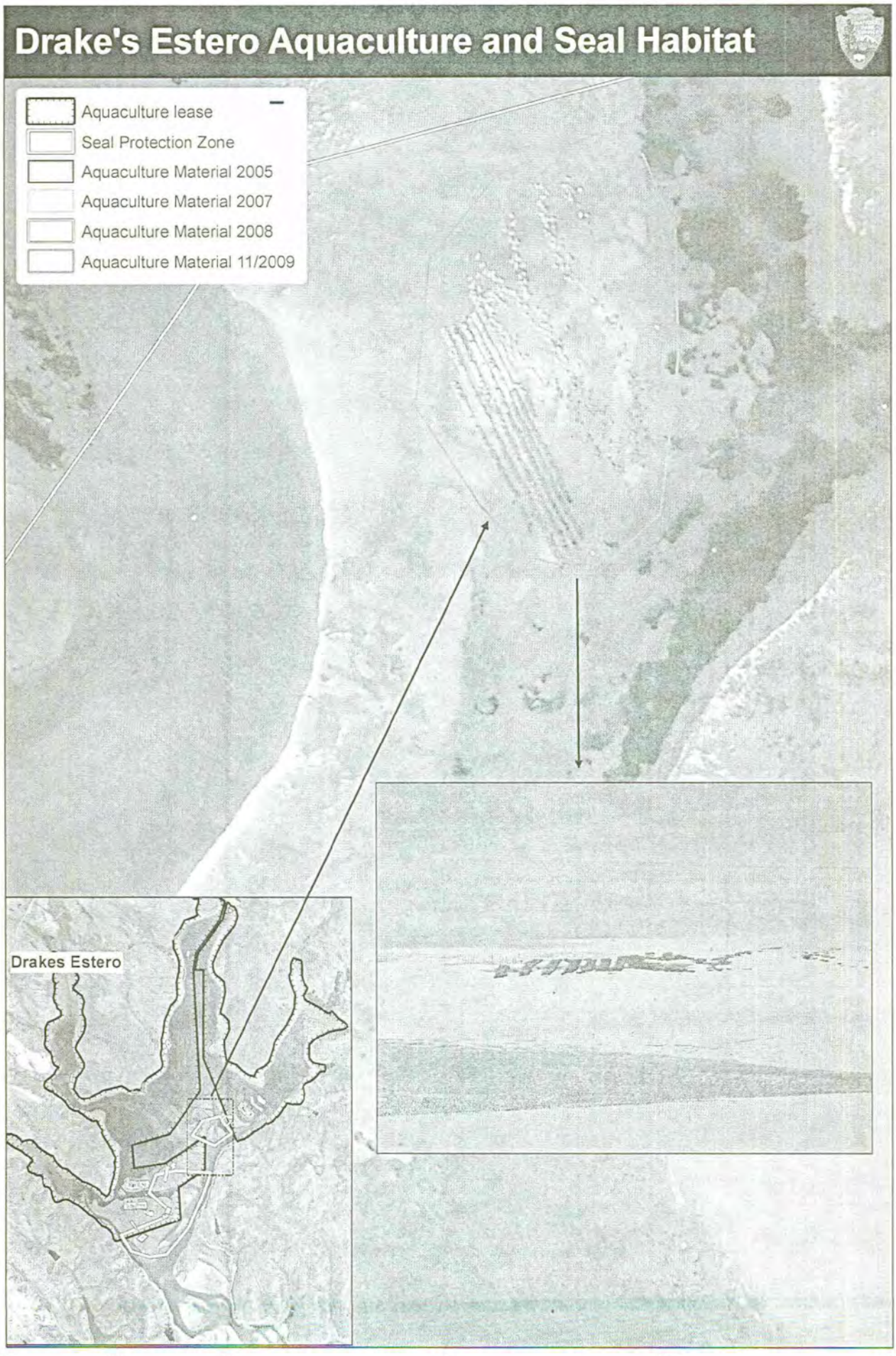
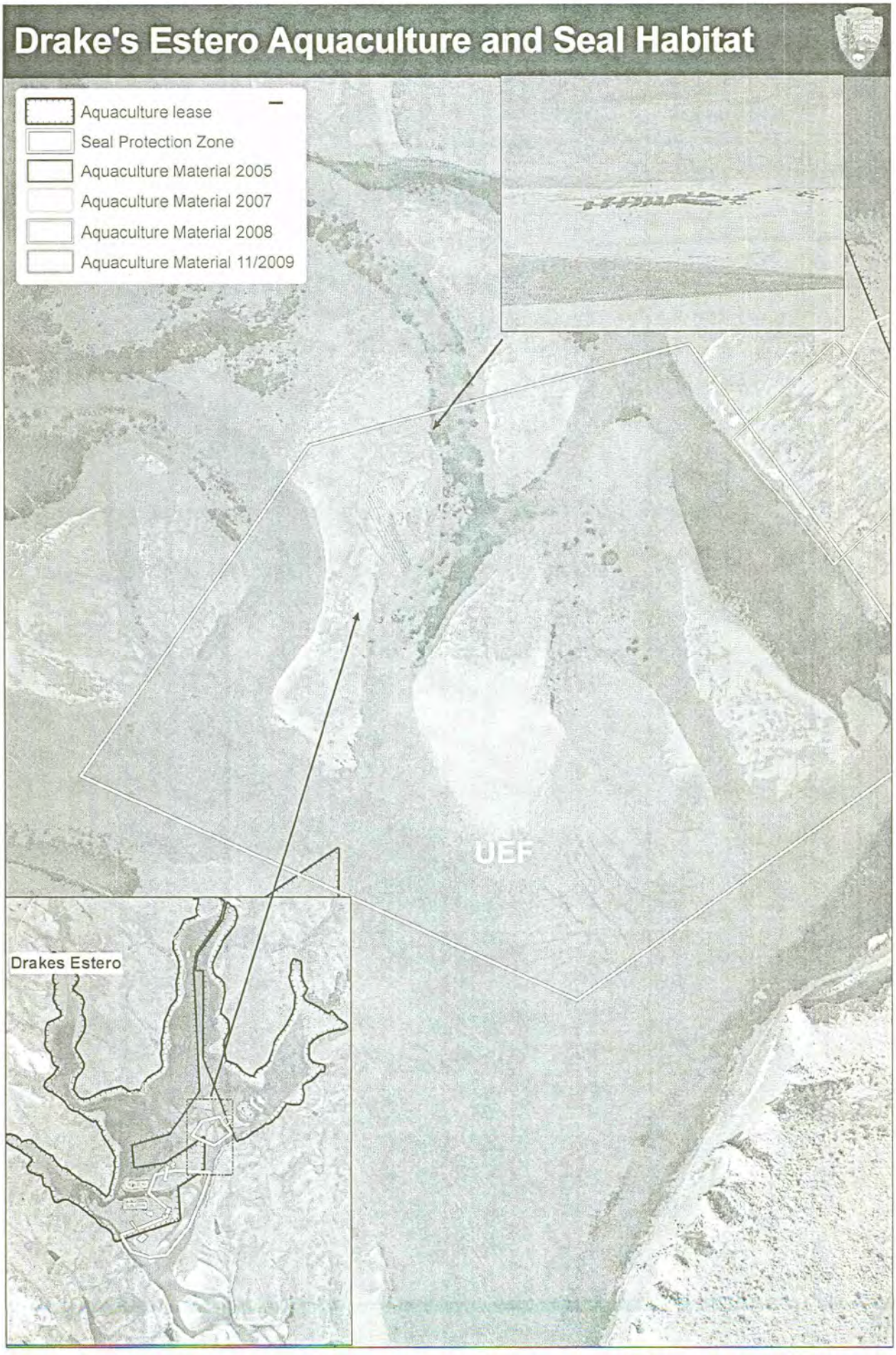
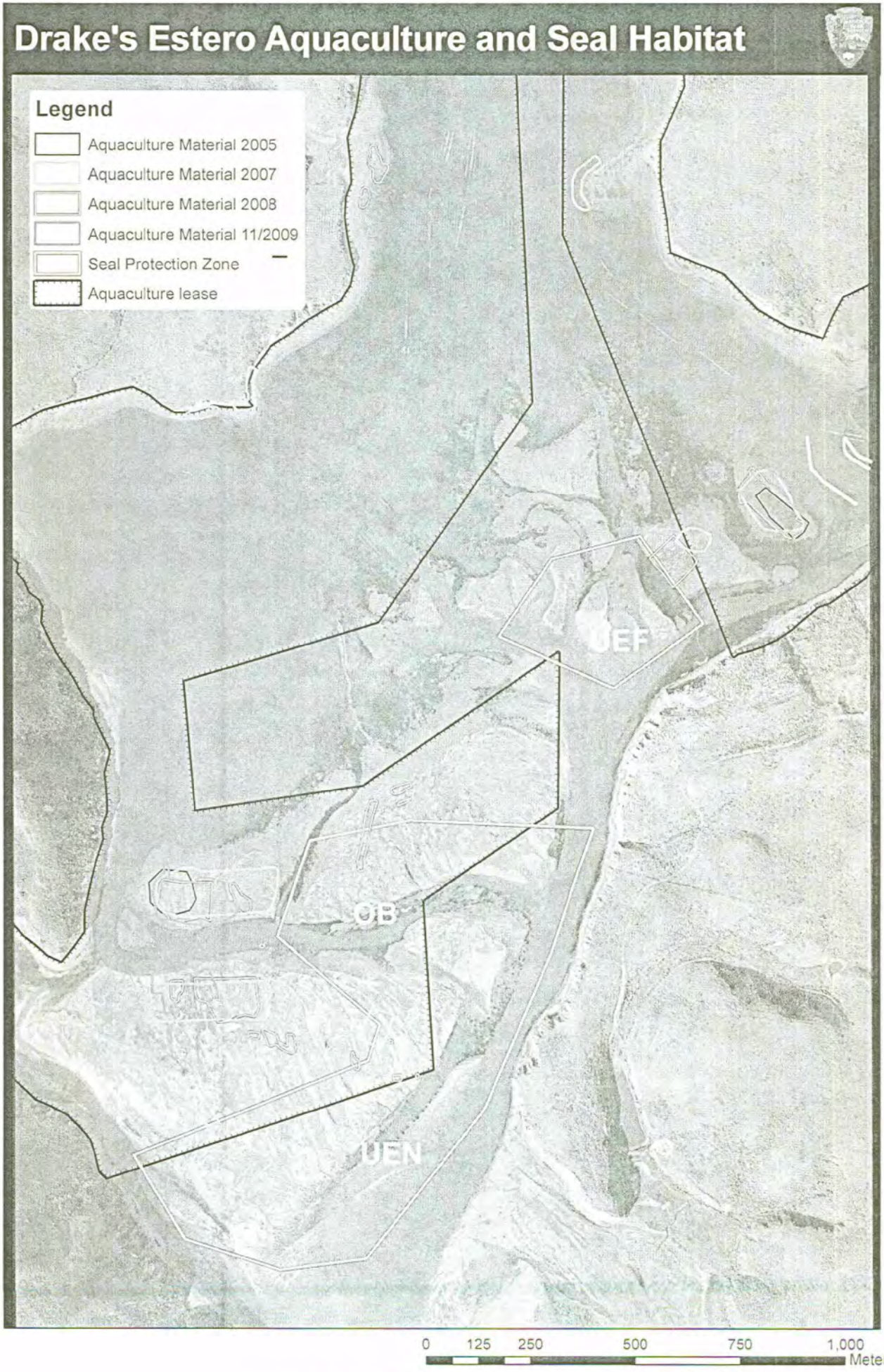
Drake's Estero Aquaculture and Seal Habitat



Drake's Estero Aquaculture and Seal Habitat




Drake's Estero Aquaculture and Seal Habitat
Legend
Aquaculture Material 2005
Aquaculture Material 2007
Aquaculture Material 2008
Aquaculture Material 11/2009
Seal Protection Zone
Aquaculture lease
JEF
JOB
JOEN
0
125
250
500
750
1,000
Meters

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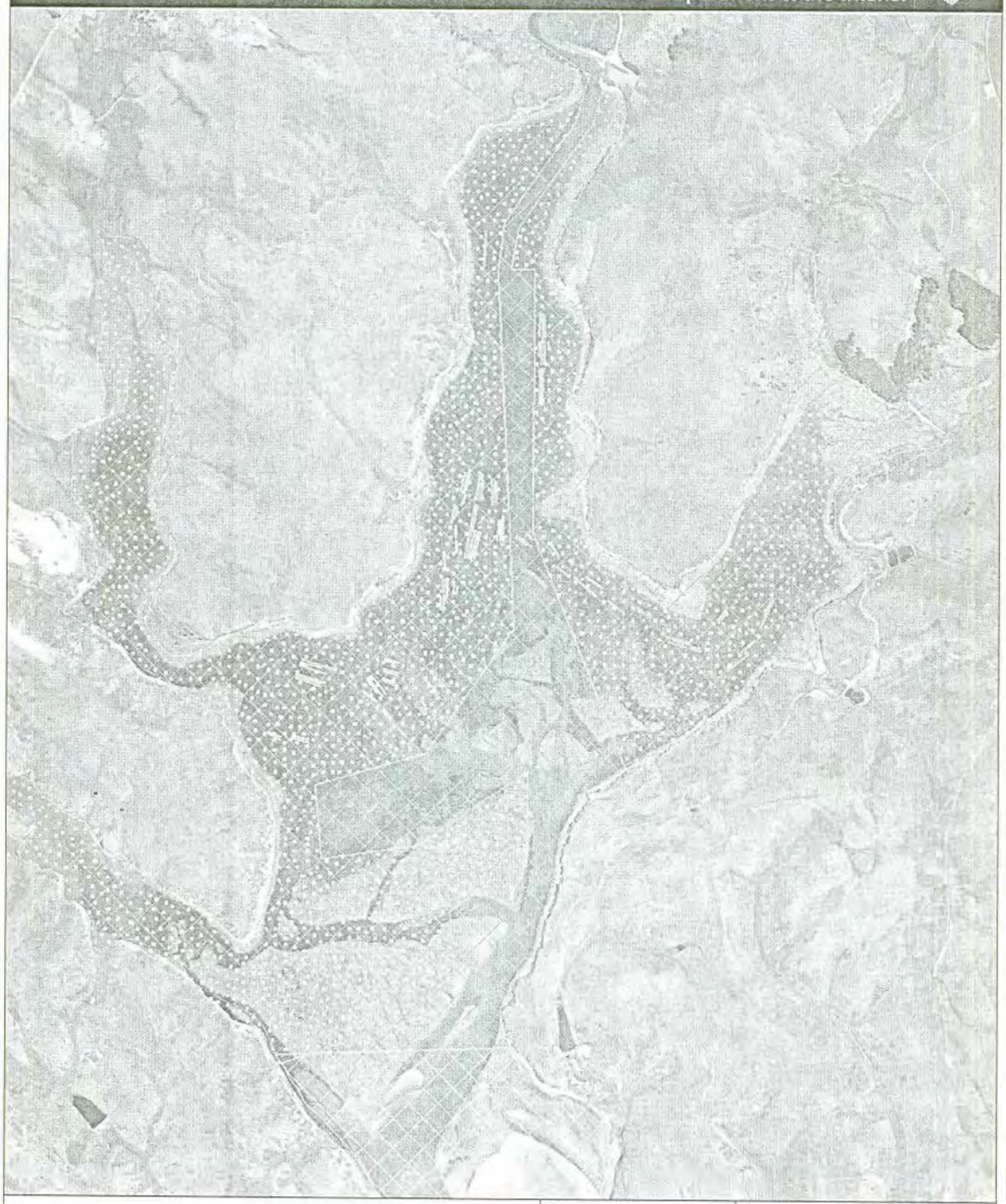
[attachment "DFG Lease Area Map.pdf" deleted by Don Neubacher/PORE/NPS]

Drake's Estero Aquaculture & CDFG Leases

NPS Resources and SUP Area

National Park Service
U.S. Department of the Interior



Permit Type

- ROP
- SUP

Oyster Racks

- Active
- Dilapidated

- Aquaculture Lease/SUP Area
- Potential Wilderness
- Existing Wilderness

Map Location

N
W E
S

0 0.5 Miles

Aquaculture Lease

Ben Becker/PORE/NPS
08/17/2009 10:53 AM

To Ex 6
cc Sarah Allen/PORE/NPS@NPS, Don Neubacher/PORE/NPS@NPS
bcc
Subject Re: Drakes Estero aerial photos

Hi Ex 6

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Thanks,

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Ex 6

Ex 6
Ex 6
08/14/2009 02:53 PM

To Ben_Becker@nps.gov
cc sarah_allen@nps.gov
Subject Re: Drakes Estero aerial photos

Ben,

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>and through the actual images. We sent you everything that had a
>reasonably good image. So, you are welcome to come over to the Archives (I
>could go with you), but I'm pretty sure I have found everything available.
>
>There could be other sources out there besides what we have in the park
>archives, I'll ask our archivist.
>
>Thanks,
>
>-Ben
>
>____________________
>
>Ben Becker, Ph.D.
>Director and Marine Ecologist
>Pacific Coast Science and Learning Center
>Point Reyes National Seashore
>1 Bear Valley Road
>Point Reyes Station, CA 94956
>
>tel: 415-464-5247
>fax: 415-868-1202
>ben_becker@nps.gov
>http://home.nps.gov/pore/parkmgmt/pcslc.htm
>________________
>
>The Pacific Coast Science and Learning Center is one of 21 Research
>Learning Centers at National Parks across the country working to increase
>the effectiveness and communication of research and science through:
>
>· Facilitating the use of parks for scientific inquiry
>· Supporting science-informed decision making
>· Communicating relevance and providing access to research knowledge
>· Promoting resource stewardship through partnerships
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>
>   To   Ben_Becker@nps.gov
>   cc   slwilliams@ucdavis.edu
>   bcc
>   Subject   Drakes Estero aerial photos
Ex 6 [redacted]
>
>08/14/2009 12:19 PM MST
>

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>
>
>
>Hi, Ben,
>
>I'm finally starting to work on the analysis for the eelgrass distribution
>in the Drakes Estero photos that Sarah sent us on DVD. To do this analysis
>requires using a current aerial photo and ground-truthing it around the
>time of the photo. The BML Reserve takes aerial photos of its land
>annually, and this year's flight is fast approaching (August 26th). I spoke
>to Jackie Sones, the Reserve Research Coordinator, about the potential of
>adding a photograph of Drakes Estero to the trip, and it's feasible, but we
>have no money for it. Is this something PRNS might be able to support? I
>haven't looked into the cost yet, but imagine it should be minimal because
>it's likely to be only a few photos, and it's such a small area.
>
>Alternatively, do you know if CDFG continues to take aerial photos of
>Drakes Estero, and what their schedule is? There would be no need to take
>advantage of this survey if CDFG continues to take photos. Do you know if
>CDFG has photos in addition to what you guys have?
>
>Finally, do you know if the PRNS collection of aerial photos contains more
>than those Sarah sent us? The years I have photos from are:1943, 1952,
>1963, 1968, 1969, 1984, 1991, 2005. If so, it would be useful it I could
>come by to check them out. I am trying to select photos from the same
>season to reduce seasonal variability, and although some photos may be of
>poorer quality, there may be small areas within the overall photo that
>could be of use to me.
>
>Also, it would be nice to meet you in person!
>
>Thanks,
Ex 6
>
>[cc: Susan Williams, slwilliams@ucdavis.edu]
>
>--
>
Ex 6
>Ecology Graduate Group, UC Davis
>Bodega Marine Laboratory
>PO Box 247
>Bodega Bay, CA 94923-0247
>office Ex 6
>http://www-bml.ucdavis.edu/facresearch/Ex 6

--
Ex 6
Ecology Graduate Group, UC Davis
Bodega Marine Laboratory
PO Box 247
Bodega Bay, CA 94923-0247
office Ex 6
http://www-bml.ucdavis.edu/facresearch/Ex 6

Devin Kelley
<kelley@hjw.com>
11/19/2009 02:13 PM

To "Ben_Becker@nps.gov" <Ben_Becker@nps.gov>
cc Ray DeLeon <rdeleon@hjw.com>, "Sarah_Allen@nps.gov" <Sarah_Allen@nps.gov>
bcc
Subject RE: Orthoimagery corrections

Ben, Sarah,

I've placed the corrected imagery on our FTP site: ftp.hjw.com in the "09-101" directory. The data is provided in three resolutions: 15cm, 30cm and 60cm, in both GeoTIF/TFW and JPG/JGW format. Please note that all data is in UTM 10, meters.

Thank you for your patience as we made the correction. Please get in touch if you have any questions.

Best regards,
Devin

Devin Kelley

Project Director, Certified Photogrammetrist (ASPRS)

HJW GeoSpatial, Inc.

Office: 510.834.2001 ext. 124

Ex 6

www.hjw.com

-----Original Message-----
From: Ben_Becker@nps.gov [mailto:Ben_Becker@nps.gov]
Sent: Wednesday, November 18, 2009 5:10 PM
To: Devin Kelley
Cc: Ray DeLeon; Sarah_Allen@nps.gov
Subject: Re: Orthoimagery corrections

Thanks, Devin and Ray.

We're under a bit of a deadline to process the info, so the sooner the better! It would be best for us to grab from your FTP site since it seems as though ours is not very reliable.

Thanks,

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
1 Bear Valley Road

Gmail by Google

Ex 6

RE: Drake Esteros Completed

Ray DeLeon <rdeleon@hjw.com> **Thu, Mar 26, 2009 at 1:14 PM**
To: sarah allen Ex 6

Hi Sarah

That has been flown and I will have the folks here produce the scan and send to your office.

Our Best, and thanks for think of us again for this flight!

~Ray

From: sarah allen [mailto:Ex 6
Sent: Wednesday, March 11, 2009 12:26 PM
To: Ray DeLeon
Subject: Re: Drake Esteros Quote

I will fax this today or tomorrow.

Sarah

On Wed, Mar 11, 2009 at 11:20 AM, Ray DeLeon <rdeleon@hjw.com> wrote:

Hi Sarah

I received your phone message, thank you. We can certainly fly low tide sometime during the March 17-19 days you've requested. Attached, please find the quote for services. When you have a moment can you fax your signed copy to us here at the number below.

Thanks for thinking of us, we look forward to working with you on this and many other projects.

Best regards!

Ray

Error! Filename not specified.

Ray DeLeon • Senior Project Manager

2001 Broadway, Third Floor • Oakland, CA 94612

Phone 510-834-2001 ext 148 • Fax 510-834-2101

No virus found in this incoming message.
Checked by AVG - www.avg.com
Version: 8.0.237 / Virus Database: 270.11.9/1993 - Release Date: 03/11/09 08:28:00

Gmail by Google

Ex 6

Drake Esteros Quote

Ray DeLeon <rdeleon@hjw.com> **Wed, Mar 11, 2009 at 11:20 AM**
To: Ex 6

Hi Sarah

I received your phone message, thank you. We can certainly fly low tide sometime during the March 17-19 days you've requested. Attached, please find the quote for services. When you have a moment can you fax your signed copy to us here at the number below.

Thanks for thinking of us, we look forward to working with you on this and many other projects.

Best regards!

Ray

HJW geospatial
PACIFIC AERIAL SURVEYS

Ray DeLeon • Senior Project Manager

2001 Broadway, Third Floor • Oakland, CA 94612

Phone 510-834-2001 ext 148 • Fax 510-834-2101

2 attachments

HJW geospatial PACIFIC AERIAL SURVEYS **image001.jpg** 130K

drake Esteros quote 030309.pdf 29K

Gmail by Google

Ex 6

Drake Esteros Quote for low tide flight

Ray DeLeon <rdeleon@hjw.com> **Tue, Mar 3, 2009 at 4:11 PM**
To: Ex 6

Hi Sarah

We can honor the same quote price as last year. Please see attached. If this is Ok for you please fax that back to me at the number below.

Thanks! I look forward to working with you on this and other projects.

Best Regards!

Ray

HJW geospatial
PACIFIC AERIAL SURVEYS

Ray DeLeon • Senior Project Manager

2001 Broadway, Third Floor • Oakland, CA 94612

Phone 510-834-2001 ext 148 • Fax 510-834-2101

2 attachments

HJW geospatial PACIFIC AERIAL SURVEYS **image001.jpg** 130K

drake Esteros quote 030309.pdf 29K

HJWgeospatial

QUOTATION

HJW GeoSpatial, Inc
2001 Broadway, 3rd Floor
Oakland, CA 94612
Tel: 510-834-2001
Fax: 510-834-2101

Quote No.: RD030309 Date: 03-03--09 Expiration Date: 90 Days

Contact: Sarah Allen
Agency / Firm: Point Reyes National Seashore
Address: 1 Bear Valley Road
Point Reyes Station, CA 94956

Tel: Ex 6 Fax:

PROJECT NAME: Drake Esteros Low Tide Quote

Description:

- Color Pinpoint Aerial photography taken at low tide, NAD 27 at 1:12,000
  38 3 18.697N 122 56 21.865W

Deliverables:

- One DVD with 2000 dpi and 600 dpi scans of PP Point Reyes Seashore

Total cost: $1,200

This proposal to perform the described services becomes a contract subject to the attached terms and conditions when signed by HJW and client.

Agreed:
HJW GeoSpatial, Inc.

By: _____
Ray DeLeon

03-03-09
Date

Agreed:
Point Reyes National Seashore

By: _____
Sarah Allen

_____
Date

TERMS AND CONDITIONS

a) Independent Contractor: HJW shall operate as an independent contractor and not as an employee, agent, joint venturer, or partner of Client. Nothing in this Agreement shall be interpreted or construed to the contrary. HJW shall retain the right to perform services for others during the term of this Agreement.

b) Payment of Invoices: Client shall pay HJW's invoices within 30 days of their receipt and acceptance by Client. Invoices will be deemed to have been accepted by Client upon receipt unless Client advises HJW within 10 days of any objection to the invoice. In no event shall Client use this objection to delay payment of any undisputed portions of the invoice. Client and HJW agree to endeavor to resolve any disputes over payment in a timely manner. HJW reserves the right to cease work or to refuse to provide Client with any work product until such disputes are resolved. HJW shall assess and Client shall pay a service charge of 1.5% per month on invoice balances over 30 days past due.

c) Cooperation: Client and HJW agree to cooperate with each other in every way in order to complete the terms of this Agreement. Upon request, Client shall execute and deliver, or cause to be executed and delivered, such documents or instruments which are necessary to perform the terms of this Agreement.

d) Rights in Data: Notes, letters, software, photographs and other work materials developed or acquired in the process of producing the products named in the "scope of services" section of this Agreement shall remain the property of HJW. HJW agrees to maintain work materials in an ordered and accessible manner and take reasonable action to safeguard work materials for future use. Client acknowledges that its right to utilize the services and work products provided pursuant to this Agreement will continue only so long as client is not in default pursuant to the terms and conditions of this Agreement and Client has performed all obligations under this Agreement.

e) Assignment: Neither party to this Agreement will assign or otherwise transfer its rights or obligations hereunder without the prior written consent of the other party.

f) Indemnity: HJW shall indemnify Client, its officers, directors, employees and agents from any claims, suits, loss, damage, expense, and liability resulting from HJW's negligent performance or willful misconduct related to the performance of this Agreement. Client shall indemnify HJW, its officers, directors, employees, and agents from any claims, suits, loss, damage, expense and liability resulting from Client's negligence or willful misconduct related to the performance of this Agreement. Neither party shall be responsible or held liable to the other party for any indirect or consequential damages arising out of services performed under this Agreement. HJW's liability under this Agreement shall be limited to the amount of the fees paid by the client to HJW for services performed under this Agreement or to $15,000.00, whichever is greater.

g) Insurance: HJW shall maintain general liability, automobile liability, aircraft liability, professional liability, and workers' compensation insurance coverages. Certificates of insurance will be sent to Client if requested.

h) Termination of Agreement: Client may terminate this Agreement in the event HJW is unable to satisfactorily perform its work , however, HJW shall be entitled to compensation for all work satisfactorily performed up to the point that the Agreement is terminated HJW shall be entitled to immediately, and without notice, suspend its performance of any and all of its obligations pursuant to this Agreement if Client files a voluntary petition seeking relief under the United States Bankruptcy Code or if there is an involuntary bankruptcy petition filed against Client in the United States Bankruptcy Court.

i) Disputes and Applicable Law: Any controversy, claim or dispute shall be construed and enforced in accordance with the laws of the State of California. Should any legal or arbitration proceedings be brought by either party to enforce or interpret any of the terms or conditions of this agreement, the prevailing party shall be entitled to recover all reasonable attorneys' fees and costs incurred in defense of the claim from the other party. The venue for any such action shall be in the County of Alameda, California.

j) Force Majeure: Neither party to this Agreement will be liable to the other party for delays in performing the services or delivery of the products, nor for the direct or indirect cost resulting from such delays, that may result from labor strikes, riots, war, acts of governmental authorities, inclement weather conditions, natural catastrophes, or any other cause beyond the reasonable control or contemplation of either party.

k) Severability and Waiver of Breach: If any provision hereof or any remedy herein provided for be invalid under any applicable law, such provision shall be inapplicable and deemed omitted, but the remaining provisions hereof shall be in effect in accordance with the intent hereof. HJW's waiver of any other term or condition, or breach of any term or condition shall not constitute the waiver of any other term or condition, or the breach of any other term or condition.

l) Sales and Use Tax: In the event any taxing authority determines that sales or use tax should have been charged on invoices for services or products sold to Client, then Client agrees that it will either pay such sales or use tax, along with any interest or penalties assessed, directly to the taxing authority or will promptly reimburse HJW for any sales or use tax, interest and penalties against HJW by any taxing authority that results from this Agreement.

m) Entire Agreement: This Agreement constitutes the basis for Agreement between HJW and Client as regards to the work specified in the "scope of services" section of this Agreement, and supersedes all prior agreements, whether written or oral. In the event of conflict between the contents of this Agreement, any purchase order, or other form of written authorization subsequently issued for HJW's services or products, the provisions of this Agreement shall govern unless rescinded in writing.

Copyright © 2007, HJW GeoSpatial, Inc.

Dave Press/GOGA/NPS
10/23/2008 04:15 PM

To "Thompson, Professor Paul M." <lighthouse@abdn.ac.uk>
cc "C. Peterson" <cpeters@email.unc.edu>, "David_Graber@nps.gov" <David_Graber@nps.gov>, "Thompson, Professor Paul M." <lighthouse@abdn.ac.uk>,
bcc
Subject project map

Paul,
Attached is a new map that synthesizes many of the maps already provided to the panel. A few notes about the data layers .....

The data layers representing 2007 aqualculture material, eelgrass coverage, and eelgrass propeller damage were collected in the field by NPS staff in March 2007. I have attached a report describing their methods. The oyster racks were also mapped in March 2007 and are applicable to all years.

The 2005 and 2008 aqualculture data layers were digitized by a NPS GIS technician using high resolution aerial imagery from that year. Imagery from 1994, 2001, and 2004 revealed no additional mariculture material besides the actual oyster racks.

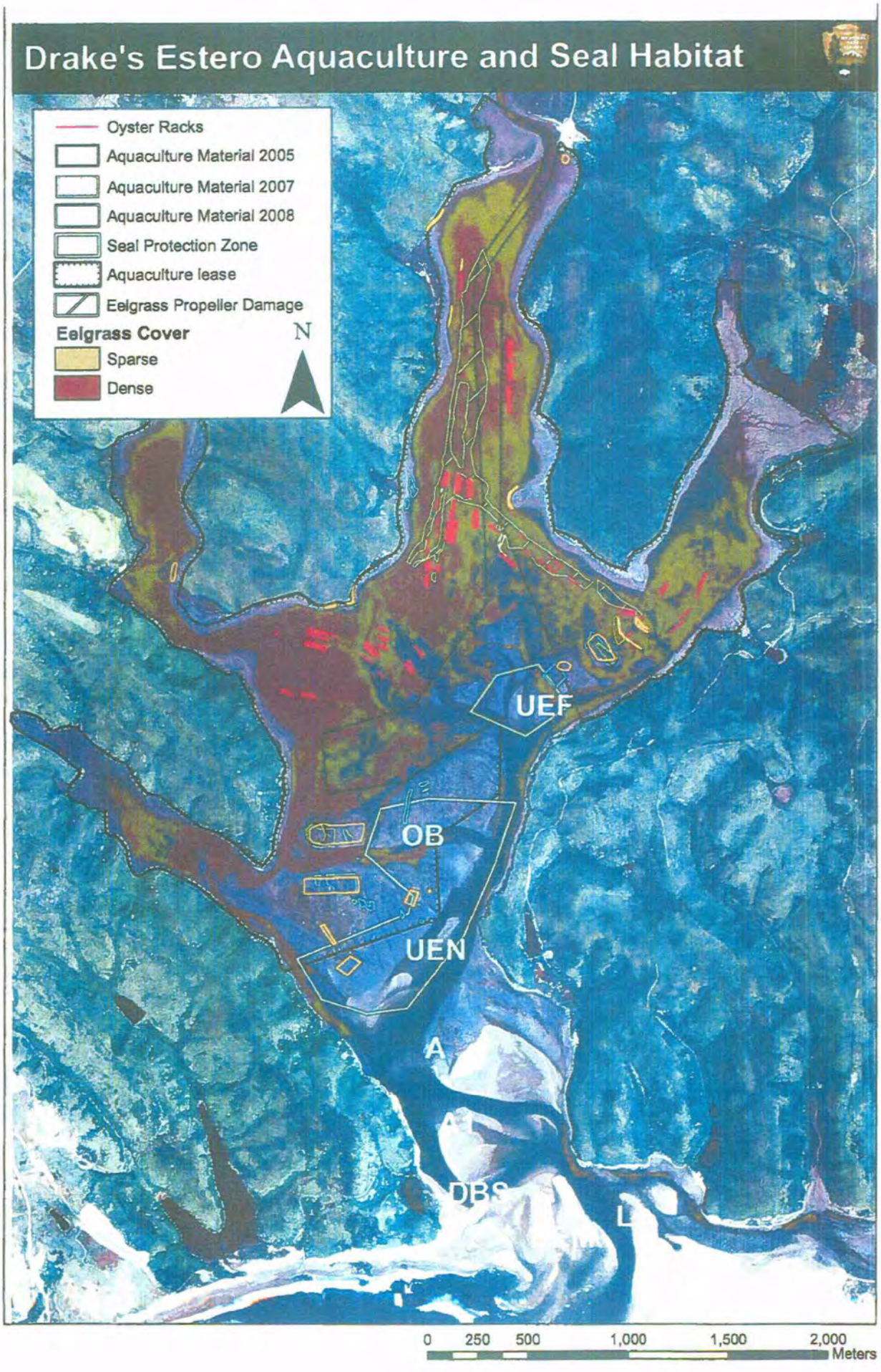
The harbor seal subsite labels (OB, UEN, UEF, etc) are placed directly over the where the majority of the seals haul-out in those respective areas.

Please let me know if I can answer any questions about the map or if there are additional data layers you had expected to see.

Best, Dave

NRC_Aquaculture_Eelgrass_Seal.pdf Drakes_Estero_Trip_Report_March_2007_d.pdf

David Press
Ecologist / Data Manager
San Francisco Area Network
Inventory and Monitoring Program
415-331-0168
415-331-5530 (FAX)


Drake's Estero Aquaculture and Seal Habitat
Oyster Racks
Aquaculture Material 2005
Aquaculture Material 2007
Aquaculture Material 2008
Seal Protection Zone
Aquaculture lease
Eelgrass Propeller Damage
Eelgrass Cover
Sparse
Dense
N
UEF
OB
UEN
A
DBS
L
0 250 500 1,000 1,500 2,000
Meters

Drakes Estero eelgrass, oyster bag, and oyster rack assessment
Trip Report - 3/20/2007

Crew: Don Brown, GIS Specialist, Point Reyes National Seashore
Ben Becker, Marine Ecologist, Point Reyes National Seashore

Equipment: 13 ft Alumicraft skiff with 15 hp 4-stroke outboard motor.
Trimble GeoExplorer3 GPS with real-time differential correction.

03/13/2007
Oyster rack, bag, line and eelgrass assessment

Objectives

1. Map all oyster racks in the estero and categorize as active, inactive or dilapidated. Dilapidated racks were defined as those considered too deteriorated for use.
2. Document any apparently recent repair work done to racks.
3. Map all oyster bags and line systems.
4. Report eelgrass occurrence (dense/patchy/absent) both adjacent and beneath all racks, bags and lines.

Field Methods: We launched from Drakes Bay Oyster Company (DBO) at ~11 AM and a + 3 ft tide, and traveled from North to South visiting all racks in the Estero. At each rack, we recorded whether the rack was surrounded by dense or patchy eelgrass, if eelgrass was present beneath the rack, the percentage of the rack currently occupied with oysters (= percent active), and the percent of the racks dilapidated. We mapped all visible bag systems along the intertidal and investigated all marker poles that are often used to mark where bags are kept. Survey was completed at ~2:45 PM and tide appeared to be about 0 ft.

Summary Results: There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There were 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor

seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero.

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

03/20/2007
Eelgrass satellite imagery ground truthing

Objectives

1. Ground truth satellite imagery classification of eelgrass beds.
    - Imagery used for classification was one-meter color digital orthophoto taken August 2005 at low tide classified using Erdas Imagine software.
2. Document any additional racks, bag or line systems not seen on day 1.

Field Methods: Beginning at ~ 10:30AM on 03/20/2007 at about a 0 ft tide, we surveyed the estero to ground truth a draft eelgrass bed map derived from satellite imagery. We traveled the perimeter of the eelgrass beds to verify changes from eelgrass to bare substrate, as well as to verify that eelgrass was dense or patchy within beds. We defined dense as close to 100% cover, patchy was considered down to 40% cover. We also verified that vegetation classified as eelgrass was not *Sargassum muticum* (as happened near the mouth of the estero) or enteromorphic algae (as occurred near some of the seal haul out sand flats in the middle of the estero). We took a total of 243 points throughout the estero noting eelgrass presence/absence/ dense/patchy to reclassify the satellite derived map to reflect actual field conditions. The survey was completed at ~1:30 PM and tide appeared to be about +3 ft.

Summary Results: In the field, the vast majority of satellite derived eelgrass classification appeared correct. Two shortcomings were that (1) channels are too deep to see eelgrass, even at low tide and (2) that during high tide in waters > 4 ft deep with windy conditions, choppy waters, and low sunlight, it was often difficult to see past 3 ft from the surface. In these instances we traveled very slowly until we came to an area shallow or calm enough to see bare bottom or eelgrass.

After analyzing ground truth data, ~ 95% of ground observations appeared to match to satellite image classification. Discrepancies mostly occurred in the southern part of the bay because of misclassification of *Sargassum muticum* and enteromorphic algae, as mentioned previously.

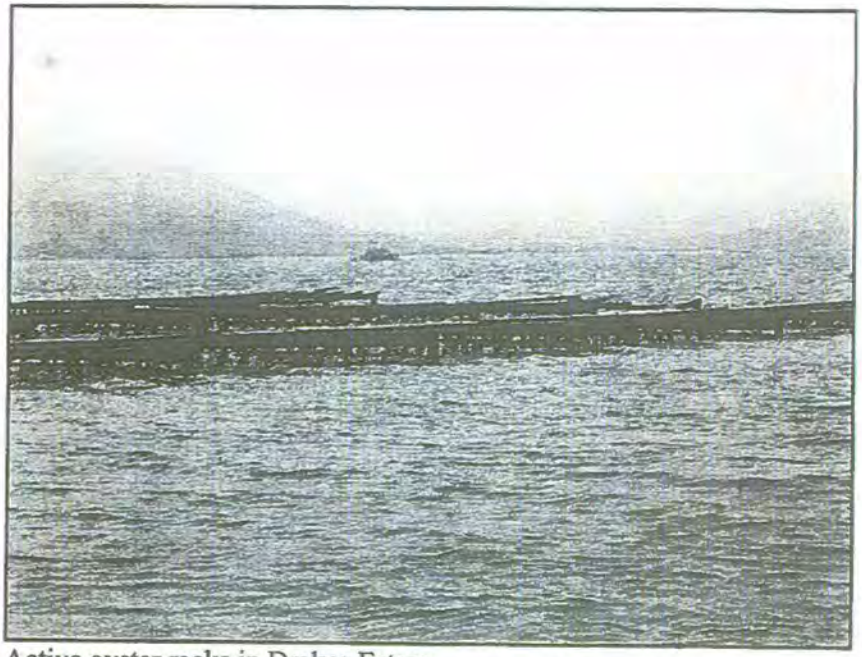
We calculated that 740 acres of the estero are covered by eelgrass, 355 acres dense, and 385 acres patchy. Oyster operations in eelgrass represent ~ 8.5 acres. We calculate that 8 acres (some dilapidated racks have patchy regrowth) of eelgrass beds are lost in Drakes Estero due to mariculture. Another factor affecting eelgrass beds which was noticed was boat propellers. It can be seen from aerial and satellite photos where regular boat paths have cut paths through eelgrass; these calculations do not reflect this factor which will necessitate further study.

We also documented three additional intertidal oyster bag systems not identified during the first survey.

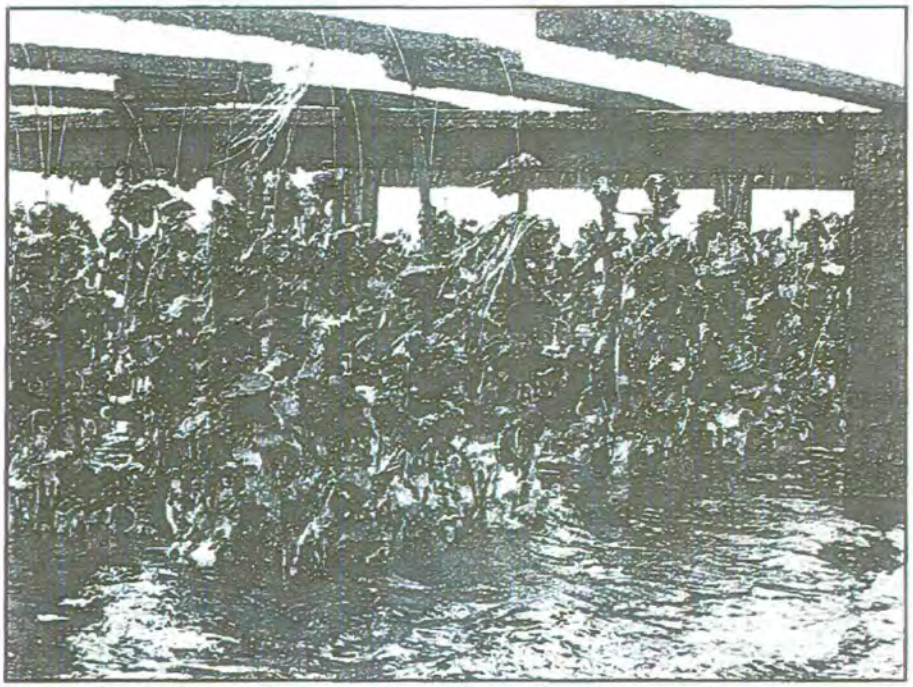
Summary Statistics

Total Oyster Racks	**93**
Usable Oyster Racks	**66**
Dilapidated racks	**27**
Percentage of racks in eelgrass beds	**96% (89 of 93)**
Percentage of usable racks with eelgrass underneath	**0%**
Percentage of dilapidated racks with eelgrass regrowth	**26% (7 of 27)**
Acres of eelgrass lost to racks	**8 acres**
Number of intertidal oyster bag areas	**12**
Acreage of intertidal oyster bag sites	**10 acres**
Total eelgrass acreage in the Estero	**740 acres**

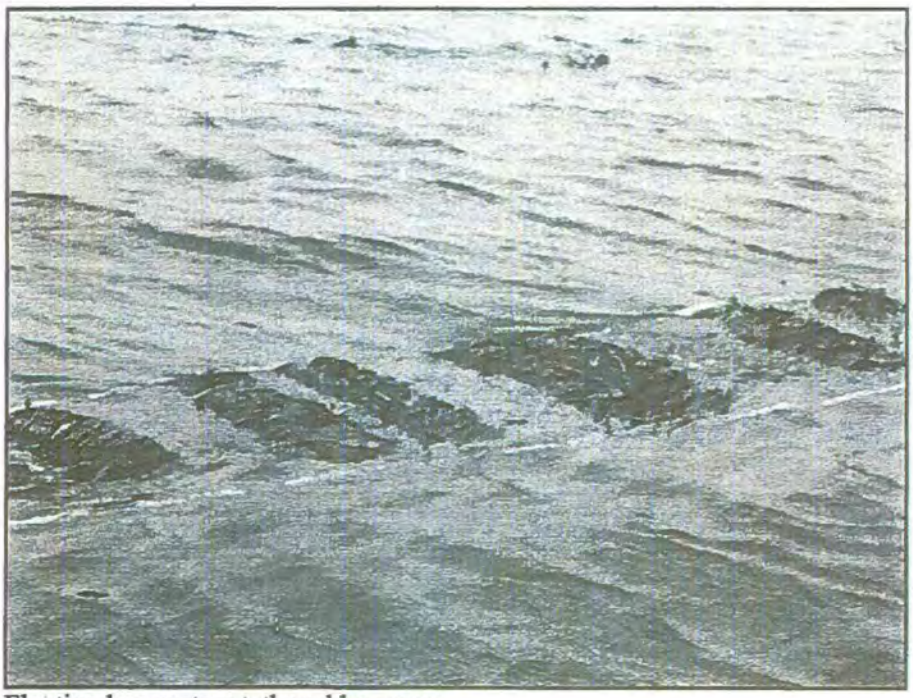
Images



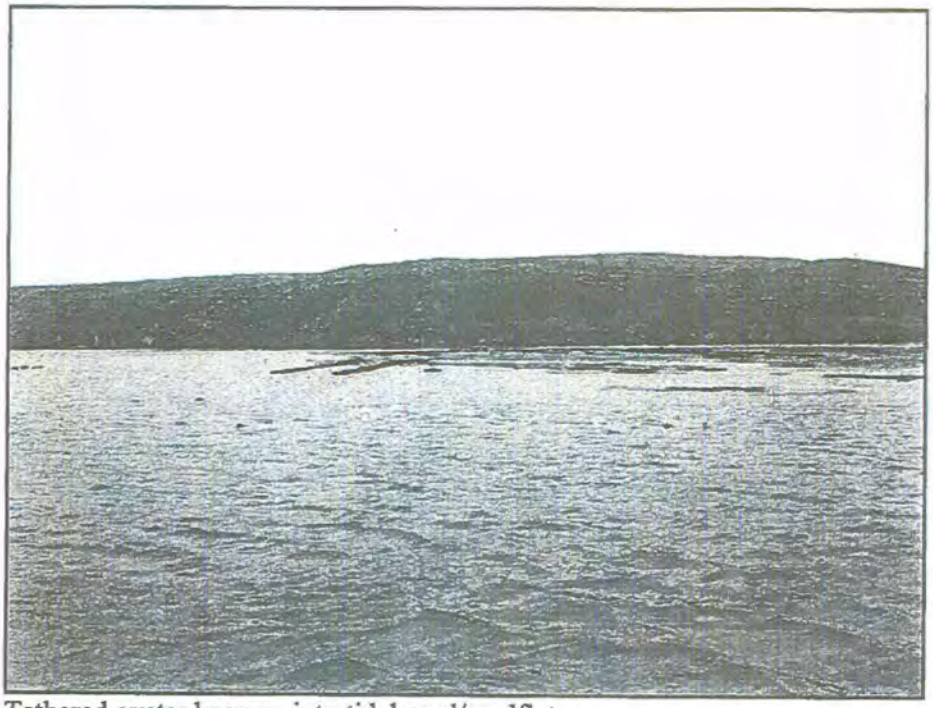
Active oyster racks in Drakes Estero.



Non-native tunicates (*Didemnum* spp. A) growing on oysters.



Floating bag system tethered by ropes.



Tethered oyster bags on intertidal sand/mudflats

Hanging bag array

Robert Campbell
<gbaerial@sbcglobal.net>
05/09/2007 09:38 AM

To Sarah_Allen@nps.gov
cc
bcc
Subject Oyster bags

What a mess!. I chose not to outline the cages. The files are full size, so you can crop and enhance as you wish.

Bob

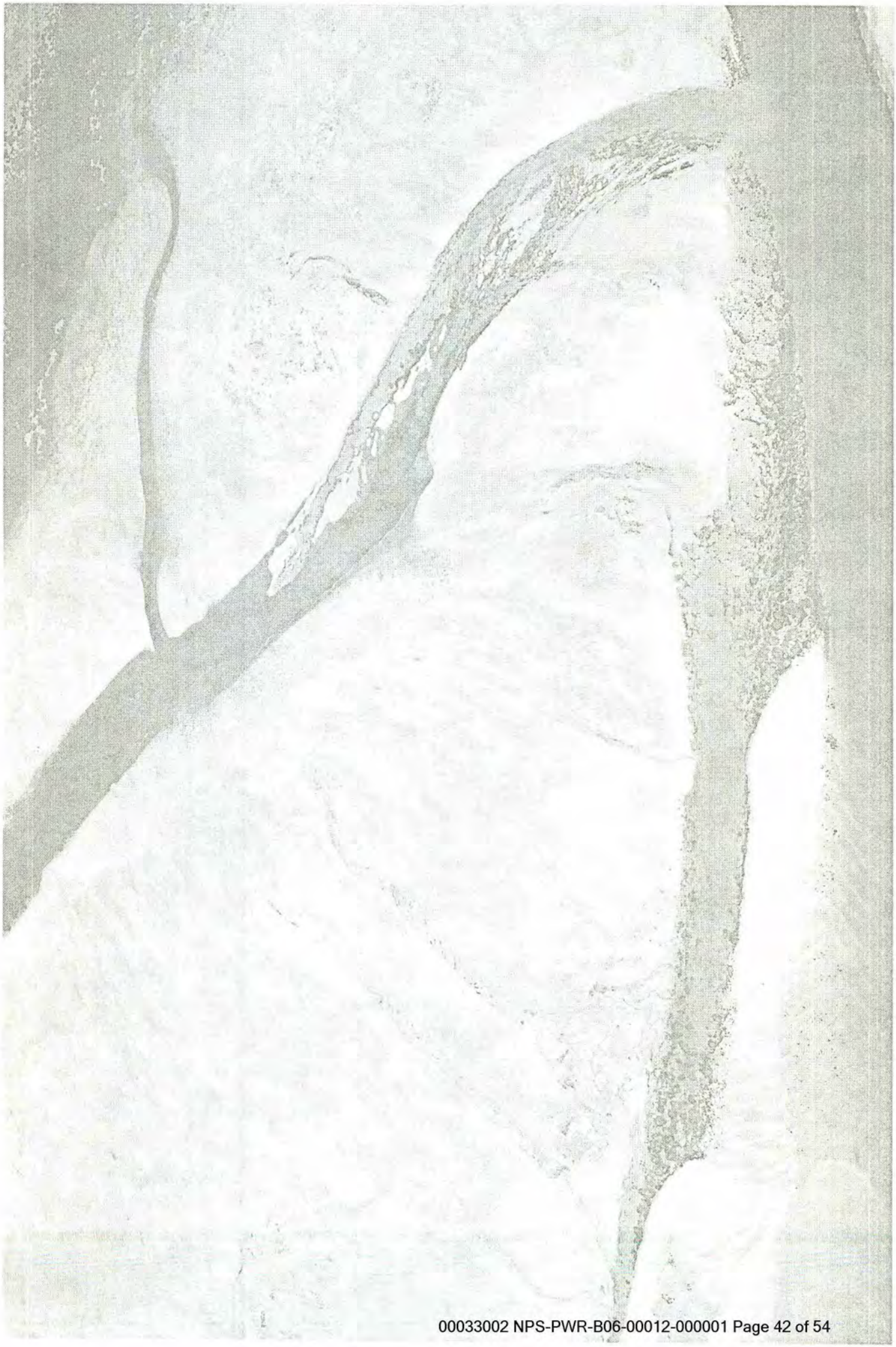
Point Reyes 167.jpg

Point Reyes 170.jpg

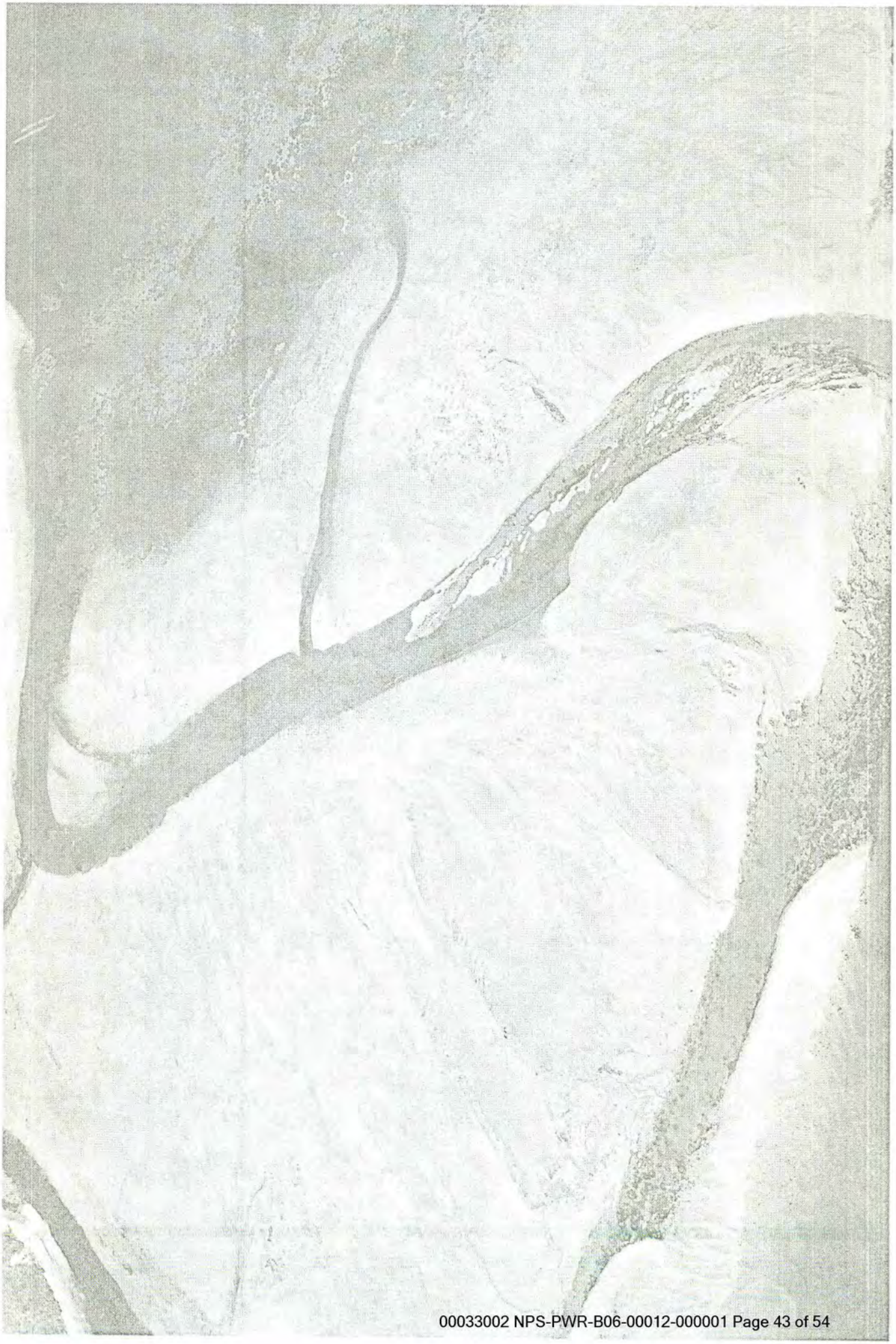
Robert Campbell Photography / Chamois Moon
707 996 8338 main
707 935 1564 fax
Ex 6
http://www.chamoismoon.com
gbaerial@sbcglobal.net

On May 9, 2007, at 8:26 AM, Sarah_Allen@nps.gov wrote:

> terrific!
>
>
> _____
>
> Sarah G. Allen, Ph.D.
> Senior Science Advisor
> National Park Service
> Point Reyes National Seashore
> One Bear Valley Road
> Point Reyes Station, CA 94956
> Phone 415-464-5187
> Fax 415-464-5182
> sarah_allen@nps.gov
>
>> <((((°>`·.¸¸.·´¯`·.¸¸.·´¯`·...¸><((((°>¸...
>
>
>
>
>
> Robert Campbell
> <gbaerial@sbcglob To:
> Sarah_Allen@nps.gov
> al.net> cc:
> Subject: Re: map of
> estero
> 05/08/2007 17:30
> MST



Point Reyes 167



>
>
>
>
>
> Sarah:
>
> I found a lot of them. They look almost white. I'll send some
> tomorrow.
>
> Bob
>
>
> Robert Campbell Photography / Chamois Moon
> 707 996 8338 main
> 707 935 1564 fax
> Ex 6
> http://www.chamoismoon.com
> gbaerial@sbcglobal.net
>
>
>
>
> On May 8, 2007, at 4:45 PM, Sarah_Allen@nps.gov wrote:
>
>>
>> (See attached file: oyster_activity_seal.pdf)
>>
>>
>> _____
>>
>> Sarah G. Allen, Ph.D.
>> Senior Science Advisor
>> National Park Service
>> Point Reyes National Seashore
>> One Bear Valley Road
>> Point Reyes Station, CA 94956
>> Phone 415-464-5187
>> Fax 415-464-5182
>> sarah_allen@nps.gov
>>
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>>> <oyster_activity_seal.pdf>
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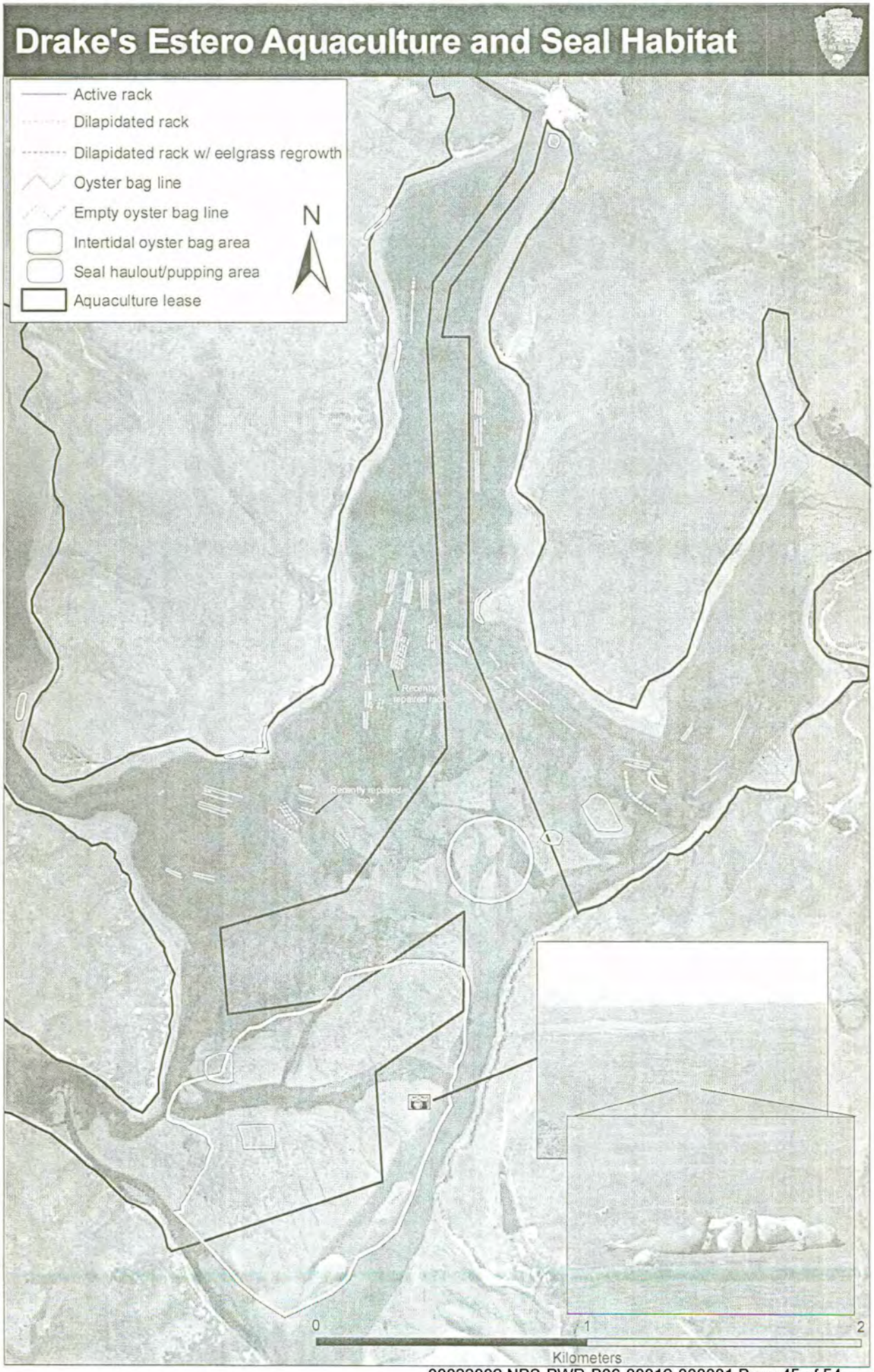
Drake's Estero Aquaculture and Seal Habitat



Robert Campbell
<gbaerial@sbcglobal.net>
05/08/2007 04:38 PM

To Sarah_Allen@nps.gov
cc
bcc
Subject Re: Aerials

Point Reyes 266.jpg

Robert Campbell Photography / Chamois Moon
707 996 8338 main
707 935 1564 fax
Ex 6
http://www.chamoismoon.com
gbaerial@sbcglobal.net

On May 8, 2007, at 1:41 PM, Sarah_Allen@nps.gov wrote:

> Robert - these are wonderful photos! Did you also have photos of the
> hundreds of oyster bags on the sandbars?
>
> Talk to you soon.
>
> Sarah
> _____
>
> Sarah G. Allen, Ph.D.
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> Point Reyes National Seashore
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> Phone 415-464-5187
> Fax 415-464-5182
> sarah_allen@nps.gov
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>

Robert Campbell
<gbaerial@sbcglobal.net>
03/15/2007 03:37 PM

To Sarah_allen@nps.gov
cc
bcc
Subject One More

Drakes Estero-Low Tide.jpg

Robert Campbell Photography / Chamois Moon
707 996 8338 main
707 935 1564 fax
Ex 6
http://www.chamoismoon.com
gbaerial@sbcglobal.net

Drakes Estero low tide

Robert Campbell
<gbaerial@sbcglobal.net>
03/15/2007 01:41 PM

To Sarah_allen@nps.gov
cc
bcc
Subject Estero selection

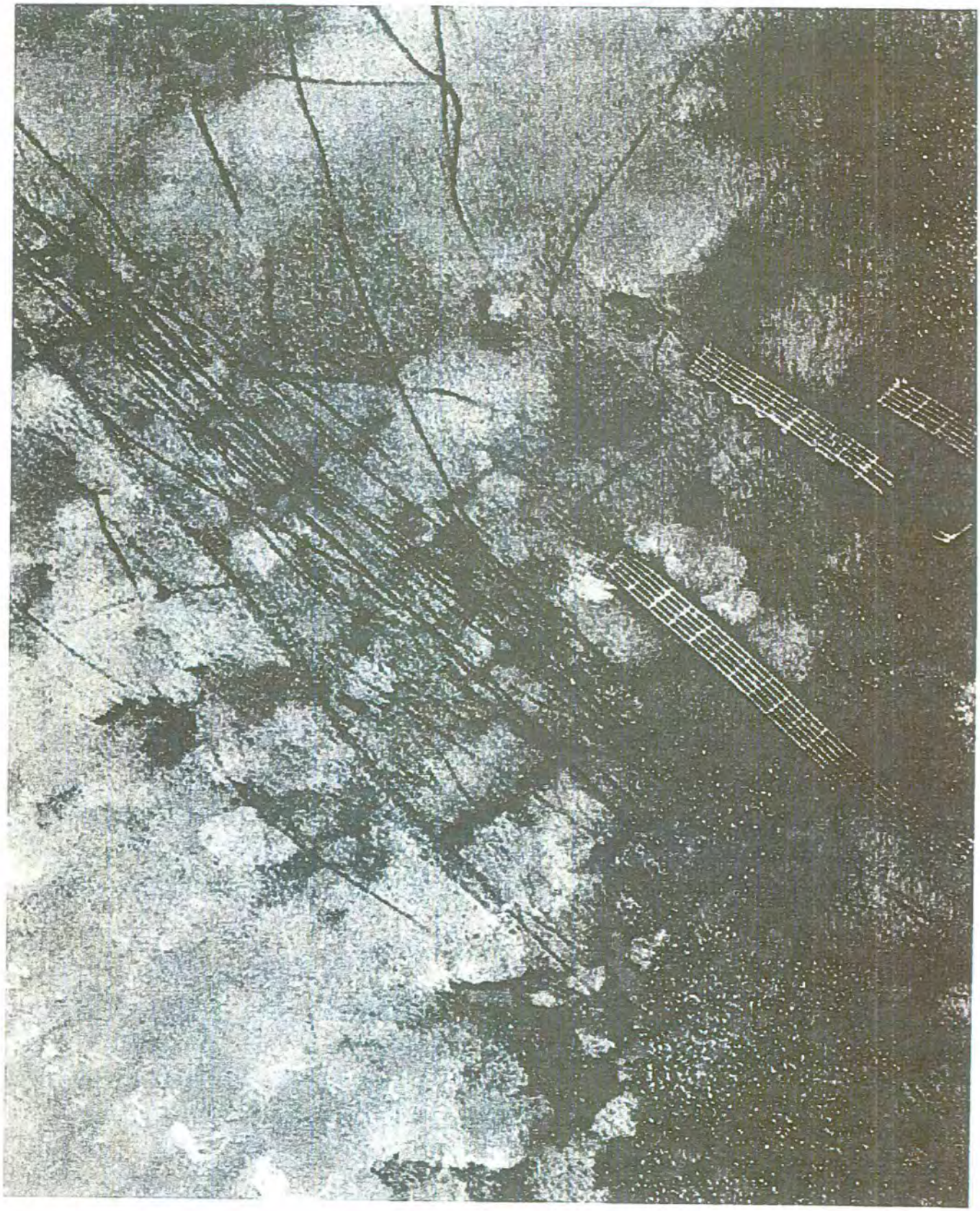
NPS - PR.zip

Robert Campbell Photography / Chamois Moon
707 996 8338 main
707 935 1564 fax
Ex 6
http://www.chamoismoon.com
gbaerial@sbcglobal.net

Robert Campbell
<gbaerial@sbcglobal.net>
05/08/2007 07:05 AM

To sarah_allen@nps.gov
cc
bcc
Subject 4

I got a message that these bounced because you were out of space.



MOVEMENT AND ACTIVITY PATTERNS OF HARBOR SEALS AT DRAKES ESTERO, CALIFORNIA, 1986-87

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INTRODUCTION

Harbor seal colonies in Point Reyes, Marin County, represent about 20% of the mainland population during the breeding season (Allen and Huber 1984, Hanan et al. 1986), and consequently, deserve attention when devising regional management policies. Estimates for the size of the state and Point Reyes populations are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. As a result, estimates are likely low and one cannot relate numbers among seasons. Several researchers have addressed the problem using radio tagged animals and have derived correction factors with varying attendance patterns based on location, time of day, and season of year (Brown and Mate 1981, Pitcher and McAllister 1981 and Yochem et al. 1987). These researchers determined that the differences between total number hauled out and the estimates of abundance were a function of variations in daily haul-out patterns as well as movements to other areas.

In the Point Reyes area we determined previously that seals displayed diurnal and seasonal variation in haul-out patterns (Allen and Huber 1983, 1984). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods. We determined in 1985-86 with the aid of radio-telemetry that seasonal variation was a function of seals both moving to other haul-out sites outside of Point Reyes and hauling out on fewer days during the winter months (Allen et al. 1986). A larger proportion of seals hauled out on a daily basis in August than in December, and this difference appeared to be more pronounced for females than for males. We have no comparable data for the breeding season, though, because transmitters were shed one month prior to the breeding season in 1986. As a consequence, there is a gap in our data set for a significant period in the seals' annual cycle. Evidence from movement patterns of radio tagged seals also suggests that Drakes Estero is a focal breeding area for seals ranging as far south as Monterey Bay and as far north as the Klamath River and that female seals are more likely to migrate than males.

Our objectives for the second year of study using radio-telemetry were to 1) compare daily and seasonal variability in haul-out behavior between the two years, 2) determine the destination of departing animals with particular emphasis on adult female seals, and 3) determine the haul-out pattern during the breeding season and premolt period. We also wanted to track movements of weaned pups since this age group is being affected by the halibut gill net fishery. In 1983-84 an estimated 383 (SE 194) harbor seals were incidentally taken in gill nets from Bodega Bay to Half Moon Bay; most of these were immature seals (D.

Hanan, California Department of Fish and Game, pers. commun.).

Information on seasonal activity patterns and fall/winter movements would be valuable for any long-term management program for seals in the Point Reyes area, and, in conjunction with results accumulated elsewhere (Stewart and Yochem 1983; Herder 1986), could provide more accurate estimates of the California harbor seal population.

STUDY AREA AND METHODS

Harbor seals haul out in Drakes Estero year round at a number of locations including numerous tidal mud flats that are exposed at low, medium and medium-high tide levels and Limantour Spit which is exposed at all tide levels. We chose to capture and tag seals at Drakes Estero because it is one of the largest breeding areas in Point Reyes and because the capture technique we wished to use was only possible in an estuarine environment. Other estuaries in Point Reyes (Bolinas Lagoon and Tomales Bay) are exposed to substantial levels of human disturbance (Allen et al. 1985, Allen and Huber 1984), and consequently, movement and activity patterns would likely be significantly altered there.

Over a two day period in 1986 (July 21 and 22), we sucessfully captured about 35 animals and affixed transmitters to 22 . On March 9 and 11 of 1987, we captured about 90 animals and affixed transmitters to 12 seals. During both capture periods, we caught seals in a 130 m long gill net, with 8-inch mesh, set off the haul-out site and then pulled ashore. Two power boats were used to deploy the net adjacent to the haul-out site. This method of capture was successfully used in 1985 without incident at Drakes Estero and enabled us to capture a large number of seals over a short period of time, thereby minimizing the duration of disturbance days to the herd (Beach et al. 1985). As was observed in 1985, some seals departed from Drakes Estero during the days of capture, but no seals departed permanently from the estero during the following week. Consequently, we do not believe that the capture technique disrupted the normal activity patterns of the seals.

Eighteen to twenty people were involved in the capture including personnel from the Point Reyes National Seashore, the Gulf of the Farallones National Marine Sanctuary, the National Marine Fisheries Service, the California Department of Fish and Game, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Game, and the Point Reyes Bird Observatory. In addition, a veterinarian monitored the condition of restrained seals and any seal deemed stressed was immediately released. The veterinarian also collected nasal and oral mucosa from animals in 1986 and these samples were transferred to the

Center for Disease Control in Atlanta, Georgia for biological analysis. Prior to this capture period several dead adult harbor seals had washed up on beaches at nearby Double Point and at Drakes Estero, and a bacterial agent was the suspected cause of death. We took the opportunity of having live animals in hand to determine if disease was present in this local population.

Captured seals were weighed, measured (length and girth), sexed, flipper-tagged, patch-tagged, and radio-tagged. We double flipper-tagged seals with lime green "Allflex" cattle ear tags manufactured by Veterinarian Supplies instead of the "Riese" tags used in 1985. The "Allflex" tags had larger numbers which could be easily read in the field. We attached an international orange colored vinyl strip with 3" numbers to each flipper tag which further aided in individual identification. Two neoprene patches with an individual number or symbol code were glued with "lock-tight" super glue to the fur between the should blades to provide an additional visual mark. A radio transmitter manufactured by Advanced Telemetry Systems, Inc (Bethel, Minnesota) was glued to the fur on the back of the seal's head with "Devcon" 5-minute epoxy. Radio transmitters were 9x3x3 cm, weighed 60 gms, had a 13-inch flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute.

We monitored seals with an automated recording station and aerial surveys, following the procedures used in 1985. The receiving station established at Drakes Estero recorded seals within a three-mile radius on a 24-hour basis. A seal was considered hauled out if it was recorded with three consecutive strong pen markes within a 1 hour period; a seal was considered in the vicinity but in the water if a strong pen mark in conjunction with three weak marks was recorded within a one hour period. We manually checked frequencies to determine if radio interference from the nearby radio communication facilities (U. S. Coast Guard and RCA Global Communications Center) triggered pens and found that interference did not hinder distinguishing whether seals were hauled out. Radio interference on several frequencies, though, prevented our distinguishing whether animals were in the water, and so we did not analyze strip chart data for the presence of seals in the vicinity. In addition, female seals with very young pups (less than 5 d) on occasion would rest in shallow water rolling and submerging the transmitter antenna. As a result, the strip chart recorder indicated that the animal was not hauled out. Females with pups also would on occasion "bottle" in the water giving a strong regular signal indicating that the seal was hauled out. Consequently, haul-out times in our analysis may be biased for this period for female animals.

A test transmitter was placed in a PVC pipe at seal "head lift" level (12" above the ground) on the haul out site to verify that the receiving system was functioning

properly and to determine when the haul-out site was exposed during tidal cycles and available to seals.

The remote receiving station was in operation continuously from 23 July 1986 through 30 June 1987 except for intermittant periods when equipment malfunctioned. We checked and maintained the remote station a minimum of two times per week, and during the 1987 breeding season, we were present almost daily. During visits we scanned all frequencies and checked for signal drift. Each signal was checked for a period of five to ten minutes to detect seals in the water. We made visual searches for marked animals to check for flipper tag and transmitter loss. At this time we also collected behavioral information on females and pups and on spatial distribution within the estero.

To locate dispersing seals we attempted to make semi-weekly aerial surveys along the cental and northern California coast. The length of flight depended on our success in locating all animals. Seals were monitored by two people using scanning receivers and frequencies chosen were continuously scanned for three seconds each. Typically, the plane would begin searching at Drakes Estero and then travel north to a designated distance and then fly south of Drakes Estero. In this manner, the coastline was covered two times by two people in order to maximize detection. When a seal was located, activity, time, and location were recorded. Most flights ranged from Point Arena south to Half Moon Bay and into San Francisco Bay. We scheduled flights on days when tides were low to medium to maximize numbers of seals hauled out.

We made weekly ground searches in addition to aerial flights to locate animals absent from Drakes Estero. From this we were able to identify feeding areas and to determine if seals temporarily relocated at other local haul-out sites. We monitored six seals for a 24 hr period on June 1, 1987, locating and recording activities every 15 min. From this information, we wished to verify accuracy of the remote receiving station and to identify local feeding areas.

DATA TREATMENT

We categorized seals captured in July 1986 by the amount of time and the time of year that they were present at Drakes Estero. We defined seals as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" if they departed in the fall but returned during the following breeding season, and "transients" if they were present at Drakes Estero during the capture but resided away from Drakes Estero during the rest of the study period. Movements greater than 25 km were defined as long distant and less than 25 km as local.

Seal behavior at Drakes Estero was classified as either hauled out or absent and descriptive statistics for all lengths are calculated for each animal by season. We chose August, December, and April-May-June data to illustrate the

seasonal differences in haul-out behavior and compared these results with those collected in 1985. When comparing time of haul out initiation and the length of haul-out-bout, we classified initiation into four categories (0100-0400 hr, 0500-01200 hr, 1300-1700 hr and 1700-2400 hr) and classified length of haul-out-bout into four categories (1-4, 5-8, 8-12, > 12).

We estimated the absolute abundance of seals using Drakes Estero in March 1987 with a modified Lincoln-Peterson Index mark-recapture model (Seber 1982). For this analysis, we only included seals marked in March 1987 in order to avoid sample bias of sex and age class representation. We calculated 16 estimates but selected an estimate prior to the onset of the pupping season in order to avoid violation of the assumption of a closed population.

All information recorded on the strip chart recorder was transferred to the "DBase III+" database system. The "SPSS" statistical program for micro-computers was used for most analyses. Analyses presented here are primarily descriptive but we intend to provide more detailed analyses in our final report.

RESULTS

We captured 30 seals in July 1986, and of these we radio tagged 22 (10 adult females, 5 adult males, and 5 immatures of both sexes), and flipper tagged an additional eight animals (5 adult males, 2 adult females and one immature) (Table 1). In March 1987, we captured and marked an additional 65 seals. Of these, we radio tagged 12 (10 adult pregnant females and 2 adult males), flipper tagged 50 seals of all age classes (22 immatures, 17 adult females and 11 adult males), and marked three seals with neoprene patches. We released many seals because of time constraints of marking animals (Table 2). On average, males weighed 8 kg more than females in July 1987 (Table 3). Though females in 1986 weighed about the same as those in 1987, males on average weighed 11 kg less in 1987. Both males and females weighed substantially more in March 1987; the weight gain in females may be explained in part by pregnancy.

All but three transmitters (86%) attached in July 1986 remained attached to seals for a minimum of five months, 15 (68%) for six months, eight (36%) for eight months, and three (14%) for ten months (Table 4). All but one transmitter attached in March 1987 remained attached until the molt in June. Of the seals radio tagged in July 1986, we were able to locate, either visually or aurally, all but three seals through March 1987. Two of these three were immature and one was an adult female (RT119) whose transmitter ceased functioning 10 d after attachment. All seals radio tagged in March 1987 were located regularly until transmitters were shed in June.

We noted a marked increase in the number of seals with fresh shark bites in the fall of 1986 compared to previous years. Three flipper tagged seals (including RT119) and five non-tagged seals had fresh shark bites in September. It is possible that the three missing seals may have been killed by sharks. The shark wound on RT119 raked the entire lower left side of her body, and after October, we no longer observed her at Drakes Estero. The other two tagged seals had minor bites (less than 1 foot across) and these scars healed within four months.

For both capture periods we used an "Allflex" cattle ear tag because the numbers were large and easily distinguished in the field. Unfortunately, these tags were easily shed and so resighting information on flipper tagged seals after about four months was unreliable. In contrast, the "Riese" tags attached in 1985 were still seen on seals as of July 1987.

MOVEMENTS

All radio tagged seals captured in July 1986 were resighted at Drakes Estero several times during the study period, and we were able to monitor the movements of most seals through February 1987. Three seals were excluded from

analysis of movement patterns. The transmiiter on RT119 ceased functioning within one month and two others (RT325, RT279) could not be located after September, having either died, moved outside the range of the aerial surveys, or lost their transmitters.

As was observed in 1985, seals moved both north and south of the capture site; however, in contrast to the previous year, only four radio tagged seals (21%) traveled more than 25 km from Drakes Estero and only two (both females) relocated permanently at other sites during winter months (Tables 5 & 6). Eleven seals (58%) were recorded hauled out exclusively at Drakes Estero, seven others (37%) on two haul out sites, and only one on three haul out sites.

We classified seventeen seals (90%) as residents of Drakes Estero; however, four of these were also recorded hauled out at Point Reyes Headland (PRH). Eight other resident seals were recorded at least once in the water around PRH. Two resident seals traveled distances greater than 25 km during the winter months but returned within a month to Drakes Estero . We classified only two female seals (RT137 and RT306) as breeders, both of which traveled greater than 25 km away from Drakes Estero. No radio tagged seals were classified as transients.

Long-range movements of greater than 25 km were recorded for four of 19 seals (3 females and 1 male). One female (RT137) resided throughout the winter months at Pescadero State Beach (south 106 km) and returned to Drakes Estero the following spring. RT305 moved locally and to Tomales Bay (north 48 km) during the winter months and also returned to Drakes Estero the following spring. One female (RT246) traveled north to Tomales Bay in October but returned to Drakes Estero by the beginning of November. One male (RT504) traveled north to Stone Lagoon, Humbolt County (410 km) in early November but returned to Drakes Estero by November 28. Our sample size was too small for comparing differences of movement between sex or age groups.

Short-range movements of less than 25 km occurred regularly throughout the study period. Most of these movements were to PRH, though seals were also recorded feeding in Drakes Bay both north and south of Drakes Estero.

One male and one female seal radio tagged in March 1987 relocated away from Drakes Estero. RT060 traveled to Bolinas Lagoon (25 km south) in early April and returned in early May. RT432 divided her time equally between Drakes Estero and PRH until April 20 when she returned to Drakes Estero and gave birth on April 22. She remained at Drakes Estero continuously until she weaned her pup on May 18 at which time she returned to PRH. Until she shed her transmitter in June, she continued to spend equal amounts of time at PRH and Drakes Estero. All other radio tagged seals were recorded at least once in the water around PRH but none hauled out there. In addition, flipper tagged seals were recorded at Double Point, Bolinas Lagoon, and PRH between March 30 and July 30.

ACTIVITY PATTERNS

Seals exhibited distinct seasonal and circadian trends in haul out behavior at Drakes Estero as was observed in 1985. Adult seals were hauled out an average of 90% of the total number of days monitored in July and 81% in August but only 74% in December (Tables 7 and 8). The difference between the months July and December is significant ($p = .02$, $n = 17$, Wilcoxon matched-pairs sign-rank test) but between August and December is not significant ($p = 0.5$, $n = 17$, Wilcoxon matched-pairs sign-rank test).. In March and April just prior to the breeding season, the percentage of days hauled per month was also low, and then during May, the percentage increased again to 92% ($p = .002$, $n = 14$, Wilcoxon matched-pairs sign-rank test). Immature seals hauled out on fewer days than adults ; however, the sample size was too small to make meaningful comparisons. The change in the number of days that seals were hauled out in winter was the similar for females and males.

The average percentage of tagged seals hauled out per day relative to the total number of tagged seals was also greater for July, May and June than for December, March, and April (Table 9). **The percentage for August was low compared to that of 1985; however, if immatures are excluded from the analysis, the percentage increases to 76%. Immature seals appeared to haul out on fewer days in August than adults.**

When resident seals were not hauled out, they were either in the water in the vicinity of the haul out or were absent from Drakes Estero. The length of time that seals were absent averaged 1.0 to 2.5 consecutive days per month; the longest absence was seven days (Table 10). The average number of trips per month per seal was greatest for December (4.8 trips) and least for May (1.0 trips). The percentage of seals that went on trips per month was least in May and greatest in August (Table 10). Immature seals appeared to take more trips ($\bar{x} = 4.3$; 22 of 60 trips) than adults in August; however, the length of trips was the same. In many cases when seals were absent for more than 3 d, we were able to locate them hauled out at PRH.

When seals were present in Drakes Estero, the haul out pattern was strongly diurnal for all months monitored as was noted in 1985. The percentage of tagged seals hauled out over a 24-hr period was largest between 0500 and 1600 hr for all months; the percentages hauled per hour, however, varied between months (Figure 2). Greater than 50% of tagged seals hauled out in May and June between 0500 and 1400 hr. In December, percentages were fairly uniform throughout all daylight hrs. These results are similar to those calculated for 1985.

On average, seals hauled out for a total of seven hours per day in August, December and March, and nine hours per day in April, May and June. In July, during the peak molt period, seals hauled out 11 hours per day (Table 11). Seals

hauled out for significantly longer hours per day during the pupping season ($p = .002$, $n = 13$, Wilcoxon matched pairs signed-rank test; comparing March and May). There appeared to be no difference in the total number of hours hauled per day between males and females or between adults and immatures for all months.

The average number of haul-out-bouts per day was 1.5 ($n = 194$, $SE = .05$) for August, and 1.4 ($n = 166$, $SE = .04$) for December. During the breeding season, seals averaged 2.4 haul-out-bouts per day ($n = 139$, $SE = .06$) between the median birthing and the median weaning dates, but only 1.5 per day ($n = 142$, $SE = .06$) in April two weeks prior to the mean birthing date.

Most haul-out-bouts averaged about five hours except in July, and 20% of all haul-out bouts were 2 hrs or less, regardless of month (Table 11). Though seals initiated haul-out-bouts at all hours of the day, most initiations occurred during daylight hours before 1200 hr (Figures 3 and 4). In July, April and May, however, many initiations occurred between 0100 and 0400 hr. This difference may be explained in part by females hauling out to nurse pups.

The length of haul-out-bout was affected by the time of initiation for all months tested such that seals that first hauled out between 0100 and 1200 hr were on shore longer than seals that initiated a haul-out-bout between 1200 and 2400 hr (July: $X^2 = 80.9$, $df = 9$, $p < .001$; August: $X^2 = 59.3$, $df = 9$, $p < .001$; December: $X^2 = 69.8$, $df = 9$, $p < .001$; May: $X^2 = 80.2$, $df = 9$, $p < .001$: June: $X^2 = 58.4$, $df = 9$, $p < .001$). For all months, more than 80% of the haul-out-bouts lasting for more than 12 hr occurred between 0100 and 1200 hr and less than 10% occurred after 1700 hr.

On June 1 and 2 1987, we monitored six radio tagged seals (4 females, 2 males) for 24 hrs from 0900-0900 hr, locating and recording activities every 15 min. The average number of hours hauled was 9.4 ($SE = 2.6$); however, the range in hours was from 1.25 to 18.5. Three seals hauled out two times during this 24 hr period, two three times, and one once. The seal that hauled for 18.5 hr was the only one to haul out at night, and coincidently this seal had just returned from hauling out for several days at PRH. Because seals could haul out at Limantour Spit at all tide levels, tide did not appear to influence the haul out pattern. When tidal mud bars were awash with rising tides, seals moved to the Spit.

During the 24 hr period, we were able to locate continuously all but one seal. Four seals traveled both north and south of the estero but stayed within a 5 mi radius of the estero, one seal never left the estero, and one seal traveled north out of range for 9.5 hrs. All seals spent a considerable amount of time in the channel of the estero or near the mouth, presumably feeding. Sunrise was at about 6:00 hr on June 2, and two seals promptly hauled out along with several non-tagged seals. By 8:00 hr, two more tagged seals hauled out, and the seal that remained all

night had again retreated to the water. At the time of my departure (9:00 hr), five seals were in the identical locations as recorded at 9:00 hr the previous day; four were hauled out at Limantour Spit and two were in the water at the mouth of the estero.

From a sample of 16 days between March 16 and April 15, we selected an estimate of abundance of 949 seals (95% confidence interval: LL 692 and UL 1206) using Drakes Estero (Figure 5). On sample day 4 (March 24), we sighted 30 marked animals hauled out among a herd of 441 seals. On sample day 6, the first pup was observed at Drakes Estero. From that date on, the assumption of a closed population was violated and estimates and confidence intervals fluctuated considerably.

BREEDING SEASON

Twenty of 28 adult female seals tagged in March of 1987 were seen at least once with pups. In addition, five of ten female seals tagged in July 1986, were seen with pups. We were able to monitor closely 15 tagged seals throughout this season. The median pupping date for these seals was April 23, and by April 28, 80% of the females had given birth (range: April 16 to April 30). The median weaning date was May 25, and by May 28, 80% of the pups had been weaned (range: May 14 to May 30). The average number of days that females were seen with pups was 30.9 (SE = 0.6, n = 15) (Table 13). Of the radio tagged seals, only one (RT821) was observed separated from a pup; 24 days after giving birth, she was seen without pup and searching throughout the estero for two hrs. On two subsequent days, she was observed searching intermittantly. All other females were seen in constant attendance with pups until the date of weaning. Weaning appeared to be abrupt. Characteristically, females departed for a minimum of one day from the estero after weaning, and one female (RT432) relocated to PRH.

For the first two weeks after giving birth, females stayed exclusively within the estero, but after that time, they began to depart for an increasing number of hours during the night. Whether pups accompanied females on these excursions is not known.

For the first two weeks with pup, females hauled out for an average total of 13.3 hrs per day (SE = 0.8, n = 10), and for the first couple of days after birth, females often hauled out for more than 20 hrs. Unexpectedly, males also hauled out for long hours between the median birthing date of April 23 and the median weaning date of May 25 ($\overline{x}$ = 13.1, SE = 2.4, n = 3). For two weeks after pups were weaned, the average total number of hours hauled was 8.0 (SE = 0.7, n = 8) for females (from estimated weaning date to 14 d) and 6.2 (SE = 0.9, n = 4) for males (for period May 12 to May 27). Since mating occurs in the water, it is not surprising that males would spend less time hauled out during the weaning

period; however, the difference between the sexes is not significant ($p = 0.27$, $n = 12$, Fisher's Exact Test).

DISCUSSION

Results from the second survey year again indicate that the decline in seal numbers during winter months is related to both seasonal movement away from Drakes Estero and a reduction in the number of days that resident seals spent hauled out. Movements of greater than 25 km were much more pronounced in 1985 than in 1986, and instead, many of the seals that remained at Drakes Estero often relocated for brief periods at Point Reyes Headland. The observed differences between years may be attributed to different individual preferences, to greater local food availability, or to some unknown factor. Similar to results in Alaska (Picther and McAllister 1981) and on San Nicolas Island in California (Yochem et al. 1987), we found a high level of site fidelity, with seals using no more than three sites. All movements were to well established haul out sites in estuaries (Tomales Bay and Bolinas Lagoon), and at coastal sites (Pescadero, Double Point, and PRH). In contrast to 1985, long range movements occurred during all months except during the height of the breeding season.

Herder (1986) observed that seals at the Klamath River, California, exhibited the greatest local movement during the period April to June. Our results indicate that more local movement occurred prior to the median birthing date and after the median weaning date, but virtually no movement occurred between those dates. Two of 12 seals (one adult male and one adult female) radio tagged in March 1987, relocated to other haul-out sites prior to the breeding season, but both returned within five days of the median birthing date.

Immature seals did not appear to travel greater distances than adult animals, as suggested by Pitcher and McAllister (1981); however, our sample size is small. One immature seal rarely departed from the Estero, one relocated intermittantly at PRH, and one traveled both to Duxbury Reef and to Tomales Bay.

The observed movements indicate that Drakes Estero is an important breeding area for seals ranging south to Pescadero and north to Stone Lagoon, an overall distance of 516 km. This range is similar to that documented in 1985. Movements also indicate that there is substantial mixing among harbor seal colonies both locally and greater than 25 km. Herder (1986) and Brown and Mate (1983) also recorded movements of seals between colonies in the Klamath River and Alsea Bay, Oregon, and between seals in Oregon and Washington.

In general, movements appear to be motivated by a group preference for breeding at Drakes Estero, but by an individual preference for feeding areas. As noted in 1985, migrant seals were highly individual in distance of movement and final destination. Individual preference may be influenced by past experience and current food availability. Seals do not appear to be responding to a single prey

situation as was noted in winter movements of seals in Oregon and Wasington (Beach et al. 1985, Brown and Mate 1983), but instead, individuals may be expressing a preference for location based on past experience, including foraging success. The fact that two seals traveled great distances (and presumably expended considerable energy) but promptly returned, suggests that past experience may have movtivated the initial movement, but that current food availability influenced where seals ultimately spent the greater proportion of their time during the winter months.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals during the molt (June, July, and early August) and the breeding season (April and May) than in December or March. As observed in 1985, the average percentage of all radio tagged seals hauled out on any given day per month was substantially higher than figures derived by both Yochem et al. (1987) and Pitcher and MacAllister (1981). The difference is partly explained by the months chosen for analysis; nonetheless, our December figure of 63% is still higher than that estimated by Yochem et al. (1987). These differences also may be attributed to the larger number of immature animals tagged in their sample versus the larger number of adult animals tagged in our sample. The percentage of days per month that immature seals were hauled out in our study was similar to figures derived by Yochem et al. (1987). A study designed to accomodate these biases would greatly improve estimates.

When hauled out, the total number of hours per day that seals spent on shore was similar for all months except during the breeding and molt periods. Stewart and Yochem (1983) observed a higher average time per day that seals were hauled out, 39%, than we found for seals at Drakes Estero (29%: 7 of 24 hrs for most months). Differences may be attributed to more exposure to disturbance from humans; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human disturbance. Though we expected pregnant females to require more time feeding than males, the percentage of days hauled out in March and April and the total number of hours per day hauled were not significantly different between the sexes.

The strong diurnal haul out pattern documented at Drakes Estero previously (Allen and Huber 1983), and shown by many other researchers (e.g. Boulva and McLaren 1979, Fancher 1979, and Stewart and Yochem 1983), was further confirmed in this year of study. Though seals hauled out at all hours of a day, peak abundance, based on the percentage of tagged seals, occurred from early morning to mid-day. Peak abundance for the year occurred in June between 0500 and 1400 hr. This represented between 60% and 73% of the estimated number of seals in the area.

Yochem et al. (1987) found that 7 of 17 seals preferred hauling out at night and suggested that this behavior could influence estimates of abundance. We identified 4 of 21

seals (3 pups and 1 adult female) in August and 4 of 15 (2 pups and 2 adult females) in December that preferred hauling out at night. In May, higher percentages of seals hauled out at night, but in most cases, these were females with pups that also hauled out for extended periods during daylight hours. Stewart and Yochem (1983) determined that time of initiation of a haul-out-bout did not influence the length of the bout; however, we found that during all months, seals hauled out for longer periods when bouts were initiated between 0100 and 1200 hr than for other time periods during day or night.

Absences of resident seals from Drakes Esetro averaged from one to two days suggesting absentees were foraging close by; local movement patterns observed during aerial and ground surveys also support this conclusion. This pattern of local movement was the same for all months and for both years. Immatures appeared to take more trips than adults in August, but we have no comparable data for other months. Once female seals had given birth in 1987, they were present daily in Drakes Estero until pups were weaned.

Attendance patterns indicate that seals spend between 50 and 70% of the time engaged in foraging activities and that most seals forage at night. All recorded foraging activities and movements of seals during aerial surveys appeared to be limited to within 0.8 km of shore. Though offshore movements of greater than 10 km by harbor seals have been recorded by others (Pitcher and McAllister 1981, Spaulding 1964, Wahl 1977), our results suggest nearshore feeding is more typical.

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Table 1. Standard measurements of harbor seals tagged at Drakes Estero, July 1986.

FLIPPER TAG	RADIO TAG	AGE	SEX	LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)	COMMENTS
302	224	PUP	F	88	69	20.4	
304	419	AD	M	146	106	70.3	
306	281	PUP	M	96	74	22.7	
308		AD	M	149	-	67.6	
310	306	1YR	F	107	83	31.8	
312	137	AD	F	140	104	63.5	Not pregnant
313		AD	F	130	103	65.8	
316	529	AD	F	141	104	65.8	
317		1YR	F	116	81	35.8	
320		AD	M	145	105	73.5	
322	342	AD	M	163	111	81.6	
324	198	AD	M	158	-	88.5	
326	540	PUP	F	95	73	19.5	
328	616	AD	F	162	-	90.3	Pregnant
330	590	AD	M	138	104	68.5	
332		AD	M	142	106	81.6	
334		AD	M	170	115	77.6	
335		AD	M	148	112	78.9	Pregnant
338	482	AD	F	139	105	64.4	
340		AD	F	145	104	64.4	
341	645	AD	F	133	105	70.3	Shark scar/Preg
344	246	AD	F	138	101	55.3	Pregnant
346	504	AD	M	143	106	70.3	Shark scar
348	444	AD	M	140	107	74.8	
350	325	1YR	F	114	82	36.3	
352	119	AD	F	145	101	63.5	
354	362	AD	F	134	98	59.8	Not pregnant
355	467	AD	F	143	103	69.4	Pregnant
357	160	AD	F	146	99	70.3	Pregnant
359	267	AD	M	149	104	71.7	Shark scar

Table 2. Standard measurements of harbor seals tagged at Drakes Estero, March 1987.

FLIPPER TAG	RADIO TAG	AGE	YEAR	SEX	LENGTH	GIRTH	WEIGHT (kg)	RECAPTURE	COMMENTS
-				F	132	105	-		
-		J		F	126	99	-		
-		J		F	118	86	40.8		
363		J		F	-	-	-		
371		J		F	-	-	-		
373		J		F	-	-	-		
386		J	1	F	99	77	30.8		
430		J	1	F	111	83	28.6		
434		J	1	F	103	75	38.6	X540	
436		J	1	F	115	85	40.8		
438		J	1	F	109	80	33.1		
440		J	1	F	107	90	33.1		
443		J	1	F	98	82	32.2		
445		J	1	F	98	78	28.6		
447		J	1	F	89	81	34.5		
449		J	1	F	112	80	34.9		
451		J		F	118	86	36.3		
-		J		M	115	87	40.4		
366		J		M	-	-	-		
368		J		M	-	-	-		
412		J	2	M	120	91	40.8		
416		J		M	114	86	32.7		
432		J	1	M	110	80	29.5		
365		A		F	135	115	84.8		Pregnant
374	432	A		F	137	128	112.0		"
378	26	A		F	150	126	104.3		"
380	46	A		F	143	128	106.6		"
384	844	A		F	165	127	109.8		"
387		A		F	138	123	78.9		"
390	92	A		F	143	121	98.4		"
392	116	A		F	143	123	96.2		"
394		A		F	-	-	81.2		?
396	856	A		F	153	-	113.4		Pregnant
398	874	A		F	143	122	94.4		"
400		A		F	136	119	89.4		"
410	622	A		F	159	139	116.6		"
418		A		F	154	121	102.9		"
419		A		F	137	109	70.8		"
421		A		F	143	125	87.1		"
424		A		F	149	115	83.0		Not pregnant
428		A		F	150	115	98.4		?
441	822	A		F	151	134	-	X234	Pregnant
453		A		F	156	133	-		?
455		A		F	132	125	-		Pregnant
457		A		F	134	123	-		"
461		A		F	143	124	-		"

463		A	F	139	128	-		?
465		A	F	146	119	-		Pregnant
467		A	F	153	111	-		Not pregnant
471		A	F	146	127	-		Pregnant
475		A	F	124	120	-		"
212		A	M	-	-	-	T212	
221		A	M	-	-	-	T221	
382		A	M	-	-	-		
402	894	A	M	163	126	102.1		
403		A	M	141	115	87.1		
406		A	M	145	110	78.0		
408		A	M	147	118	89.4		
413	60	A	M	174	128	116.6		
426		A	M	149	105	83.5		
459		A	M	153	112	-		
469		A	M	150	123	-		
473		A	M	150	112	-		

Table 3. Average standard measurements of seals tagged in 1986 and 1987; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals.

		LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)
1986				
Adult Males	$\bar{x}$	149.25	107.6	75.41
	SE	2.79	1.18	1.8
	n	12	10	12
Adult Females	$\bar{x}$	141.33	102.46	66.9
	SE	2.38	0.72	2.5
	n	12	11	12
1 Year-Olds	$\bar{x}$	112.3	82.0	34.6
	SE	2.73	0.58	1.4
	n	3	3	3
Pups	$\bar{x}$	93.0	72.0	20.9
	SE	2.52	1.53	1.0
	n	3	3	3
1987				
Adult Males	$\bar{x}$	152.44	116.56	92.8
	SE	3.37	2.59	5.8
	n	9	9	6
Adult Females	$\bar{x}$	144.52	123.08	96.0
	SE	1.76	1.35	3.1
		27	26	18
Immature	$\bar{x}$	110.78	85.06	34.7
	SE	2.52	1.79	1.1
	n	18	18	16

Table 4. Length of attachment of radio transmitters on seals and last date seal was seen or heard.

SEAL	DATE ATTACH	LAST DATE W/XMATR	MIN. LENGTH OF ATTACH.(d)	DATE LAST OBSERVED
1986				
117	7/22/86	7/31/86	10	1/6/87
224	7/21/86	3/20/87	243	3/26/87
419	7/21/86	1/22/87	186	6/29/87
281	7/21/86	9/11/86	53	9/11/86
306	7/21/86	4/6/87	260	4/6/87
137	7/21/86	1/10/87	174	5/22/87
529	7/22/86	2/3/87	197	3/6/87
342	7/22/86	2/1/87	195	2/24/87
198	7/22/86	1/22	185	6/29/87
540	7/22/86	12/19	151	4/2/87
616	7/22/86	1/22	185	6/24/87
590	7/22/86	4/22	275	4/22/87
482	7/22/86	2/3	197	5/12/87
645	7/22/86	1/22	185	6/29/87
246	7/22/86	12/10	142	3/2/87
504	7/22/86	5/17/87	300	6/29/87
444	7/22/86	4/17/87	270	6/27/87
325	7/22/86	9/9/86	51	9/9/86
362	7/22/86	4/2/87	255	6/27/87
467	7/22/86	5/24	307	6/24/87
160	7/22/86	12/22	154	6/29/87
267	7/22/86	5/17/87	300	6/26/87
1987				
432	3/9/87	6/17	101	6/29/87
026	3/9/87	6/17	101	6/29/87
046	3/9/87	4/23	99	6/29/87
844	3/9/87	6/17	101	6/14/87
092	3/9/87	6/25	109	6/29/87
116	3/9/87	6/17	101	6/29/87
856	3/9/87	6/22	106	6/29/87
874	3/9/87	6/20	104	6/29/87
894	3/9/87	6/27	111	6/29/87
821	3/11/87	6/20	102	6/29/87
621	3/9/87	6/16	100	6/29/87
058	3/9/87	6/27	111	6/27/87

Table 5. Distance of movement >25 km and locations of individual seals radio tagged in 1986.

SEAL	#MOVES	AVE. DISTANCE (KM)	LOCATIONS	# LOCATIONS HAULED
137	4	81	PSB/MB/DE	3
161	0	-	DE	1
196	0	-	DE	1
223	0	-	DE	1
246	2	48	TB/DE	2
267	0	-	DE	1
305	3	36	DE/TB	2
343	0	-	DE	1
362	0	-	DE	1
418	0	-	DE	1
445	0	-	DE	1
467	0	-	DE	1
482	0	-	DE	1
504	2	410	SL/DE	2
531*	0	-	DE	2
540*	0	-	DE	2
590*	0	-	DE	2
616*	0	-	DE	2
644	0	-	DE	1

* These seals were frequently hauled out at PRH.

Table 6. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys. Behavior is classified as A = active/swimming; I = inactive/hauled out.

Seal	7/29	7/30	8/31	9/5	9/9	9/21	9/22	9/30	10/13	10/14	10/30	11/10	11/28	12/10	1/8	2/7	2/23	3/24	4/6	5/18
137	D	D	D		DB/I		PSB/I	MB/C	MB/C	MB/C			PSB/C	PSB/C	PSB/C					
161	D	D			D	D		D			D	D	D	D						
196	D	D			D			D		D	D	D	D	D	D					
223		D	D		0	D		D			D		D	D	D	D				
246	D	D	D		D			D		TB/C	D			D						
267	D	D	D		D	D		D		D	D	D	D	D	D	D	D	D	D	
279					DB/I															
305	D		DR/I		TB/C	TB/C				0	TB/C	TB/C			D				D	
325	D	D			DB/I									PRH/I	PRH/I					
343	D	D			D			D		D	D									
362	D	D	D		D			D		D	D	D	D	D	D	D		D	D	
418	D	D			D					D	D	D	D	D	D					
445	D	D	D		D			D		D	D	D		D	D			D	D	
467	D	D	D			D		D		D	D	D		D	D	D		D		
482	D	D	D		D			D		D	D		D	D	D					
504	D	D			PRH/I			D		D	D	SL/C	D	D	D			D	D	
531	D	D			D			D		D	D	D	D	D	PRH/C	D			D	
540	D	D			PRH/I						D		D	D	D					
590	D	D			D			D		D	D			D	D		PRH/C	D	PRH/C	
616					D	PRH/I		D		D	D	D	PRH/I	PRH/I	D					
644	D	D	D		DB/I			D		D	D	D		D	D					
092																			BL/C	D
060																				PRH/C
431																		CR/I		
046																		PRH/I		
874																				

Locations with distances (km) from capture site:

BL	= Bolinas, Marin County	25
D	= Drakes Estero, Marin County	0
DB	= Drakes Bay, Marin County	<10
DR	= Duxbury Reef, Marin County	22
MB	= Muir Beach, Marin County	38
PRH	= Point Reyes Headland, Marin County	12
PSB	= Pescadero State Beach, San Mateo County	106
SL	= Stone Lagoon/Prairie Creek, Humboldt County	410
TB	= Tomales Bay, Marin County	48

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Table 7. Percentage of days present per month for sex and age classes; $\bar{x}$ is the mean percentage, SE is the standard error, and n is the number of seals.

	July	Aug	Dec	Mar	Apr	May	June
Females							
$\bar{x}$	85.6	84.8	70.43	64.2	63.8	91.3	86.6
SE	7.05	7.5	5.6	5.2	12.6	4.7	6.6
n	10	9	7	12	11	10	9
Males							
$\bar{x}$	96.9	76.0	78.4	72.7	62.3	94.0	83.0
SE	3.2	8.8	5.6	11.3	18.7	2.9	17.0
n	7	7	7	6	6	4	2
Immatures							
$\bar{x}$	57.6	38.8	52.5				
SE	18.1	7.7	13.5				
n	5	5	2				
Total Adults							
$\bar{x}$	90.2	80.7	74.4	67.0	63.3	92.1	85.9
SE	4.6	5.6	4.0	5.0	6.7	3.4	5.8
n	17	15	14	18	17	14	11

Table 8. Percentage of days per month each radio tagged seal hauled out at Drakes Estero.

SEAL	JULY	AUG	DEC	MAR	APR	MAY	JUN
Females							
117	78	*					
137	67	23	0	*			
161	100	100	83	*			
246	100	100	0	*			
362	100	94	90	79			
467	100	97	79	50	83	100	*
482	100	90	59	*			
531	100	84	72	*			
616	33	36	48	*			
644	78	77	62	*			
Males							
196	100	94	93				
267	100	77	97	96	100	95	*
343	100	48	62	*			
418	100	86	86	*			
444	100	94	83	79	71		
503	100	94	62	58	93	95	*
590	78	39	66	25	10	*	*
Immatures							
224	11	52	66	29	*		
279	44	42	*				
305	100	58	0	0			
325	100	19	*				
540	33	23	39	*			
Females							
024				83	60	100	94
043				61	58	–	
090				52	47	93	88
116				39	67	97	88
432				35	50	50	35
620				61	53	93	94
821				62	67	93	90
843				78	67	93	100
856				87	87	97	100
871				83	63	97	90
Males							
058				78	0	86	66
893				100	100	100	100

* Transmitter ceased functioning.

Table 9. Average percentage of radio tagged seals hauled out per day by month relative to the total number of radio tagged seals (seals relocated at other haul out sites at distances greater than 25 km not included); $\bar{x}$ is the average, SE is the standard error, and n is the number of days monitored per month.

	MONTH						
No. Seals	JUL 22	AUG 21	DEC 19	MAR 19	APR 17	MAY 14	JUN 11
$\bar{x}$	82.8	66.9	63.0	64.3	68.2	91.7	86.9
SE	1.6	2.1	2.3	1.7	2.9	2.4	1.9
n	9	31	28	23	20	27	20

Table 10. Length of time seals were absent from Drakes Estero, excluding seals that relocated to other haul outs; seal in the number of seals monitored per month, n1 is the total number of trips recorded per month, n2 is the number of seals that took trips each month, $\bar{x}$ days is the average length in days of trips, $\bar{x}$ trips is the average number of trips per month, and SE is the standard error for each.

	1986			MONTH		1987	
	JUL	AUG	DEC	MAR	APR	MAY	JUN
Seal	21	20	15	15	13	11	10
n1	13	60	53	30	27	2	7
$\bar{x}$ days/mo	1.8	2.5	1.4	2.2	1.4	1.0	2.0
SE	0.3	0.3	0.1	0.9	0.1	0.0	0.5
mode	1	1	1	1	1	1	1
range	1-5	1-7	1-13	1-7	1-3	1	1-4
$\bar{x}$ trips/mo	1.9	3.5	4.8	3.0	2.7	1.0	1.8
SE	0.3	0.5	0.9	0.4	0.4	0.0	0.8
range	1-3	1-9	1-11	1-5	1-5	1	1-4
n2	7	17	11	10	10	2	4
% Seals to take trips	33	85	73	67	77	18	40

Table 11. Average number of total hours per day seals were hauled out at Drakes Estero by month and by sex and age class; n is the number of seals.

		1986			MONTH		1987	
		JUL	AUG	DEC	MAR	APR	MAY	JUN
TOTAL HOURS								
All seals	$\bar{x}$	11.2	7.6	7.2	7.7	8.9	9.7	9.5
	SE	.4	.3	.3	.4	.4	.6	.4
	n	21	10	16	10	15	14	11
	range	1-22						1-19
Adult female	$\bar{x}$	10.4	6.9	6.6	7.1	8.7	9.9	9.5
	SE	.6	.4	.5	.3	.4	.7	.4
	n	11	7	7	12	11	10	9
Adult male	$\bar{x}$	12.5	8.1	7.9	8.5	9.7	9.2	9.5
	SE	.6	.4	.4	.5	1.1	1.5	1.0
	n	5	7	7	6	4	4	2
Immature	$\bar{x}$	10.5	6.8	7.2	--	--	--	--
	SE	.8	.3	1.0				
	n	5	5	2				
LENGTH OF BOUT								
All seals	$\bar{x}$	7.9	5.5	5.7	--	5.25	4.5	5.8
	SE	.4	.2	.3		.2	.2	.3
	range	1-37	1-18	1-20		1-34	1-19	1-21

Table 12. Birthing and weaning dates of pregnant females radio and flipper tagged in July 1986 and March 1987.

SEAL	ESTIMATED BIRTHDAY	ESTIMATED WEAN DAY	#DAYS W/PUP
RADIO-TAGGED			
024	4/28	5/26	30
090	4/30	5/28	29
116	4/28	5/28	31
432	4/22	5/18	27
467	4/27	5/30	39
621	4/26	5/29	34
821	4/26	5/19	24
843	4/23	5/22	30
856	4/21	5/23	33
871	4/23	5/25	33
FLIPPER-TAGGED			
X043*	4/22	5/27	33
T365	4/16	5/14	29
T465	4/19	5/21	33
T454	4/28	5/25	28
X645*	4/30	5/30	31

* Radio tag had ceased functioning.

FIGURE 1. Capture site and locations of movement of harbor seals in California, 1986-87.

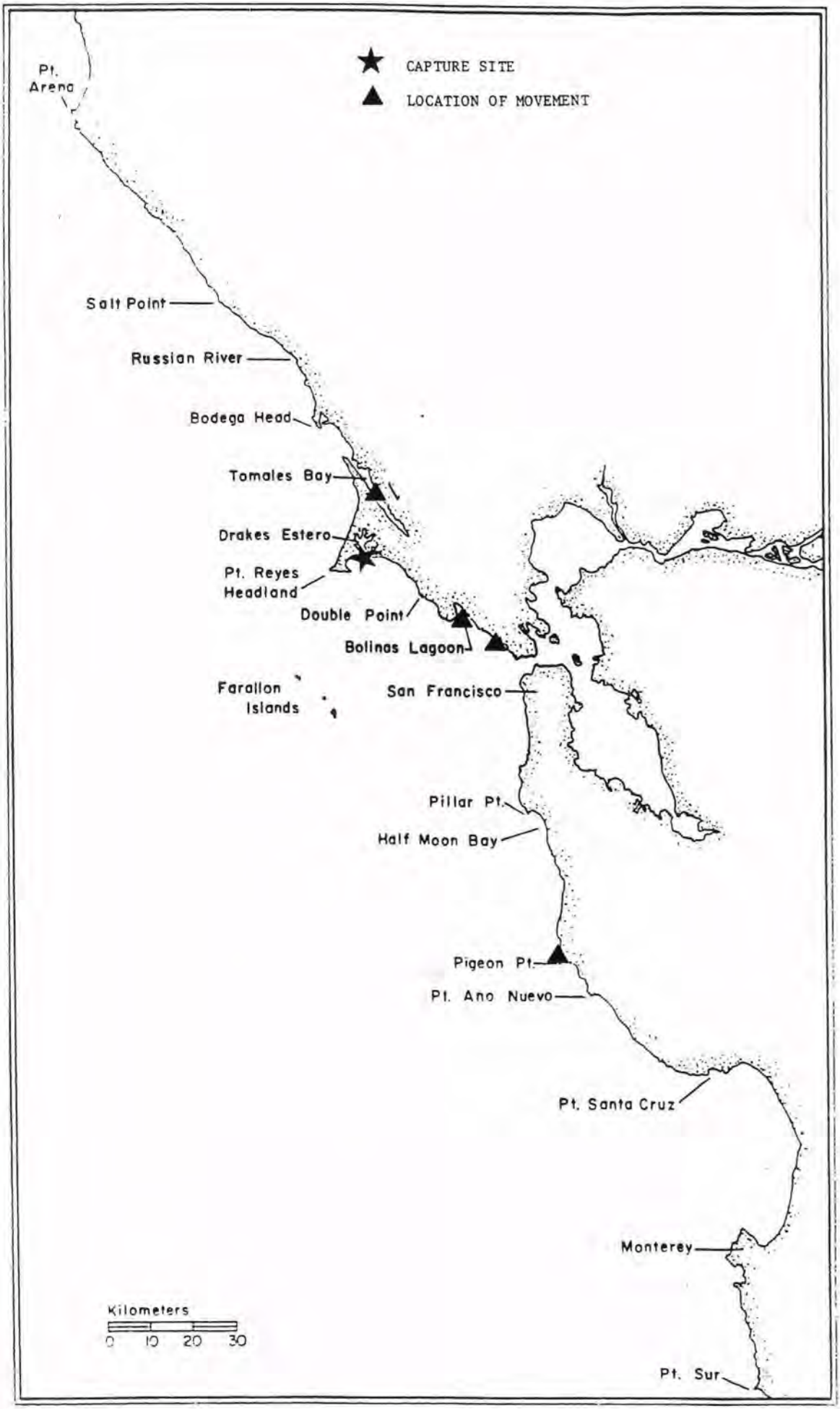

CAPTURE SITE
LOCATION OF MOVEMENT
Pt. Arena
Salt Point
Russian River
Bodega Head
Tomales Bay
Drakes Estero
Pt. Reyes Headland
Double Point
Bolinas Lagoon
Farallon Islands
San Francisco
Pillar Pt.
Half Moon Bay
Pigeon Pt.
Pt. Ano Nuevo
Pt. Santa Cruz
Monterey
Pt. Sur
Kilometers
0 10 20 30

Figure 2. Percentage of radio tagged seals hauled out by hour of day.

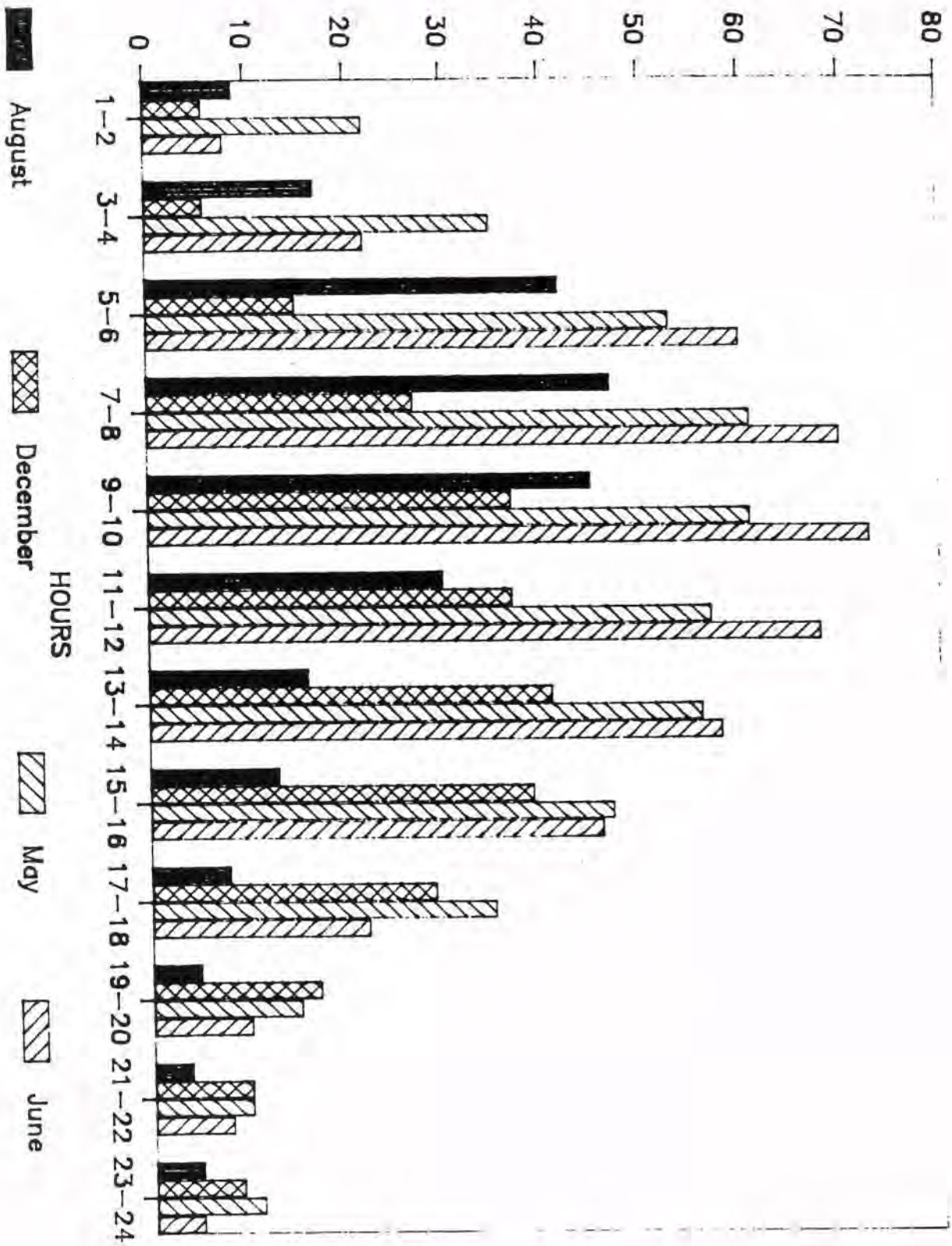

PERCENTAGE SEALS HAULED
0
10
20
30
40
50
60
70
80
1–2
3–4
5–6
7–8
9–10
11–12
13–14
15–16
17–18
19–20
21–22
23–24
HOURS
August
December
May
June

FIGURE 3. Initiation of haul-out-bouts by hour of day for the months July, August, and December.

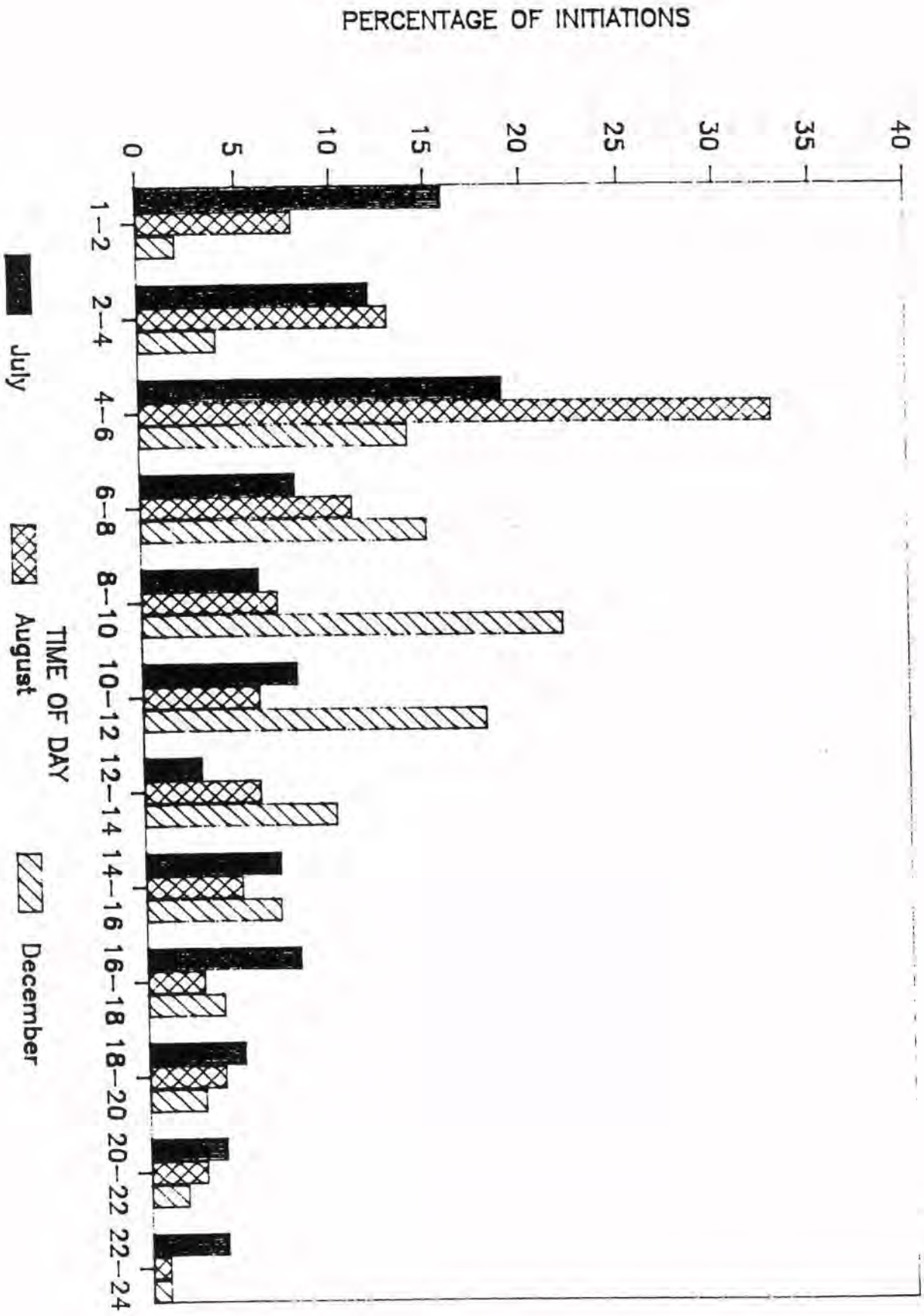

PERCENTAGE OF INITIATIONS
0
5
10
15
20
25
30
35
40
1-2
2-4
4-6
6-8
8-10
10-12
12-14
14-16
16-18
18-20
20-22
22-24
TIME OF DAY
July
August
December

Figure 4. Initiation of haul-out-bouts by hour of day for the months April, May, and June.

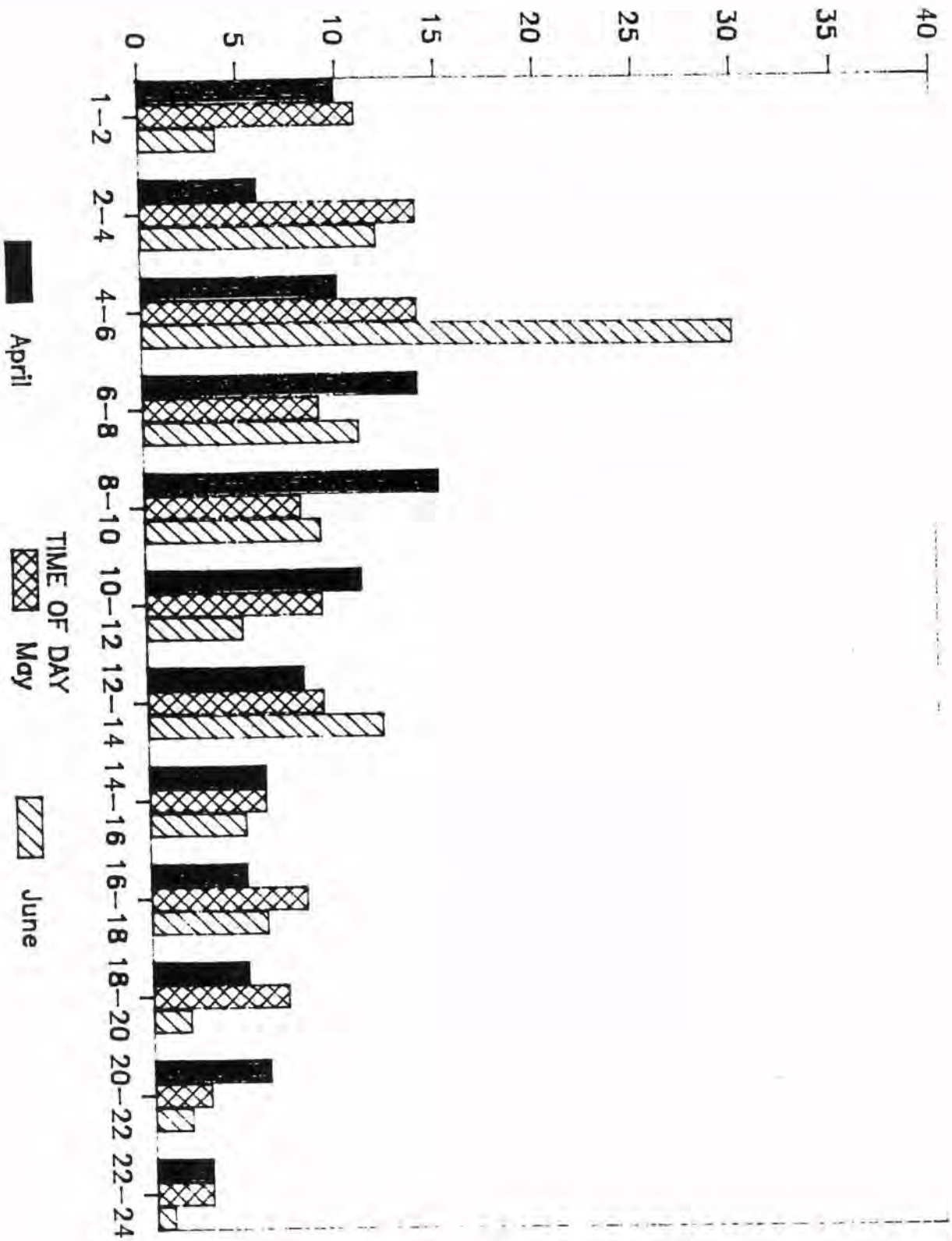
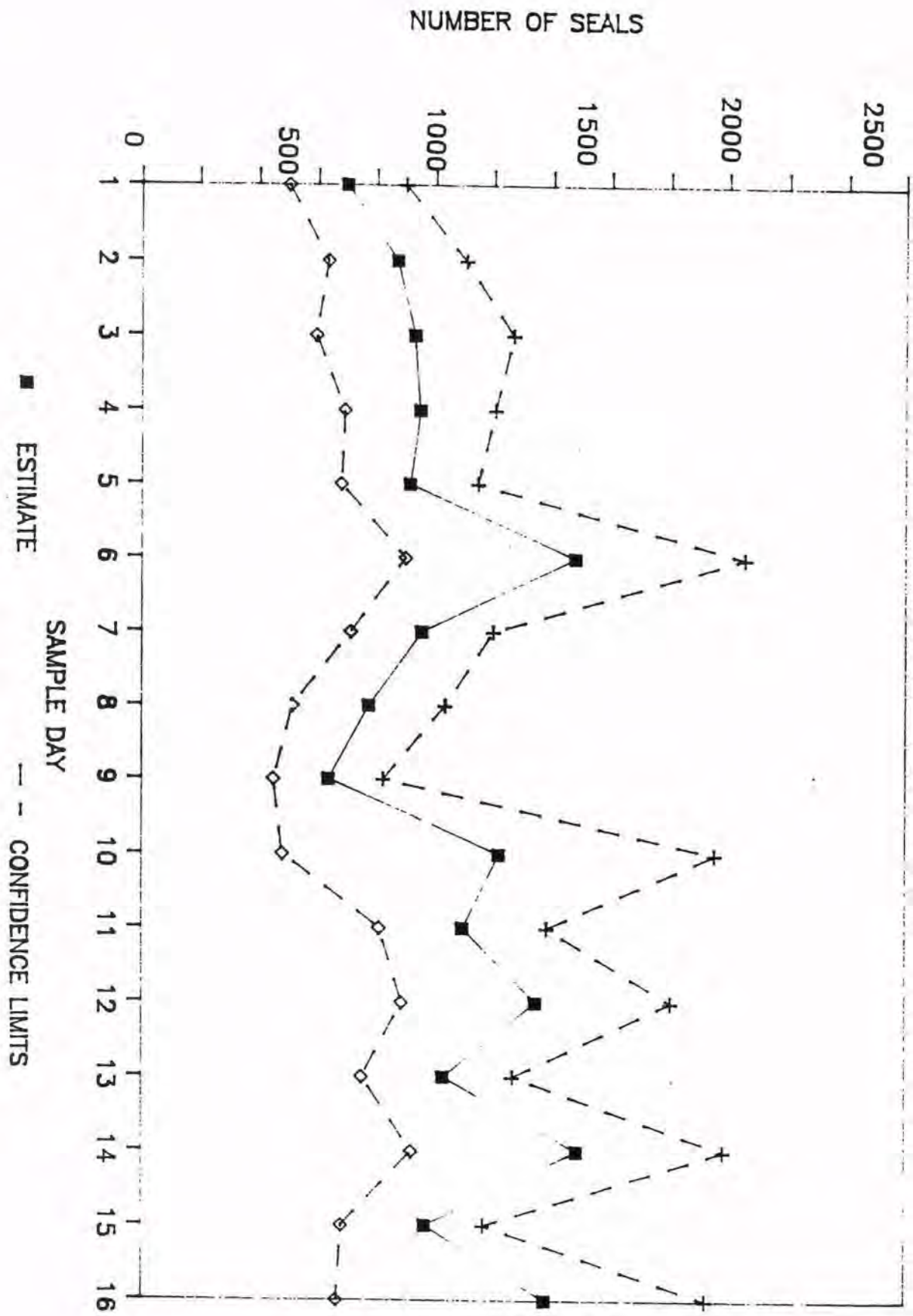

PERCENTAGE OF INITIATIONS
0
5
10
15
20
25
30
35
40
1–2
2–4
4–6
6–8
8–10
10–12
12–14
14–16
16–18
18–20
20–22
22–24
TIME OF DAY
April
May
June

Figure 5. Estimate of absolute abundance of seals at Drakes Estero in March 1987.


NUMBER OF SEALS
2500
2000
1500
1000
500
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SAMPLE DAY
ESTIMATE
CONFIDENCE LIMITS

Point Reyes National Seashore
Drakes Estero Assessment of Oyster Farming Final Completion Report
March 2005
(revised May 2005)

Co-PI Professor Deborah L. Elliott-Fisk, UC Davis
Co-PI Dr. Sarah Allen, Point Reyes National Seashore
Graduate Student Researchers Angie Harbin, Jesse Wechsler, and David Press
GIS Specialist Dave Schirokauer, Point Reyes National Seashore
Marine Ecologist Ben Becker, Point Reyes National Seashore

Project Title: Assessment of Oyster Farming in Drakes Estero, Point Reyes National Seashore

USDI/NPS Cooperative Agreement No. H8530000045
USDI/NPS Task Agreement No. J8530020081
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Project Logistics and Summary

Over a four-year period (Fall 2000-Fall 2004), with funding provided for the latter two years of this project by the National Park Service, UC Davis scientists working in cooperation with staff scientists from Pt. Reyes National Seashore conducted a preliminary inventory and assessment of the marine biota in Drakes Estero, a coastal embayment and saline estuary at Pt. Reyes National Seashore. An objective of this assessment was to provide information on impacts of the oyster farm (operated by Johnson's) on the biota and ecological conditions in the estero, as well as provide baseline information on marine organisms that had not been previously inventoried here, in particular, fish and marine benthic and epibenthic invertebrates. This estero has a history of oyster farming since 1934 which occurred prior to the designation of the National Seashore in 1964. Part of the estero (and in particular, the eastern most "arm," Estero de Limantour) is also within a designated Wilderness Area. The research was field based in sampling and as needed the collecting of fish, invertebrates, and sediment and water quality samples for subsequent laboratory analyses. The fieldwork and laboratory work was conducted primarily by UC Davis master's students Angie Harbin

(benthic invertebrates), David Press (benthic and epibenthic invertebrates, including fouling community organisms), and Jesse Wechsler (fish). Press and Wechsler are former scientific employees of Pt. Reyes National Seashore as well, with Press currently employed by the Golden Gate National Recreation Area. Harbin and Wechsler produced master's theses from their research (Harbin 2004, Wechsler 2005). The UC Davis scientists were assisted by both park scientists and volunteers in the field sampling (as a minimum of two persons were always needed for safety in the field), as well as by the marine rangers. Three undergraduate assistants helped in our laboratory work on campus, and professional staff of the campus Division of Agriculture and Natural Resources Analytical Laboratory processes and analyzed all sediment and water samples. Angie Harbin, David Press and Jesse Wechsler worked on the mapping (using GPS technology) of all field sampling sites, as well as on the oyster racks themselves. David Press added database and GIS information to the park's PC Microsoft Access database and ARC/GIS projects, working with David Schirokauer as the park's GIS expert. Ben Becker played a key role in logistical planning and support.

The oyster farming operation was found to have an impact on the ecological communities of Drakes Estero. Invasive organisms as a fouling community were found on the hard substrates provided by the oyster racks in Schooner Bay. These organisms were not present in Limantour Estero. Further biosystematic work should be done by taxonomic specialists on the epibenthic fouling taxa, as it appears that one species, *Didemnum lahillei* is a non-native, aggressive, invasive species. The overall richness of benthic infaunal taxa was not influenced by the oyster aquaculture in Schooner Bay, however, the relative abundance of various benthic taxa may be influenced by the oyster operation, as the relative abundance of ostracods and bivalves approximately doubles between the racks and 50 meters away. This may be due to decreased predation by fish and decapods away from the racks. The oyster racks did provide unique, hard substrate habitat and shelter for marine organisms, both for fouling community invertebrates and as shelter and habitat for some of the smaller marine fish, increasing the diversity and richness of fish assemblages. These fish and decapods through predation may decrease the abundance of benthic ostracods and bivalves beneath the oyster racks. There were no negative water quality impacts detected.

Although pseudofeces from the suspended oysters may contribute to the amount of organic matter below the racks, adding to the system, the amount of organic matter resulting from eelgrass decomposition is likely far greater considering how expansive and dense the beds are within the estuary, making any significant organic inputs from the oysters undetectable in this study (Harbin 2004). The decrease in silt content values beneath the oyster racks in this study may indicate some sediment erosion is taking place due to the presence of the rack structures, shifting the abundance of various species in the invertebrate communities (both benthic infauna and epibenthics), but not changing the species assemblage.

This inventory and initial assessment provides a baseline for future research, for monitoring impacts of the oyster farming operation on the estero, and for examining environmental change in the estero into the future.

Project Purpose and Objectives

A comprehensive inventory of marine biota and their environments has never been conducted for Drakes Estero (Pt. Reyes National Seashore), one of the most pristine estuaries on the west coast of the USA (Figure 1 from Wechsler, 2005). The park has had good information on marine mammals and shorebirds as species targeted for management, and also of the most interest to scientists at the park and nearby Pt. Reyes Bird Observatory. The large sheltered expanses of mudflats and extensive eelgrass beds in Drakes Estero are home to numerous invertebrates and serve as foraging grounds for many birds, fish, and pinnipeds. Seagrass beds are probably the most widespread habitat type in the estuary as they are expansive in all arms of the estero during spring and summer. They are absent only from the very deep portion of the estero near the mouth and fringing intertidal areas.

Drakes Estero was created by the drowning of an ancient river valley on a small block of granitic-based crust of the Pacific Plate on the western side of the San Andreas Fault zone. The most recent sea level rise following the Late Pleistocene glacial during the Flandrian transgression formed the contemporary estuary by 6,000 years before present (Elliott-Fisk unpublished, Harbin 2004). The geology of the surrounding watershed is characterized by the late Cenozoic Drakes Bay Formation, which consists mainly of fine-grained siltstone interbedded with silty mudstone, as well as basal glauconitic greensand over the granitic basement (Galloway 1977). The sediments of the lower portion of Drakes Estero near its mouth consist of sand, due to strong longshore transport in Drakes Bay along the continental shelf, while muddy sediments characterize the rest of the estuary due to runoff and associated processes. A small section of the seaward portion of the estuary (e.g. near its mouth) is characterized by a rock bottom and kelp beds, with adjacent sand bars that create important habitat for pinnipeds, such as harbour seals. Northern elephants seals are also seen near the mouth of the estero but more frequently haul out on Drakes Beach proper. Steep cliffs interface in places with the waters edge, but more commonly narrow to wide intertidal silty sand tidal flats occur alongshore, providing important saltmarsh and macroalgal covered tidal flats, providing important habitat for shorebirds. The location and abundance of intertidal vegetation communities such as salt marsh are greatly influenced by this topography (Harbin 2004, Elliott-Fisk unpublished).

Drakes Estero's only hydrological connection to the ocean is via the mouth to Drakes Bay. Tidal heights have an approximate eight-foot range and the tidal regime corresponds to mixed semi-diurnal. Freshwater inputs are largely from the small watersheds surrounding the estuary which encompass an area of 7,847 acres. Several unnamed intermittent drainages and perennial creeks flow from sources in the surrounding hills into the five arms of the estuary. Surface water temperatures range from 10° C in the winter to 17° C in the summer. Salinity has been found to be as low as 31 ppt in the upper reaches of the estuary in winter and as high as 41 ppt in early fall (Harbin 2004). As such, the species that occur here are properly termed marine, and this might be viewed as more of a coastal embayment than an estuary based on the near-ocean salinity levels.

Drakes Estero has been commercially farmed for oysters since 1936, with the leasee Johnson's Oyster Farm. The Park has oversight of this lease, and has expressed concern over whether exotic organisms may have been introduced by the oyster culture into the estero from non-native oyster "seed or spat" and associate packing materials. As the

National Park Service is charged with preserving and protecting the resources, it was deemed wise to do an initial assessment of the biota and general ecological conditions of the estero.

Since 1934, six companies have held mariculture leases (from the California Dept. of Fish and Game) in Drakes Estero that allowed them to farm Pacific oysters. Johnson's Oyster Farm has held state mariculture lease allotments since 1954, which entitles the company to farm oysters in approximately 648 hectares (1,600 acres) of the estero (California Department of Health Services 1991; see Wechsler 2005 and Harbin 2004). In 1972, the federal government purchased the five-acre parcel of land and shoreline dwellings held by Johnson's located at the northern end of Schooner Bay, the base of the operation in Drakes Estero. Since then, the oyster company has leased the facilities from National Park Service, and has the option to do so until 2012, assuming they uphold their lease conditions (Marin County Community Development Agency 1998). Because a management objective for the park is to preserve aspects of cultural significance, park staff has attempted to include oyster farming in its General Management Plan (National Park Service 1980).

The protected and largely undeveloped lands of the Drakes Estero watershed provide a water quality that is optimal for the culture of oysters (California Department of Health Services 1991). State, federal, and county agencies monitor the shellfish harvest to ensure that Johnson's mariculture practices comply with the appropriate California environmental health standards for the production of shellfish (Wechsler, 2005). Because approximately 2,000 cattle graze in the watershed (personal communication, Mark Homringhausen, NPS Range Specialist), Johnson's oyster company is required to conduct a monthly fecal coliform self-monitoring program (California Department of Health Services 1996). However, it has also been demonstrated elsewhere that oyster cultivation may alter sedimentation processes and characteristics in estuaries. Previous studies have shown that the rack method of oyster cultivation can lead to local erosion resulting in a decrease in sediment carbon content, proportional weight of silt to clay, and eelgrass cover in areas beneath racks (Everett et. al. 1995). Large-scale sediment erosion has been shown to cause extensive reduction of plant and animal populations in estuaries (Patriquin 1975, Zieman 1976). Localized changes in sediment composition and stability may also significantly affect both species diversity and abundance of benthic infauna (Harbin 2004).

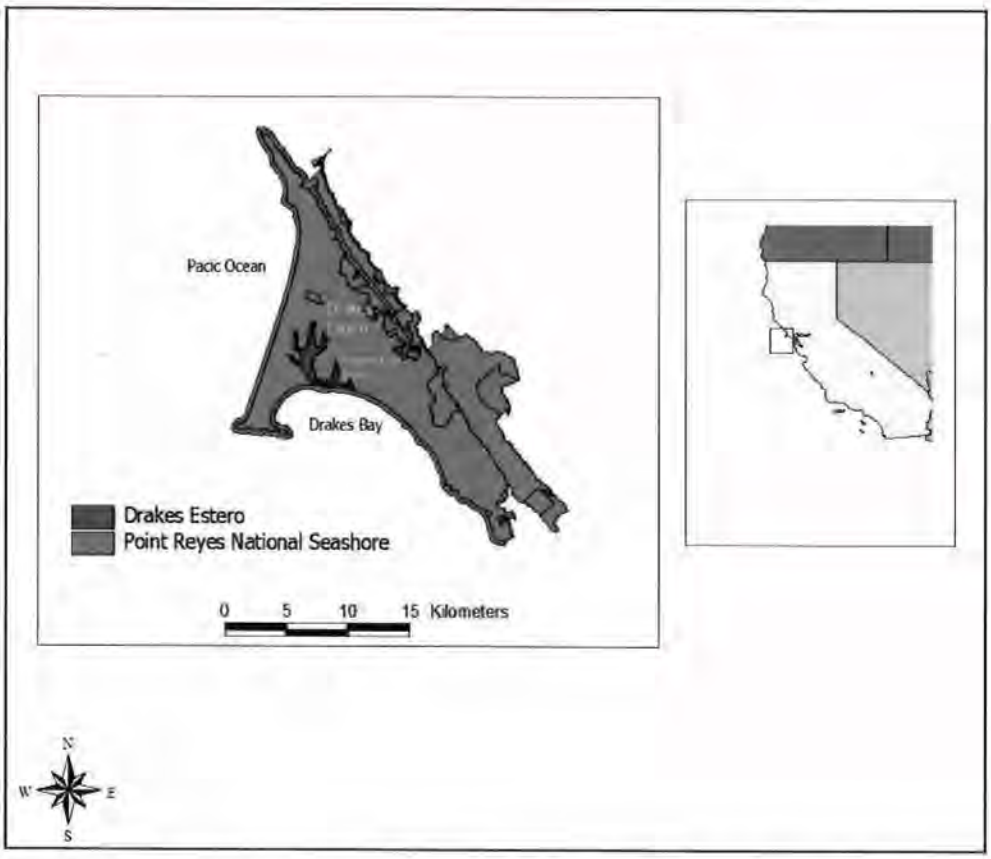

Figure 1. Location of the Drakes Estero Ichthyofauna - Oyster Mariculture study, Point Reyes National Seashore (Wechsler, 2005).

To detect whether direct and indirect impacts had occurred from the oyster culture, sampling of the biota, sediments, and water was done for this research project both immediately at and some distance away from the farming operation in Schooner Bay (and at a few other sites), as well as in the arm of the estero most remote from the oyster farm: Estero de Limantour in the designated Wilderness Area. Initial sampling focused on the soft-sediment (benthic or infaunal) macro-invertebrates, which are routinely used for assessment of pollution and other anthropogenic disturbances in marine environments. However, focusing on a single species and trying to extrapolate its response to other components of the ecosystem ignores the importance of community structure, interactions and trophic relationships (Soule 1988, Harbin 2004). As such, our focus was at the community level, and we also used this approach in assessing the fish community (Wechsler 2005) and associated epibenthic invertebrates. A series of secondary objectives were also identified and addressed, including mapping of the existing oyster racks.

Methods Employed by the Project

The research was primarily field based in Drakes Estero to inventory the fish, epibenthic and benthic invertebrates, and any associated organisms, as well as to collect a limited set of sediment and water quality samples. Most of the fish and many of the invertebrates were able to be positively identified as to genus or species in the field, but a few specimens as well as all sediment cores with benthic invertebrates were brought back to the laboratory at UC Davis for subsequent analyses, as were sediment and water quality samples for physical and chemical analyses.

The research design was by Professor Elliott-Fisk and Dr. Sarah Allen, in collaboration with UC Davis master's degree students Angie Harbin, David Press and Jesse Wechsler, and Park staff scientists Ben Becker and David Schirokauer. The fieldwork and laboratory work was conducted primarily by UC Davis master's students Angie Harbin (benthic invertebrates), David Press (benthic and epibenthic invertebrates, including fouling community organisms), and Jesse Wechsler (fish). Press and Wechsler are former employees of of Pt. Reyes National Seashore, with Press currently employed by the Golden Gate National Recreation Area. Harbin and Wechsler produced master's theses from their research (Harbin 2004, Wechsler 2005). The UC Davis scientists were assisted by both park scientists and volunteers in the field sampling (as a minimum of two persons were always needed for safety in the field), as well as by the marine rangers. Three undergraduate assistants helped in our laboratory work on campus, and professional staff of the campus Division of Agriculture and Natural Resources Analytical Laboratory processes and analyzed all sediment and water samples following the strictest protocols. Angie Harbin, David Press and Jesse Wechsler worked on the mapping (using GPS technology) of all field sampling sites, as well as on the oyster racks themselves. David Press added database and GIS information to the park's PC Microsoft Access database and ArcGIS projects, working with David Schirokauer as the park's GIS expert. Ben Becker played a key role in logistical planning and support, and useful input as the park's marine ecologist.

Initial reconnaissance field sampling for the project began in the fall of 2000 to test sampling methods around the racks. In 2003 when intensive sampling for this project began, there were 85 oyster racks in the estero, most of which were located in Schooner Bay, Home Bay, and main body of Drakes Bay. Thirty-eight racks (45%) were either fully or partially active (Figure 2) (Wechsler, 2005). These wooden racks (Figure 3) are approximately 3 m wide and 50-150 m long. Additionally, a small number of oysters are grown in floating or hanging mesh bags attached to racks or suspended in the water column (Wechsler, 2005).

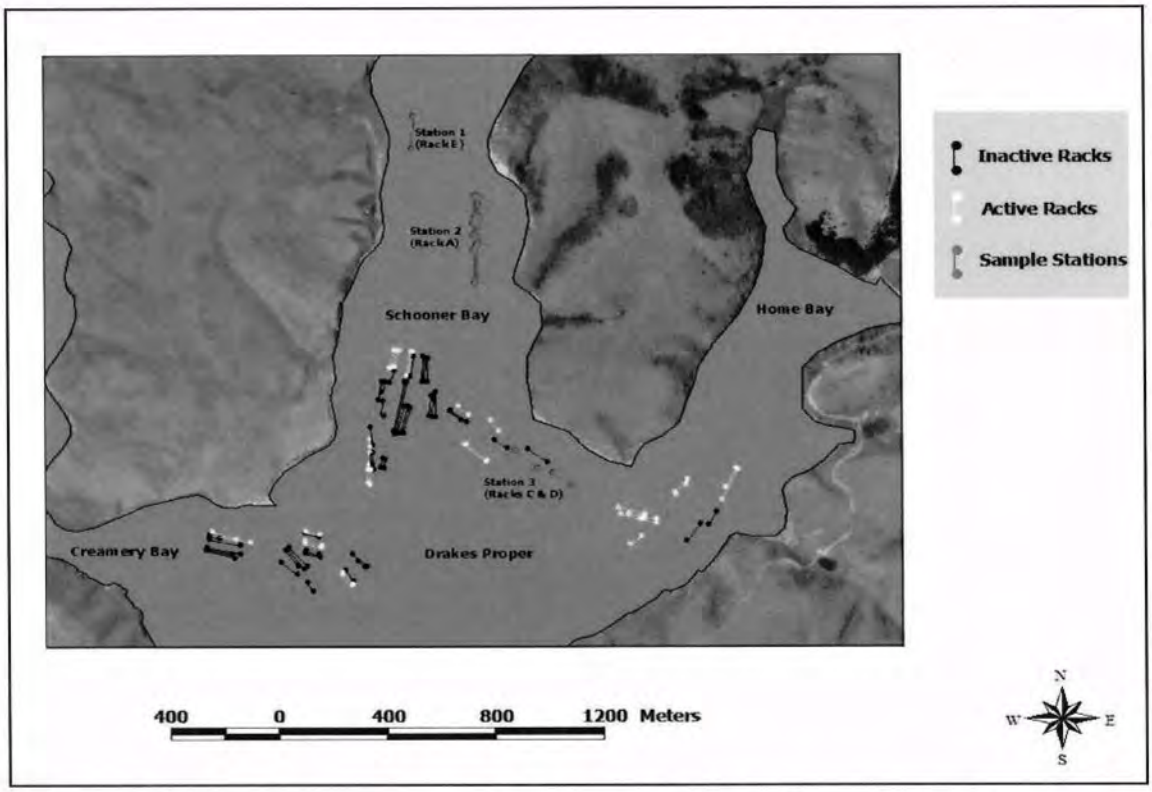

Figure 2. Location of oyster racks and fish sampling stations in Drakes Estero, Point Reyes National Seashore. (from Wechsler, 2005).

Figure 3. The oyster racks of Johnson's Oyster Company in Drakes Estero, Point Reyes National Seashore (photo courtesy of David Press).

Figure 4. Wooden racks and oyster harvest technique, Johnson's Oyster Company, Drakes Estero, Point Reyes National Seashore.

The leasee uses a hanging-line technique to grow oysters in the subtidal portion of Drakes Estero (see Figure 4 from Wechsler, 2005). As the oysters are held above the bottom substrate, predation by benthos is reduced and the oysters are submerged throughout the entire tidal cycle, enhancing their growth rate (Matthieson 2001). Because the water temperature in Drakes Estero is too low for Pacific oysters to successfully reproduce (Fred Conte, University of California, personal communication to Jesse Wechsler), Johnson's imports larval spat from several international oyster stocks. Juveniles are incubated on shore for several weeks until they have settled onto old adult oyster shells (clutch), which are then spaced evenly on inverted-U strings, which are draped over the wooden racks and cultured for approximately eighteen months. Harvests are done manually and oysters are brought by flat-bottomed barge to a small processing plant at the head of Schooner Bay. At peak production, Johnson's harvests up to 80,000 bivalves per day, which workers sort, shuck, clean, and sell on premises by the pint, quart, or on the half-shell (Mark Johnson, Johnson's Oyster Company, personal communication to Jesse Wechsler – see Wechsler, 2005).

Quality Control and Quality Assurance

In order to collect the best data under the constraints of inclement weather, hazards and safety, budget limitations, and time constraints, our study design was focused on sampling organisms and their environments in (1) the most heavily farmed arm of Drakes Estero where the oyster operation is based (Schooner Bay), and at (2) the least impacted arm of the estero where oysters have not been cultivated (Estero de Limantour in the Wilderness Area). Three duplicates (i.e., replicates) of all samples were taken to assess differences between samples, and sampling was done through the year temporally to pick up any seasonal changes. Personnel were all well trained in the sampling methodologies, organism identification, and laboratory techniques. The analysis of sediment and water samples was done by the professional, certified staff of the University of California's DANR Anaytical Laboratory at UC Davis. Review of sampling methodologies, data sets, data analyses, and findings was done by the professional statisticians in the UC Davis Statistics Consulting Laboratory, by Professor Peter Moyle (UC Davis) for the benthic invertebates and the fish, by Dr. Sharon Kramer (Stillwater Consultants) for the fish, and by Dr. Ted Grosholz (UC Davis) for the invertebrates through work with the three graduate student researchers, PI Professor Elliott-Fisk, and thesis reviews.

Field Sampling Locations

Four primary study locations were selected for Schooner Bay and then for Estero de Limnatour. Schooner Bay is the main arm of Drakes Estero for the Johnson's oyster farming operation. Oyster racks were randomly selected as Racks 5, 8, 11, and 14 and a coin tossed to decide which side of the rack to place the 5, 10, 50, or 75 m "away" sites along. Sampling was done at or adjacent to the racks and then a set distance from them.

Estero de Limantour is the "quasi-contol site for oyster farming impacts" as no oyster racks occur in this most remote arm of Drakes Estero from the mariculture sites. With no racks here, four grid sites were randomly selected for sampling from the Point Reyes National Seashore reference grid system as:
Grid 55 – UTME 507970, UTMN 4210107
Grid 97 – UTME 508170, UTMN 4210507
Grid 116 – UTME 508070, UTMN 4210707
Grid 136 – UTME 508070, UTMN 4210907.

Fish Community Sampling

UC Davis Graduate Student Researcher Jesse Wechsler conducted the fish sampling and data analysis. This information is taken from his master's thesis (Wechsler, 2005), as supervised by Professor Elliott-Fisk and also reviewed and approved by Professor Peter Moyle and Dr. Sharon Kramer. Wechsler sampled the fish community both adjacent to (Schooner Adjacent) and at a distance of approximately seventy-five meters (Schooner Away) from three randomly selected oyster racks in the subtidal portion of Schooner Bay. For

estero where oysters have not been cultivated (Estero de Limantour in the Wilderness Area). Three duplicates (i.e., replicates) of all samples were taken to assess differences between samples, and sampling was done through the year temporally to pick up any seasonal changes. Personnel were all well trained in the sampling methodologies, organism identification, and laboratory techniques. The analysis of sediment and water samples was done by the professional, certified staff of the University of California's DANR Anaytical Laboratory at UC Davis. Review of sampling methodologies, data sets, data analyses, and findings was done by the professional statisticians in the UC Davis Statistics Consulting Laboratory, by Professor Peter Moyle (UC Davis) for the benthic invertebates and the fish, by Dr. Sharon Kramer (Stillwater Consultants) for the fish, and by Dr. Ted Grosholz (UC Davis) for the invertebrates through work with the three graduate student researchers, PI Professor Elliott-Fisk, and thesis reviews.

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skiff allowed access to most areas of the estero during high or slack tides. Average water depth at the time of sampling was between one and two meters. With safety concerns (poor weather and operating difficulties for the boat), Wechsler was not able to complete the surveys in December 2002 and April 2003; that portion of the data was used to report on species presence and absence only. Since the majority of oyster racks were located in eelgrass *(Zostera marina)* beds, all sampling was conducted primarily within this habitat type. Surveys were conducted seasonally from December 2002 to January 2004 to gather additional information about the temporal use of Drakes Estero by marine fishes.

Table 1. Sample dates for the Drakes Estero Ichthyofauna – Oyster Mariculture study, Point Reyes National Seashore.

Sample Number	Sample Period
1*	December 3 - December 4, 2002
2*	April 3 - April 4, 2003
3	June 28 - July 2, 2003
4	July 24 - July 28, 2003
5	August 25 - September 6, 2003
6	October 4 - October 6, 2003
7	October 17 - October 19, 2003
8	November 12 - November 15, 2003
9	January 10 - January 12, 2004

* sample not used for analysis

At each station, Wechsler took three replicate otter-trawl samples that lasted three to five minutes each depending on the dimensions of the oyster rack. When adjacent to an oyster rack, he navigated the boat and trawl as close to the structure as possible without endangering the net, a distance of approximately 1 – 2 m. Trawl direction was alternated to coincide with both incoming and outgoing tides. Because water depth was generally less than 2 m, the trawl effectively captured benthic and pelagic fish simultaneously. In October, trawling was ineffective because eelgrass approached peak density. During these samples, the trawl immediately filled with eelgrass, restricting both the ability to catch fish and the ability to navigate. As a result, we replaced the trawl with a thirty-meter boat seine for the October sampling events.

A 1.8-meter X 60-meter monofilament experimental gill net with eight panels (1.27-cm to 10.16-cm) was fished repeatedly at all sites for 0.5 to 1.5 hours, depending on the initial catch rate of the first set. The high density of fish, sharks, and rays in the estero mandated short gill sets to reduce the likelihood of incidental mortality. Three sets were made per site per sampling episode. Adjacent to the racks, the gill net was attached directly to the wooden supports. At sites away from the racks, the gill net was set parallel to the rack orientation at a distance of approximately 75 m. In Estero de Limantour, the gill net was set as close to the trawl sites as possible where water depth allowed.

To catch small benthic and crevice dwelling fish, we set four to six minnow traps at each sampling station for eighteen to twenty-four hours. All traps were attached to fluorescent buoys to allow for relocation and retrieval. Adjacent to the oyster racks, minnow traps were tied directly to the wooden supports. Away from the racks and in Estero de Limantour, traps were set approximately 10 m apart. We used several baits to experiment with fishing effectiveness including stink bait, cat food, squid, herring, and anchovies.

Rectangular collapsible mesh fish traps were used experimentally, but because they were regularly destroyed by benthic decapods, this method was discarded. Hoop nets and fyke nets were also used on an experimental basis, but were not particularly successful; both of these methods were discarded.

Miller and Lea's *Guide to the Coastal Marine Fishes of California* (1972) was used for all fish identifications made in the field. Fish not identified in the field were collected and brought to our University of California, Davis laboratory and museum for identification. Total length for all individual fish and biomass per species were recorded unless measurements increased the likelihood of fish mortality. Recorded fish length was used as an indication of life-stage to assess the nursery function of the estero (Wechsler, 2005).

Benthic Invertebrate Community Sampling

Sediment cores were also taken in replicates of 3 at each sampling site to a depth of 10 centimeters to sample benthic invertebrates both at and away from the racks in Schooner Bay (by Harbin and Press) and in the pseudo-control arm of Estero de Limantour (by Press). Duplicate sediment cores (also, replicates of 3) were collected for physical (texture, particle size) and chemical analyses. In her research begun before the funded project started, Harbin (2004) chose two sets of oyster racks within Schooner Bay for sampling in order to ensure that all samples were taken from areas with comparable hydrology and sediments. Six different locations were sampled beneath and adjacent to the oyster racks for invertebrate and sediment analyses. All sampling locations overlapped with the location of eelgrass beds, however, samples were taken in fall and winter after the eelgrass had died back. All samples were taken in subtidal portions of the bay. Water depths ranged between one and two meters at the time of sampling. For winter sampling, on January 20, 2001, core samples were taken at one sample point beneath each rack (R1 & R2) and at four successive distances - 1, 5, 10, and 50 m - from each oyster rack to evaluate invertebrate diversity and abundance beneath oyster racks and adjacent areas (1, 5, 10, and 50 m away). Three core samples were taken at each sampling point (n=30). For fall sampling, on October 21, 2001, core samples were taken at four sample points (R3, R4, R5, and R6) beneath the westernmost rack within Schooner Bay and at four sample points in adjacent areas (10 m away). Two core samples were taken at each sample point (n=16). All samples were taken from a kayak using a large bore sediment corer (10 cm diameter x 10 cm deep) on an aluminum extension rod (Aquatic Research Instruments, Idaho) (Harbin 2004).

Sediment samples were kept on ice, taken back to the laboratory and sieved through a mesh of 0.5 mm, fixed in 4% buffered formalin for 48 hours, resieved through a 0.5 mm mesh, and transferred to 70% ethanol for later identification. All individual organisms in each core were

counted and identified to the lowest taxonomic level possible using taxonomic keys (Smith and Carlton 1974, Kozloff 1996) and a dissecting microscope – Leica GZ7 70X. In some cases this was only to order or family as many marine invertebrate groups are not well described, i.e. ostracods, or their taxonomy is in flux, i.e. amphipods, and available taxonomic keys are considered obsolete (Harbin 2004).

Sediment cores for sediment particle size and organic content analyses were taken in the same manner and at the same time as those for macrobenthos. Samples were frozen in the laboratory until analyzed. Samples analyzed for organic content were thawed then dried at 100 °C for 24 hours, ground to powder with a mortar and pestle, and combusted at 450 °C for 2 hours in a muffle furnace to determine their ash-free dry weight. Particle size analysis of sand, silt, and clay in soil suspension by hydrometer was carried out following the methods of Gee and Bauder (1979) by the DANR Analytical Laboratory at University of California, Davis. A time series of hydrometer readings were taken to estimate sand, silt, and clay percentages in a soil suspended solution. Hydrometer readings were taken over a time period of 0.5 minute to 24 hours and Na hexametaphosphate was used as a dispersant (Harbin 2004).

Sites and locations for these 10 cm sediment cores as collected in 2003 and 2004 by David Press were taken at the rack vs. 50 m away (based on Harbin's earlier findings and recommendations) for Schooner Bay 4/28/03 – Rack 11 Away only, 4/30/03 – Rack 14, Rack 11, Rack 5, Rack 5 Away, Rack 14 Away, 5/2/03 – Rack 8, Rack 8 Away, 10/14/03 – Rack 14, Rack 14 Away, Rack 5, Rack 5 Away, and 10/16/03 – Rack 11, Rack 11 Away, Rack 8, Rack 8 Away, and for Estero de Limantour, 5/28/03 – all four grid points and 10/15/03 – all four grid points. Sites and locations for the sediment samples for physico-chemical analyses as sampled by David Press were Schooner Bay 7/15/04 – all 8 sites at and away from oyster racks, and Estero de Limantour 7/23/04 – all four grid points. All infaunal sediment cores were processed using the same techniques Harbin (2004) used, but due to time and budget constraints, were were only able to separate all the organisms from the sediment and preserve them, not identify them. All 79 samples or preserved organisms remaining to be identified are at UC Davis.

Epibenthic Invertebrate Community Sampling

Epibenthic invertebrates were sampled as both mobile and sessile organisms in the eelgrass beds and as the fouling community at the oyster racks. "By-catch" epibenthic invertebrates were also noted with fish sampling, especially that using the trawls over eelgrass beds. This work is very much incomplete due to adverse weather and other logistic problems that limited time on the water.

We used a stratified random sampling scheme to select sampling sites in the subtidal, since we are interested in the organisms and physical processes at and away from oyster racks in Schooner Bay and in the control area of Estero de Limantour. Oyster racks in Schooner Bay were numbered from digital photographs and randomly selected for sampling using a random numbers table. In order to select random sampling sites in the Estero de Limantour, a geo-referenced grid was generated using ArcInfo GIS software that may be placed over a digital aerial photo of the estuary. The grid cells measured 100 x 100 m and covered the total area

of Estero de Limantour. With each grid cell numbered, cells were then randomly selected for field sampling such that no cell extends into the intertidal zone of the estuary and no two cells lie adjacent to one another. UTM coordinates for the center of each cell were generated, allowing field teams to navigate to the center of each sampling cell, with an accuracy of +/- 2 m using a handheld GPS.

Our research design was to use throw traps to estimate densities of epibenthic invertebrates and invertebrates associated with the eelgrass (*Zostera marina*) community (Rozas and Minello 1997, Raposa and Oviatt 2000). A one meter square trap was constructed that stands one meter tall, fitted with 3 mm wire mesh around the sides (Chick et. al 1992, Raposa and Oviatt 2000). Eelgrass enclosed within the trap was clipped at the base and put into a bucket containing seawater on board the boat. Once clear of eelgrass, the throw trap was swept with a large dip net of 1 mm mesh size (Chick et. al 1992, Raposa and Oviatt 2000). All fish and invertebrates collected in the dip net were retained. Net sweeps were made until three consecutive sweeps come up empty. Eelgrass retained in the collecting bucket was also washed and cleared of all invertebrates by hand. By-catch fish collected from the throw trap with the dip net were identified and enumerated in the field. Invertebrates collected were identified in the field, enumerated, and returned to the water. The remaining contents of each bucket were passed through a 0.5 mm sieve to collect all other small invertebrates, which were fixed in 4% buffered formalin for 48 hours, transferred to 70% ethanol, and identified to the lowest taxonomic level in the laboratory using standard taxonomic keys (Light 1975, Morris et. al 1980). At least three replicate samples were taken with the throw trap at each site (Press unpublished). This work is incomplete and not reported on herein.

Due to the presence of the oyster rack structures, and the potential introduction of non-native organims by the oyster farm practices, we put our highest priority on determination of what species of invertebrates composed the fouling community (sponges, tunicates, hydroids, bryozoans, barnacles, bivalve molluscs, etc.) at the oyster racks. Without having to snorkle or SCUBA to sample or disturb the oyster cultivation, we installed 20 x 20 cm settling (fouling) plates on fixed rods suspended 1.5 feet (45 cm) above the bottom at and away from the oyster racks. These were installed as replicates of three plates per site. These were collected at intervals to see what organisms were resident at the racks and had colonized the plates. The first set of settlement plates was deployed in Schooner Bay and Estero de Limantour on April 14, 2003. Sites and locations for the settlement plates as collected (retrieved) by David Press were 7/23/03 – all 12 sample sites in Schooner Bay and Estero de Limantour, and 8/11/04 to 8/17/04 – scheduled to pull and read all settlement plates. Percent cover estimates of organisms were made in the field by a point-sampling technique. Using a 20 x 20 cm grid placed over the plate, the species present were recorded at 25 randomly selected grid coordinates (Sutherland 1974). The plates were also quickly inventoried for rare species not found in the percent cover estimate. Mobile invertebrates collected on the settlement plates were not enumerated or identified.

Water and Sediment Sampling and Analyses

To see if differences in the characteristics of sediment and water samples at the racks existed to those away from the mariculture oyster racks, samples were collected periodically and analyzed for total suspended solids (TSS), ammonia, and nitrate; dissolved oxygen, water clarity, salinity, and water temperature were also recorded with sample colletion. Ammonia, nitrate, and TSS samples were taken at a depth of thirty centimeters with a bottle-mounted pole sampler and brought to our DANR Analytical Laboratory at the University of California, Davis for processing. Water clarity was measured in the field with a Secchi disc; salinity, temperature, and dissolved oxygen were measured in the field with a YSI 85 meter. Results from the physico-chemical and nutrient samples are listed in Appendix B and Appendix C.

Results and Discussion: Accomplishments and Failures of the Project (including actions not successfully accomplished and why)

Fish community (condensed from Wechsler 2005): We captured 3,128 fish, which represented 20 families and 35 species (see Appendix A). The surfperches (Embiotocidae) were the predominant family (8 species), followed by the sculpins (Cottidae) with 4 species. All other families consisted of 2 or fewer species. [Because of sampling difficulties encountered during the December 2002 and April 2003 sampling efforts, only the data from the seven sampling periods from June 2003 through January 2004 were used for the statistical tests and descriptive accounts of the fish communities; this data incorporated 2,816 fish and twenty-nine species. Of this total, 44% of the fish were captured in Estero de Limantour, 30% away from the racks in Schooner Bay, and 26% percent adjacent to the racks in Schooner Bay. Five species, topsmelt (*Atherinopsis affinis*), three-spined stickleback (*Gasterosteus aculeatus*), staghorn sculpin (*Leptocottus armatus)*, Bay pipefish (*Sygnathus leptorhynchus*), and kelp surfperch (*Brachyistius frenatus)* dominated the fish assemblage and accounted for eighty-nine percent of the total catch (Table 3). It is likely that these five species are permanent residents of Drakes Estero, as they were collected during all sampling episodes. Six species were intermediate in abundance, represented by greater than10 but fewer than 100 individuals. The remaining 18 species were captured in lower frequencies with total catch per species consisting of 10 individuals or fewer. The Shannon-Weiner Function of Diversity Index indicated that the fish community associated with the oyster racks was the most diverse. Species richness was similar among all three sites (Table 3).

Table 3. Relative abundance of the fish species captured during the Drakes Estero Ichthyofauna – Oyster Mariculture study, Point Reyes National Seashore, December 2002 - January 2004.

Scientific Name	Common Name	Estero de Limantour	Schooner Adjacent	Schooner Away	Grand Total	Relative % of Total
Atherinopsis affinis *	topsmelt	487	83	306	876	31.11%
Gasterosteus aculeatus *	three-spined stickleback	317	54	80	451	16.02%
Leptocottus armatus *	staghorn sculpin	226	97	108	431	15.31%
Sygnathus leptorhynchus *	Bay pipefish	102	180	132	414	14.70%
Brachyistius frenatus *	kelp surfperch	41	195	105	341	12.11%
Cymatogaster aggregata	shiner surfperch	14	39	41	94	3.34%
Triakis semifasciata	leopard shark	15	31	25	71	2.52%
Citharichthys stigmaeus	speckled sanddab	1	20	10	31	1.10%
Atherinopsis californiensis	jacksmelt	8	5	12	25	0.89%
Gibbonsia metzi	striped kelpfish	8	3	3	14	0.50%
Embiotoca jacksoni	black surfperch	7	3	3	13	0.46%
Micrometrus minimus	dwarf surfperch	3	5	0	8	0.28%
Aulorhynchus flavidus	tubesnout	1	1	6	8	0.28%
Clinocottus analis	wooly sculpin	0	6	1	7	0.25%
Sebastes sp.	unid. rockfish	0	3	2	5	0.18%
Hyperprosopon argenteum	walleye surfperch	2	2	0	4	0.14%
Pholis ornata	saddleback gunnel	2	2	0	4	0.14%
Platichthys stellatus	starry flounder	2	0	1	3	0.11%
Lepidogobius lepidus	Bay goby	0	0	3	3	0.11%
Damalichthys vacca	pile surfperch	2	0	0	2	0.07%
Isopsetta isolepis	butter sole	2	0	0	2	0.07%
Microgadus proximus	Pacific tomcod	0	2	0	2	0.07%
Clupea harengus	Pacific herring	1	0	0	1	0.04%
Hypsopsetta guttulata	diamond turbot	1	0	0	1	0.04%
Cebidichthys violaceus	monkey-faced eel	0	1	0	1	0.04%
Hemilepidotus spinosus	brown Irish Lord	0	0	1	1	0.04%
Hypomesus pretiosus	surf smelt	0	1	0	1	0.04%
Porichthys notatus	plainfin midshipman	0	1	0	1	0.04%
Scorpaenichthys marmoratus	cabezon	0	0	1	1	0.04%
Total Number of Individuals		1,242	734	840	2,816	-
Percent of Total		44.11	26.07	29.83	-	100.00%
Species Diversity		1.63	2.05	1.91	-	-
Species Richness		20	21	18	29	-

* Likely permanent residents

Calculated ANOVA values indicated that there were no significant differences in the abundance of fish over time (F=0.55, p=0.01) or among sites (F=0.23, p=0.01) between Schooner Adjacent, Schooner Away, and Estero de Limantour. There were also no significant differences in the number of species captured (F=1.07, p=0.01) or number of species among sites (F=0.16, p=0.01) during this study (Table 4). Confidence levels were all set at p=0.01 (as listed in Table 4), and these p values were not met.

Table 4. Two-way analysis of variance for abundance of fish and number of species, Drakes Estero Ichthyofauna – Oyster Mariculture study, Point Reyes National Seashore, December 2002 – January 2004.

ANOVA results for tests of significance for abundance of fish captured (p=0.01)						
Source of Variation	**Sum Squares**	**Degrees of Freedom**	**Variance**	**Calculated F-values**		**p**
SS between	2.27	20	0.11	variable A (date) =	0.55	**0.01***
SS variable A (date)	0.82	6	0.14	variable B (site) =	0.23	**0.01***
SS variable B (site)	0.11	2	0.06	interaction =	0.45	**0.01***
SS interaction	1.33	12	0.11			

SS within	9.22	37	0.25			

ANOVA results for tests of significance for number of species captured (p=0.01)

Source of Variation	Sum Squares	Degrees of Freedom	Variance	Calculated F-values		p
SS between	0.926	20	0.04	variable A (date) =	1.07	**0.01***
SS variable A (date)	0.351	6	0.05	variable B (site) =	0.16	**0.01***
SS variable B (site)	0.017	2	0.009	interaction =	0.85	**0.01***
SS interaction	0.557	12	0.04			
SS within	2.026	37	0.05			

***significant at the p=0.01 level.**

Four of the five similarity tests run on the fish community assemblages (Renkonen Percent Similarity, Euclidian Distance, Bray-Curtis Index, Morista Index; see Wechsler, 2005 for additional information) showed that the fish communities adjacent to the oyster racks and in Estero de Limantour were the most compositionally different or divergent. Two of the three calculated similarity coefficients indicated a similar trend. The Morista Index, reportedly the most appropriate for use in ecology, showed the most pronounced difference in the fish assemblages. In contrast, the Canberra Index indicated that all three communities were compositionally similar. The number of species per guild was not greatly altered by the presence of the oyster racks, but changes in fish abundance within each guild were observed (Table 6). Fewer pelagic planktivorous and more structure feeding fish (e.g., Embiotocidae) fish were found associated with the oyster racks. Although more species of the Embiotocidae family were captured in Estero de Limantour, kelp surfperch and shiner surfperch were found in higher densities in Schooner Bay adjacent to the racks. Nearly twice as many benthic fish were captured in Estero de Limantour, although ninety-one percent were staghorn sculpin. Of the predominant benthic species, speckled sanddab, wooly sculpin, and leopard sharks were captured more frequently adjacent to the oyster racks. The frequency of crevice-dwelling was highest in Estero de Limantour, however, the chosen sample gear was not successful in capturing many individuals (Table 6). Anecdotally, numerous crevice-dwelling fish (e.g., monkey-faced eels, striped kelpfish) were observed on the flat-bottomed barges used to harvest oysters, suggesting that these fish use the oyster shell matrix as habitat. A similar number of eelgrass dependent fish was captured in all sites.

Table 6. Number of fish per ecological guild captured during the Drakes Estero Ichthyofauna – Oyster Mariculture study, Point Reyes National Seashore, December 2002 - January 2004.

Schooling Plantivores	**Common Name**	**Estero de Limantour**	**Schooner Adjacent**	**Schooner Away**
Atherinopsis affinis	topsmelt	487	83	306
Atherinopsis californiensis	jacksmelt	8	5	12
Clupea harengus	Pacific herring	1	0	0
Total		**496**	**88**	**318**
Structure Feeders	**Common Name**	**Estero de Limantour**	**Schooner Adjacent**	**Schooner Away**
Brachyistius frenatus	kelp surfperch	41	195	105
Cymatogaster aggregata	shiner surfperch	14	39	41
Embiotoca jacksoni	black surfperch	7	3	3
Damalichthys vacca	pile surfperch	2	0	0
Hyperprosopon argenteum	walleye surfperch	2	2	0
Micrometrus minimus	dwarf surfperch	3	5	0
Total		**69**	**244**	**149**
Benthic Oriented	**Common Name**	**Estero de Limantour**	**Schooner Adjacent**	**Schooner Away**
Leptocottus armatus	staghorn sculpin	226	97	108
Triakis semifasciata	leopard shark	15	31	25
Citharichthys stigmaeus	speckled sanddab	1	20	10
Lepidogobius lepidus	bay goby	0	0	3
Clinocottus analis	wooly sculpin	0	6	1
Hemilepidotus spinosus	brown Irish Lord	0	0	1
Platichthys stellatus	starry flounder	2	0	1
Scorpaenichthys marmoratus	cabezon	0	0	1
Isopsetta isolepis	butter sole	2	0	0
Porichthys notatus	plainfin midshipman	0	1	0
Hypsopsetta guttulata	diamond turbot	1	0	0
Microgadus proximus	Pacific tomcod	0	2	0
Total		**247**	**157**	**150**
Crevice Dwellers	**Common Name**	**Estero de Limantour**	**Schooner Adjacent**	**Schooner Away**
Gibbonsia metzi	striped kelpfish	8	3	3
Cebidichthys violaceus	monkey-faced eel	0	1	0
Pholis ornata	saddleback gunnel	2	2	0
Total		**10**	**6**	**3**
Eelgrass Dependent	**Common Name**	**Estero de Limantour**	**Schooner Adjacent**	**Schooner Away**
Sygnathus leptorhynchus	bay pipefish	102	180	132
Aulorhynchus flavidus	tubesnout	1	1	6
Total		**103**	**181**	**138**

In comparing Estero de Limantour and Schooner Adjacent, the relative abundance and rank order of the 5 dominant species was nearly reversed, while a more equitable pattern of abundance for these 5 species was noted at Schooner Away (Table 7). These trends show (1) shifts in the fish assemblage to a group of species capable of taking advantage of the rack structure in the water in Schooner Bay (Schooner Adjacent), and (2) differences in the physical environment, and possibly in predators and competitors, between Estero de Limantour (where oyster racks are not present) and Schooner Bay (where intense oyster farming is occurring).

Table 7. Dominant species of fish captured during the Drakes Estero Ichthyofauna – Oyster Mariculture study, Point Reyes National Seashore, December 2002 - January 2004.

Scientific Name	Common Name	Estero de Limantour	Schooner Adjacent	Schooner Away
Atherinopsis affinis	topsmelt	487	83	306
Gasterosteus aculeatus	three-spined stickleback	317	54	80
Leptocottus armatus	staghorn sculpin	226	97	108
Sygnathus leptorhynchus	Bay pipefish	102	180	132
Brachyistius frenatus	kelp surfperch	41	195	105
Total		**1173**	**609**	**731**

Juvenile fish were present in the estero throughout this study, which indicated that the estero fulfils a substantial nursery habitat function (Table 8, from Wechsler 2005). Young-of-year fish were identified in forty percent of the species captured, which indicated that reproduction of these species likely occurs within the estero (see Wechsler, 2005 for more information).

Table 8. Lifestages of the fish captured during the Drakes Estero Ichthyofauna - Oyster Mariculture study, Point Reyes National Seashore.

Scientific Name	Common Name	Size Range Captured (mm)	Maximum length for Adult Fish (mm)*	Life Stage
Amphistichus argenteus	barred surfperch	282 - 313	425	A, SA
Atherinopsis affinis	topsmelt	47 - 245	360	J, SA, YOY
Atherinopsis californiensis	jacksmelt	305 - 425	437.5	A, SA
Aulorhynchus flavidus	tubesnout	125 - 169	175	A, SA
Brachyistius frenatus	kelp surfperch	30 - 155	212.5	J, SA, YOY
Cebidichthys violaceus	monkey-faced eel	93	750	J
Citharichthys stigmaeus	speckled sanddab	40 - 125	167.5	J, SA, YOY
Clinocottus analis	wooly sculpin	51 - 99	150	J, SA, YOY
Clupea harengus	Pacific herring	85	450	J
Cymatogaster aggregata	shiner surfperch	45 - 138	175	J, SA, YOY
Damalichthys vacca	pile surfperch	316 - 342	435	A, SA
Embiotoca jacksoni	black surfperch	85 - 382	383.75	J, A
Engraulis mordax	northern anchovy	58	175-225	YOY
Gasterosteus aculeatus	three-spined stickleback	25 - 86	100	J, SA, A, YOY
Gibbonsia metzi	striped kelpfish	39 - 120	231.25	J, SA, YOY
Hemilepidotus spinosus	brown Irish Lord	155	250	SA
Hyperprosopon argenteum	walleye surfperch	71 - 170	300	J, SA
Hypsopsetta guttulata	diamond turbot	49 - 180	450	J, SA, YOY
Isopsetta isolepis	butter sole	50 - 69	543.75	J, YOY
Lepidogobius lepidus	Bay goby	84 - 104	100	A, SA
Leptocottus armatus	staghorn sculpin	34 - 195	300	J, SA, YOY
Microgadus proximus	Pacific tomcod	85 - 110	300	J, SA
Micrometrus minimus	dwarf surfperch	52 - 123	156.25	J, SA, YOY
Ophiodon elongates	lingcod	100	1125	J
Hypomesus pretiosus	surf smelt	168	300	SA
Phanerodon atripes	white surfperch	75	310	J
Pholis ornate	saddleback gunnel	98 - 158	300	SA
Platichthys stellatus	starry flounder	130 - 204	900	J
Porichthys notatus	plainfin midshipman	149	375	SA
Scorpaenichthys marmoratus	cabezon	180	975	J, SA
Sebastes sp.	unid. rockfish	70 - 86		
Sygnathus leptorhynchus	Bay pipefish	05 - 317	325	J, SA, A, YOY

* data from Guide to the Coastal Marine Fishes of California, Miller and Lea (1972)
A = adult

SA = sub-adult
J = juvenile
YOY = young-of-year

The abundance of fish captured in the estero was relatively steady except during the August throughSeptember survey in which the maximum number of fish were observed. This peak in abundance was largely due to several large gill net hauls of schooling topsmelt. The number of species captured per sampling episode ranged from a minimum of 9 in October to a maximum of 16 in November (Table 8). Species composition also varied seasonally as different species entered the estuary at different times of the year. The nine most dominant fish were captured in the estero during all sampling events, indicating that at least one lifestage may be in the estero at any point during any given year. These nine species did exhibit a seasonal pattern with regard to the use of the system (see Wechsler 2005 for additional information).

This preliminary investigation into the relationship between oyster mariculture and the Drakes Estero ichthyofauna suggests that species dominance in the fish community has shifted at the oyster racks to favor structure-oriented feeders. However, analysis of variance tests showed no significant difference in species abundance or species richness among the three fish communities sampled. Because fish species richness and fish diversity were greatest in the samples taken adjacent to the oyster racks, it is likely that the physical structure associated with the oyster mariculture facility enhances habitat complexity, thereby providing additional resources (e.g., cover and feeding opportunities) for fish. The results of this study indicate that a localized shift in species composition, distribution, and population dynamics of certain fish species has occurred. Alterations to the relative percentage of species captured both within and amongst ecological guilds indicate that the resource base (i.e., prey items, shelter) may have shifted to favor several structure-oriented feeders (e.g., kelp surfperch). Four of the five indices used to assess the similarity of the fish assemblages showed the greatest compositional divergence was between Estero de Limantour and Schooner Adjacent. This again suggests that the use of the artificial habitat derived from mariculture facilities may attract opportunistic fish species to the racks if they provide resources not otherwise available, or supplement preexisting conditions.

Benthic Invertebrate Community (condensed from Harbin 2004):

The most frequently encountered species in core samples included the tanaid *Leptochelia dubia*, the cumacean *Cumella vulgaris*, amphipods, polychaetes, and ostracods. Of the 46 samples taken and analyzed from beneath racks and adjacent areas *L. dubia* were found in all but 6 samples, *C. vulgaris* were found in all but 10 samples, ostracods were found in all but 2 samples, and polychaetes and amphipods were found in all but 1 sample. For a full list of invertebrate species and taxa found in core samples see Appendix H (from Harbin 2004). It

should also be noted that we have an additional 79 benthic infauna core samples from Schooner Bay and Estero de Limantour where we were able to sort, extract and preserve the organisms present, but did not have funds or time to identify these suites of species. Waste from these samples is also preserved.

The number of distinct taxonomic groups found in core samples at each distance ranged between 11 and 15. From the pooled samples collected on October 20, 2001, 12 taxonomic groups were found beneath racks and 12 taxonomic groups were found 10 meters away. The number of taxonomic groups found in samples collected from 0 to 50 meters from racks on January 21, 2001, is as follows: 0 meters – 14; 1 meter – 15; 5 meters – 11; 10 meters – 13; 50 meters – 14 (Harbin 2004).

Shannon-Weiner indices calculated for each distance and sampling location ranged from 1.5-2.5, showing nearly uniform diversity at all sampling locations and distances. For each sample location, Jaccard's similarity index values calculated for percentage of overlap in taxa diversity for 0 and 10 meter samples ranged between 43% and 60%. An ANOVA conducted separately for January and October samples did not reveal a significant difference in taxa richness between samples collected in areas beneath oyster racks and areas adjacent to oyster racks (Table 9). A significant difference in the number of taxa was not found when data were compared for the same distance at different sample locations (Table 9). Samples collected beneath oyster racks and ten meters away were also compared for both sample dates concurrently with no finding of significance (Table 9) (Harbin 2004). Our statistical consultants at UC Davis did not recommend a two-way ANOVA for distance by month as no significance was found in any of the single-factor tests. Probability values (p values) given in Table 9 are all values calculated by the ANOVA software, and all but one (see discussion below) well exceeded the specified confidence level of 0.05.

Table 9. Single-Factor ANOVA Comparing Number of Individuals and Taxa Richness Below Oyster Racks and in Adjacent Areas and Single-Factor ANOVA Comparing Results Within Distances, with Calculated P-Values (probability of occurrence) (Harbin 2004)

Analysis	d.f.	F	P-Value calculated
January Taxa All Racks	4,25	0.23902	0.91357
January Taxa 0m & 1m Racks	1,10	0.04425	0.83762
January Taxa 0m & 5m Racks	1,10	0.04425	0.83762
January Taxa 0m & 10m Racks	1,10	0.00000	1.00000
January Taxa 0m & 50m Racks	1,10	0.47059	0.50831
January Individuals All Racks	4,25	1.59459	0.20677
January Individuals 0m & 1m Racks	1,10	1.63946	0.22930
January Individuals 0m & 5m Racks	1,10	1.44026	0.25776
January Individuals 0m & 10m Racks	1,10	3.38607	0.09558
January Individuals 0m & 50m Racks	***1,10***	***7.04666***	***0.02412***
January Taxa 0m Distances	1,4	0.05000	0.83402
January Taxa 1m Distances	1,4	0.00000	1.00000
January Taxa 5m Distances	1,4	4.00000	0.11612
January Taxa 10m Distances	1,4	0.02632	0.87900
January Taxa 50m Distances	1,4	0.45000	0.53908
January Individuals 0m Distances	1,4	0.93556	0.38820
January Individuals 1m Distances	1,4	0.27131	0.62996
January Individuals 5m Distances	1,4	0.00067	0.98063
January Individuals 10m Distances	1,4	2.32690	0.20185
January Individuals 50m Distances	1,4	3.04765	0.15579
October Taxa All Racks	1,14	0.18156	0.67652
October Individuals All Racks	1,14	0.19930	0.66211
October Taxa 0m Distances	3,4	0.66667	0.61510
October Taxa 10m Distances	3,4	0.34503	0.79572
October Individuals 0m Distances	3,4	1.09385	0.44817
October Individuals 10m Distances	3,4	0.43700	0.73881
Both Dates Taxa 0m & 10m Racks	1,26	0.09249	0.76346
Both Dates Individuals 0m & 10m Racks	1,26	0.42258	0.52135
Both Dates Taxa 0m Distances	5,8	0.70026	0.63878
Both Dates Taxa 10m Distances	5,8	0.30217	0.89838
Both Dates Individuals 0m Distances	5,8	1.36607	0.33035
Both Dates Individuals 10m Distances	5,8	0.98064	0.48410

Bold Italics = Statistical Significance

The relative abundance of dominant taxonomic groups was calculated for each distance and sampling date as a percentage of the total number of individuals found in the pooled samples. For January 21, 2001 zero to 50 meter samples the percentages ranged as follows: polycheates 6-21%; amphipods 16-35 %; ostracods 11-34%; tanaids 3-38%; cumaceans 2-9%; and bivalves 11-29% (Table 9). For October 20, 2001 zero and 10 meter samples the percentages ranged as follows: polycheates 16-19 %; amphipods 15-33 %; ostracods 27-28 %; tanaids 11-29 %; cumaceans 7-8 %; and bivalves 3-4 %. Similar patterns are observed in the January and October samples for both amphipods and tanaids. The percentage of amphipods decreases by half between 0 and10 meters for both sampling dates (January - 35 % at 0 m vs. 17% at 10 m; October - 33% at 0 m vs. 15% at 10 m). The percentage of tanaids more than doubles between 0 and 10 meters for both sampling dates (January - 18 % at 0 m vs. 38% at 10 m; October - 11% at 0 m vs. 29% at 10 m). The percentage of polychaetes, ostracods, cumaceans, and bivalves was found to be similar below racks and 10 meters away in samples collected during October 2001. Those groups demonstrated more variation in percentages found in the January 2001 samples. The percentage of ostracods and bivalves showed a marked increase at 50 meters away from the racks.

In January 2001, invertebrate abundance compared via single-factor ANOVA was found to be significantly higher in samples collected 50 meters away from racks (mean = 91) than beneath racks (mean =39) (p-value = 0.02412) (Table 9). This pattern was not observed for any of the other pairwise comparisons of invertebrate abundance for the January or October sampling dates.

A significant increase in the abundance of infaunal invertebrates was observed in areas 50 meters away from oyster racks as compared to areas beneath oyster racks in January 2001. An increase in macroinfaunal abundance in areas adjacent to oyster racks was documented by Nugues et al. (1996) and Castel et al. (1989) in their research in other region. Possible explanations for decreased abundance below oyster racks include increased predation by fish and decapods attracted to oyster cultivation sites by the high densities of oysters (Castel et al. 1989), in addition to the potential inhibition of predatory efficiency in areas of dense eelgrass cover (i.e., control areas) due to the presence of blades and roots which inhibit foraging epibenthos (Reise 1985). In addition, some studies provide evidence that dense assemblages of filter feeders (oysters in this case) may reduce recruitment of other species with a planktonic larval stage (Woodin 1976, Best 1978, Williams 1980).

Significantly higher Shannon-Weiner diversity index values were reported by Nugues et al. (1996) for areas within 15 meters of oyster trestles than beneath them. Such a pattern was not detected in this Drakes Estero study, as Shannon-Weiner index values were relatively similar for both cultivated and adjacent areas. Samples taken from adjacent areas and areas beneath racks were characterized by a similar taxonomic composition as evidenced by the Jaccard's similarity indices. At all but one sampling location, more than half of the taxa were found in both samples. In addition, taxa richness was relatively similar across distances and between distances for the two sample dates.

A significant difference in the number of taxa was not found in any of the single-factor ANOVA analyses. Overall taxa richness was not influenced by oyster aquaculture in Schooner Bay. However, the relative abundance of various taxa may be influenced by the oyster operation. The descriptive data presented here hints at this pattern. However, more collection of data will be necessary to draw more meaningful conclusions. The relative abundance of ostracods and bivalves approximately doubles between zero and 50 meters. This may be due to decreased predation as previously discussed as a possible explanation for an increase in invertebrate abundance 50 meters from the racks. Ostracods and bivalves likely rely on the same food source as oysters given that they are many of them are filter feeders. The filtering of phytoplankton from the water column by oysters may be limiting the amount available to other organisms in the vicinity that rely directly on this food source. Previous studies have shown that the Eastern oyster can significantly reduce the abundance of phytoplankton in the water column, in some cases by half (Ulanowicz and Tuttle 1992), and alter the structure of the microbial community (Wetz et al. 2002). The relative abundance of amphipods was found to be higher below racks than in adjacent areas for both sampling dates. The amphipods living in soft sediment habitat such as this are likely to be detritus feeders. Although percent organic matter was not found to be increase significantly beneath racks, perhaps a preferred or more easily accessible food source was available below racks than in adjacent areas. Eelgrass detritus was observed to collect beneath racks. Most of the polychaetes found in the samples belong to the Nereid family. Their relative abundance was for the most part unchanged in areas beneath and adjacent to oyster racks. These polychaetes are predatory and are likely to be unaffected by taxonomic shifts of other infaunal groups as long as prey items remain abundant.

Marine Invertebrate Fouling Community:

The marine invertebrate fouling community of sessile organisms could be properly characterized as "introduced" and "invasive" due to lack of hard, shallow water substrate in Drakes Estero (Table 10). This community is present and associated with the oyster farming operation in Schooner Bay, but non-existent in Estero de Limantour (where no fouling organisms settled or grew on the plates other than one *Balanus* species on one plate). Very little research has been done on non-native, invasive species in this community type on the West Coast, but we believe that the non-native *Didemnum lahillei* may properly be called an invasive species (see http://woodshole.er.usgs.gov/project-pages/stellwagen/didemnum/ for more information). It is unlikely that the *Balanus* spp., *Botrylloides* spp. ,*Botryllus* spp., *Obelia* spp., or *Spirorbis* spp. are introduced, since there are common, native species in these genera. However, as there are also some introduced species in these genera, David Press erred on the side of caution and simply listed them as UNKNOWN in regard to their invasive status. Some of the fouling plates set in Schooner Bay became completely covered by *Didemnum lahillei*, and it grew over all the other organisms on many of those plates as an aggressive species of tunicate. The full data set is a PC Access database that has been provided to Pt. Reyes National Seashore and is attached here as a text file in Appendices E, F, and G, showing species by point location, by station and percent cover, and showing other species not listed below. More research is recommended on the systematics (taxonomy) of the fouling organisms in Drakes Estero.

Table 10 Invertebrate Fouling Community and Invasive Status

SpCode	Species	Phylum	SubGroup	CommonGroup	Invasive_
BOTROI	Botrylloides sp.	Chordata	Ascidiacea	Tunicate	UNK
BOTRUS	Botryllus sp.	Chordata	Ascidiacea	Tunicate	UNK
DIAL	Didemnum albidum	Chordata	Ascidiacea	Tunicate	UNK
DILA	Didemnum lahilei	Chordata	Ascidiacea	Tunicate	YES
DIOC	Distalpia occidentalis	Chordata	Ascidiacea	Tunicate	NO
BUNE	Bugula neritina	Ectoprocta	Cheilostomata	Bryozoan	NO
SCUN	Schizoporella unicornis	Ectoprocta	Cheilostomata	Bryozoan	Introduced
WASU	Watersipora subtorquata	Ectoprocta	Cheilostomata	Bryozoan	Introduced
BALA	Balanus sp.	Arthropoda	Cirripedia	Barnacle	UNK
SPIR	Spirorbis sp.	Annelida	Polychaete	Tube Worm	UNK
BARE	Bare	NA	NA	NA	NA
OBEL	Obelia sp.	Cnidaria	Hydrozoa	Hydroid	UNK
HABO	Halichondria bowerbanki	Porifera	NA	Sponge	Introduced
TUN1	unknown tunicate 1 - black and yellow	Chordata	Ascidiacea	Tunicate	UNK
TUN2	unknown tunicate 2 - dark gray	Chordata	Ascidiacea	Tunicate	UNK

Marine Invertebrate Eelgrass, Epibethic Community:

The suite of species typical of our central California subtidal, shallow water marine communities, especially those organisms associated with eelgrass beds, were found in Drakes Estero. This work is very much incomplete as David Press's time on the boat with Jesse Wechsler was very limited by weather, boat and other logistical problems. Fishing data sheets note that kelp crab were frequently collected, and that rock crab, Dungeness crab, various nudibranchs, shrimp, and starfish were collected, along with select amphipods and nematodes. There is not enough data nor species level identifications of organisms to warrant any analysis.

Physical Environment:

The hydrologic conditions of coastal embayments, such as Drakes Estero, including water circulation patterns, precipitation, and tidal flushing, play an important role in determining the fate of materials are deposited there (Hayakawa et al. 2001; Wechsler, 2005). The relatively small scale of the Johnson's oyster farming operation combined with the hydrologic conditions in Drakes Estero likely dissipate the accumulation of biodeposits (e.g., oyster feces) that other studies have been shown to effect benthic ecology and water quality. In Drakes Estero, the tidal prism is high and a large volume of water drains twice daily with the mixed, semi-diurnal tidal regime. Our analyses of a limited set of water and sediment samples suggest that no major deterioration in water quality exists adjacent to the oyster racks (see Appendices B and C). We did not have access to data reportedly collected by the California Department of Health Services on fecal contamination (coliform bacteria) or phytoplankton blooms that may be associated with shellfish food safety concerns. In regard

to the physical environment, we did map (using GPS technology) the oyster racks, sand bars, eelgrass beds, and any other obvious physical features in Drakes Estero. This information was provided to the park as a series of GIS-layers.

From Harbin's research (2004), she found that all sediments appeared oxygenated as evidenced by light to medium brown coloration of the uppermost portion of the sediments. Mean percent organic matter of core samples was 5.25% below racks and 5.27% in adjacent areas 10 meters away and ranged from 3.17-9.8%. The amount of organic matter in sediment from adjacent areas was not found to be significantly different from that beneath racks (t=0.04; t-critical=2.45). Mean sediment composition of samples taken beneath racks was 43% silt, 28% clay, and 30% sand. Mean sediment composition of samples taken 10 meters away from racks was 49% silt, 26% clay, and 25% sand. A significant increase in the percentage of silt (t=8.75; t-critical=2.07) and a significant decrease in the percentage of sand (t=4.96; t-critical=2.07) were found 10 meters away from racks. Average percent silt-clay values for each sample are shown in Table 11.

Table 11. Sediment Characteristics

		Avg. % Organic Content		Avg. % Silt Clay	
Location	Date	10 meters	0 meters	10 meters	0 meters
R1	1/21/2001	7.71	9.18	80.5	76.5
R2	1/21/2001	9.01	7.48	74.5	76
R3	10/20/2001	3.68	3.97	70.5	70
R4	10/20/2001	3.84	3.54	73	68
R5	10/20/2001	3.33	3.52	70	71.5
R6	10/20/2001	4.07	3.83	73.5	73.5

A significant difference in the percent organic matter in areas below and adjacent to the oyster racks was not detected and all sediments appeared oxygenated to at least a depth of 10 cm (Harbin 2004). Nugues et al. (1996) detected a decrease in the depth of the oxygenated layer and an increase in organic content of the sediment beneath oyster cultivation structures elsewhere. However, such patterns were not observed in Drakes Estero. The organic matter input into the estuary with the breakdown of the vegetative material from the eelgrass in the fall and winter likely accounts for the relatively high percent organic matter found in all sediment cores. Although pseudofeces from the suspended oysters may contribute to the amount of organic matter below the racks, adding to the system, the amount of organic matter resulting from eelgrass decomposition is likely far greater considering how expansive and dense the beds are within the estuary, making any significant organic inputs from the oysters undetectable in this study (Harbin 2004). Tidal action, eelgrass root zone oxidation, and currents continuously mixing water through the estuary likely maintain oxygenated surface sediments. The expansive eel grass beds attest to this as *Zostera* prefers sediments in which the surface is oxidized (Wood et al. 1969).

The decrease in silt content values beneath the oyster racks in this study may indicate some sediment erosion is taking place due to the presence of the rack structures, however the difference, 43% below racks as compared to 49% in control areas 10 meters away, is not likely great enough to alter benthic invertebrate community composition, as the silt-clay fractions beneath the racks are still quite high (up to 9.80%) and the majority of the organisms found are deposit feeders (i.e. amphipods) (see Harbin 2004). However, erosion may be a factor in reduced invertebrate abundance beneath the racks. Further study addressing the explanation for these patterns is needed.

A more intensive study of water quality, nutrient budgets, and sedimentation rates, along with the hydrodynamics of the estuary, is advised.

Conclusions and Lessons Learned

The oyster mariculture has had an impact on the marine fish and invertebrates of Drakes Estero. Invasive organisms as a fouling community, and in particular, the non-native species of tunicate *Didemnum lahillei*, have recruited into the estero. This fouling community is not present in Estero de Limantour where oyster farming is absent. The relative abundance of various benthic invertebrate and fish species has changed at and around the oyster racks in Schooner Bay with the oyster cultivation. The physical structure of the racks provides a different set of habitats for marine species, influencing the penetration of light, sedimentation and erosion, and providing a hard substrate. Overall richness (e.g. species diversity) of benthic infaunal taxa was not influenced by oyster aquaculture in Schooner Bay. However, the relative abundance of various benthic taxa may be influenced by the oyster operation, as the relative abundance of ostracods and bivalves approximately doubles between the racks and 50 meters away. The oyster racks did provide unique, hard substrate habitat and shelter for marine organisms, both for fouling community and epibenthic invertebrates and as shelter and habitat for some of the smaller marine fish, increasing the diversity and richness of fish assemblages. These fish and decapods through predation may decrease the abundance of benthic ostracods and bivalves beneath the oyster racks, shifting species dominance (e.g., relative abundance) in the community, but not effecting diversity. However, the invasion of a non-native tunicate and possibly other fouling community organisms identified only to genus level is of concern.

Although pseudofeces from the suspended oysters may contribute to the amount of organic matter below the racks, adding to the system, the amount of organic matter resulting from eelgrass decomposition is likely far greater considering how expansive and dense the beds are within the estuary, making any significant organic inputs from the oysters undetectable in this study (Harbin 2004). The decrease in silt content values beneath the oyster racks in this study may indicate some sediment erosion is taking place due to the presence of the rack structures.

This inventory and initial assessment provides a baseline for future research, for monitoring impacts of the oyster farming operation on the estero, for examining environmental change in

the estero into the future, and for recommendations concerning habitat restoration. Much further research remains to be done.

Major lessons were learned in starting a project before the funds are actually available (the start of the funded work was delayed by more than two years, with a key graduate student researcher lost to the main part of the project, with Professor Elliott-Fisk's status also changed during that period with no summer salary support from the University nor salary support from this project). Logistics to work on the water in this shallow, windy, and very large coastal embayment were daunting, especially as the University researchers ended up having to provide their own boat and kayaks. Using even modified fishing methods for trawling in shallow waters with the prolific eelgrass beds in Drakes Estero was also challenging, and fishing techniques had to be modified several times. However, we very much enjoyed working with the NPS scientists and staff on this project and together we have learned a great deal about the ecology of Drakes Estero.

Financial Report and Final Budget

The final financial report has been prepared and submitted by the Accounting Office of the Extramural Funds Division (UC Davis, contact Diana Wiggins, phone (530)757-8689) and submitted to the NPS, Pt. Reyes National Seashore (to Contracting Officer Kristi Swofford). UC Davis Account/Fund No. 3-AWFRJ42, Federal Cooperative Agreement. Expenditures were for part-time salary for Graduate Student Researchers Angie Harbin, Jesse Wechsler, David Press, small work study stipends for 3 undergraduate assistants in the laboratory, minor supplies and expenses, travel to Pt. Reyes and on the water in our boat and a boat rented from the UCD Bodega Marine Laboratory, employee benefits and fees for graduate student researchers, and indirect costs from the University accounted for all expenditures.

Evaluation of Project

Our assessment of the marine biota of Drakes Estero and the impacts of the oyster mariculture operation on the ecosystem was a "first look" at the estero's ecology due to time and financial limitations. However, we are confident that our data tell the "right story" of a shift in marine community composition and especially the relative abundances of species with the current Johnson's oyster farm operation. As noted, the physical structure and hard-substrate of the rack structures adds a new habitat type up-estuary, providing a refuge for small fish and crevice dwelling and hard-substrate invertebrates (including the fouling community). If the racks provide unique habitat for non-native invasive species, this is a problem, and we did find one such aggressive tunicate species. We found the oyster racks to have no pronounced impacts on the eelgrass beds, which existed both under and away from the racks as an incredibly rich habitat type.

The project was an extensive endeavor in planning, fieldwork, laboratory analyses, and data management. Obtaining the proper boats and sampling devices was challenging due to the shallow waters, thick eelgrass beds, and marine weather conditions, and the persistence of the graduate student researchers working with Dr. Ben Becker at the park paid off in eventually overcoming these challenges to successfully navigate the estuary and sample the

biota. The three graduate students, with their training in the systematics and ecology of the organisms, as well as in field, laboratory and data protocols, were key to making the project a success. However, more funding to allow researchers to be employed for more time in the laboratory doing systematic identification of organisms is needed. Separating the infauna from the sediments is also very time consuming and needs to be budgeted for. Having David Press employed part-time as both a graduate student researcher on the project and a parkbiological technican helped immensely with data management (Access DBMS and GIS) and logistics. This was truly a cooperative project in every sense of our UC-NPS cooperative agreement.

Current Status of Project

The project has been completed and as noted herein is preliminary in scope due to limitations of both the objectives and the funding. Funding over two years provided part-time salary for three graduate student researchers and no additional salary for the University principal investigator or any park staff. Partial field logistical and travel support was supplied by the funding agreement, as well as by the University. Seventy-nine samples of separated, sorted, and preserved marine benthic invertebrates remain to be identified, as with the very time consuming nature of separating microscopic organisms from the muds and sorting them into functional/taxonomic categories, then identifying them, was not sufficiently budgeted for in the project. All samples are preserved and being held in storage for future analyses.

Future Recommendations

This study found evidence that oyster mariculture has had an impact on the marine fish and invertebrates of Drakes Estero. Invasive organisms as a fouling community, and in particular, the non-native species of tunicate *Didemnum lahillei*, have recruited into this marine ecosystem and possibly also been introduced by the non-native oyster spat and cultivation practices. The relative abundance of various benthic invertebrate and fish species has changed at and around the oyster racks in Schooner Bay with the oyster cultivation. The physical structure of the racks provides a different set of habitats for marine species, influencing the penetration of light, sedimentation and erosion, and providing a hard substrate. Thus, the oyster racks are like habitat islands in the larger sea of Drakes Estero. These changes are largely at the community level.

One of several management directives could be implemented that may enhance the overall ecological structure and productivity of the system. To completely restore the Drakes Estero ecosystem, the oyster racks (both active and abandoned) would have to be removed. It would be useful to do a hydrodynamic model and tidal prism for the estero before removing the racks, such that hydrologic and geomorphic dynamics could be studied pre- and post-rack removal. Removal of the racks may have a short-term (one to five year), somewhat localized impact on the eelgrass bed communities and on some of the juvenile fish associated with the racks, but should not have a long-term impact, as strong tidal ebb and flood in the shallow waters should allow the eelgrass to rapidly reestablish, and along with it,

the native community associates. Removal of the racks would result in a loss of hard-substrate for the fouling community organisms which do not naturally exist in the estero. Monitoring of marine species should occur at select sites before, during, and after rack removal, with a minimum of 3 years of monitoring recommended post-rack.

From a cultural-historical resource perspective, other long-time oyster farms occur in Tomales Bay, as part of the Pt. Reyes National Seashore and Golden Gate National Recreation Area. As Tomales Bay does not carry Wilderness Area designation, it seems more appropriate to continue oyster farming in that estuary versus Drakes Estero. With the Park working to protect Estero de Limantour and restore Horseshoe Pond (a tidal lagoon immediately west of Drakes Estero), it only seems appropriate to restore Drakes Estero under the guidelines of the Wilderness Act.

An alternative management option involves the Olympia oyster (*Ostreola conchaphila*). Historically, Olympia oysters, the native reef oysters of the Pacific coast, were found from Baja, California to Alaska (Cook et al. 2000). This bivalve was important in the Pacific Northwest for Native Americans, and was an important commodity for settlers in the early-twentieth century (Cook et al. 2000). Baker (1995) reported these oysters to have been common in Drakes Estero, although it is unknown if a remnant population still exists (we did not encounter any in our sampling). Our colleagues at UC Davis (Dr. Ted Grosholz and graduate students) are examining the utility of remnant and introduced populations of native oysters in Tomales Bay as a key species important for the restoration of historical ecological conditions. As suggested by Wechsler (2005) in his thesis research for this project, the culture of the small Olympia oyster would likely provide additional habitat for aquatic species in Drakes Estero. Olympia oysters would reproduce naturally in the cold waters, creating more consolidated reef habitat for fish and invertebrates. A well-conceived oyster harvest plan would need to be designed to allow harvest to take place in a manner that would leave a sufficient portion of the structure for the associated aquatic biota to persist. It is interesting to note that Costa-Pierce (2002) termed the evolution of aquaculture towards a more sustainable system of practices as the "greening-up of the blue revolution." As such, this might be an alternative oyster fishery, but it would function best with the removal of the artificial oyster rack structures.

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APPENDICES

Appendix A. List of all species captured during fish - oyster mariculture study, Drakes Estero, Point Reyes National Seashore.

Species #	Scientific Name	Common Name	Number Captured	Percent of Total
1	*Atherinopsis affinis*	topsmelt	977	31.23%
2	*Sygnathus leptorhynchus*	Bay pipefish	519	16.59%
3	*Gasterosteus aculeatus*	three-spined stickleback	472	15.09%
4	*Leptocottus armatus*	staghorn sculpin	435	13.91%
5	*Brachyistius frenatus*	kelp surfperch	375	11.99%
6	*Cymatogaster aggregata*	shiner surfperch	96	3.07%
7	*Triakis semifasciata*	leopard shark	81	2.59%
8	*Citharichthys stigmaeus*	speckled sanddab	49	1.57%
9	*Atherinopsis californiensis*	jacksmelt	27	0.86%
10	*Gibbonsia metzi*	striped kelpfish	16	0.51%
11	*Embiotoca jacksoni*	black surfperch	14	0.45%
12	*Aulorhynchus flavidus*	tubesnout	8	0.26%
13	*Micrometrus minimus*	dwarf surfperch	8	0.26%
14	*Clinocottus analis*	wooly sculpin	7	0.22%
15	*Hyperprosopon argenteum*	walleye surfperch	7	0.22%
16	*Sebastes sp.*	unid. rockfish	5	0.16%
17	*Pholis ornata*	saddleback gunnel	4	0.13%
18	*Isopsetta isolepis*	butter sole	3	0.10%
19	*Lepidogobius lepidus*	Bay goby	3	0.10%
20	*Platichthys stellatus*	starry flounder	3	0.10%
21	*Amphistichus argenteus* *	barred surfperch	2	0.06%
22	*Damalichthys vacca*	pile surfperch	2	0.06%
23	*Hypsopsetta guttulata*	diamond turbot	2	0.06%
24	*Microgadus proximus*	Pacific tomcod	2	0.06%
25	*Cebidichthys violaceus*	monkey-faced eel	1	0.03%
26	*Clupea harengus*	Pacific herring	1	0.03%
27	*Engraulis mordax* *	northern anchovy	1	0.03%
28	*Hemilepidotus spinosus*	brown Irish Lord	1	0.03%
29	*Hypomesus pretiosus*	surf smelt	1	0.03%
30	*Mustelus californicus* *	brown smoothhound	1	0.03%
31	*Myliobatis californica* *	bat ray	1	0.03%
32	*Ophiodon elongatus* *	lingcod	1	0.03%
33	*Phanerodon atripes* *	white surfperch	1	0.03%
34	*Porichthys notatus*	plainfin midshipman	1	0.03%
35	*Scorpaenichthys marmoratus*	cabezon	1	0.03%
Grand Total			3128	100.00%

* not included in statistical analysis

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Appendix B. Environmental characteristics measured in Estero de Limantour and Schooner Bay, Drakes Estero, Point Reyes National Seashore, 2002 - 2004.

Date	Location	Depth (m)	Salinity (ppt)	Temp (C)	Clarity (m)	DO (mg/l)	DO (%)
12/4/02	Limantour	2.10	32.7	13.3	2.10	7.33	85.0
12/4/02	Limantour	1.67	32.7	12.5	1.67	6.35	74.6
4/14/03	Limantour	1.55	32.2	13.5	1.55	7.79	89.4
4/14/03	Limantour	0.65	32.5	13.9	0.65	9.01	106.2
4/14/03	Limantour	1.50	32.0	14.7	1.50	7.23	86.5
4/14/03	Limantour	1.10	32.7	12.8	1.10	8.94	103.4
7/1/03	Limantour	0.97	32.6	19.5	0.61	13.27	176.0
7/1/03	Limantour	1.73	32.3	15.0	1.28	10.43	125.3
7/27/03	Limantour	2.00	33.0	18.7	2.00	9.50	124.5
10/17/03	Limantour	2.07	33.7	11.7	2.07	7.80	88.0
10/17/03	Limantour	1.46	33.9	13.5	1.46	9.71	115.3
10/17/03	Limantour	2.59	33.9	12.7	2.59	8.16	96.5
11/14/03	Limantour	*	32.5	12.2	*	6.82	77.8
11/14/03	Limantour	2.10	32.7	12.5	2.01	7.68	88.5
11/14/03	Limantour	1.34	32.4	12.5	1.34	8.02	92.4
1/12/04	Limantour	1.44	29.8	12.0	1.44	8.45	93.2
1/12/04	Limantour	1.30	28.7	12.1	1.30	8.47	94.4
	Mean	**1.60**	**32.37**	**13.71**	**1.54**	**8.53**	**101.00**
12/3/02	Adjacent	2.30	32.8	12.0	2.30	9.50	*
4/11/03	Adjacent	2.10	34.0	15.7	1.75	8.44	104.0
4/14/03	Adjacent	*	32.8	13.2	*	7.36	86.4
4/14/03	Adjacent	1.45	32.7	14.3	1.45	8.44	100.8
6/28/03	Adjacent	1.60	32.3	18.9	1.07	10.75	140.5
7/24/03	Adjacent	1.60	34.6	19.4	6.70	6.70	89.5
7/25/03	Adjacent	1.65	34.3	20.6	1.65	10.31	140.0
10/18/03	Adjacent	1.25	33.9	13.4	1.25	8.07	95.5
11/12/03	Adjacent	1.92	31.6	12.8	1.92	7.88	91.1
11/12/03	Adjacent	1.86	31.8	12.8	1.86	8.51	98.3
11/12/03	Adjacent	2.01	31.7	12.3	1.71	7.43	84.7
1/10/04	Adjacent	1.98	28.9	12.2	1.14	7.71	86.2
1/10/04	Adjacent	1.52	29.3	13.1	0.83	8.67	98.2
	Mean	**1.68**	**32.00**	**14.18**	**1.83**	**8.43**	**99.76**
4/11/03	Away	1.05	33.5	18.1	1.05	11.08	143.0
4/14/03	Away	1.45	32.4	12.5	1.45	7.33	84.4
6/29/03	Away	1.58	32.8	20.6	0.97	8.75	117.5
7/24/03	Away	1.50	31.5	15.7	1.50	11.31	139.0
10/18/03	Away	1.58	34.2	15.4	1.58	7.84	96.0
10/18/03	Away	1.83	33.8	14.6	1.83	9.80	118.3
11/12/03	Away	1.52	31.6	12.8	1.52	7.98	92.0
11/12/03	Away	1.55	31.8	12.8	1.55	8.90	102.8
11/12/03	Away	2.07	31.4	12.5	1.46	7.31	82.5
1/10/04	Away	2.38	27.9	12.4	0.91	8.66	93.8
1/10/04	Away	1.88	23.5	12.3	0.45	8.74	92.0
	Mean	**1.73**	**31.16**	**13.95**	**1.39**	**8.61**	**101.15**

* not recorded

Appendix C. Water column variables measured during Drakes Estero Ichthyofauna – Oyster Mariculture study, Point Reyes National Seashore, December 2002 – January 2004.

Date	Location	Ammonia (NH4-N)	Nitrate (NO3-N)	Total Suspended Solids
April	Limantour	0.13	0.050	112.00
April	Limantour	0.11	0.170	84.00
April	Limantour	0.12	0.050	86.00
April	Limantour	0.16	0.050	110.00
July	Limantour	0.18	0.050	62.00
July	Limantour	0.21	0.050	56.00
July	Limantour	0.21	0.050	94.00
	Mean	***0.16***	***0.07***	***86.29***
April	Schooner Adjacent	0.13	0.060	104.00
April	Schooner Adjacent	0.14	0.080	98.00
April	Schooner Adjacent	0.12	0.050	108.00
July	Schooner Adjacent	0.20	0.050	96.00
July	Schooner Adjacent	0.14	0.050	94.00
July	Schooner Adjacent	0.38	0.050	72.00
	Mean	***0.19***	***0.06***	***95.33***
April	Schooner Away	0.12	0.050	112.00
April	Schooner Away	0.12	0.050	82.00
April	Schooner Away	0.21	0.050	116.00
July	Schooner Away	0.25	0.050	58.00
July	Schooner Away	0.21	0.050	72.00
July	Schooner Away	0.12	0.050	70.00
	Mean	***0.17***	***0.05***	***85.00***

Appendix D. Invertebrate Taxonomic Groups and Species Found In Core Samples (from Harbin 2004).

Phylum Annelida
- Class Polychaete
  - Family Ampheritidae
  - Family Glyceridae
  - Family Nereidae
    - *Platynereis bicanaliculata*
    - *Cheilonereis cyclurus*
  - Family Oweniidae
  - Family Opheliidae
  - Family Terebellidae
  - Family Spionidae
  - Family Phyllodocidae
  - Family Polynoidae

Phylum Mollusca
- Class Bivalvia
  - *Nutricola confusa*
  - *Nutricola tantilla*
- Class Gastropoda

Phylum Arthropoda - Subphylum Crustacea
- Class Maxillopoda
  - Subclass Ostracoda
- Class Malacostraca
  - Subclass Phyllocarida
    - Order Leptostraca
      - *Nebalia pugettensis*
  - Subclass Eumalacostraca
    - Superorder Pericarida
      - Order Cumacea
        - *Cumella vulgaris*
      - Order Tanaidacea
        - *Leptochelia dubia*
      - Order Amphipoda
        - Suborder Gammaridea

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Appendix E – Description of fouling plate samples as point data/locations; this is a PC Access database file entered in the main database at Pt. Reyes National Seashore (see attached file on CD).

"ID" "Location" "Grid_Rack_""Rack_Away""Plate_" "Date" "Comments" "Point" "PtNo""SpCode" "Species"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
1 1.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
2 2.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
3 3.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
4 4.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
5 5.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
6 6.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
7 7.00 "BUNE" "Bugula neritina"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
8 8.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
9 9.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
10 10.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
11 11.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
12 12.00 "BARE" "Bare"

1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
13 13.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
14 14.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
15 15.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
16 16.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
17 17.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
18 18.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
19 19.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
20 20.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
21 21.00 "BUNE" "Bugula neritina"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
22 22.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
23 23.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
24 24.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
25 25.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
26 26.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
27 27.00 "BARE" "Bare"

1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
28 28.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
29 29.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
30 30.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
31 31.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
32 32.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
33 33.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
34 34.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
35 35.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
36 36.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
37 37.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
38 38.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
39 39.00 "BARE" "Bare"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
40 40.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
41 41.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
42 42.00 "SCUN" "Schizoporella unicornis"

1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
43 43.00 "BUNE" "Bugula neritina"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
44 44.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
45 45.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
46 46.00 "WASU" "Watersipora subtorquata"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
47 47.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
48 48.00 "SCUN" "Schizoporella unicornis"
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate"
49 49.00 "SCUN" "Schizoporella unicornis"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 50 1.00 "SCUN" "Schizoporella unicornis"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 51 2.00 "BOTROI" "Botrylloides sp."
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 52 3.00 "BOTROI" "Botrylloides sp."
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 53 4.00 "OBEL" "Obelia sp."
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 54 5.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 55 6.00 "WASU" "Watersipora subtorquata"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 56 7.00 "WASU" "Watersipora subtorquata"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 57 8.00 "BOTROI" "Botrylloides sp."
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 58 9.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 59 10.00 "WASU" "Watersipora subtorquata"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 60 11.00 "WASU" "Watersipora subtorquata"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 61 12.00 "WASU" "Watersipora subtorquata"

2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 62	13.00	"WASU"	"Watersipora subtorquata"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 63	14.00	"WASU"	"Watersipora subtorquata"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 64	15.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 65	16.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 66	17.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 67	18.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 68	19.00	"WASU"	"Watersipora subtorquata"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 69	20.00	"WASU"	"Watersipora subtorquata"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 70	21.00	"WASU"	"Watersipora subtorquata"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 71	22.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 72	23.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 73	24.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 74	25.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 75	26.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 76	27.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 77	28.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 78	29.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 79	30.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 80	31.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 81	32.00	"SCUN"	"Schizoporella unicornis"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 82	33.00	"BUNE"	"Bugula neritina"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 83	34.00	"BARE"	"Bare"
2	"Drakes Estero"	5.00	"Away"	2.00	8/13/2004	"substantial growth of Bugula and Obelia" 84	35.00	"BARE"	"Bare"

2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 85 36.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 86 37.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 87 38.00 "WASU" "Watersipora subtorquata"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 88 39.00 "SCUN" "Schizoporella unicornis"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 89 40.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 90 41.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 91 42.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 92 43.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 93 44.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 94 45.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 95 46.00 "SCUN" "Schizoporella unicornis"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 96 47.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 97 48.00 "BARE" "Bare"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" 98 49.00 "BARE" "Bare"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 100 1.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 101 2.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 102 3.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 103 4.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 104 5.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 105 6.00 "DILA""Didemnum lahilei"

3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 106 7.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 107 8.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 108 9.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 109 10.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 110 11.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 111 12.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 112 13.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 113 14.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 114 15.00 "DILA""Didemnum lahilei"
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3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 117 18.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 118 19.00 "DILA""Didemnum lahilei"
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3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 120 21.00 "DILA""Didemnum lahilei"

3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 121 22.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 122 23.00 "DILA""Didemnum lahilei"
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3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 124 25.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 125 26.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 126 27.00 "DILA""Didemnum lahilei"
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3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 132 33.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 133 34.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 134 35.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 135 36.00 "DILA""Didemnum lahilei"

3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 136 37.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 137 38.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 138 39.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 139 40.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 140 41.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 141 42.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 142 43.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 143 44.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 144 45.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 145 46.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 146 47.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 147 48.00 "DILA""Didemnum lahilei"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" 148 49.00 "DILA""Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 149 1.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 150 2.00 "DILA" "Didemnum lahilei"

4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 151 3.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 152 4.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 153 5.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 154 6.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 155 7.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 156 8.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 157 9.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 158 10.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 159 11.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 160 12.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 161 13.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 162 14.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 163 15.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 164 16.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 165 17.00 "DILA" "Didemnum lahilei"

4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 166 18.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 167 19.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 168 20.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 169 21.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 170 22.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 171 23.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 172 24.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 173 25.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 174 26.00 "DILA" "Didemnum lahilei"
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4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 179 31.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 180 32.00 "DILA" "Didemnum lahilei"

4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 181 33.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 182 34.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 183 35.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 184 36.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 185 37.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 186 38.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 187 39.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 188 40.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 189 41.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 190 42.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 191 43.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 192 44.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 193 45.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 194 46.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 195 47.00 "DILA" "Didemnum lahilei"

4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 196 48.00 "DILA" "Didemnum lahilei"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" 197 49.00 "DILA" "Didemnum lahilei"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 198 1.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 199 2.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 200 3.00 "BARE" "Bare"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 201 4.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 202 5.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 203 6.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 204 7.00 "TUN2" "unknown tunicate 2 - dark gray"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 205 8.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 206 9.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 207 10.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 208 11.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 209 12.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 210 13.00 "BARE" "Bare"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 211 14.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 212 15.00 "SCUN" "Schizoporella unicornis"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 213 16.00 "TUN1" "unknown tunicate 1 - black and yellow"

5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 214 17.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 215 18.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 216 19.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 217 20.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 218 21.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 219 22.00 "SCUN" "Schizoporella unicornis"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 220 23.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 221 24.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 222 25.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 223 26.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 224 27.00 "BARE" "Bare"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 225 28.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 226 29.00 "SCUN" "Schizoporella unicornis"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 227 30.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 228 31.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 229 32.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 230 33.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 231 34.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 232 35.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 233 36.00 "BARE" "Bare"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 234 37.00 "BOTROI" "Botrylloides sp."

5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 235 38.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 236 39.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 237 40.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 238 41.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 239 42.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 240 43.00 "BARE" "Bare"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 241 44.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 242 45.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 243 46.00 "TUN1" "unknown tunicate 1 - black and yellow"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 244 47.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 245 48.00 "BOTROI" "Botrylloides sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" 246 49.00 "BOTROI" "Botrylloides sp."
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 247 1.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 248 2.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 249 3.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 250 4.00 "BOTROI" "Botrylloides sp."
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 251 5.00 "BOTROI" "Botrylloides sp."
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 252 6.00 "BOTROI" "Botrylloides sp."

6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 253 7.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 254 8.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 255 9.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 256 10.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 257 11.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 258 12.00 "BOTROI" "Botrylloides sp."
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 259 13.00 "BOTROI" "Botrylloides sp."
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 260 14.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 261 15.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 262 16.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 263 17.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 264 18.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 265 19.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 266 20.00 "BOTROI" "Botrylloides sp."
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 267 21.00 "TUN1" "unknown tunicate 1 - black and yellow"

6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 268 22.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 269 23.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 270 24.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 271 25.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 272 26.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 273 27.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 274 28.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 275 29.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 276 30.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 277 31.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 278 32.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 279 33.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 280 34.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 281 35.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 282 36.00 "TUN1" "unknown tunicate 1 - black and yellow"

6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 283 37.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 284 38.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 285 39.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 286 40.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 287 41.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 288 42.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 289 43.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 290 44.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 291 45.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 292 46.00 "SCUN" "Schizoporella unicornis"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 293 47.00 "BARE" "Bare"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 294 48.00 "TUN1" "unknown tunicate 1 - black and yellow"
6 "Drakes Estero" 14.00 "Rack"3.00 8/13/2004 "more small colonial pendant lobes which were difficult to identify; big Botrylloides colony" 295 49.00 "BOTROI" "Botrylloides sp."
7 "Drakes Estero" 14.00 "Away" 1.00 8/13/2004 "very little invert growth" 314 1.00 "BARE" "Bare"
7 "Drakes Estero" 14.00 "Away" 1.00 8/13/2004 "very little invert growth" 315 2.00 "BARE" "Bare"
7 "Drakes Estero" 14.00 "Away" 1.00 8/13/2004 "very little invert growth" 316 3.00 "BARE" "Bare"

7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	317	4.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	318	5.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	319	6.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	320	7.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	321	8.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	322	9.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	323	10.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	324	11.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	325	12.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	326	13.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	327	14.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	328	15.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	329	16.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	330	17.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	331	18.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	332	19.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	333	20.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	334	21.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	335	22.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	336	23.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	337	24.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	338	25.00	"BARE"	"Bare"			
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"	
	339	26.00	"BARE"	"Bare"			

7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	340	27.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	341	28.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	342	29.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	343	30.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	344	31.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	296	32.00	"SCUN"	"Schizoporella unicornis"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	297	33.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	298	34.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	299	35.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	300	36.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	301	37.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	302	38.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	303	39.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	304	40.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	305	41.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	306	42.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	307	43.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	308	44.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	309	45.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	310	46.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	311	47.00	"SCUN"	"Schizoporella unicornis"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	312	48.00	"BARE"	"Bare"		
7	"Drakes Estero"	14.00	"Away"	1.00	8/13/2004	"very little invert growth"
	313	49.00	"BARE"	"Bare"		

8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
345	1.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
346	2.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
347	3.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
348	4.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
349	5.00	"SCUN"	"Schizoporella unicornis"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
350	6.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
351	7.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
352	8.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
353	9.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
354	10.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
355	11.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
356	12.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
357	13.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
358	14.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
359	15.00	"SCUN"	"Schizoporella unicornis"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
360	16.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
361	17.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
362	18.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
363	19.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
364	20.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
365	21.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
366	22.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
367	23.00	"BARE"	"Bare"			

8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	368	24.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	369	25.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	370	26.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	371	27.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	372	28.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	373	29.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	374	30.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	375	31.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	376	32.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	377	33.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	378	34.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	379	35.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	380	36.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	381	37.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	382	38.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	383	39.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	384	40.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	385	41.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	386	42.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	387	43.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	388	44.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	389	45.00	"BARE"	"Bare"		
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"
	390	46.00	"BARE"	"Bare"		

8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"	
	391	47.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"	
	392	48.00	"BARE"	"Bare"			
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"	
	393	49.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	394	1.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	395	2.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	396	3.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	397	4.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	398	5.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	399	6.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	400	7.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	401	8.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	402	9.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	403	10.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	404	11.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	405	12.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	406	13.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	407	14.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	408	15.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	409	16.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	410	17.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	411	18.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	412	19.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	413	20.00	"BARE"	"Bare"			

9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	414	21.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	415	22.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	416	23.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	417	24.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	418	25.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	419	26.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	420	27.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	421	28.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	422	29.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	423	30.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	424	31.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	425	32.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	426	33.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	427	34.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	428	35.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	429	36.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	430	37.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	431	38.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	432	39.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	433	40.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	434	41.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	435	42.00	"BARE"	"Bare"			
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"	
	436	43.00	"BARE"	"Bare"			

9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"
	437	44.00	"SCUN"	"Schizoporella unicornis"		
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"
	438	45.00	"BARE"	"Bare"		
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"
	439	46.00	"BARE"	"Bare"		
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"
	440	47.00	"BARE"	"Bare"		
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"
	441	48.00	"BARE"	"Bare"		
9	"Drakes Estero"	14.00	"Away"	3.00	8/13/2004	"very little invert growth"
	442	49.00	"BARE"	"Bare"		
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			443	1.00	"BARE"	"Bare"
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			444	2.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			445	3.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			446	4.00	"BARE"	"Bare"
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			447	5.00	"BARE"	"Bare"
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			448	6.00	"BARE"	"Bare"
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			449	7.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			450	8.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			451	9.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			452	10.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			453	11.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			454	12.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			455	13.00	"BARE"	"Bare"
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			456	14.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			457	15.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			458	16.00	"BALA"	"Balanus sp."
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth;
three Hermi. Nudibranchs present"			459	17.00	"BALA"	"Balanus sp."

10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	460
18.00	"BARE"	"Bare"					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	461
19.00	"BARE"	"Bare"					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	462
20.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	463
21.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	464
22.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	465
23.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	466
24.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	467
25.00	"BARE"	"Bare"					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	468
26.00	"BARE"	"Bare"					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	469
27.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	470
28.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	471
29.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	472
30.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	473
31.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	474
32.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	475
33.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	476
34.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	477
35.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	478
36.00	"BARE"	"Bare"					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	479
37.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	480
38.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	481
39.00	"BALA"	"Balanus sp."					
10	"Drakes Estero"	11.00	"Away"	1.00	8/13/2004	"lots of Barnacle growth; three Hermi. Nudibranchs present"	482
40.00	"BALA"	"Balanus sp."					

10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 483 41.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 484 42.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 485 43.00 "BARE" "Bare"
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 486 44.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 487 45.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 488 46.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 489 47.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 490 48.00 "BALA" "Balanus sp."
10 "Drakes Estero" 11.00 "Away" 1.00 8/13/2004 "lots of Barnacle growth; three Hermi. Nudibranchs present" 491 49.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 492 1.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 493 2.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 494 3.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 495 4.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 496 5.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 497 6.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 498 7.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 499 8.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 500 9.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 501 10.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 502 11.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 503 12.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 504 13.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 505 14.00 "BARE" "Bare"

11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
506	15.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
507	16.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
508	17.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
509	18.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
510	19.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
511	20.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
512	21.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
513	22.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
514	23.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
515	24.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
516	25.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
517	26.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
518	27.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
519	28.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
520	29.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
521	30.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
522	31.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
523	32.00	"SCUN"	"Schizoporella unicornis"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
524	33.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
525	34.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
526	35.00	"BARE"	"Bare"				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
527	36.00	"BALA"	"Balanus sp."				
11	"Drakes Estero"	11.00	"Away"	2.00	8/13/2004	"lots of barnacle growth"	
528	37.00	"BARE"	"Bare"				

11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 529 38.00 "SCUN" "Schizoporella unicornis"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 530 39.00 "SCUN" "Schizoporella unicornis"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 531 40.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 532 41.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 533 42.00 "BARE" "Bare"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 534 43.00 "SCUN" "Schizoporella unicornis"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 535 44.00 "SCUN" "Schizoporella unicornis"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 536 45.00 "SCUN" "Schizoporella unicornis"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 537 46.00 "SCUN" "Schizoporella unicornis"
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 538 47.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 539 48.00 "BALA" "Balanus sp."
11 "Drakes Estero" 11.00 "Away" 2.00 8/13/2004 "lots of barnacle growth" 540 49.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 541 1.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 542 2.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 543 3.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 544 4.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 545 5.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 546 6.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 547 7.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 548 8.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 549 9.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 550 10.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 551 11.00 "BALA" "Balanus sp."

12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 552 12.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 553 13.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 554 14.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 555 15.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 556 16.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 557 17.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 558 18.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 559 19.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 560 20.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 561 21.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 562 22.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 563 23.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 564 24.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 565 25.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 566 26.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 567 27.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 568 28.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 569 29.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 570 30.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 571 31.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 572 32.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 573 33.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 574 34.00 "BALA" "Balanus sp."

12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 575 35.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 576 36.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 577 37.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 578 38.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 579 39.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 580 40.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 581 41.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 582 42.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 583 43.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 584 44.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 585 45.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 586 46.00 "BALA" "Balanus sp."
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 587 47.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 588 48.00 "BARE" "Bare"
12 "Drakes Estero" 11.00 "Away" 3.00 8/13/2004 "moderate barnacle growth" 589 49.00 "BARE" "Bare"
13 "Drakes Estero" 11.00 "Rack" 1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 590 1.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack" 1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 591 2.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack" 1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 592 3.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack" 1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 593 4.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack" 1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 594 5.00 "WASU" "Watersipora subtorquata"

13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 595 6.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 596 7.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 597 8.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 598 9.00 "BARE" "Bare"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 599 10.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 600 11.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 601 12.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 602 13.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 603 14.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 604 15.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 605 16.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 606 17.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 607 18.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 608 19.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 609 20.00 "WASU" "Watersipora subtorquata"

13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 610 21.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 611 22.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 612 23.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 613 24.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 614 25.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 615 26.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 616 27.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 617 28.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 618 29.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 619 30.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 620 31.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 621 32.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 622 33.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 623 34.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 624 35.00 "SCUN" "Schizoporella unicornis"

13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 625 36.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 626 37.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 627 38.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 628 39.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 629 40.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 630 41.00 "WASU" "Watersipora subtorquata"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 631 42.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 632 43.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 633 44.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 634 45.00 "HABO" "Halichondria bowerbanki"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 635 46.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 636 47.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 637 48.00 "SCUN" "Schizoporella unicornis"
13 "Drakes Estero" 11.00 "Rack"1.00 8/13/2004 "completely encrusted with bryozoans except for sponge in one corner" 638 49.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack"2.00 8/13/2004 "completely encrusted with bryozoans" 639 1.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack"2.00 8/13/2004 "completely encrusted with bryozoans" 640 2.00 "WASU" "Watersipora subtorquata"

14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 641 3.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 642 4.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 643 5.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 644 6.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 645 7.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 646 8.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 647 9.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 648 10.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 649 11.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 650 12.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 651 13.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 652 14.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 653 15.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 654 16.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 655 17.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 656 18.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 657 19.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 658 20.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 659 21.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 660 22.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 661 23.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 662 24.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 663 25.00 "SCUN" "Schizoporella unicornis"

14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 664 26.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 665 27.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 666 28.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 667 29.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 668 30.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 669 31.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 670 32.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 671 33.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 672 34.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 673 35.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 674 36.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 675 37.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 676 38.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 677 39.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 678 40.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 679 41.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 680 42.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 681 43.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 682 44.00 "SCUN" "Schizoporella unicornis"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 683 45.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 684 46.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 685 47.00 "WASU" "Watersipora subtorquata"
14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 686 48.00 "WASU" "Watersipora subtorquata"

14 "Drakes Estero" 11.00 "Rack" 2.00 8/13/2004 "completely encrusted with bryozoans" 687 49.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 692 1.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 693 2.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 694 3.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 695 4.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 696 5.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 697 6.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 698 7.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 699 8.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 700 9.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 701 10.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 702 11.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 703 12.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 704 13.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 705 14.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 706 15.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 707 16.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 708 17.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 709 18.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 710 19.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 711 20.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 712 21.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 713 22.00 "BOTROI" "Botrylloides sp."

15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 714 23.00 "TUN1" "unknown tunicate 1 - black and yellow"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 715 24.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 716 25.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 717 26.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 718 27.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 719 28.00 "BARE" "Bare"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 720 29.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 721 30.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 722 31.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 723 32.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 724 33.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 725 34.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 726 35.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 727 36.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 728 37.00 "TUN1" "unknown tunicate 1 - black and yellow"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 729 38.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 730 39.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 731 40.00 "WASU" "Watersipora subtorquata"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 732 41.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 733 42.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 734 43.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 735 44.00 "BOTROI" "Botrylloides sp."

15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 736 45.00 "BOTROI" "Botrylloides sp."
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 688 46.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 689 47.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 690 48.00 "SCUN" "Schizoporella unicornis"
15 "Drakes Estero" 11.00 "Rack" 3.00 8/13/2004 "large red Botrylloides sp. colony covering most of plate" 691 49.00 "BOTROI" "Botrylloides sp."
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 737 1.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 738 2.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 739 3.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 740 4.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 741 5.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 742 6.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 743 7.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 744 8.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 745 9.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 746 10.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 747 11.00 "SPIR" "Spirorbis sp."
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 748 12.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 749 13.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 750 14.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 751 15.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 752 16.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 753 17.00 "BARE" "Bare"
16 "Drakes Estero" 8.00 "Away" 1.00 8/16/2004 "sparse invert growth" 754 18.00 "BARE" "Bare"

16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	755	19.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	756	20.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	757	21.00	"SPIR"	"Spirorbis sp."		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	758	22.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	759	23.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	760	24.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	761	25.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	762	26.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	763	27.00	"SCUN"	"Schizoporella unicornis"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	764	28.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	765	29.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	766	30.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	767	31.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	768	32.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	769	33.00	"SPIR"	"Spirorbis sp."		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	770	34.00	"SCUN"	"Schizoporella unicornis"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	771	35.00	"SCUN"	"Schizoporella unicornis"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	772	36.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	773	37.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	774	38.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	775	39.00	"BARE"	"Bare"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	776	40.00	"SCUN"	"Schizoporella unicornis"		
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"
	777	41.00	"SCUN"	"Schizoporella unicornis"		

16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
778	42.00	"SCUN"	"Schizoporella unicornis"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
779	43.00	"WASU"	"Watersipora subtorquata"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
780	44.00	"WASU"	"Watersipora subtorquata"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
781	45.00	"BARE"	"Bare"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
782	46.00	"WASU"	"Watersipora subtorquata"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
783	47.00	"WASU"	"Watersipora subtorquata"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
784	48.00	"BUNE"	"Bugula neritina"				
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	
785	49.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
786	1.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
787	2.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
788	3.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
789	4.00	"BUNE"	"Bugula neritina"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
790	5.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
791	6.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
792	7.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
793	8.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
794	9.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
795	10.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
796	11.00	"BARE"	"Bare"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
797	12.00	"BARE"	"Bare"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
798	13.00	"SCUN"	"Schizoporella unicornis"				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
799	14.00	"BOTROI"	"Botrylloides sp."				
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"	
800	15.00	"BARE"	"Bare"				

17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
801	16.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
802	17.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
803	18.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
804	19.00 "SPIR"		"Spirorbis sp."			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
805	20.00 "SPIR"		"Spirorbis sp."			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
806	21.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
807	22.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
808	23.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
809	24.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
810	25.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
811	26.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
812	27.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
813	28.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
814	29.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
815	30.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
816	31.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
817	32.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
818	33.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
819	34.00 "SCUN"		"Schizoporella unicornis"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
820	35.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
821	36.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
822	37.00 "BARE"		"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
823	38.00 "BARE"		"Bare"			

17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
824	39.00	"BARE"	"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
825	40.00	"SCUN"	"Schizoporella unicornis"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
826	41.00	"SCUN"	"Schizoporella unicornis"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
827	42.00	"BARE"	"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
828	43.00	"SCUN"	"Schizoporella unicornis"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
829	44.00	"BARE"	"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
830	45.00	"SPIR"	"Spirorbis sp."			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
831	46.00	"BARE"	"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
832	47.00	"BARE"	"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
833	48.00	"BARE"	"Bare"			
17	"Drakes Estero"	8.00	"Away"	2.00	8/16/2004	"sparse invert growth"
834	49.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
835	1.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
836	2.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
837	3.00	"SPIR"	"Spirorbis sp."			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
838	4.00	"BUNE"	"Bugula neritina"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
839	5.00	"SCUN"	"Schizoporella unicornis"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
840	6.00	"SCUN"	"Schizoporella unicornis"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
841	7.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
842	8.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
843	9.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
844	10.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
845	11.00	"BUNE"	"Bugula neritina"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
846	12.00	"BUNE"	"Bugula neritina"			

18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	847	13.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	848	14.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	849	15.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	850	16.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	851	17.00	"SPIR"	"Spirorbis sp."				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	852	18.00	"SPIR"	"Spirorbis sp."				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	853	19.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	854	20.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	855	21.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	856	22.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	857	23.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	858	24.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	859	25.00	"BUNE"	"Bugula neritina"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	860	26.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	861	27.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	862	28.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	863	29.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	864	30.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	865	31.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	866	32.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	867	33.00	"BARE"	"Bare"				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	868	34.00	"SPIR"	"Spirorbis sp."				
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"		
	869	35.00	"BUNE"	"Bugula neritina"				

18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
870	36.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
871	37.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
872	38.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
873	39.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
874	40.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
875	41.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
876	42.00	"BUNE"	"Bugula neritina"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
877	43.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
878	44.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
879	45.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
880	46.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
881	47.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
882	48.00	"BARE"	"Bare"			
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"
883	49.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
884	1.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
885	2.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
886	3.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
887	4.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
888	5.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
889	6.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
890	7.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
891	8.00	"BARE"	"Bare"			
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	
892	9.00	"BARE"	"Bare"			

22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 893 10.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 894 11.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 895 12.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 896 13.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 897 14.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 898 15.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 899 16.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 900 17.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 901 18.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 902 19.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 903 20.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 904 21.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 905 22.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 906 23.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 907 24.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 908 25.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 909 26.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 910 27.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 911 28.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 912 29.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 913 30.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 914 31.00 "BARE" "Bare"
22 "Estero de Limantour" 97.00 1.00 8/16/2004 "only 2 Balanus and a few specks of what appears to be Ralfsia sp." 915 32.00 "BARE" "Bare"

22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	916	33.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	917	34.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	918	35.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	919	36.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	920	37.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	921	38.00	"BALA" "Balanus sp."
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	922	39.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	923	40.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	924	41.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	925	42.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	926	43.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	927	44.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	928	45.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	929	46.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	930	47.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	931	48.00	"BARE" "Bare"
22	"Estero de Limantour"	97.00	1.00	8/16/2004	"only 2 Balanus and a few specks of what appears to be Ralfsia sp."	932	49.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	933	1.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	934	2.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	935	3.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	936	4.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	937	5.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	938	6.00	"BARE" "Bare"

23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	939	7.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	940	8.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	941	9.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	942	10.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	943	11.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	944	12.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	945	13.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	946	14.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	947	15.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	948	16.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	949	17.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	950	18.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	951	19.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	952	20.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	953	21.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	954	22.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	955	23.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	956	24.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	957	25.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	958	26.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	959	27.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	960	28.00	"BARE" "Bare"
23	"Estero de Limantour"	97.00	2.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	961	29.00	"BARE" "Bare"

23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 962 30.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 963 31.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 964 32.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 965 33.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 966 34.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 967 35.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 968 36.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 969 37.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 970 38.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 971 39.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 972 40.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 973 41.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 974 42.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 975 43.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 976 44.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 977 45.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 978 46.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 979 47.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 980 48.00 "BARE" "Bare"
23 "Estero de Limantour" 97.00 2.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 981 49.00 "BARE" "Bare"
24 "Estero de Limantour" 97.00 3.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 982 1.00 "BARE" "Bare"
24 "Estero de Limantour" 97.00 3.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 983 2.00 "BARE" "Bare"
24 "Estero de Limantour" 97.00 3.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 984 3.00 "BARE" "Bare"

24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	985
4.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	986
5.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	987
6.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	988
7.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	989
8.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	990
9.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	991
10.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	992
11.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	993
12.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	994
13.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	995
14.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	996
15.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	997
16.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	998
17.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	999
18.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1000
19.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1001
20.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1002
21.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1003
22.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1004
23.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1005
24.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1006
25.00	"BARE"	"Bare"				
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."	1007
26.00	"BARE"	"Bare"				

24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1008	27.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1009	28.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1010	29.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1011	30.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1012	31.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1013	32.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1014	33.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1015	34.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1016	35.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1017	36.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1018	37.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1019	38.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1020	39.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1021	40.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1022	41.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1023	42.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1024	43.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1025	44.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1026	45.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1027	46.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1028	47.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1029	48.00	"BARE"	"Bare"		
24	"Estero de Limantour"	97.00	3.00	8/16/2004	"only few specks of what appears to be Ralfsia sp."
1030	49.00	"BARE"	"Bare"		

25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1072 1.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1073 2.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1074 3.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1075 4.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1076 5.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1077 6.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1078 7.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1079 8.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1031 9.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1032 10.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1033 11.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1034 12.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1035 13.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1036 14.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1037 15.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1038 16.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1039 17.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1040 18.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1041 19.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1042 20.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1043 21.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1044 22.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp."1045 23.00 "BARE" "Bare"

25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1046 24.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1047 25.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1048 26.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1049 27.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1050 28.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1051 29.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1052 30.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1053 31.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1054 32.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1055 33.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1056 34.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1057 35.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1058 36.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1059 37.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1060 38.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1061 39.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1062 40.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1063 41.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1064 42.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1065 43.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1066 44.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1067 45.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1068 46.00 "BARE" "Bare"

25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1069 47.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1070 48.00 "BARE" "Bare"
25 "Estero de Limantour" 116.00 1.00 8/16/2004 "only few specks of what appears to be Ralfsia sp." 1071 49.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1080 1.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1081 2.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1082 3.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1083 4.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1084 5.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1085 6.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1086 7.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1087 8.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1088 9.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1089 10.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1090 11.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1091 12.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1092 13.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1093 14.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1094 15.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1095 16.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1096 17.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1097 18.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1098 19.00 "BARE" "Bare"
26 "Estero de Limantour" 116.00 2.00 8/16/2004 "only 1 Balanus and a few specks of what appears to be Ralfsia sp." 1099 20.00 "BARE" "Bare"

26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1100	21.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1101	22.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1102	23.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1103	24.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1104	25.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1105	26.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1106	27.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1107	28.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1108	29.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1109	30.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1110	31.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1111	32.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1112	33.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1113	34.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1114	35.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1115	36.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1116	37.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1117	38.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1118	39.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1119	40.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1120	41.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1121	42.00	"BARE" "Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1122	43.00	"BARE" "Bare"

26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1123	44.00	"BARE"	"Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1124	45.00	"BARE"	"Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1125	46.00	"BARE"	"Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1126	47.00	"BARE"	"Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1127	48.00	"BARE"	"Bare"
26	"Estero de Limantour"	116.00	2.00	8/16/2004	"only 1 Balanus and a few specks of what appears to be Ralfsia sp."	1128	49.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1129	1.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1130	2.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1131	3.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1132	4.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1133	5.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1134	6.00	"BALA"	"Balanus sp."
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1135	7.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1136	8.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1137	9.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1138	10.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1139	11.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1140	12.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1141	13.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1142	14.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1143	15.00	"BARE"	"Bare"
27	"Estero de Limantour"	116.00	3.00	8/16/2004	"only 4 Balanus and a few specks of what appears to be Ralfsia sp."	1144	16.00	"BARE"	"Bare"

27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1145 17.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1146 18.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1147 19.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1148 20.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1149 21.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1150 22.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1151 23.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1152 24.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1153 25.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1154 26.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1155 27.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1156 28.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1157 29.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1158 30.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1159 31.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1160 32.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1161 33.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1162 34.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1163 35.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1164 36.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1165 37.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1166 38.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1167 39.00 "BARE" "Bare"

27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1168 40.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1169 41.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1170 42.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1171 43.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1172 44.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1173 45.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1174 46.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1175 47.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1176 48.00 "BARE" "Bare"
27 "Estero de Limantour" 116.00 3.00 8/16/2004 "only 4 Balanus and a few specks of what appears to be Ralfsia sp." 1177 49.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1178 1.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1179 2.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1180 3.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1181 4.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1182 5.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1183 6.00 "BALA" "Balanus sp."
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1184 7.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1185 8.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1186 9.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1187 10.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1188 11.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1189 12.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1190 13.00 "BARE" "Bare"

28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1191 14.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1192 15.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1193 16.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1194 17.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1195 18.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1196 19.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1197 20.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1198 21.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1199 22.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1200 23.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1201 24.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1202 25.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1203 26.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1204 27.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1205 28.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1206 29.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1207 30.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1208 31.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1209 32.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1210 33.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1211 34.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1212 35.00 "BARE"	"Bare"			
28	"Estero de Limantour"	136.00	1.00	8/16/2004	"no invert growth
at all"	1213 36.00 "BARE"	"Bare"			

28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1214 37.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1215 38.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1216 39.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1217 40.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1218 41.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1219 42.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1220 43.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1221 44.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1222 45.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1223 46.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1224 47.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1225 48.00 "BARE" "Bare"
28 "Estero de Limantour" 136.00 1.00 8/16/2004 "no invert growth at all" 1226 49.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1227 1.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1228 2.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1229 3.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1230 4.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1231 5.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1232 6.00 "BALA" "Balanus sp."
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1233 7.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1234 8.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1235 9.00 "BARE" "Bare"
29 "Estero de Limantour" 136.00 2.00 8/16/2004 "no invert growth at all" 1236 10.00 "BARE" "Bare"

29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1237 11.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1238 12.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1239 13.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1240 14.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1241 15.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1242 16.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1243 17.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1244 18.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1245 19.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1246 20.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1247 21.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1248 22.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1249 23.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1250 24.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1251 25.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1252 26.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1253 27.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1254 28.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1255 29.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1256 30.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1257 31.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1258 32.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1259 33.00 "BARE"	"Bare"			

29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1260 34.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1261 35.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1262 36.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1263 37.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1264 38.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1265 39.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1266 40.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1267 41.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1268 42.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1269 43.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1270 44.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1271 45.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1272 46.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1273 47.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1274 48.00 "BARE"	"Bare"			
29	"Estero de Limantour"	136.00	2.00	8/16/2004	"no invert growth
at all"	1275 49.00 "BARE"	"Bare"			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1276 1.00 "BARE"	"Bare"			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1277 2.00 "BARE"	"Bare"			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1278 3.00 "BARE"	"Bare"			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1279 4.00 "BARE"	"Bare"			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1280 5.00 "BARE"	"Bare"			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1281 6.00 "BALA"	"Balanus sp."			
30	"Estero de Limantour"	136.00	3.00	8/16/2004	"no invert growth
at all"	1282 7.00 "BARE"	"Bare"			

30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1283 8.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1284 9.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1285 10.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1286 11.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1287 12.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1288 13.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1289 14.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1290 15.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1291 16.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1292 17.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1293 18.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1294 19.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1295 20.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1296 21.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1297 22.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1298 23.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1299 24.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1300 25.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1301 26.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1302 27.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1303 28.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1304 29.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1305 30.00 "BARE" "Bare"

30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1306 31.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1307 32.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1308 33.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1309 34.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1310 35.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1311 36.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1312 37.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1313 38.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1314 39.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1315 40.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1316 41.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1317 42.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1318 43.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1319 44.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1320 45.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1321 46.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1322 47.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1323 48.00 "BARE" "Bare"
30 "Estero de Limantour" 136.00 3.00 8/16/2004 "no invert growth at all" 1324 49.00 "BARE" "Bare"
31 "Drakes Estero" 5.00 "Rack" 1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1325 1.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack" 1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1326 2.00 "SCUN" "Schizoporella unicornis"

31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1327 3.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1328 4.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1329 5.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1330 6.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1331 7.00 "BOTRUS" "Botryllus sp."
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1332 8.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1333 9.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1334 10.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1335 11.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1336 12.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1337 13.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1338 14.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1339 15.00 "BARE" "Bare"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1340 16.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1341 17.00 "BARE" "Bare"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1342 18.00 "SCUN" "Schizoporella unicornis"

31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1343 19.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1344 20.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1345 21.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1346 22.00 "BARE" "Bare"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1347 23.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1348 24.00 "BOTRUS" "Botryllus sp."
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1349 25.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1350 26.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1351 27.00 "BARE" "Bare"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1352 28.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1353 29.00 "BARE" "Bare"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1354 30.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1355 31.00 "OBEL" "Obelia sp."
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1356 32.00 "OBEL" "Obelia sp."
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1357 33.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1358 34.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1359 35.00 "WASU" "Watersipora subtorquata"

31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1360 36.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1361 37.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1362 38.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1363 39.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1364 40.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1365 41.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1366 42.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1367 43.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1368 44.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1369 45.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1370 46.00 "WASU" "Watersipora subtorquata"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1371 47.00 "OBEL" "Obelia sp."
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1372 48.00 "SCUN" "Schizoporella unicornis"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" 1373 49.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1374 1.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1375 2.00 "OBEL" "Obelia sp."

32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1376 3.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1377 4.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1378 5.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1379 6.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1380 7.00 "BOTROI" "Botrylloides sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1381 8.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1382 9.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1383 10.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1384 11.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1385 12.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1386 13.00 "BARE" "Bare"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1387 14.00 "BUNE" "Bugula neritina"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1388 15.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1389 16.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1390 17.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1391 18.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1392 19.00 "OBEL" "Obelia sp."

32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1393 20.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1394 21.00 "BUNE" "Bugula neritina"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1395 22.00 "DIAL""Didemnum albidum"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1396 23.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1397 24.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1398 25.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1399 26.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1400 27.00 "BARE" "Bare"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1401 28.00 "BARE" "Bare"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1402 29.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1403 30.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1404 31.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1405 32.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1406 33.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1407 34.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1408 35.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1409 36.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1410 37.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1411 38.00 "OBEL" "Obelia sp."

32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1412 39.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1413 40.00 "BARE" "Bare"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1414 41.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1415 42.00 "BARE" "Bare"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1416 43.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1417 44.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1418 45.00 "WASU" "Watersipora subtorquata"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1419 46.00 "BARE" "Bare"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1420 47.00 "SCUN" "Schizoporella unicornis"
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1421 48.00 "OBEL" "Obelia sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" 1422 49.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1423 1.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1424 2.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1425 3.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1426 4.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1427 5.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1428 6.00 "WASU" "Watersipora subtorquata"

33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1429 7.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1430 8.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1431 9.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1432 10.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1433 11.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1434 12.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1435 13.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1436 14.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1437 15.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1438 16.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1439 17.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1440 18.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1441 19.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1442 20.00 "BOTRUS" "Botryllus sp."
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1443 21.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1444 22.00 "WASU" "Watersipora subtorquata"

33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1445 23.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1446 24.00 "BUNE" "Bugula neritina"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1447 25.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1448 26.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1449 27.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1450 28.00 "BUNE" "Bugula neritina"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1451 29.00 "BOTROI" "Botrylloides sp."
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1452 30.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1453 31.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1454 32.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1455 33.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1456 34.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1457 35.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1458 36.00 "OBEL" "Obelia sp."
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1459 37.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1460 38.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1461 39.00 "BARE" "Bare"

33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1462 40.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1463 41.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1464 42.00 "OBEL" "Obelia sp."
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1465 43.00 "BARE" "Bare"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1466 44.00 "BOTRUS" "Botryllus sp."
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1467 45.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1468 46.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1469 47.00 "SCUN" "Schizoporella unicornis"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1470 48.00 "WASU" "Watersipora subtorquata"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" 1471 49.00 "WASU" "Watersipora subtorquata"
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1472 1.00 "BUNE" "Bugula neritina"
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1473 2.00 "BARE" "Bare"
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1474 3.00 "BARE" "Bare"
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1475 4.00 "BUNE" "Bugula neritina"
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1476 5.00 "BOTROI" "Botrylloides sp."
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1477 6.00 "BOTROI" "Botrylloides sp."
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1478 7.00 "BUNE" "Bugula neritina"
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1479 8.00 "BOTROI" "Botrylloides sp."
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" 1480 9.00 "BUNE" "Bugula neritina"

34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1481	10.00	
	"WASU"	"Watersipora subtorquata"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1482	11.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1483	12.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1484	13.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1485	14.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1486	15.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1487	16.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1488	17.00	
	"BOTROI"	"Botrylloides sp."						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1489	18.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1490	19.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1491	20.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1492	21.00	
	"DILA""Didemnum lahilei"							
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1493	22.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1494	23.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1495	24.00	
	"BOTROI"	"Botrylloides sp."						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1496	25.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1497	26.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1498	27.00	
	"DILA""Didemnum lahilei"							
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1499	28.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1500	29.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1501	30.00	
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1502	31.00	
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"1.00	8/17/2004	"no photo"	1503	32.00	
	"BARE"	"Bare"						

34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1504	33.00
	"WASU"	"Watersipora subtorquata"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1505	34.00
	"BOTROI"	"Botrylloides sp."						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1506	35.00
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1507	36.00
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1508	37.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1509	38.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1510	39.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1511	40.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1512	41.00
	"OBEL"	"Obelia sp."						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1513	42.00
	"BOTROI"	"Botrylloides sp."						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1514	43.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1515	44.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1516	45.00
	"BUNE"	"Bugula neritina"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1517	46.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1518	47.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1519	48.00
	"BARE"	"Bare"						
34	"Drakes Estero"	8.00	"Rack"	1.00	8/17/2004	"no photo"	1520	49.00
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"	2.00	8/17/2004	"no photo"	1521	1.00
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"	2.00	8/17/2004	"no photo"	1522	2.00
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"	2.00	8/17/2004	"no photo"	1523	3.00
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"	2.00	8/17/2004	"no photo"	1524	4.00
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"	2.00	8/17/2004	"no photo"	1525	5.00
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"	2.00	8/17/2004	"no photo"	1526	6.00
	"SPIR"	"Spirorbis sp."						

35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1527	7.00	
	"BUNE"	"Bugula neritina"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1528	8.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1529	9.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1530	10.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1531	11.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1532	12.00	
	"BUNE"	"Bugula neritina"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1533	13.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1534	14.00	
	"SPIR"	"Spirorbis sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1535	15.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1536	16.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1537	17.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1538	18.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1539	19.00	
	"BUNE"	"Bugula neritina"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1540	20.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1541	21.00	
	"BOTROI"	"Botrylloides sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1542	22.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1543	23.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1544	24.00	
	"BUNE"	"Bugula neritina"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1545	25.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1546	26.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1547	27.00	
	"BOTROI"	"Botrylloides sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1548	28.00	
	"SPIR"	"Spirorbis sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1549	29.00	
	"SCUN"	"Schizoporella unicornis"						

35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1550	30.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1551	31.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1552	32.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1553	33.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1554	34.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1555	35.00	
	"OBEL"	"Obelia sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1556	36.00	
	"BUNE"	"Bugula neritina"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1557	37.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1558	38.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1559	39.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1560	40.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1561	41.00	
	"BOTROI"	"Botrylloides sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1562	42.00	
	"OBEL"	"Obelia sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1563	43.00	
	"BUNE"	"Bugula neritina"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1564	44.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1565	45.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1566	46.00	
	"SCUN"	"Schizoporella unicornis"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1567	47.00	
	"BARE"	"Bare"						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1568	48.00	
	"BOTROI"	"Botrylloides sp."						
35	"Drakes Estero"	8.00	"Rack"2.00	8/17/2004	"no photo"	1569	49.00	
	"OBEL"	"Obelia sp."						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1570	1.00	
	"SCUN"	"Schizoporella unicornis"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1571	2.00	
	"SCUN"	"Schizoporella unicornis"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1572	3.00	
	"BARE"	"Bare"						

36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1573	4.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1574	5.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1575	6.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1576	7.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1577	8.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1578	9.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1579	10.00	
	"TUN1"	"unknown tunicate 1 - black and yellow"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1580	11.00	
	"SPIR"	"Spirorbis sp."						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1581	12.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1582	13.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1583	14.00	
	"SPIR"	"Spirorbis sp."						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1584	15.00	
	"TUN2"	"unknown tunicate 2 - dark gray"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1585	16.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1586	17.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1587	18.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1588	19.00	
	"SCUN"	"Schizoporella unicornis"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1589	20.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1590	21.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1591	22.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1592	23.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1593	24.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1594	25.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1595	26.00	
	"BARE"	"Bare"						

36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1596	27.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1597	28.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1598	29.00	
	"SCUN"	"Schizoporella unicornis"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1599	30.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1600	31.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1601	32.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1602	33.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1603	34.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1604	35.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1605	36.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1606	37.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1607	38.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1608	39.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1609	40.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1610	41.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1611	42.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1612	43.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1613	44.00	
	"BUNE"	"Bugula neritina"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1614	45.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1615	46.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1616	47.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1617	48.00	
	"BARE"	"Bare"						
36	"Drakes Estero"	8.00	"Rack"3.00	8/17/2004	"no photo"	1618	49.00	
	"WASU"	"Watersipora subtorquata"						

Appendix F – Description of fouling plate samples as percent cover; this is a PC Access database file entered in the main database at Pt. Reyes National Seashore (see attached file on CD).

"Location"	"Grid_Rack_"	"Rack_Away"	"Plate_"	"Species"	"CountOfSpCode"	"Expr1"
"Drakes Estero"	5.00	"Away"	1.00	"Bare"	17	34.69
"Drakes Estero"	5.00	"Away"	1.00	"Bugula neritina"	3	6.12
"Drakes Estero"	5.00	"Away"	1.00	"Schizoporella unicornis"	14	28.57
"Drakes Estero"	5.00	"Away"	1.00	"Watersipora subtorquata"	15	30.61
"Drakes Estero"	5.00	"Away"	2.00	"Bare"	23	46.93
"Drakes Estero"	5.00	"Away"	2.00	"Botrylloides sp."	3	6.12
"Drakes Estero"	5.00	"Away"	2.00	"Bugula neritina"	1	2.04
"Drakes Estero"	5.00	"Away"	2.00	"Obelia sp."	1	2.04
"Drakes Estero"	5.00	"Away"	2.00	"Schizoporella unicornis"	10	20.40
"Drakes Estero"	5.00	"Away"	2.00	"Watersipora subtorquata"	11	22.44
"Drakes Estero"	5.00	"Away"	3.00	"Didemnum lahilei"	49	100.00
"Drakes Estero"	5.00	"Rack"	1.00	"Bare"	5	10.20
"Drakes Estero"	5.00	"Rack"	1.00	"Botryllus sp."	2	4.08
"Drakes Estero"	5.00	"Rack"	1.00	"Obelia sp."	3	6.12
"Drakes Estero"	5.00	"Rack"	1.00	"Schizoporella unicornis"	25	51.02
"Drakes Estero"	5.00	"Rack"	1.00	"Watersipora subtorquata"	14	28.57
"Drakes Estero"	5.00	"Rack"	2.00	"Bare"	7	14.28
"Drakes Estero"	5.00	"Rack"	2.00	"Botrylloides sp."	1	2.04
"Drakes Estero"	5.00	"Rack"	2.00	"Bugula neritina"	2	4.08
"Drakes Estero"	5.00	"Rack"	2.00	"Didemnum albidum"	1	2.04
"Drakes Estero"	5.00	"Rack"	2.00	"Obelia sp."	18	36.73
"Drakes Estero"	5.00	"Rack"	2.00	"Schizoporella unicornis"	11	22.44
"Drakes Estero"	5.00	"Rack"	2.00	"Watersipora subtorquata"	9	18.36
"Drakes Estero"	5.00	"Rack"	3.00	"Bare"	9	18.36
"Drakes Estero"	5.00	"Rack"	3.00	"Botrylloides sp."	1	2.04
"Drakes Estero"	5.00	"Rack"	3.00	"Botryllus sp."	2	4.08
"Drakes Estero"	5.00	"Rack"	3.00	"Bugula neritina"	2	4.08
"Drakes Estero"	5.00	"Rack"	3.00	"Obelia sp."	2	4.08
"Drakes Estero"	5.00	"Rack"	3.00	"Schizoporella unicornis"	9	18.36
"Drakes Estero"	5.00	"Rack"	3.00	"Watersipora subtorquata"	24	48.97
"Drakes Estero"	8.00	"Away"	1.00	"Bare"	34	69.38
"Drakes Estero"	8.00	"Away"	1.00	"Bugula neritina"	1	2.04
"Drakes Estero"	8.00	"Away"	1.00	"Schizoporella unicornis"	7	14.28
"Drakes Estero"	8.00	"Away"	1.00	"Spirorbis sp."	3	6.12
"Drakes Estero"	8.00	"Away"	1.00	"Watersipora subtorquata"	4	8.16
"Drakes Estero"	8.00	"Away"	2.00	"Bare"	30	61.22
"Drakes Estero"	8.00	"Away"	2.00	"Botrylloides sp."	1	2.04
"Drakes Estero"	8.00	"Away"	2.00	"Bugula neritina"	1	2.04
"Drakes Estero"	8.00	"Away"	2.00	"Schizoporella unicornis"	14	28.57

"Drakes Estero"	8.00	"Away"	2.00	"Spirorbis sp."	3	6.12		
"Drakes Estero"	8.00	"Away"	3.00	"Bare"	37	75.51		
"Drakes Estero"	8.00	"Away"	3.00	"Bugula neritina"	6	12.24		
"Drakes Estero"	8.00	"Away"	3.00	"Schizoporella unicornis"	2	4.08		
"Drakes Estero"	8.00	"Away"	3.00	"Spirorbis sp."	4	8.16		
"Drakes Estero"	8.00	"Rack"	1.00	"Bare"	22	44.89		
"Drakes Estero"	8.00	"Rack"	1.00	"Botrylloides sp."	7	14.28		
"Drakes Estero"	8.00	"Rack"	1.00	"Bugula neritina"	15	30.61		
"Drakes Estero"	8.00	"Rack"	1.00	"Didemnum lahilei"	2	4.08		
"Drakes Estero"	8.00	"Rack"	1.00	"Obelia sp."	1	2.04		
"Drakes Estero"	8.00	"Rack"	1.00	"Watersipora subtorquata"	2	4.08		
"Drakes Estero"	8.00	"Rack"	2.00	"Bare"	15	30.61		
"Drakes Estero"	8.00	"Rack"	2.00	"Botrylloides sp."	4	8.16		
"Drakes Estero"	8.00	"Rack"	2.00	"Bugula neritina"	6	12.24		
"Drakes Estero"	8.00	"Rack"	2.00	"Obelia sp."	3	6.12		
"Drakes Estero"	8.00	"Rack"	2.00	"Schizoporella unicornis"	18	36.73		
"Drakes Estero"	8.00	"Rack"	2.00	"Spirorbis sp."	3	6.12		
"Drakes Estero"	8.00	"Rack"	3.00	"Bare"	31	63.26		
"Drakes Estero"	8.00	"Rack"	3.00	"Bugula neritina"	9	18.36		
"Drakes Estero"	8.00	"Rack"	3.00	"Schizoporella unicornis"	4	8.16		
"Drakes Estero"	8.00	"Rack"	3.00	"Spirorbis sp."	2	4.08		
"Drakes Estero"	8.00	"Rack"	3.00	"unknown tunicate 1 - black and yellow"	1	2.04		
"Drakes Estero"	8.00	"Rack"	3.00	"unknown tunicate 2 - dark gray"	1	2.04		
"Drakes Estero"	8.00	"Rack"	3.00	"Watersipora subtorquata"	1	2.04		
"Drakes Estero"	11.00	"Away"	1.00	"Balanus sp."	38	77.55		
"Drakes Estero"	11.00	"Away"	1.00	"Bare"	11	22.44		
"Drakes Estero"	11.00	"Away"	2.00	"Balanus sp."	20	40.81		
"Drakes Estero"	11.00	"Away"	2.00	"Bare"	16	32.65		
"Drakes Estero"	11.00	"Away"	2.00	"Schizoporella unicornis"	13	26.53		
"Drakes Estero"	11.00	"Away"	3.00	"Balanus sp."	21	42.85		
"Drakes Estero"	11.00	"Away"	3.00	"Bare"	28	57.14		
"Drakes Estero"	11.00	"Rack"	1.00	"Bare"	1	2.04		
"Drakes Estero"	11.00	"Rack"	1.00	"Halichondria bowerbanki"	8	16.32		
"Drakes Estero"	11.00	"Rack"	1.00	"Schizoporella unicornis"	18	36.73		
"Drakes Estero"	11.00	"Rack"	1.00	"Watersipora subtorquata"	22	44.89		
"Drakes Estero"	11.00	"Rack"	2.00	"Schizoporella unicornis"	24	48.97		
"Drakes Estero"	11.00	"Rack"	2.00	"Watersipora subtorquata"	25	51.02		
"Drakes Estero"	11.00	"Rack"	3.00	"Bare"	1	2.04		
"Drakes Estero"	11.00	"Rack"	3.00	"Botrylloides sp."	38	77.55		
"Drakes Estero"	11.00	"Rack"	3.00	"Schizoporella unicornis"	7	14.28		
"Drakes Estero"	11.00	"Rack"	3.00	"unknown tunicate 1 - black and yellow"	2	4.08		
"Drakes Estero"	11.00	"Rack"	3.00	"Watersipora subtorquata"	1	2.04		
"Drakes Estero"	14.00	"Away"	1.00	"Bare"	47	95.91		
"Drakes Estero"	14.00	"Away"	1.00	"Schizoporella unicornis"	2	4.08		
"Drakes Estero"	14.00	"Away"	2.00	"Bare"	47	95.91		
"Drakes Estero"	14.00	"Away"	2.00	"Schizoporella unicornis"	2	4.08		

"Drakes Estero"	14.00	"Away"	3.00	"Bare"	48	97.95	
"Drakes Estero"	14.00	"Away"	3.00	"Schizoporella unicornis"	1	2.04	
"Drakes Estero"	14.00	"Rack"	1.00	"Didemnum lahilei"	49	100.00	
"Drakes Estero"	14.00	"Rack"	2.00	"Bare"	5	10.20	
"Drakes Estero"	14.00	"Rack"	2.00	"Botrylloides sp."	30	61.22	
"Drakes Estero"	14.00	"Rack"	2.00	"Schizoporella unicornis"	3	6.12	
"Drakes Estero"	14.00	"Rack"	2.00	"unknown tunicate 1 - black and yellow"	10	20.40	
"Drakes Estero"	14.00	"Rack"	2.00	"unknown tunicate 2 - dark gray"	1	2.04	
"Drakes Estero"	14.00	"Rack"	3.00	"Bare"	18	36.73	
"Drakes Estero"	14.00	"Rack"	3.00	"Botrylloides sp."	7	14.28	
"Drakes Estero"	14.00	"Rack"	3.00	"Schizoporella unicornis"	7	14.28	
"Drakes Estero"	14.00	"Rack"	3.00	"unknown tunicate 1 - black and yellow"	17	34.69	
"Estero de Limantour"	97.00		1.00	"Balanus sp."	1	2.04	
"Estero de Limantour"	97.00		1.00	"Bare"	48	97.95	
"Estero de Limantour"	97.00		2.00	"Bare"	49	100.00	
"Estero de Limantour"	97.00		3.00	"Bare"	49	100.00	
"Estero de Limantour"	116.00		1.00	"Bare"	49	100.00	
"Estero de Limantour"	116.00		2.00	"Bare"	49	100.00	
"Estero de Limantour"	116.00		3.00	"Balanus sp."	1	2.04	
"Estero de Limantour"	116.00		3.00	"Bare"	48	97.95	
"Estero de Limantour"	136.00		1.00	"Balanus sp."	1	2.04	
"Estero de Limantour"	136.00		1.00	"Bare"	48	97.95	
"Estero de Limantour"	136.00		2.00	"Balanus sp."	1	2.04	
"Estero de Limantour"	136.00		2.00	"Bare"	48	97.95	
"Estero de Limantour"	136.00		3.00	"Balanus sp."	1	2.04	
"Estero de Limantour"	136.00		3.00	"Bare"	48	97.95	

Appendix G - Other species in fouling community:

"ID"	"Location"	"Grid_Rack_"	"Rack_Away"	"Plate_"	"Date"	"Comments"	"SpCode"	"Species"
8	"Drakes Estero"	14.00	"Away"	2.00	8/13/2004	"very little invert growth"	"BOTROI"	"Botrylloides sp."
16	"Drakes Estero"	8.00	"Away"	1.00	8/16/2004	"sparse invert growth"	"BOTROI"	"Botrylloides sp."
18	"Drakes Estero"	8.00	"Away"	3.00	8/13/2004	"sparse invert growth"	"BOTROI"	"Botrylloides sp."
31	"Drakes Estero"	5.00	"Rack"	1.00	8/16/2004	"bushy growth of Bugula and Obelia covering much of plate, but not surface cover"	"BOTROI"	"Botrylloides sp."
3	"Drakes Estero"	5.00	"Away"	3.00	8/13/2004	"Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth"	"BOTRUS"	"Botryllus sp."
32	"Drakes Estero"	5.00	"Rack"	2.00	8/16/2004	"bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover"	"BOTRUS"	"Botryllus sp."

31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" "DIAL""Didemnum albidum"
33 "Drakes Estero" 5.00 "Rack"3.00 8/16/2004 "bushy growth of Bugula and Obelia covering 30% of plate, but less surface cover" "DIAL""Didemnum albidum"
17 "Drakes Estero" 8.00 "Away" 2.00 8/16/2004 "sparse invert growth" "DILA""Didemnum lahilei"
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" "DIOC" "Distalpia occidentalis"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" "SCUN" "Schizoporella unicornis"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" "SCUN" "Schizoporella unicornis"
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" "WASU" "Watersipora subtorquata"
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" "WASU" "Watersipora subtorquata"
2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" "BALA" "Balanus sp."
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate" "BALA" "Balanus sp."
4 "Drakes Estero" 14.00 "Rack"1.00 8/13/2004 "massive growth of Didemnum lahillei; small Cancer crab taking refuge under fold of Didemnum" "BALA" "Balanus sp."
5 "Drakes Estero" 14.00 "Rack"2.00 8/13/2004 "lots of tunicate growth - colonial pendant lobes which were difficult to identify" "BALA" "Balanus sp."
7 "Drakes Estero" 14.00 "Away" 1.00 8/13/2004 "very little invert growth" "BALA" "Balanus sp."
8 "Drakes Estero" 14.00 "Away" 2.00 8/13/2004 "very little invert growth" "BALA" "Balanus sp."
9 "Drakes Estero" 14.00 "Away" 3.00 8/13/2004 "very little invert growth" "BALA" "Balanus sp."
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" "SPIR" "Spirorbis sp."
32 "Drakes Estero" 5.00 "Rack"2.00 8/16/2004 "bushy growth of Bugula and Obelia covering 75% of plate, but less surface cover" "SPIR" "Spirorbis sp."
34 "Drakes Estero" 8.00 "Rack"1.00 8/17/2004 "no photo" "SPIR" "Spirorbis sp."
1 "Drakes Estero" 5.00 "Away" 1.00 8/13/2004 "bushy growth of Bugula and Obelia covering about 50% of plate, but not surface cover; Obelia on other side of plate" "OBEL" "Obelia sp."

2 "Drakes Estero" 5.00 "Away" 2.00 8/13/2004 "substantial growth of Bugula and Obelia" "OBEL" "Obelia sp."
3 "Drakes Estero" 5.00 "Away" 3.00 8/13/2004 "Didemnum lahilea lost on removal from water, but covered entire surface of plate; other species listed were underlying Didemnum growth" "HABO" "Halichondria bowerbanki"
31 "Drakes Estero" 5.00 "Rack"1.00 8/16/2004 "bushy growth of Bugula and Obelia covering much of plate, but not surface cover" "HABO" "Halichondria bowerbanki"

Movement and Activity Patterns of Harbor Seals at the Point Reyes Peninsula, California

By

Sarah Allen Miller

B.S. (University of California) 1976

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF SCIENCE

in

WILDLAND RESOURCE SCIENCE

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA at BERKELEY

Approved: ..... 12 Dec 1988

Chair Russell D. Congalton ..... Date 19 Dec 1988

..... 12 Dec 1988

****

MOVEMENT AND ACTIVITY PATTERNS OF HARBOR SEALS AT THE POINT REYES PENINSULA, CALIFORNIA

Sarah Allen Miller

ABSTRACT

Seasonal and diel activity patterns of harbor seals were studied at Drakes Estero on the Point Reyes Peninsula, California, between 1985 and 1987. Activity patterns and movements were monitored with radio telemetry. Movements ranged south 210 km to Monterey Bay and north 480 km to the Klamath River. All movements >25 km occurred during the nonbreeding season and most seals returned to Drakes Estero by the following breeding season. More seals migrated in 1985 than 1986, and of the seals that migrated in 1985, more were females than males.

Seals hauled out for more hours per day and for more days per month during the breeding/molt season than during the winter. From November through March, the average percentage of radio-tagged seals hauled out per day varied between 52 and 81%, and from April through July, between 68% and 92%. Total hours per day that seals were hauled out during the breeding/molt season ranged from 9 to 11 hrs and for the nonbreeding season from 7 to 8 hrs. Foraging trips averaged 1.0 to 2.7 consecutive days per month, and seals took more trips per month during the nonbreeding season than during the breeding/molt season. The percentage of tagged seals hauled out over a 24-hr period was largest between 0500 and 1600 hr, regardless of season.

The amount of time that seals spent onshore varied seasonally. During the nonbreeding season seals spent about 30% of the time per day (7 hr) hauled out and 70% (17 hr) either traveling to feeding areas or engaged in foraging activities. During the breeding/molt season, however, they were hauled out 38 to 46% of the time per day (9 to 11 hr); the increase was due to additional haul-out bouts and during the molt to prolongation of individual bouts. The total hours per day, the length of a single haul-out bout, and the

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proportion of days hauled out per month were similar for males and females. Preference for location of haul-out site was the only significant difference in haul-out behavior between males and females, and segregation occurred only during the breeding season.

Based on a mark-recapture model, an estimated 950 seals used Drakes Estero in March 1987 (95% confidence interval: LL 692 and UL 1206). Recommendations for further study are to 1) determine biases associated with age-related differences in movement and activity patterns, 2) devise methods for monitoring seals with radio telemetry through the molt, and 3) research biases associated with annual variation in movement patterns.

Dec 19 1995

Approved: Dr. Reginald Barrett

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INTRODUCTION

Conservation, management, and protection of harbor seals, Phoca vitulina richardsi, come under the purview of the Marine Mammal Protection Act (MMPA) of 1972 (Public Law 92-522). A primary directive of the MMPA is to protect marine mammal stocks from declining below the optimum sustainable population (OSP) which is defined as "the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent" (Sec. 3(9) of the MMPA). Eberhardt (1977) interpreted the meaning of OSP as a level ranging between the maximum sustainable yield and asymptotic levels. In fulfillment of the MMPA guidelines, research has been directed toward identifying the OSP for all marine mammal species.

In California, the California Department of Fish and Game (CDFG), in cooperation with the National Marine Fisheries Service (NMFS) of the U. S. Department of Commerce, has been conducting annual, statewide, aerial surveys of harbor seals to assess the status of the population (Miller 1983, Hanan 1986, and Hanan et al. 1987). Harbor seal colonies along the Point Reyes coastline, Marin County, represent about 20% of the California mainland population during the breeding season (Allen and Huber 1984a, Hanan 1986), and consequently, have received attention from CDFG and NMFS, the agencies responsible for enforcement of the MMPA. Estimates for the size of the Point Reyes population, though, are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. As a result, estimates are likely low and one cannot relate numbers among seasons. In fact, establishing OSP for any marine mammal has been impeded by the difficulty of censusing species that spend a major portion of their lives in the water. A major endeavor in research, therefore, has been to devise accurate methods of population estimation (Eberhardt et al. 1979). For pinnipeds, all of these methods revolve around defining the amount of time seals, individually or as a group, spend on shore. Several researchers have addressed the problem using radio-tagged harbor seals and have derived correction factors with varying attendance patterns based on location, time of day,

and season of year (Brown and Mate 1983, Pitcher and McAllister 1981, Harvey 1987, Thompson 1987, and Yochem et al. 1987). Researchers have related differences between total number hauled out and estimates of abundance with variations in daily and seasonal haul-out patterns and with movements to other areas.

Local factors influencing the number of harbor seals hauled out on shore have been ascribed to food availability, tide level, time of day, weather, and disturbance (Brown and Mate 1983, Slater and Markowitz 1983, Stewart 1984, Allen et al. 1985, Harvey 1987, and Thompson 1987). Seasonal factors affecting number of seals hauled out include breeding, molt, and food availability (Loughlin 1978, Brown and Mate 1983, Stewart and Yochem 1983, Allen et al. 1985, Harvey 1987). Brown and Mate (1983) suggested that movement accounted for seasonal changes in number of harbor seals hauled out in Oregon and that movements were associated with seasonal changes in reproductive status and in response to seasonal variability in the abundance of coastal fish populations. Harbor seals at the Klamath River, California, moved locally to alternate haul-out sites year round and dispersed long distances in winter months (Herder 1986).

In the Point Reyes area harbor seals display diurnal and seasonal variation in haul-out patterns (Allen and Huber 1984a, Allen et al. 1985). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods, with a maximum of 2502 seals counted on June 28, 1984. Diurnal and tidal effects on seal haul-out behavior varied but most seals hauled out from mid-day to late afternoon at low to medium tides, depending on the physical attributes of each location. The diurnal pattern was similar to that of the southern Channel Islands (Stewart 1984), Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), and Bolinas Lagoon (Allen et al. 1985). During fall and winter months, the maximum number of seals was around 1000 animals. The winter decline in seal numbers may be the result of seals either moving to other haul-out sites outside of Point Reyes, or spending more time at sea.

Information on seasonal activity patterns and fall/winter movements would be valuable for any long-term management program for seals in the Point Reyes area, and in conjunction with results accumulated elsewhere (Harvey 1987, Herder 1986, Yochem et al. 1987), could provide more accurate estimates of abundance of the harbor seal population in California (Ribic et al. 1986). The objectives of this study were

to determine: 1) if the apparent decline in seal numbers during the winter months is a function of seasonal migration or a change in the haul-out pattern, 2) the destination of departing animals, 3) daily and seasonal variability in haul-out behavior, and 4) if gender or age accounted for variations in the above. Hypotheses associated with these objectives are that the winter decline in the number of seals hauled out is a function of movement out of the area and that daily and seasonal variability in haul-out behavior is related to sex and age class.

STUDY AREA AND METHODS

Study Area

The Point Reyes coastline extends from the mouth of Tomales Bay (38° 30'N) south to and including Bolinas Bay (37° 30'N) (Figure 1). Coastal embayments include Tomales Bay, Drakes Estero and Bolinas Lagoon. The Point Reyes National Seashore, the Golden Gate National Recreation Area, the Gulf of the Farallones National Marine Sanctuary, and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game and the California State Water Resources Control Board as Areas of Special Biological Significance because of their unique biological attributes (Chan 1979). The safeguards provided by these agencies and the inaccessibility of much of the area have protected the seals from human disruption. Consequently, seal terrestrial habitat usage probably has not changed significantly over the past century.

The topographical diversity of this coastline provides a broad range of substrates upon which seals haul-out in large groups. These include tidal mud flats, offshore tidal ledges and sandy beaches. A haul-out site is a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). At Point Reyes, these sites include sand bars in Tomales Bay, Tomales Point, Point Reyes Headland, Drakes Estero, Limantour Spit, Double Point, Duxbury Reef, and Bolinas Lagoon (Figure 1).

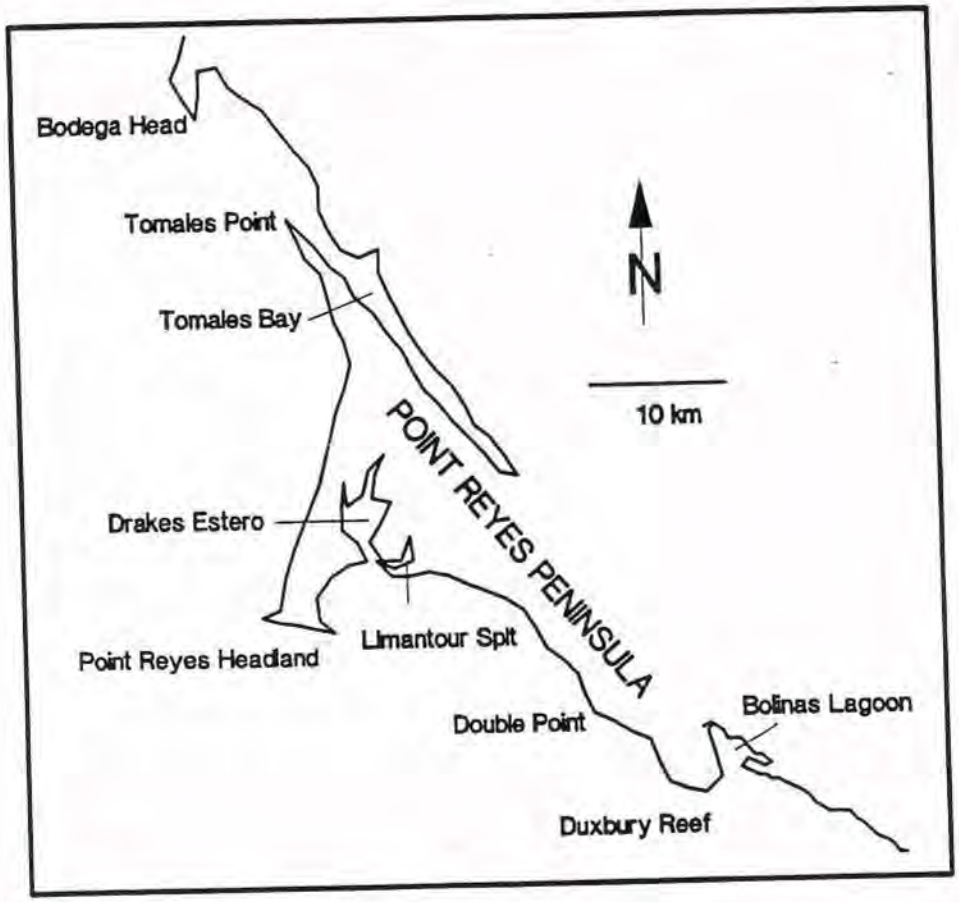

Figure 1. Haul-out sites of harbor seals along the Point Reyes coastline, Marin County, California.

Drakes Estero was selected as the study site because the capture technique chosen is only possible in an estuarine environment and because Drakes Estero is one of the main breeding locations in the Point Reyes area (Allen and Huber 1984a; Figure 2). Other estuaries along the Point Reyes coastline (Bolinas Lagoon and Tomales Bay) are exposed to substantial levels of human disturbance (Allen and Huber 1984b, Allen et al. 1985), and consequently, movement and activity patterns would likely be atypical there.

Drakes Estero is a system of drowned valleys invaded by the sea and is surrounded by low bluffs composed of a geologic formation described as the Drakes Bay Formation which includes fine-grained siltstone interbedded with mudstone (Galloway 1977). The embayment is 35.7 km^2 and is protected from ocean wave action by sandspits (Mudie and Byrne 1980). Tidal exchange occurs through a narrow inlet that is 1.5-3.0 m deep at mean low water. Siltation within the estero has escalated since the turn of the century when cattle ranching was established, and currently, a deep channel courses only half way up the estero (Mudie and Byrne 1980). Present human uses in and around the estero include recreational fishing and canoeing, commercial mariculture, and cattle ranching.

The climate is characterized by moderate temperatures and precipitation. The average annual precipitation at Point Reyes Lighthouse over a 64 yr period was 51 cm and the average annual temperature over 52 yrs was 20° C (Galloway 1977). Fog and drizzle during the summer months are common resulting in a daily temperature mean difference between January and September of only 3° C.

Seals haul-out in Drakes Estero on a number of tidal sand bars exposed at low to medium-high tides. The sand bar used most frequently by the seals is near the estero mouth (A) and is bordered by the main channel with a depth of 8 m. Seals also haul-out near the mouth of the estero on the tip of Limantour Beach (L) at all tide levels (Figure 2).

Capture

The method used to capture seals was conceived by personnel from the Washington Department of Game and the Oregon Department of Fish and Wildlife. We caught seals in a 130-m long gill-net, with 20-cm mesh, set off the haul-out site and then pulled ashore. The net had a lead line on the bottom which

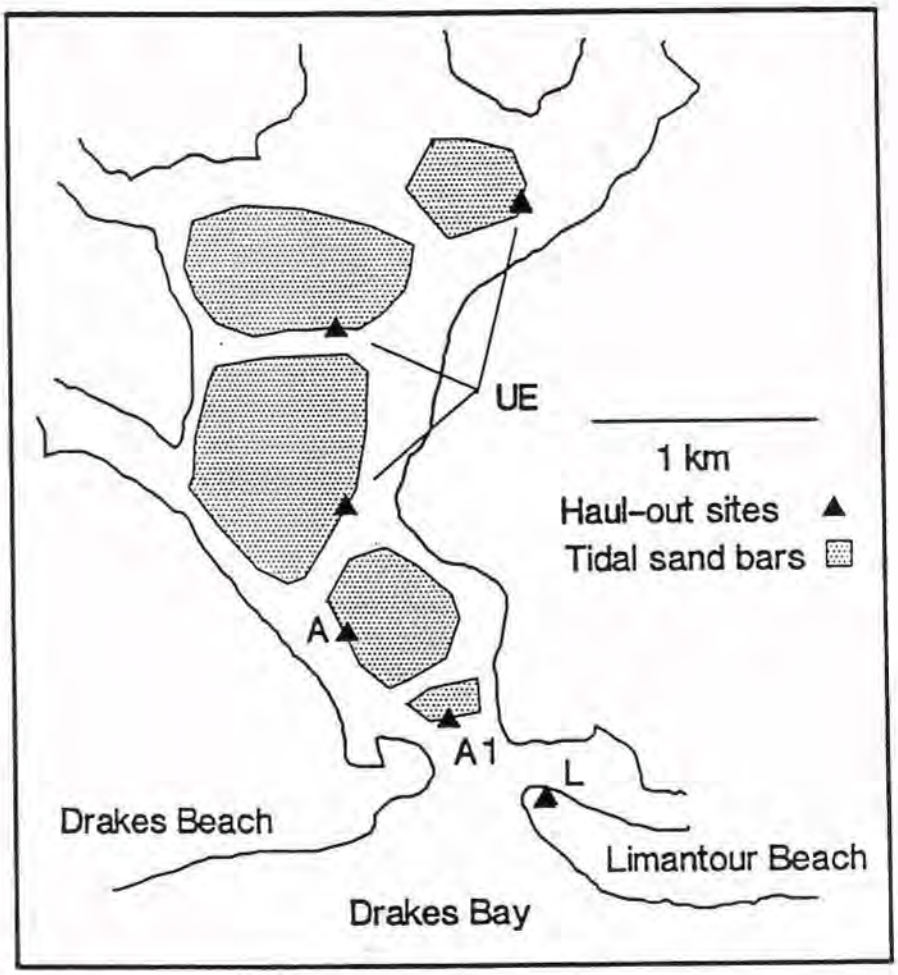

Figure 2. Harbor seal haul-out sites within Drakes Estero; A is the primary haul-out site, A1 is used during the breeding season, L is Limantour Beach, and UE are haul-out sites up the estero.

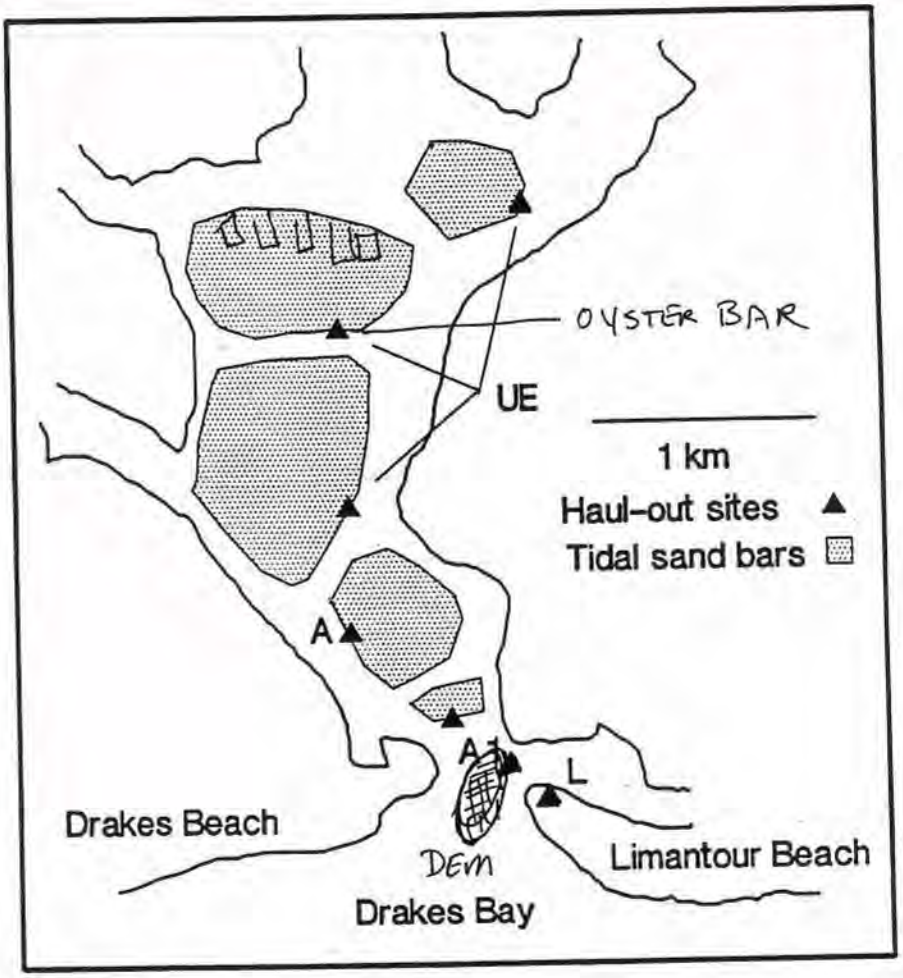

Figure 2. Harbor seal haul-out sites within Drakes Estero; A is the primary haul-out site, A1 is used during the breeding season, L is Limantour Beach, and UE are haul-out sites up the estero.

prevented seals from escaping underneath. Two power boats were used to deploy the net adjacent to the haul-out site. The lead boat carried the net on a platform set above the transom. This boat approached the hauled out seals at about 20 knots, set the net as the seals entered the water, and then landed on the far side of the sand bar. A second boat retrieved the other end of the net, landing on the near end of the bar. Seals were thus captured in a beach seine fashion. This method enabled the capture of a large number of seals over a short period of time, thereby minimizing the frequency of disturbance (Beach et al. 1985, Brown 1981, Jeffries et al. 1985).

Eighteen to twenty people were involved in the capture including personnel from Point Reyes National Seashore, Gulf of the Farallones National Marine Sanctuary, National Marine Fisheries Service, California Department of Fish and Game, Oregon Department of Fish and Wildlife, Washington Department of Fish and Game, the University of California, and Point Reyes Bird Observatory. In addition, a veterinarian monitored the condition of restrained seals and any seal deemed dangerously stressed was immediately released.

Capture periods were initially scheduled for late July to coincide with the pelage molt to maximize the length of transmitter attachment (see below). An additional capture period in March was scheduled because many transmitters had fallen off by February. No radio-tagged seals departed permanently from the estero during the week following the capture, and consequently, I assume that the capture technique did not disrupt the normal activity patterns of the seals.

Tagging Technique

Captured seals were weighed, measured (length and maximum girth), and sexed. All seals were marked with flipper-tags in the webbing of the hind flippers and with a neoprene patch on the dorsum (Figure 3). Certain seals were selected to be radio-tagged. We double flipper-tagged seals with plastic, lime green, "Riese" cattle ear tags in 1985 and lime green "Allflex" cattle ear tags (Veterinarian Supplies, Harbor City, California 90710) in 1986 and 1987. The "Allflex" tags had larger numbers which could be easily read in the field at a distance of 150 m. We attached a bright orange colored vinyl strip with 7.6 cm numbers to each flipper tag which further aided in identification of individuals. Two neoprene patches with an individual

number or symbol code were glued with "Lock-tight" Super Glue to the fur between the shoulder blades to provide an additional visual mark.

A radio transmitter manufactured by Advanced Telemetry Systems, Inc. (Isanti, Minnesota 55040) was glued to the fur on the posterior of the seal's head with "Devcon" 5-minute epoxy (Figure 3). Radio-transmitters were 9x3x3 cm, weighed 60 gms, had a 33 cm flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute. Placement of the transmitter on the head allowed for tracking movements of seals while in the water when they surfaced to breathe. Radio signals could be monitored to 5 km from bluffs (50-100 m) along the coastline and to 16 km from aircraft (100-300 m).

Monitoring

Seals were monitored with an automated recording station, and by ground and aerial surveys. The automated recording station was established on a 30-m bluff overlooking Drakes Estero 150 m from the primary haul-out site and consisted of an "Esterline Angus", 20-channel, strip chart recorder, a programmable scanning receiver, a 12-volt marine battery, and a "Yagi" antenna. The receiving station recorded seals within a 4-km radius on a 24-hr basis. Each frequency was monitored by the scanning receiver for 32 sec and was scanned five to six times per hour. A seal was considered hauled out within a 1-hr period if the pen was triggered continuously for three consecutive 32-sec intervals; a seal was considered in the vicinity but in the water if the pen was triggered continuously for one 32-sec interval in conjunction with three 32-sec intervals that displayed discontinuous pen marks.

Frequencies were checked to determine if radio interference from nearby radio communication facilities (U. S. Coast Guard and RCA Global Communications Center) triggered pens. Interference did not hinder the recording of hauled out seals. However, radio interference on several frequencies prevented determining whether animals were in the water, and so strip chart data were not analyzed for the presence of these particular seals in the water. In addition, female seals with very young pups (less than 5 d) on occasion would rest in shallow water rolling and submerging the transmitter antenna. As a result, the strip chart recorder registered that the animal was not hauled out. Females with pups also on occasion would rest

vertically in the water with head raised above the surface and the recorder registered that the seal was hauled out. Consequently, haul-out times of females in this analysis may be biased for this period.

A beacon transmitter was placed in a PVC pipe at seal "head lift" level (31 cm above the ground) on the haul-out site to verify that the receiving system was functioning properly and to determine when the haul-out site was exposed during tidal cycles and therefore available to seals.

The station was in operation continuously from July 31 through September 5, and from October 25 through December 31, 1985; and from January 1 through April 30, 1986. It was again in operation from 23 July 1986 through 30 June 1987 except for intermittent periods when equipment malfunctioned.

The station was inspected and maintained a minimum of two times per week and almost daily during the 1987 breeding season. During visits all frequencies were scanned and checked for signal drift. Each signal was monitored for a period of five to ten minutes to detect seals in the water. The scan period was selected based on averaging dive times of radio-tagged seals during the first month of the project ($x = 3$ min, range 0.08 to 9.75 min, SD = 2 min, $n = 76$). Seals onshore were visually scanned for marks to check for flipper-tag or transmitter loss. At this time, information on female and pup behavior and on spatial distribution within the estero was recorded.

Ten all-day censuses were conducted at Drakes Estero to compare the diurnal haul-out pattern of the herd with that of individually marked seals and to determine the accuracy of the equipment in distinguishing the presence or absence of seals. In addition, six seals were monitored for a 24-hr period on June 1, 1987, and their location and activities were recorded every 15 min. From this information, accuracy of the remote receiving station could be compared with field observations and local feeding areas could be identified.

To locate dispersing seals, semi-weekly aerial surveys along the central and northern California coast were scheduled. A Cessna 180, single engine, aeroplane was used for all flights, and Yagi receiving antennas were mounted on the wing struts (Mech 1983). An antenna was mounted on each side of the aircraft and pointed to the side so that the strongest signal is received from the side. With this arrangement, seals could be detected for a distance of 16 km on either side of the plane as it cruised along the coast. Typically, scheduled aerial surveys began at Drakes Estero and then proceeded north to Point Arena, south

to Half Moon Bay, and then into San Francisco Bay. Length of flight depended on success in locating all animals. However, if individual seals were not recorded for one month either by the remote receiving station or by ground surveys, then aerial surveys were extended north to the Oregon border or south to Point Conception.

Seals were monitored by two people using scanning receivers and frequencies chosen were continuously scanned for three seconds each. In this manner, much of the coastline was covered two times by two people thereby maximizing detection. When a seal was located, activity, time, and location were recorded. Flights were scheduled on weekdays around tides that were low to medium to maximize the likelihood of seals being hauled out. Under this sampling regime, I assumed that major shifts in location (both spatially and temporally) would be recorded but that local and short-term movements might be over looked.

Ground surveys were scheduled in addition to aerial flights to account for local, short-term movements along the Point Reyes Peninsula. Surveys were made once per week to locate animals absent from Drakes Estero. Typically ground surveys extended along the coastline from Limantour Beach to the north end of Point Reyes Beach. Feeding areas and movement to local haul-out sites were identified from this exercise. Uneven topography hindered the mobility necessary for obtaining several fixes for triangulation to determine precise locations of animals in the water (Tester 1971); however, seals on shore were easily located visually for confirmation of position.

Data Analysis

Radio-tagged seals were categorized by the amount of time and the season that they were present at Drakes Estero. Seals were defined as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" if they departed in the fall but returned during the following breeding season, and "transients" if they were present at Drakes Estero during the capture and shortly thereafter, but resided away from Drakes Estero during the rest of the study period. Movements greater than 25 km were defined as long distance and less than 25 km as local.

Seal behavior at Drakes Estero was classified as either hauled out or absent. Descriptive statistics were calculated for each behavior for each animal by season. The months December and March (winter) and April through June (spring) were chosen to illustrate seasonal differences in haul-out behavior. The months August, December and March were used for comparing year to year differences. A chi-square test statistic was used when comparing time of haul-out initiation and the length of haul-out bout; initiation time was categorized into four periods (0000-0500, 0500-01200, 1200-1700 and 1700-2400 hr) and length of haul-out bout was categorized into four periods (1-4, 4-8, 8-12, $\geq$ 12 hr).

The absolute abundance of seals using Drakes Estero in March 1987 was estimated with a modified Lincoln-Peterson Index mark-recapture model (Caughley 1977: 141). For this analysis, only seals marked in March 1987 were included to avoid sample bias of sex and age class representation and of tag loss from the previous year. Sixteen estimates were made but an estimate prior to the onset of the pupping season was selected to avoid violation of the closed population assumption. The probability of tag loss was estimated with the equation

$$p = B^1/(2B^2+B^1)$$

where p is the probability that an animal will lose one tag, B^1 is the number of animals counted with one tag and B^2 is the number of animals counted with two tags (Caughley 1977: 140).

All information recorded on the strip chart recorder was transferred to a "DBase III+" database. The "SPSS" statistical program for micro-computers was used for most analyses. Non-parametric statistical analyses including Mann-Whitney U test and Fisher's Exact test were used for comparing behaviors of gender and between-year differences in behavior. Wilcoxon matched-pairs sign-rank tests were applied to test seasonal differences in haul-out behavior when the same individuals were sampled over two different time periods. To test the null hypothesis for independence of location within the estero with sex, a chi-square test of independence was performed (Sokal and Rohlf 1981).

RESULTS

Between 1985 and 1987 during three capture periods, 109 seals were flipper-tagged, and of these, 51 were radio-tagged. In 1985 (July 31 - August 1), radio transmitters were attached to 17 adult seals and an

additional three were flipper-tagged (Table 1a); in 1986 (July 21 and 22), transmitters were affixed to 22 and flipper tags to eight (Table 1b); and on March 9 and 11 of 1987, 92 animals were captured and transmitters affixed to 12 and flipper-tags to 47 (Table 1c). During the March capture, many seals were released because of time constraints. One adult male seal died during handling procedures. A necropsy was performed and cause of death was likely related to respiratory failure due to shock (Beach et al. 1985).

On average, adult males weighed 24 kg more and were 16 cm longer than adult females in July 1985 and weighed 9 kg more than females in July 1986 (Table 2). Though females in 1985 weighed about the same as those in 1986, males on average weighed less in 1986. Adult males and females both weighed substantially more in March 1987 than in July 1986; the weight gain in females may be explained in part by pregnancy. Average length of adult males was not substantially different from that of females for all three periods. Immatures were about 35 cm shorter than adults, and on average, weighed 34 kg both in July 1986 and March 1987.

Tag Loss

An insufficient number of seals were tagged in 1985 or 1986 for analysis of flipper-tag loss, but in 1987, the probability of flipper tag loss was estimated to be 0.31 after four months (June 26) and 0.57 after five months (July 31). Consequently, resighting information on seals with "Allflex" flipper-tags was unreliable after four months. In contrast, the "Riese" flipper-tags attached in 1985 were still seen periodically on six seals as of June 1987. "Allflex" tags were square in shape and may have snagged on objects more easily than "Riese" tags; on one occasion, I observed fishing line hanging from an "Allflex" flipper tag.

Transmitter Life Span and Loss

Length of transmitter attachment affected analysis of movement patterns such that movements of seals absent from Drakes Estero were less likely to be documented after January for both years. The median length of attachment for 1985 was 221 d ($\bar{x}$ = 181 d, SD = 80, n = 17) and 1986 was 186 d ($\bar{x}$ = 194 d, SD = 81, n = 22; Tables 3a and 3b). In 1986 transmitters tended to remain on male seals longer than on females but the difference in days was not significant ($p = 0.08$; Mann-Whitney U test). All but two

Table 1a. Standard measurements of 21 adult harbor seals tagged at Drakes Estero, August 1985; SE is standard error.

Flipper Tag No.	Radio Tag No.	Sex	Length (cm)	Girth (cm)	Weight (kg)	Comments
229	024	F	146	98	63.5	
216	033	F	138	95	56.7	
225	092	F	148	96	55.8	
214	234	F	147	120	86.2	
206	313	F	145	103	63.5	
--	415	F	131	94	50.0	
232	491	F	121	94	56.7	
228	710	F	138	96	63.5	
--	047	M	150	108	74.8	
--	084	M	154	112	93.0	Old shark bite
224	124	M	148	125	77.1	
--	176	M	148	118	84.4	
204	256	M	146	105	74.8	Old shark bite
--	272	M	167	117	90.7	
218	435	M	168	106	79.4	
201	753	M	147	118	93.0	
210	974	M	163	114	90.7	
212		M	155	111	90.7	
222		M	144	107	77.1	
220		M	150	--	83.9	
		M	173	117	102.0	

Table 1b. Standard measurements of 30 harbor seals tagged at Drakes Estero, July 1986.

Flipper Tag No.	Radio Tag No.	Age*	Sex	Length (cm)	Girth (cm)	Weight (kg)	Comments
302	224	P	F	88	69	20.4	
304	419	A	M	146	106	70.3	
306	281	P	M	96	74	22.7	
308		A	M	149	--	67.6	
310	306	I	F	107	83	31.8	
312	137	A	F	140	104	63.5	Not pregnant
313		A	F	130	103	65.8	
316	531	A	F	141	104	65.8	
317		I	F	116	81	35.8	
320		A	M	145	105	73.5	
322	343	A	M	163	111	81.6	
324	198	A	M	158	--	88.5	
326	540	P	F	95	73	19.5	
328	616	A	F	162	--	90.3	Pregnant
330	590	A	M	138	104	68.5	
332		A	M	142	106	81.6	
334		A	M	170	115	77.6	
335		A	M	148	112	78.9	
338	482	A	F	139	105	64.4	Pregnant
340		A	F	145	104	64.4	
341	645	A	F	133	105	70.3	Shark scar/Preg
344	246	A	F	138	101	55.3	Pregnant
346	504	A	M	143	106	70.3	Shark scar
348	444	A	M	140	107	74.8	
350	325	I	F	114	82	36.3	
352	117	A	F	145	101	63.5	
354	362	A	F	134	98	59.8	Not pregnant
355	467	A	F	143	103	69.4	Pregnant
357	160	A	F	146	99	70.3	Pregnant
359	267	A	M	149	104	71.7	Shark scar

* A = adult, P = pup, and I = immature.

Table 1c. Standard measurements of 63 harbor seals tagged at Drakes Estero, March 1987.

Flipper Tag No.	Radio Tag No.	Age*	Sex	Length (cm)	Girth (kg)	Weight	Comments
--		--	F	--	132	105	
--		I	F	--	126	99	
--		I	F	118	86	40.8	
363		I	F	--	--	--	
371		I	F	--	--	--	
373		I	F	--	--	--	
386		I	F	99	77	30.8	
430		I	F	111	83	28.6	
434		I	F	103	75	38.6	RT540
436		I	F	115	85	40.8	
438		I	F	109	80	33.1	
440		I	F	107	90	33.1	
443		I	F	98	82	32.2	
445		I	F	98	78	28.6	
447		I	F	89	81	34.5	
449		I	F	112	80	34.9	
451		I	F	118	86	36.3	
--		I	M	115	87	40.4	
366		I	M	--	--	--	
368		I	M	--	--	--	
412		I	M	120	91	40.8	
416		I	M	114	86	32.7	
432		I	M	110	80	29.5	
365		A	F	135	115	84.8	Pregnant
374	432	A	F	137	128	112.0	Pregnant
378	026	A	F	150	126	104.3	Pregnant
380	046	A	F	143	128	106.6	Pregnant
384	844	A	F	165	127	109.8	Pregnant
387		A	F	138	123	78.9	Pregnant
3900	092	A	F	143	121	98.4	Pregnant
392	116	A	F	143	123	96.2	Pregnant
394		A	F	--	--	81.2	
396	856	A	F	153	--	113.4	Pregnant
398	874	A	F	143	122	94.4	Pregnant
400		A	F	136	119	89.4	Pregnant
410	622	A	F	159	139	116.6	Pregnant
418		A	F	154	121	102.9	Pregnant
419		A	F	137	109	70.8	Pregnant
421		A	F	143	125	87.1	Pregnant
424		A	F	149	115	83.0	Not pregnant
428		A	F	150	115	98.4	
441	821	A	F	151	134		--RT234/Pregnant

453		A	F	156	133	--	
455		A	F	132	125	--	Pregnant
457		A	F	134	123	--	Pregnant
461		A	F	143	124	--	Pregnant
463		A	F	139	128	--	
465		A	F	146	119	--	Pregnant
467		A	F	153	111	--	Not pregnant
471		A	F	146	127	--	Pregnant
475		A	F	124	120	--	Pregnant
212		A	M	--	--	--	FT212
221		A	M	--	--	--	FT221
382		A	M	--	--	--	
402	894	A	M	163	126	102.1	
403		A	M	141	115	87.1	
406		A	M	145	110	78.0	
408		A	M	147	118	89.4	
413	060	A	M	174	128	116.6	
426		A	M	149	105	83.5	
459		A	M	153	112	--	
469		A	M	150	123	--	
473		A	M	150	112	--	

* A = adult and I = immature.

Table 2. Average standard measurements of seals tagged in 1985, 1986, and 1987; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals.

		LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)
1985				
Adult Males:	$\bar{x}$	154.8	113.2	85.5
	SE	2.8	1.7	2.5
	n	13	12	13
Adult Females:	$\bar{x}$	139.0	99.5	62.0
	SE	3.3	3.1	3.9
	n	8	8	8
Total Adults:	$\bar{x}$	149.0	107.7	76.6
	SE	2.6	2.1	3.3
	n	21	20	21
1986				
Adult Males:	$\bar{x}$	149.4	107.6	75.4
	SE	2.79	1.2	1.8
	n	12	10	12
Adult Females:	$\bar{x}$	141.3	102.5	66.9
	SE	2.4	0.7	2.5
	n	12	11	12
Immatures:	$\bar{x}$	112.3	82.0	34.6
	SE	2.7	0.6	1.4
	n	3	3	3
Pups:	$\bar{x}$	93.0	72.0	20.9
	SE	2.5	1.5	1.0
	n	3	3	3
Total Adults:	$\bar{x}$	145.3	104.9	71.2
	SE	0.5	1.1	1.2
	n	24	21	24
1987				
Adult Males:	$\bar{x}$	152.4	116.6	92.8
	SE	3.4	2.6	5.8
	n	9	9	6
Adult Females:	$\bar{x}$	144.5	123.08	96.0
	SE	1.8	1.4	3.1
	n	27	26	18
Immatures:	$\bar{x}$	110.8	85.1	34.7
	SE	2.5	1.8	1.1
	n	18	18	16
Total Adults:	$\bar{x}$	146.5	121.4	95.2
	SE	0.6	0.8	0.4
	n	36	35	24

Table 3a. Duration of radio-transmitter attachment on seals tagged in 1985 and last date seal was located visually or with receiver.

Seal	Date Attached	Last Date Attached	Days Attached	Date Last Observed
024	8/01/85	11/12/85	101	4/29/86
033	8/01/85	3/03/86	240	7/10/86
047	7/31/85	3/12/86	221	7/10/86
084	7/31/85	3/27/86	236	7/10/86
092	8/01/85	3/19/86	228	7/03/86
124	8/01/85	3/06/86	236	4/08/87
176	7/31/85	1/08/86	158	1/08/86
234	8/01/85	1/24/86	174	*
256	7/31/85	8/09/85	7	7/21/86
272	7/31/85	8/28/85	26	7/10/86
313	8/01/85	12/19/85	138	5/22/86
415	7/31/85	4/18/86	258	4/18/86
435	8/01/85	1/01/86	151	7/3/86
491	8/01/85	12/19/85	138	6/08/88
710	8/01/85	3/19/86	228	7/23/86
753	8/01/85	5/03/86	273	7/10/86
974	8/01/85	4/16/86	256	7/03/86
		Average	181	
		SD	80	

* Seal was retagged as RT821 in March 1987.

Table 3b. Duration of transmitter attachment on seals tagged in 1986 and last date seal was located visually or with receiver.

Seal	Date Attached	Last Date Attached	Days Attached	Date Last Observed
119	7/22/86	7/31/86	10	1/06/87
224	7/21/86	3/20/87	243	3/26/87
419	7/21/86	1/22/87	186	6/29/87
281	7/21/86	9/11/86	53	9/11/86
306	7/21/86	4/06/87	260	4/06/87
137	7/21/86	1/10/87	174	5/22/87
529	7/22/86	2/03/87	197	3/06/87
342	7/22/86	2/01/87	195	2/24/87
198	7/22/86	1/22/87	185	6/29/87
540	7/22/86	12/19/86	151	4/02/87
616	7/22/86	1/22/87	185	6/24/87
590	7/22/86	4/22/87	275	4/22/87
482	7/22/86	2/03/87	197	5/12/87
645	7/22/86	1/22/87	185	6/29/87
246	7/22/86	12/10/86	142	7/06/87
504	7/22/86	5/17/87	300	6/29/87
444	7/22/86	4/17/87	270	6/27/87
325	7/22/86	9/09/86	51	9/09/86
362	7/22/86	4/02/87	255	6/27/87
467	7/22/86	5/24/87	307	6/24/87
160	7/22/86	12/22/86	154	6/29/87
267	7/22/86	5/17/87	300	6/26/87
		Average	194	
		SD	81	

transmitters (88%) attached in 1985 remained on seals for a minimum of five months, nine (53%) for seven months, six (35%) for eight months, and one for nine months. Of 22 transmitters attached in 1986, 19 (86%) remained attached for a minimum of five months, 15 (68%) for six months, eight (36%) for eight months, and three (14%) for ten months. The maximum length of attachment was 273 d for seals tagged in 1985 and 307 d for those in 1986. All but one transmitter attached in March 1987 remained functioning for four months, i.e., until the molt in June (Table 3c).

All but one (RT176) of the seals radio-tagged in 1985 were located at least once every two weeks, either visually or with receiver, until April 1986. The radio-tags of two seals (RT256 and RT272) ceased functioning within the first month of study; however, both were observed periodically at Drakes Estero for the entire year. Of the seals radio-tagged in July 1986, all but three were located intermittently through February 1987. Two of these three were immature (RT281 and RT325) and one was an adult female (RT119) whose transmitter ceased functioning 10 d after attachment. All seals radio-tagged in March 1987 were located regularly until transmitters were shed in June.

Seals with transmitters that ceased functioning within two months of attachment were excluded from analysis of movement patterns; these included RT256 and RT272 of 1985, and RT119 of 1986. In addition, RT325 and RT281 were excluded from movement analysis because they could not be located after September. It is possible that these two missing seals may have been killed by sharks (Ainley et al. 1985, Stewart and Yochem 1984). A number of seals with fresh shark bites were noted in the fall of 1986. Three adult flipper-tagged seals (including RT119) and five untagged seals had fresh shark bites in September. The wound on RT119 raked the entire lower left flank. The other two flipper-tagged seals had minor bites (less than 30 cm across) and these scars healed within four months.

Movements

In 1985, eight (53%) radio-tagged seals were classified as residents, four (27%) as breeders, and three (20%) as transients (Tables 4a and 5a). Seven seals (5 females and 2 males) left within one month of the date of capture, and four of these returned the following breeding season. In 1986, most seals (90%) were classified as residents (Table 4b and 5b). Five of these were also recorded hauled out periodically at Point Reyes Headland (PRH) and two traveled distances greater than 25 km during the winter months but

Table 3c. Duration of radio-transmitter attachment on seals tagged in 1987 and last date seal was located visually or with receiver.

Seal	Date Attached	Last Date Attached	Days Attached	Date Last Observed
432	3/09/87	6/17/87	101	6/29/87
026	3/09/87	6/17/87	101	6/29/87
046	3/09/87	4/23/87	99	6/29/87
844	3/09/87	6/17/87	101	6/14/87
092	3/09/87	6/25/87	109	6/29/87
116	3/09/87	6/17/87	101	6/29/87
856	3/09/87	6/22/87	106	6/29/87
874	3/09/87	6/20/87	104	6/29/87
894	3/09/87	6/27/87	111	6/29/87
821	3/11/87	6/20/87	102	6/29/87
622	3/09/87	6/16/87	100	6/29/87
060	3/09/87	6/27/87	111	6/27/87
		Average	104	
		SD	4	

Table 4a. Data for trips over 25 km taken by seals radio-tagged in 1985; $\bar{x}$ is average for total and n is number of seals to take trips.

Seal	Status[a]	No. Moves	Average Distance (km)	Location[b]	No. Locations
Females:					
024	B	2	480	KR/DE	2
033	R	0	--	DE	1
092	B	2	210	MB/DE	2
234	R	0	--	DE	1
313	B	3	47	TB/SP/DE	3
415	T	2	58	SR/RR	3
491	T	3	24	DP/PRH/DP	3
710	R	2	48	TB/DE	2
	$\bar{x}$	2.3	128		2.1
	n	6			
Males:					
047[c]	R	0	--	DE	1
084	R	0	--	DE	1
124	T	4	18	PRH/DP/DE/DP	3
176	R	0	--	DE	1
435	R	2	20	BP/DE	2
753	R	0	--	DE	1
974	B	2	48	TB/DE	2
	$\bar{x}$	2.7	28		1.6
	n	3			

[a] Status of seal; R = resident, B = breeder, T = transient.

[b] Locations:

BP = Bolinas Point, Marin Co.
DE = Drakes Estero, Marin Co.
DP = Double Point, Marin Co.
KR = Klamath River, Del Norte Co.
MB = Monterey Bay, Santa Cruz Co.
RR = Russian River, Sonoma Co.
SP = Salt Point, Sonoma Co.
SR = Sea Ranch, Mendocino Co.
TB = Tomales Bay, Marin Co.

[c] Hauled out frequently at Point Reyes Headland (12 km).

Table 4b. Data for trips over 25 km taken by seals radio-tagged in 1986; $\bar{x}$ is average for total and n is number of seals to take trips.

Seal	Status[a]	No. Moves	Average Distance (km)	Location[b]	No. Locations
137	B	4	81	PSB/MB/DE	3
160	R	0	--	DE	1
198	R	0	--	DE	1
224	R	0	--	DE	1
246	R	2	48	TB/DE	2
267	R	0	--	DE	1
305	B	3	47	DR/TB/DE	3
342	R	0	--	DE	1
362	R	0	--	DE	1
419	R	0	--	DE	1
444	R	0	--	DE	1
467	R	0	--	DE	1
482	R	0	--	DE	1
504	R	2	410	PC/DE	2
591[c]	R	0	--	DE	2
540[c]	R	0	--	DE	2
590[c]	R	0	--	DE	2
616[c]	R	0	--	DE	2
645[c]	R	0	--	DE	2
	$\bar{x}$	2.8	144		1.6
	n	4			

[a] Status of seal; R = resident, B = breeder, T = transient.

[b] Locations:

DE = Drakes Estero, Marin Co.
DR = Duxbury Reef, Marin Co.
MB = Muir Beach, Marin Co.
PC = Prairie Creek, Humboldt Co.
TB = Tomales Bay, Marin Co.

[c] Hauled out frequently at Point Reyes Headland (12 km).

Table 5a. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys, 1985-86. Behavior is classified as A (active/swimming) and I (inactive/hauled out).

Seal	Date																						
	8/9	8/15	8/29	9/12	9/13	9/19	9/26	10/4	10/10	10/22	10/23	10/28	10/31	11/8	11/21	11/26	12/19	2/7	2/27	3/20	3/23	3/25	4/2	4/18
024	DE/I								KR/A					DE/I	DE/I					DE/I	DE/I	DE/I		
033				DE/I			DE/I		DB/A				DE/A	DP/A	DE/I			PRH/A	PRH/A					
047				PRH/A			DE/I		DE/A				DE/A	DE/I	DE/I	DE/I				DE/I	DE/I			
084					MB/I	DE/A	DE/I	DE/I	DE/I		MB/I						DP/I				MB/I			
092	DE/I							DP/I	DP/A					DE/I	DE/I	DE/I								
124	PRH/A			DP/I			DE/A		DB/A															
176				DE/I			DE/I		DE/I				BH/A	TB/A		SP/I	SP/I							
234			DE/I	DE/I				TB/A	TB/I								RR/I	RR/I		RR/I		RR/I	RR/I	RR/I
313	DE/I		TB/A	TB/I					SR/I			DB/A	BP/A	DE/I	DE/I									
415							DE/I										DP/I							
435				DE/I		DP/I	DP/A	PRH/A	DP/A					DE/I	DE/I				DE/A	DE/I				
491	DE/I						DE/I	TB/A		DE/A		DE/A	DB/A		DE/I	DE/I			DE/I	DE/I	DE/I	DE/I	DE/I	DE/I
710	DE/I			DE/I			DE/I		DE/I			TB/I	BH/A	TB/I	TB/I		TB/I	TB/A	TB/I			TB/I	TB/I	DE/I
753							TB/I	TB/I																
974	DE/I	TB/I	TB/I	TB/I																				

Locations with linear distances (km) from capture site:

BH = Bodega Head	40	MB = Monterey Bay	210
BP = Bolinas Point	20	PRH = Pt. Reyes Head	12
DE = Drakes Estero	0	RR = Russian River	55
DB = Drakes Bay	<10	SP = Salt Point	65
DP = Double Point	16	SR = Sea Ranch	85
KR = Klamath River	480	TB = Tomales Bay	40

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Table 5b. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys, 1986-87. Behavior is classified as A (active/swimming) and I (inactive/hauled out).

	Date																	
Seal	7/29	7/30	8/31	9/9	9/21	9/22	9/30	10/13	10/14	10/30	11/10	11/28	12/10	1/8	2/7	2/23	3/24	4/6	5/18
137	DE/I	DE/I	DE/I	DB/I		PSB/I	MB/A	MB/A	MB/A			PSB/A	PSB/A	PSB/A					
160	DE/I	DE/I		DE/I	DE/I		DE/I			DE/I	DE/I	DE/I	DE/I						
198	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I	DE/I	DE/I	DE/I	DE/I					
224		DE/I	DE/I	DE/I			DE/I			DE/I		DE/I	DE/I	DE/I	DE/I				
246	DE/I	DE/I	DE/I	DE/I			DE/I		TB/I	DE/I			DE/I						
267	DE/I	DE/I	DE/I	DE/I	DE/I				DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	
281				DB/A															
306	DE/I		DR/A	TB/I	TB/I					TB/I	TB/I			DE/I				DE/A	
325	DE/I	DE/I		DB/A															
342	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I			PRH/A	PRH/A					
362	DE/I	DE/I	DE/I	DE/I			DE/I		DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I		DE/I	DE/I	
419	DE/I	DE/I		DE/I					DE/I	DE/I	DE/I	DE/I	DE/I	DE/I					
444	DE/I	DE/I	DE/I	DE/I			DE/I		DE/I	DE/I	DE/I		DE/I	DE/I			DE/I	DE/I	
467	DE/I	DE/I	DE/I		DE/I		DE/I		DE/I	DE/I	DE/I		DE/I	DE/I	DE/I		DE/I		
482	DE/I	DE/I	DE/I	DE/I			DE/I		DE/I	DE/I		DE/I	DE/I	DE/I					
504	DE/I	DE/I		PRH/A			DE/I		DE/I	DE/I	PC/I	DE/I	DE/I	DE/I			DE/I	DE/I	
529	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I	DE/I	DE/I	DE/I	PRH/I	DE/I			DE/I	
540	DE/I	DE/I		PRH/A						DE/I		DE/I	DE/I	DE/I					
590	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I			DE/I	DE/I		PRH/I	DE/I	PRH/I	
616				DE/I	PRH/I		DE/I		DE/I	DE/I	DE/I	PRH/A	PRH/A	DE/I					
645	DE/I	DE/I	DE/I	DB/A			DE/I		DE/I	DE/I	DE/I		DE/I	DE/I					
046																	PRH/A	DE/I	
060																		BL/A	DE/I
090																		DP/A	DE/I
432																			PRH/I
874																	PRH/I	DE/I	DE/I

Locations with linear distances (km) from capture site:

BL = Bolinas Lagoon	25
DE = Drakes Estero	0
DB = Drakes Bay	<10
DR = Duxbury Reef	22
MB = Muir Beach	38
PRH = Pt. Reyes Head	12
PSB = Pescadero State Beach	106
PC = Prairie Creek	410
TB = Tomales Bay	48

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returned within one month to Drakes Estero. In contrast to 1985, only two (10%) seals were classified as breeders and none as transients.

Locations to which seals migrated ranged both north and south of Drakes Estero; however, most (8 of 13) seals traveled to northern sites, four journeyed to southern ones, and one seal traveled to sites in both directions (Figure 4). In all cases, seals traveled to documented harbor seal haul-out sites (Miller 1983). Seals were very individual, though, in location selected and no more than two seals traveled to the same site in a given year. The southern most haul-out site was at Hopkins Marine Station in Monterey Bay (210 km) and the northern most one was at the Klamath River (480 km; Tables 5a and 5b).

The maximum number of recorded haul-out sites used by an individual seal over a one-year cycle was three (Tables 4a and 4b). Five (33%) of the seals tagged in 1985 were recorded exclusively at Drakes Estero, six (40%) on two haul-out sites, and four (27%) on three haul-out sites. Ten seals (53%) of the those tagged in 1986 were recorded hauled out exclusively at Drakes Estero, seven (37%) on two haul-out sites, and two (11%) on three haul-out sites.

Distances traveled to alternate haul-out sites ranged from 12 km to 480 km. Long-range movements of greater than 25 km were recorded for seven of 15 seals in 1985 and four of 19 seals in 1986. In 1985, one female moved north to the Klamath River (480 km) and one traveled south to Monterey Bay (210 km). Both were observed without transmitter at Drakes Estero in April 1986. The seal at Monterey Bay was observed almost weekly hauled out in front of the Hopkins Marine Station from mid-August to mid-March (A. Baldridge, Hopkins Marine Station, CA; C. Deutsch, Univ. of Calif., Santa Cruz, pers. commun.). Five seals traveled to haul-out sites within Point Reyes; three to Tomales Bay and two to Double Point. In 1986, one female (RT137) resided throughout the winter at Pescadero State Beach (south 106 km) and returned to Drakes Estero the following spring. RT305 moved locally and to Tomales Bay (north 48 km) during the winter and also returned to Drakes Estero the following spring. One female (RT246) traveled north to Tomales Bay in October but returned to Drakes Estero by the beginning of November. One male (RT504) was recorded at Drakes Estero on November 5, north at Prairie Creek (410 km), Humboldt County, on November 10, and again at Drakes Estero on November 20.

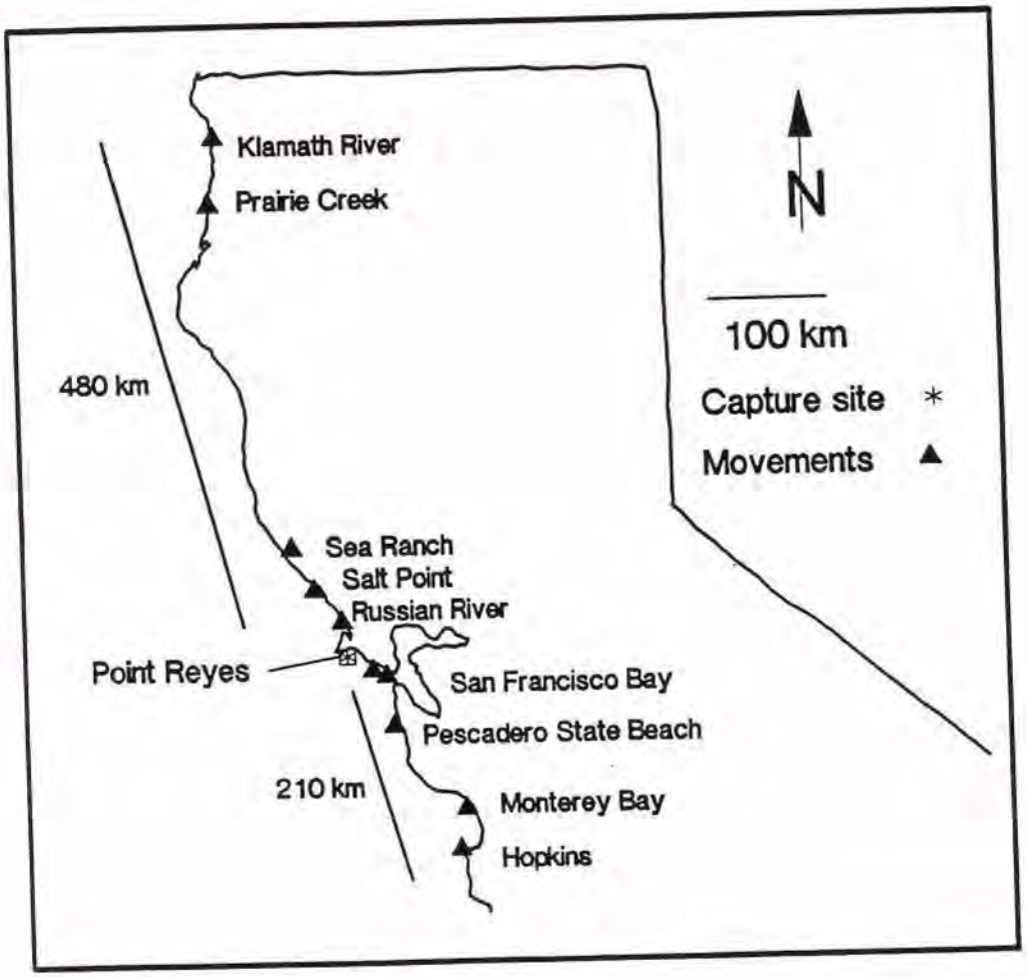

Figure 4. Capture site and resighting locations of harbor seals in California, 1985-1987.

The sample size was too small for comparing differences of movements by sex or age group in 1986, but in 1985 more females (6) traveled long distance than males (2) and females averaged longer distances than males (Table 4a). The pooled results for both years indicate that more movements occurred during the fall (16) than during the winter (5) or spring (6) and that the majority of movements were made by breeders; however, these results may be biased by the length of transmitter attachment (Table 6).

Short-range movements of less than 25 km occurred frequently throughout the study period. Most short-range movements were to Point Reyes Headland (PRH; 12 km) where seals were recorded primarily in the water. Five seals tagged in 1986 were recorded hauled out at PRH and two of these (an immature and adult male) spent more than half their time there. Two transient seals tagged in 1985 relocated to Double Point (16 km south). During both years, seals were also recorded feeding in Drakes Bay both north and south of Drakes Estero.

Two radio-tagged seals captured in March 1987 departed from Drakes Estero. One male (RT060) traveled to Bolinas Lagoon (25 km south) in early April and returned in early May just prior to the estimated weaning date of most pups (see below). One female (RT432) divided her time equally between Drakes Estero and PRH until April 20 when she returned to Drakes Estero and gave birth on April 22. She remained at Drakes Estero continuously until she weaned her pup on May 18 when she returned to PRH. She continued to spend equal amounts of time at PRH and Drakes Estero until her transmitter was shed in June. All other radio-tagged seals in 1987 were recorded at least once in the water around PRH but none hauled out there. In addition, individual seals identified by flipper-tags were recorded at Double Point (6), Bolinas Lagoon (1), and PRH (8) between March 15 and July 30, 1987.

Activity Patterns

All-day censuses at Drakes Estero were conducted to compare the diurnal haul-out pattern of the herd with that of individually marked seals. For both summer and winter in 1985, individual patterns were similar to those of the herd and there was a strong positive correlation between the proportion of tagged seals and the total number of seals hauled out ($r = 0.81$, $p < 0.01$, $n = 86$ counts; Table 7). Consequently, assumptions regarding herd haul-out behavior can be extrapolated from monitoring individuals. Seals

Table 6. Movements greater than 25 km of resident, breeding, and transient seals by year and by season.

	Resident	Breeder	Transient	Totals
Seals tagged 1985	8	4	3	15
Females	3	3	2	
Males	5	1	1	
Seals tagged 1986	17	2	0	19
Females	8	2		
Males	7			
Immatures	2			
No. moves by season:*				
Jul-Oct	4	8	4	16
Nov-Feb	2	2	1	5
Mar-Apr	0	6	0	6

* Combined results for both years.

Table 7. Diurnal haul-out pattern of harbor seals compared to that of radio-tagged individuals at Drakes Estero during summer and winter 1985; Herd is total number of seals hauled out, Tag is total number of tagged seals hauled out, and Prop is number of tagged seals hauled out per hour in proportion to the total number of resident, tagged seals.

Date		Time (PST) 0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
						Summer					
Aug 6	Herd	453	397	429	462	365	259	81	36	17	21
	Tag	8	8	8	9	7	7	3	3	0	0
	Prop	0.6	0.6	0.6	0.6	0.5	0.5	0.2	0.2	0	0
Aug 13	Herd	387	378	325	94	24	106	89	173	192	70
	Tag	5	7	7	5	3	3	4	4	5	2
	Prop	0.5	0.7	0.7	0.5	0.3	0.3	0.4	0.4	0.5	0.2
Aug 20	Herd	389	427	261	372	316	51	1	0	0	6
	Tag	8	8	5	9	8	4	0	0	0	0
	Prop	0.8	0.8	0.5	0.9	0.8	0.4	0	0	0	0
Aug 27	Herd	257	241	174	56	60	72	211	248	265	157
	Tag	3	3	4	2	2	3	8	8	9	9
	Prop	0.3	0.3	0.4	0.2	0.2	0.3	0.8	0.8	0.9	0.9
Sep 3	Herd	100	230	355	252	210	48	0	0	3	24
	Tag	3	4	4	5	5	2	0	0	1	2
	Prop	0.3	0.4	0.4	0.6	0.6	0.2	0	0	0.1	0.2
						Winter					
Jan 1	Herd	190	266	404	467	467	497	192	70	66	0
	Tag	4	4	7	8	8	8	3	1	1	0
	Prop	0.5	0.5	0.9	1.0	1.0	1.0	0.4	0.1	0.1	0
Jan 7	Herd	0	0	0	0	157	329	419	497	498	506
	Tag	0	0	0	0	5	6	7	7	7	7
	Prop	0	0	0	0	.7	.9	1.0	1.0	1.0	1.0
Jan 15	Herd	309	364	413	456	462	451	229	110	0	0
	Tag	3	3	4	4	5	6	5	4	0	0
	Prop	0.4	0.4	0.6	0.6	0.7	0.9	1.0	0.6	0	0
Jan 18	Herd	--	212	210	165	79	64	100	100	110	110
	Tag	--	4	4	3	3	3	3	3	3	4
	Prop	--	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.6
Jan 20	Herd	0	0	14	124	310	372	464	476	467	445
	Tag	0	0	0	2	4	4	5	5	4	4
	Prop	0	0	0	0.3	0.6	0.6	0.7	0.7	0.5	0.6

exhibited distinct seasonal trends in haul-out behavior at Drakes Estero. In 1985, resident seals hauled out an average of 92% (SE = 3%) of the days from August through October, but only 77% (SE = 4%) of the days from November through February (Tables 8a and 9; $p = 0.008$, $n = 8$, Wilcoxon matched-pairs sign-rank test). In 1986, adult seals were hauled out an average of 90% of the total number of days monitored in July and 81% in August but only 74% in December (Tables 8b and 9). The difference between the months July and December was significant ($p = 0.02$, $n = 17$) but not between August and December ($p = 0.5$, $n = 17$, Wilcoxon matched-pairs sign-rank test). In March and April just prior to the breeding season, the percentage of days hauled per month was also low, and then during May, the percentage increased again to 92% ($p = 0.002$, $n = 14$, Wilcoxon matched-pairs sign-rank test). Immature seals hauled out on fewer days than adults; however, the sample size was too small to make meaningful comparisons. In 1985, females appeared to haul-out on fewer days than males in September and November; however, the sample size is too small for useful statistical comparison. There was no significant difference between the number of days that male and female seals were hauled out for the months July and October 1986 ($p > 0.05$; Kolmogorov-Smirnov two-sample test; Table 10). For all other months the percentages were similar.

In 1985, the percentage of tagged seals hauled out per day relative to the total number of tagged seals was also greater for August through October than from January through March (Table 10). For the seals tagged in 1986, the percentages were greater in May, June, and July than in August through April (Table 10). The percentage difference between years for August and September can be explained in part by the inclusion of immatures in the 1986 sample. If immatures are excluded from the analysis, the percentage increases to 76%. Immature seals appeared to haul-out on fewer days in August and September than adults.

When resident seals were not hauled out, they were either in the water within Drakes Estero or were absent from Drakes Estero. The length of time that seals were absent averaged 1.4 to 1.9 consecutive days per month in 1985 and 1.0 to 2.7 in 1986 and 1987 (Table 11). Combined data for both years averaged from 1.5 to 2.5 days per trip (Table 12). The longest absence was for seventeen days but most trips were one day. The average number of trips per month was greatest for February for both years and least for May 1987. Combined data for both years averaged from 2.7 to 5.2 trips per seal per month.

Table 8a. Percentage of days per month individual radio-tagged seals were present at Drakes Estero, 1985-86.

	Month							
Seal	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Females:								
033	90	100	100	90	73	76	58	74
234	90	60	86	52	50	67	*	
491	55	40	**					
710	90	80	86	48	93	73	63	63
Males:								
047	93	100	100	90	83	73	33	50
084	80	80	57	76	93	80	71	65
176	100	100	100	81	93	***		
272	85	*						
435	93	100	100	90	80	*		
753	93	100	100	90	90	80	88	90

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.
*** Condition unknown.

Table 8b. Percentage of days per month individual radio-tagged seals were present at Drakes Estero, 1986-87.

	Month											
Seal	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Females:												
119	78	*										
137	67	23	**									
160	100	100	96	96	93	*						
246	100	100	100	23	33	0	*					
362	100	94	96	92	93	90	86	82	79			
467	100	97	73	65	60	79	86	100	50	83	100	*
482	100	90	92	69	67	59	61	*				
529	100	84	89	77	60	72	71	61	*			
616	33	36	31	57	33	48	50	*				
645	78	77	46	50	40	62	57	*				
024									83	60	100	94
046									61	58	*	
090									52	47	93	88
116									39	67	97	88
432									35	50	50	35
622									61	53	93	94
821									62	67	93	90
844									78	67	93	100
856									87	87	97	100
874									83	63	97	90
Males:												
198	100	94	92	96	83	93	96	*				
267	100	77	96	100	100	97	96	86	*			
342	100	48	46	54	20	62	64	*				
419	100	86	79	77	83	86	*					
444	100	94	89	100	87	83	68	50	71	*		
504	100	94	89	77	40	62	61	39	58	93	95	*
590	78	39	50	73	53	66	75	11	25	10	*	
060									78	0	86	66
893									100	100	100	100
Immatures:												
224	11	52	58	65	50	66	64	36	29	*		
281	44	42	8	***								
305	100	58	**									
325	100	19	19	***								
540	33	23	8	27	33	39	*					

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.
*** Condition unknown

Table 9. Average percentage of days per month seals were hauled out at Drakes Estero by sex and age; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals monitored.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Measurement period 1985-86												
Total Adults:												
$\bar{x}$		87	84	91	77	82	75	63	68			
SE		3.9	7.3	5.4	6.2	5.2	2.0	9.0	6.6			
n		10	9	8	8	8	6	5	5			
Females:												
$\bar{x}$		81	70	91	63	72	72	61	69			
SE		2.9	4.0	8.6	2.9	2.7	2.3	16.3	11.7			
n		4	4	3	3	3	3	2	2			
Males:												
$\bar{x}$		91	92	91	85	88	78	64	68			
SE		0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.1			
n		6	5	5	5	5	3	3	3			
Measurement period 1986-87												
Total Adults:												
$\bar{x}$	90	81	78	74	63	74	73	61	67	63	92	86
SE	4.6	5.6	5.9	5.6	6.7	4.0	4.0	8.0	5.0	6.7	3.4	5.8
n	17	15	15	15	15	14	12	7	18	17	14	11
Females:												
$\bar{x}$	86	85	78	66	60	70	69	81	64	64	91	87
SE	7.1	7.5	9.2	8.3	8.5	5.6	5.4	6.9	5.2	12.6	4.7	6.6
n	10	9	8	8	8	7	6	3	12	11	10	9
Males:												
$\bar{x}$	97	76	77	82	67	78	77	47	73	62	94	83
SE	3.2	8.8	6.5	11.0	11.1	5.6	6.4	15.5	11.3	18.7	2.9	17.0
n	7	7	7	7	7	7	6	4	6	6	4	2
Immatures:												
$\bar{x}$	58	39	23	46	42	53						
SE	18.1	7.7	11.9	19.0	8.5	13.5						
n	5	5	4	2	2	2						

Table 10. Average percentage of radio-tagged seals hauled out per day by month relative to the total number of radio-tagged seals (seals relocated to other haul-out sites are not included); SE is standard error, and n is number of days monitored.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Measurement period 1985-86												
No. Seals		14	8	8	8	8	7	5	5	--	--	--
$\bar{x}$		86	86	88	81	74	65	63	70	--	--	--
SE		3.4	2.8	0.0	4.3	5.2	3.9	5.6	8.0	--	--	--
n		30	5	7	21	30	29	24	21	--	--	--
Measurement period 1986-87												
No. Seals	22	21	20	17	17	17	16	10	19	17	14	11
$\bar{x}$	83	67	64	70	61	69	64	52	64	68	92	87
SE	1.6	2.1	2.0	1.5	2.6	3.3	2.8	3.2	1.7	2.9	2.4	1.9
n	9	31	26	26	30	29	28	26	23	20	27	20

Table 11. Number of consecutive days seals were absent from Drakes Estero, excluding seals that relocated to other sites, for the years 1985-86, and 1986-87. Insufficient data were available for September and October, 1985; n is the number of seals monitored per month, Seal is the number of seals that took trips each month, $\bar{x}$ is mean, and SE is standard error.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Measurement period 1985-86												
n	--	7	--	--	7	7	5	4	3	--	--	--
Seal	--	6	--	--	4	6	4	3	3	--	--	--
$\bar{x}$ days/trip	--	1.5	--	--	1.4	1.9	1.0	1.8	1.4	--	--	--
SE	--	0.3	--	--	0.3	0.6	0.0	0.5	0.2	--	--	--
mode	--	1	--	--	1	1	1	1	1	--	--	--
range	--	1-3	--	--	1-4	1-10	1	1-4	1-2	--	--	--
$\bar{x}$ trips/mo	--	1.7	--	--	2.3	2.7	3.3	4.3	2.7	--	--	--
SE	--	0.5	--	--	0.6	0.6	0.9	1.2	0.9	--	--	--
range	--	1-4	--	--	1-4	1-5	1-5	1-6	1-4	--	--	--
Measurement period 1986-87												
n	21	20	17	16	15	15	13	7	15	13	11	10
Seal	7	17	16	14	14	11	13	6	11	11	3	4
$\bar{x}$ days/trip	1.8	2.5	2.2	2.1	2.7	1.4	1.7	2.0	2.1	1.4	1.0	2.0
SE	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.3	0.5	0.1	0.0	0.5
mode	1	1	1	1	1	1	1	1	1	1	1	1
range	1-5	1-7	1-12	1-17	1-15	1-13	1-4	1-7	1-7	1-3	1	1-4
$\bar{x}$ trips/mo	1.9	3.5	3.8	4.1	4.7	4.8	4.5	5.3	2.6	2.7	1.0	1.8
SE	0.3	0.5	0.7	0.5	0.6	0.9	0.5	0.9	0.4	0.4	0.0	0.8
range	1-3	1-9	1-8	1-7	1-9	1-11	1-7	1-8	1-5	1-5	1	1-4

Table 12. Combined data on number of consecutive days seals were absent from Drakes Estero, excluding seals that relocated to other sites, 1985-87; n is the number of seals monitored per month, Seal is the number of seals that took trips each month, $\bar{x}$ is average, and SE is standard error.

	Month					
	Aug	Nov	Dec	Jan	Feb	Mar
n	22	20	22	17	10	19
Seal	18	16	16	16	8	14
$\bar{x}$ days/trip	2.0	2.5	1.5	1.5	1.8	1.7
SE	0.2	0.3	0.2	0.1	0.2	0.4
mode	1	1	1	1	1	1
range	1-3	1-15	1-13	1-4	1-7	1-7
$\bar{x}$ trips/mo	2.7	4.0	3.9	4.3	5.2	2.8
SE	0.5	0.6	0.7	0.5	0.7	0.4
range	1-9	1-9	1-11	1-7	1-8	1-5
Days absent ($\bar{x}$ days/trip times $\bar{x}$ trips/month):						
	5.4	10.0	5.9	6.3	9.2	4.9

Seals spent more time away from Drakes Estero on foraging trips during the months from September through February, and this trend was most pronounced in November and February (Table 12). For all months except May, June, and July, more than 50% of the seals left the estero at least once. Immature seals appeared to take more trips ($x = 4.3$; 22 of 60 trips) than adults in August; however, the average length of trip was the same as for adults. When seals were absent for more than three days, they often hauled out at PRH.

When seals were present in Drakes Estero, the haul-out pattern was strongly diurnal and most seals hauled out during mid-day regardless of season. The percentage of tagged seals hauled out over a 24-hr period was largest between 0600 and 1600 hr for all months; the percentages hauled per hour, however, varied between months (Figures 5 through 8). Greater than 50% of radio-tagged seals hauled out between 0600 and 1400 hr in May and June 1987. Tide level also influenced the diurnal haul-out pattern. The sand bar where most seals hauled out within Drakes Estero was awash on average 5.1 hrs per 24-hr day ($SD = 1.4$, $n = 13$) and was submerged during tide levels greater than 1.4 m above the mean low except when winter storms would push water levels higher. In the event that sand bars were underwater, seals often hauled out at Limantour Spit which was exposed at all tide levels.

On average, seals hauled out for a total of 7 hrs per day during winter months in both years (Tables 13a and 13b). Seals hauled out for an average of 9 hrs per day during the breeding season (April, May, June) and 11 hrs per day in July during the molt (Table 13b). Seals hauled out for significantly more hours per day during the breeding season than the nonbreeding season ($p = 0.002$, $n = 13$, Wilcoxon matched pairs signed-rank test;comparing March and May). The averages were not significantly different between August and December in 1985 ($p = 0.88$; Wilcoxon matched-pairs sign-ranks test). Males appeared to be on shore for more hours per day than females in 1985, but the sample size was small. In 1986, males also appeared to haul-out for more hours per day; however, the difference was not significant ($p = 0.12$, Mann-Whitney U test, for October). Small sample size restricted testing differences between adults and immatures; however, there appeared to be no difference between the months August and September (Table 13b).

Seals would often come onshore more than once per day. The average number of haul-out bouts was around 1.5 per day for all months except May (Table 14). Seals averaged 2.4 haul-out-bouts per day

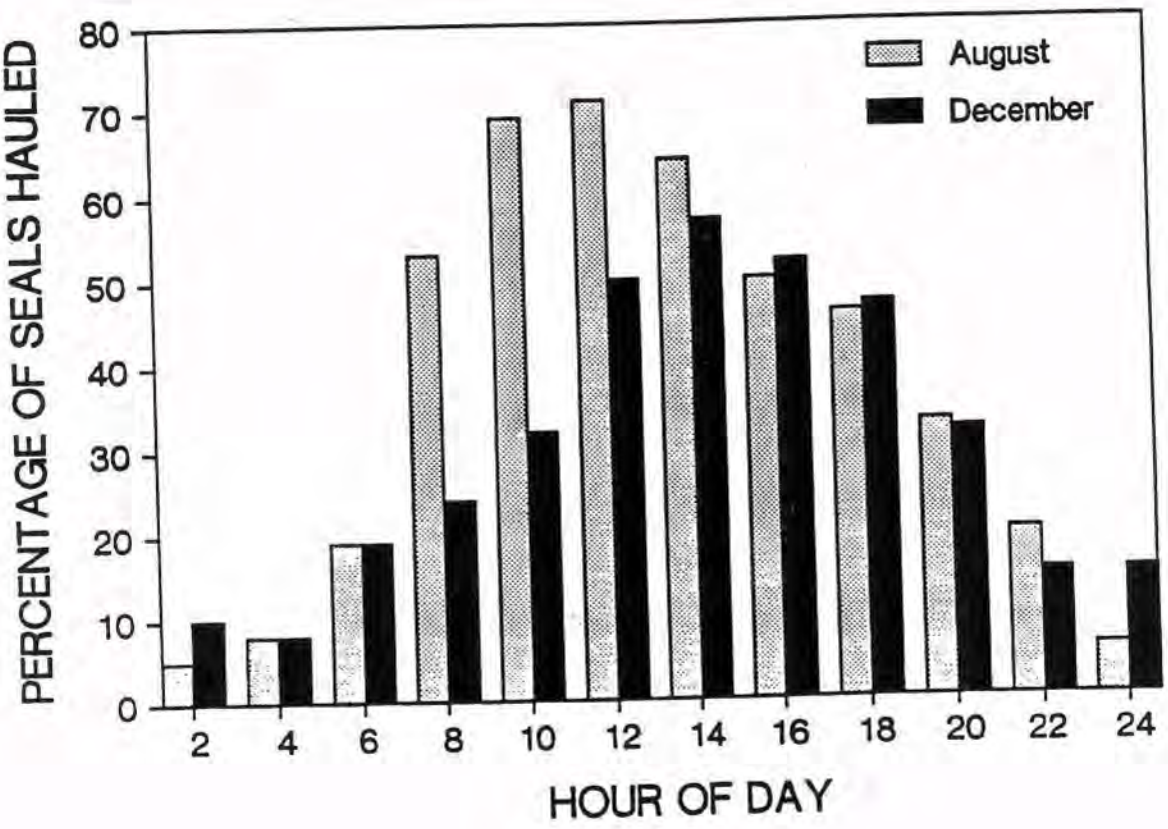

Figure 5. Percentage of radio-tagged seals hauled out by hour of day for August and December, 1985.

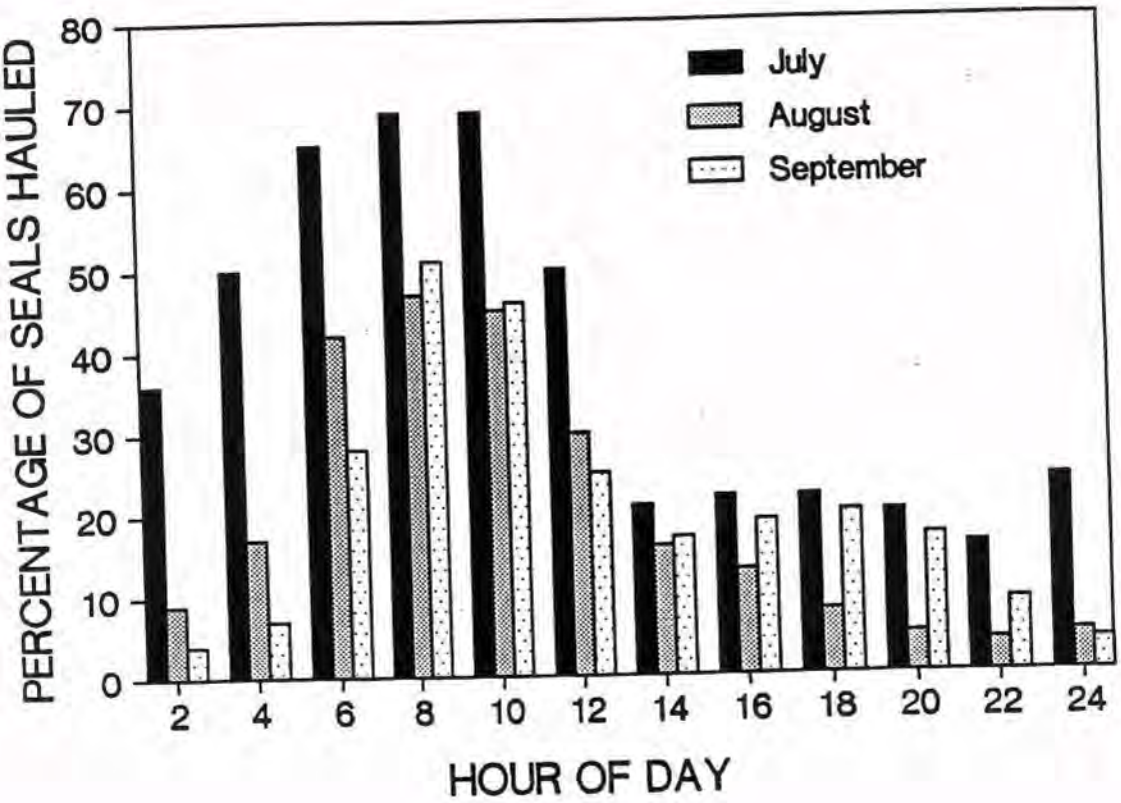

Figure 6. Percentage of radio-tagged seals hauled out by hour of day for summer months, 1986.

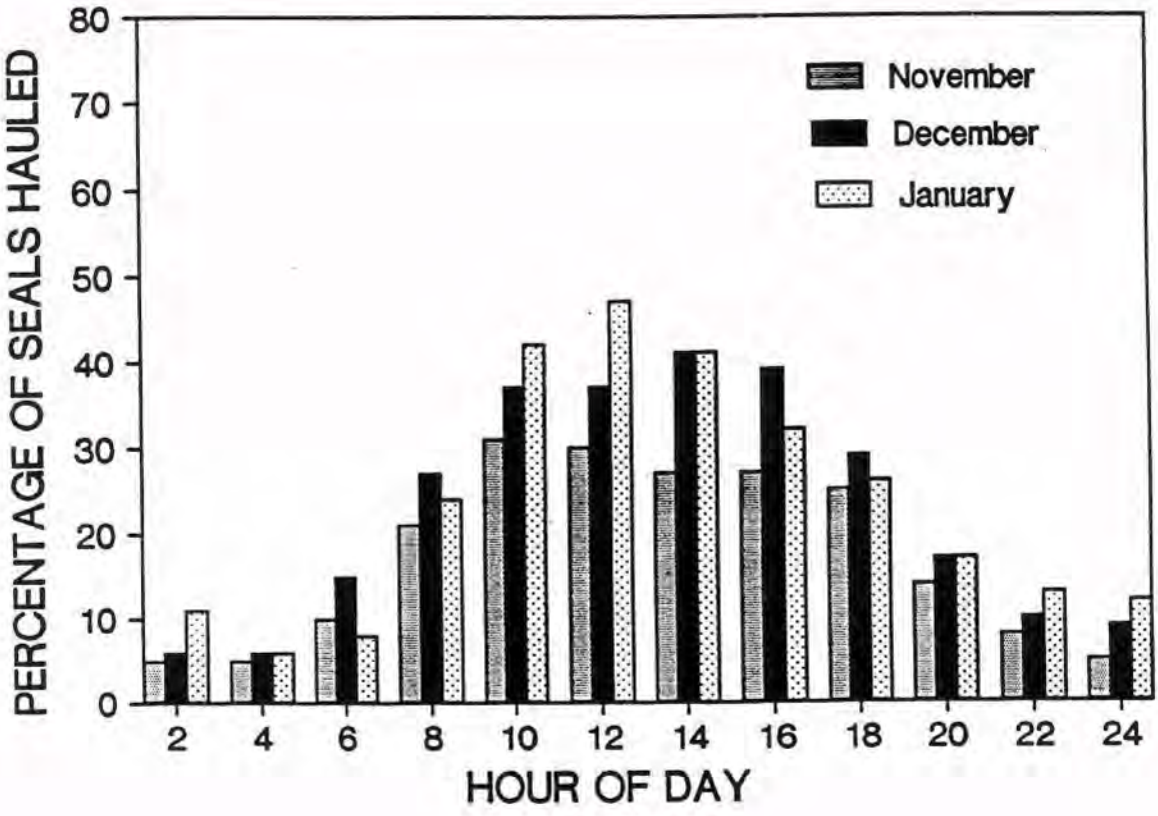

Figure 7. Percentage of radio-tagged seals hauled out by hour of day for winter months, 1986-87.

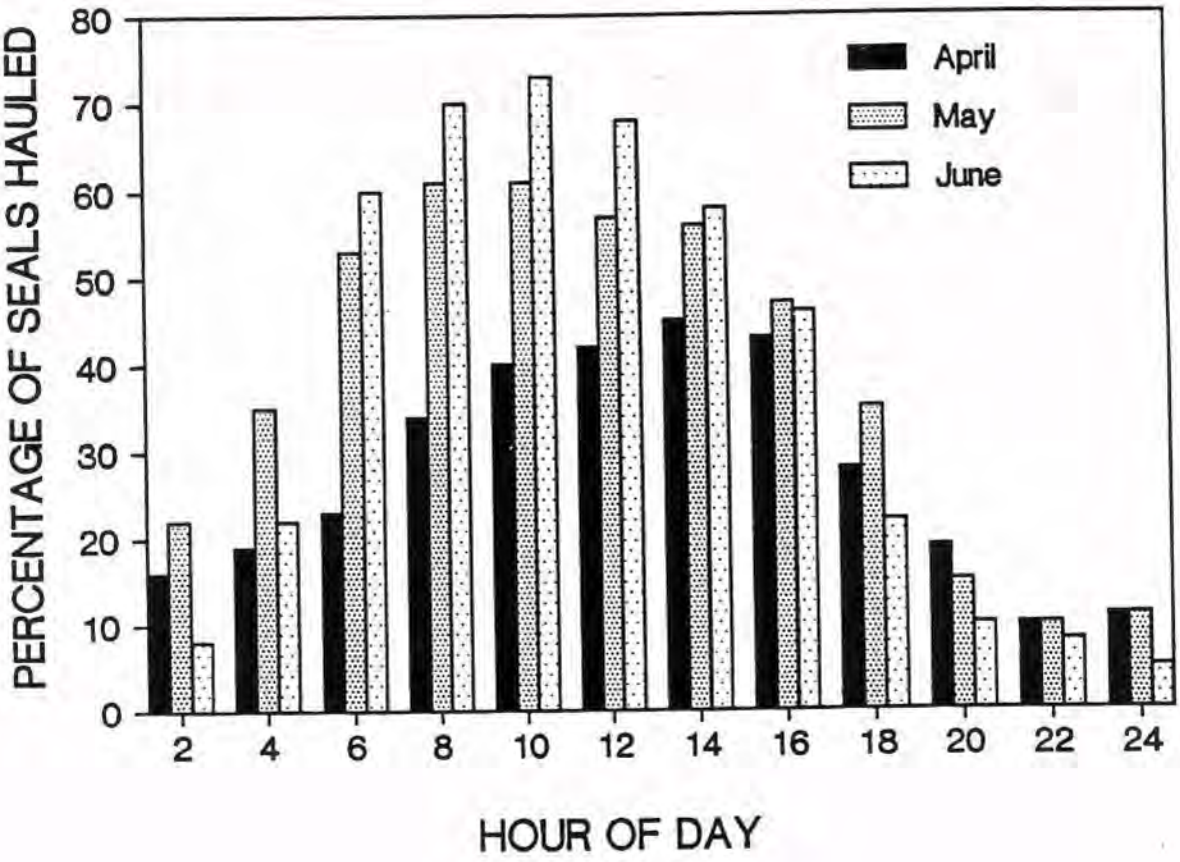

Figure 8. Percentage of radio-tagged seals hauled out by hour of day for spring months, 1987.

Table 13a. Average number of hours per day seals were hauled out at Drakes Estero by month and by sex and age class, 1985-86; $\bar{x}$ is the average, SE is standard error, and n is number of seals monitored.

	Month		
	August	December	March
All seals:			
$\bar{x}$	7.5	7.3	6.9
SE	0.2	0.3	0.3
n	10	8	5
Females:			
$\bar{x}$	7.3	6.0	6.6
SE	0.4	0.5	0.4
n	4	3	2
Males:			
$\bar{x}$	7.6	7.9	7.2
SE	0.3	0.3	0.4
n	6	5	3

Table 13b. Average number of hours per day seals were hauled out at Drakes Estero by month and by sex and age class, 1986-87; $\bar{x}$ is the average, SE is standard error, and n is number of seals monitored.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
All seals:												
$\bar{x}$	11.2	6.9	6.8	7.2	6.6	7.2	7.4	7.9	7.5	8.9	9.7	9.5
SE	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.4	0.6	0.4
n	21	14	14	14	14	13	13	7	18	15	14	11
Adult females:												
$\bar{x}$	10.4	6.5	6.5	6.4	6.1	6.4	6.6	6.8	7.1	8.7	9.9	9.5
SE	0.6	0.7	0.7	0.5	0.7	0.5	0.7	0.2	0.3	0.4	0.7	0.4
n	11	7	7	7	7	6	6	4	12	11	10	9
Adult males:												
$\bar{x}$	12.5	7.3	7.2	8.0	7.1	7.9	8.0	9.7	8.5	9.7	9.2	9.5
SE	0.6	0.7	0.5	0.5	0.4	0.4	0.4	0.5	0.8	1.1	1.5	1.0
n	5	7	7	7	7	7	7	3	6	4	4	2
Immatures:												
$\bar{x}$	10.5	6.8										
SE	0.8	0.3										
n	5	5										

Table 14. Length and number of haul-out bouts by month ; $\bar{x}$ is average, SE is standard error, and n is number of seals monitored.

	Month						
	Jul	Aug	Dec	Mar	Apr	May	Jun
Measurement period 1985-86							
n		8	8	6			
$\bar{x}$/length		4.8	5.6	6.1			
SE		0.2	0.2	0.4			
range		1-34	1-17	1-13			
$\bar{x}$/number		1.6	1.4	1.2			
SE		0.1	0.1	0.1			
range		1-4	1-4	1-4			
Measurement period 1986-87							
n	21	19	16	19	15	14	11
$\bar{x}$/length	7.9	5.5	5.7	5.7	5.25	4.5	5.8
SE	0.4	0.2	0.3	0.2	0.2	0.2	0.3
range	1-37	1-27	1-20	1-17	1-34	1-19	1-21
$\bar{x}$/number	1.3	1.5	1.4	1.4	1.7	2.2	1.6
SE	0.0	0.1	0.0	0.1	0.1	0.1	0.1
range	1-3	1-4	1-3	1-5	1-6	1-6	1-4

(n = 139, SE = 0.06,) between the median birthing and the median weaning dates, but only 1.5 per day (n = 142, SE = 0.06) in April two weeks prior to the median birthing date.

Haul-out bouts averaged around 5 hrs for all months except July, when they averaged 8 hrs (Table 14). The length of a haul-out bout was not significantly different between August and December 1985 ($p = 0.84$; Wilcoxon matched-pairs sign-rank test) but did differ between July and August 1986 ($p = 0.0002$; Wilcoxon matched-pairs sign-rank test). Twenty percent of all haul-out bouts were 2 hrs or less; over 90% were 12 hours or less, regardless of month. Maximum length of haul-out bout occurred during the molt (37 hrs) and during the early phase of the birthing season (34 hrs). There did not appear to be a difference in behavior between age classes for the months July and August or between sexes for any month.

Though seals initiated haul-out bouts at all hours of the day, most initiations occurred during daylight hours and before 1200 hr during both years (Figures 9, 10, 11). In April, May and July, however, many initiations occurred between 0100 and 0400 hr. The difference may be explained in part by females hauling out to nurse pups; however, males also initiated haul-outs then. In May, the cumulative percentage for female initiations between 0100 and 0400 hr was 27% and for males was 21%. In June, though, the cumulative percentage for female initiations declined to 14% between 0100 and 0400 hr but for males remained about the same (22%).

The length of haul-out bout was affected by the time of initiation for all months tested except December 1985. Seals that first hauled out between 0000 and 1200 hr were on shore longer than seals that initiated a haul-out bout between 1200 and 2400 hr (July: $X^2 = 80.9$, $df = 9$, $p < 0.001$; August: $X^2 = 59.3$, $df = 9$, $p < 0.001$; December: $X^2 = 69.8$, $df = 9$, $p < 0.001$; May: $X^2 = 80.2$, $df = 9$, $p < 0.001$: June: $X^2 = 58.4$, $df = 9$, $p < 0.001$). For all months, more than 80% of the haul-out bouts lasting for more than 12 hr occurred between 0100 and 1200 hr and less than 10% occurred after 1700 hr.

On June 1 and 2, 1987, I monitored six radio-tagged seals (4 females, 2 males) for 24 hrs beginning at 0900 hr, locating and recording activities every 15 min. The average number of hours hauled was 9.4 (SE = 2.6); however, the range was from 1.3 to 18.5 hr. Three seals hauled out two times during this 24 hr period, two three times, and one once. A seal that hauled for 18.5 hr was the only one to haul-out at night, and coincidentally had just returned from hauling out for several days at PRH. Because seals could haul-out

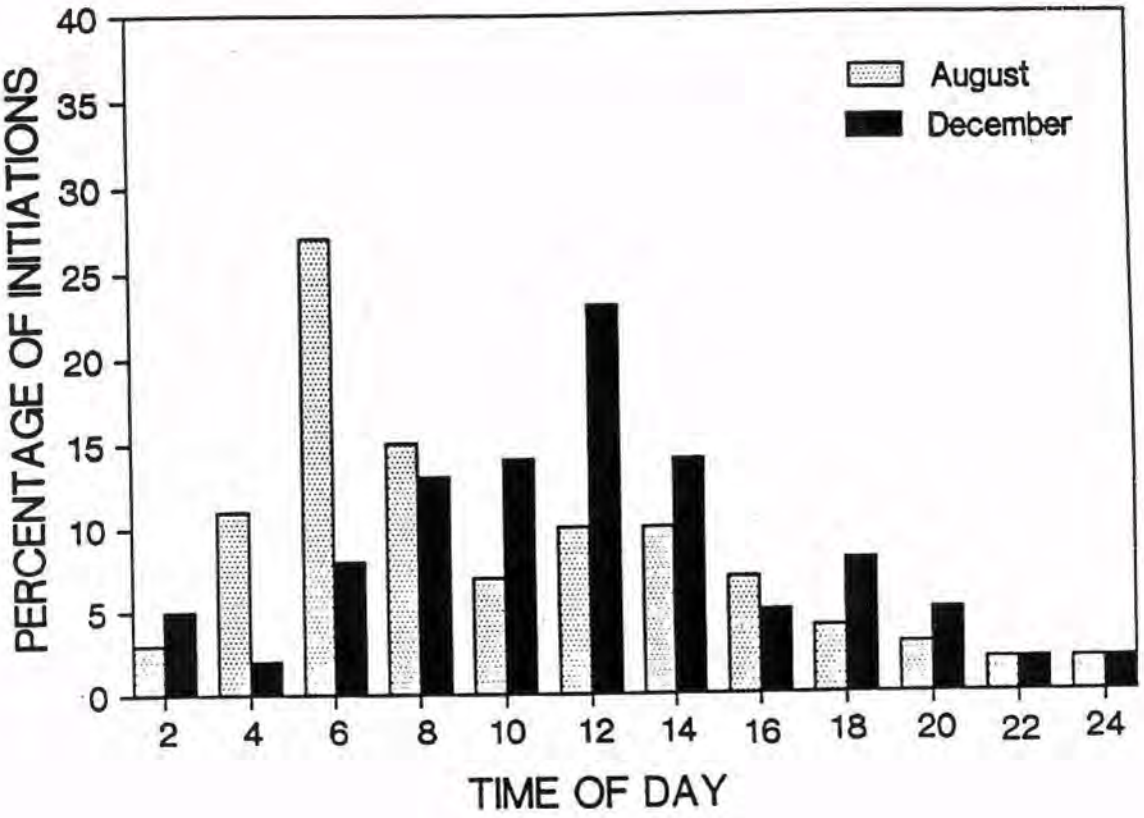

Figure 9. Initiation of haul-out bouts by hour of day for the months August and December, 1985.

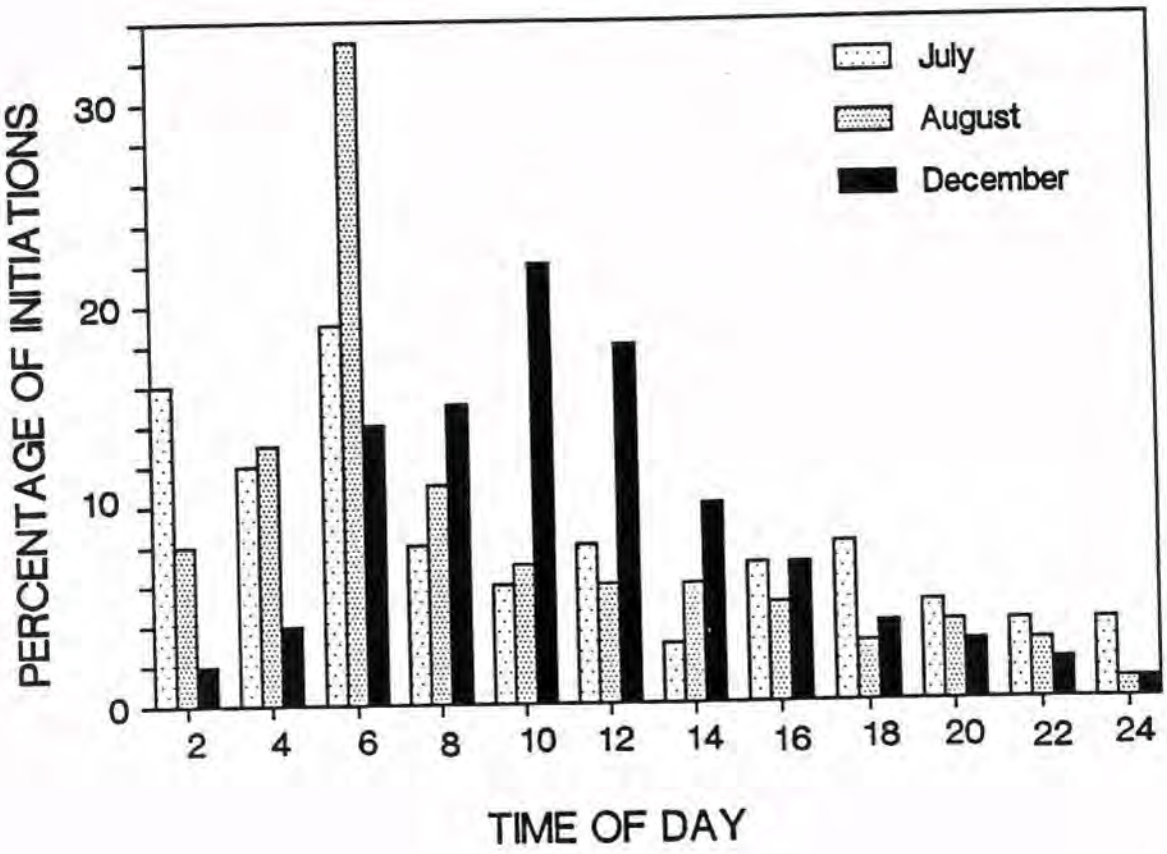

Figure 10. Initiation of haul-out bouts by hour of day for July, August, and December, 1986.

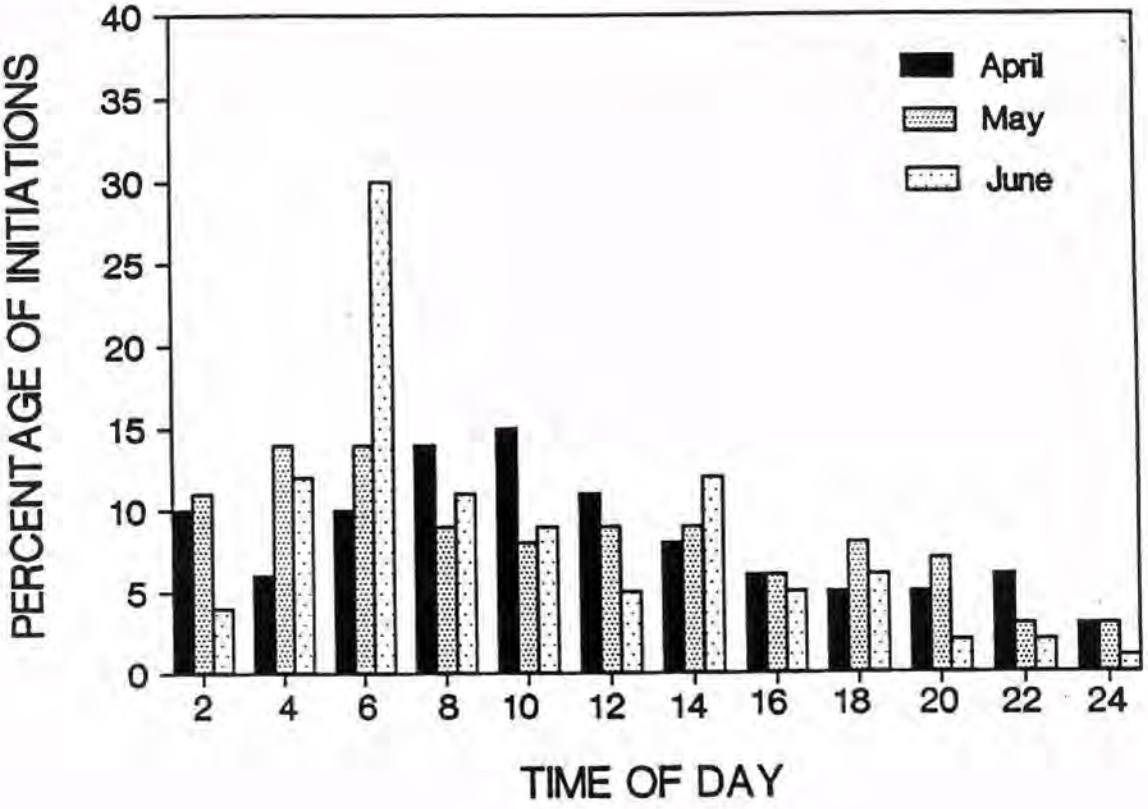

Figure 11. Initiation of haul-out bouts by hour of day for spring months, 1987.

at Limantour Spit at all tide levels, tide did not appear to influence the haul-out pattern. When sand bars in Drakes Estero were awash with rising tides, seals moved to Limantour Spit.

During the 24-hr period, all but one seal were located continuously. Four seals traveled both north and south of the estero but stayed within an 8 km radius, one seal never left the estero, and one seal traveled north out of range for 9.5 hrs. All seals spent a considerable amount of time in the channel of the estero or near the mouth, presumably feeding. Sunrise was at 0600 hr on June 2, and two tagged seals promptly hauled out along with several non-tagged seals. By 0800 hr, two more tagged seals hauled out, and the seal that had remained out all night retreated to the water. At the time of my departure (0900 hr), five seals were in identical locations as recorded at 0900 hr the previous day; four were hauled out at Limantour Spit and two were in the water at the mouth of the estero.

Estimates of Abundance

Direct counts of seals at Drakes Estero indicated that monthly maxima occurred in May, June, and July both in 1986 and 1987 (Figure 12). These numbers, though, are substantially lower than estimates derived from mark-recapture data. From a sample of 16 days between March 16 and April 15, an estimated 949 seals (95% confidence interval: LL 692 and UL 1206) used Drakes Estero (Figure 13). On sample day 4 (March 24), 30 marked animals were hauled out among a herd of 409 seals (18 adults and 12 immatures). On sample day 6 (March 26), the first pup was observed at Drakes Estero. From that date on, the assumption of a closed population was violated and estimates and confidence intervals fluctuated considerably. A population estimate for the same day derived from the expected maximum proportion of seals hauled out mid-day for March (0.455) was 899 (95% confidence interval: LL 769 and UL 1029).

Breeding Season

The first pup was observed at Drakes Estero during the last week of March during both 1986 and 1987. Maximal pup counts were made on April 30 in 1986 (255), and May 6 in 1987 (224). The proportion of pups to total number of seals censused was 0.30 and 0.32, respectively. By the end of May, it became increasingly difficult to distinguish pups from immature seals and few mother-pup pairs were recorded.

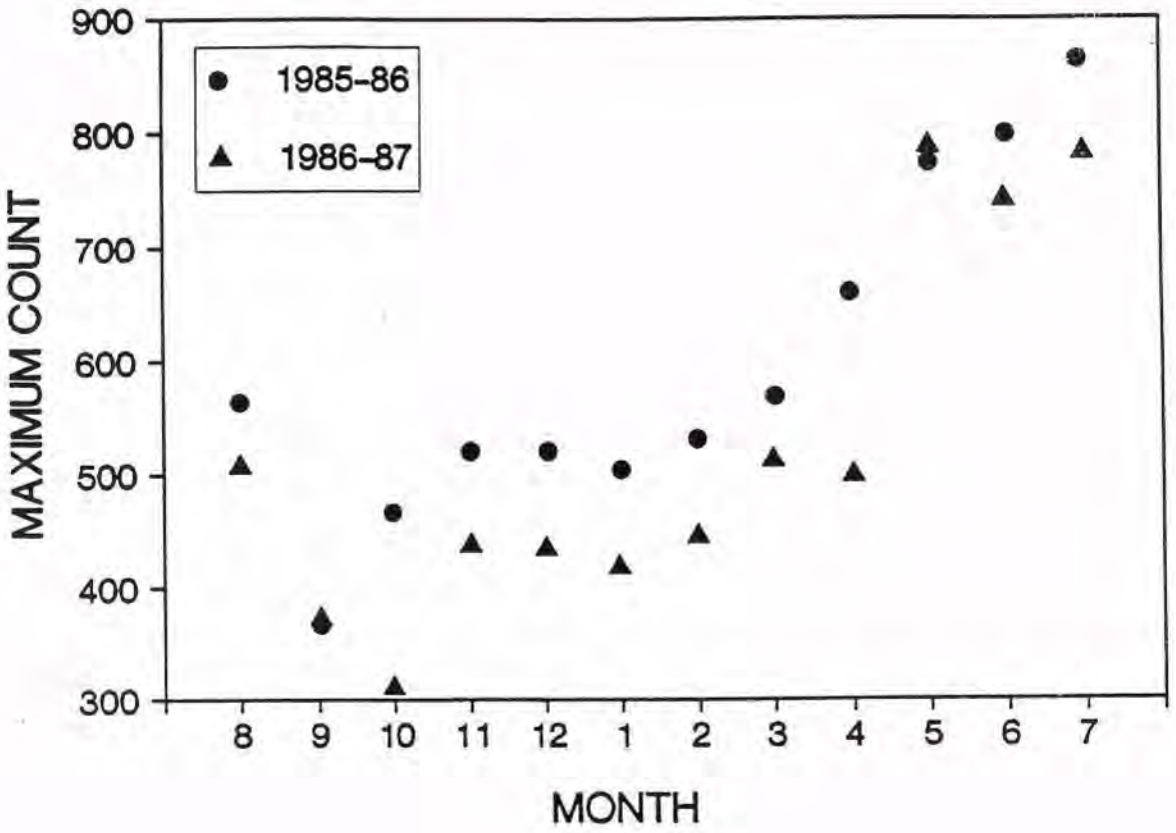

Figure 12. Monthly maximum number of seals counted at Drakes Estero between August 1985 and July 1987.

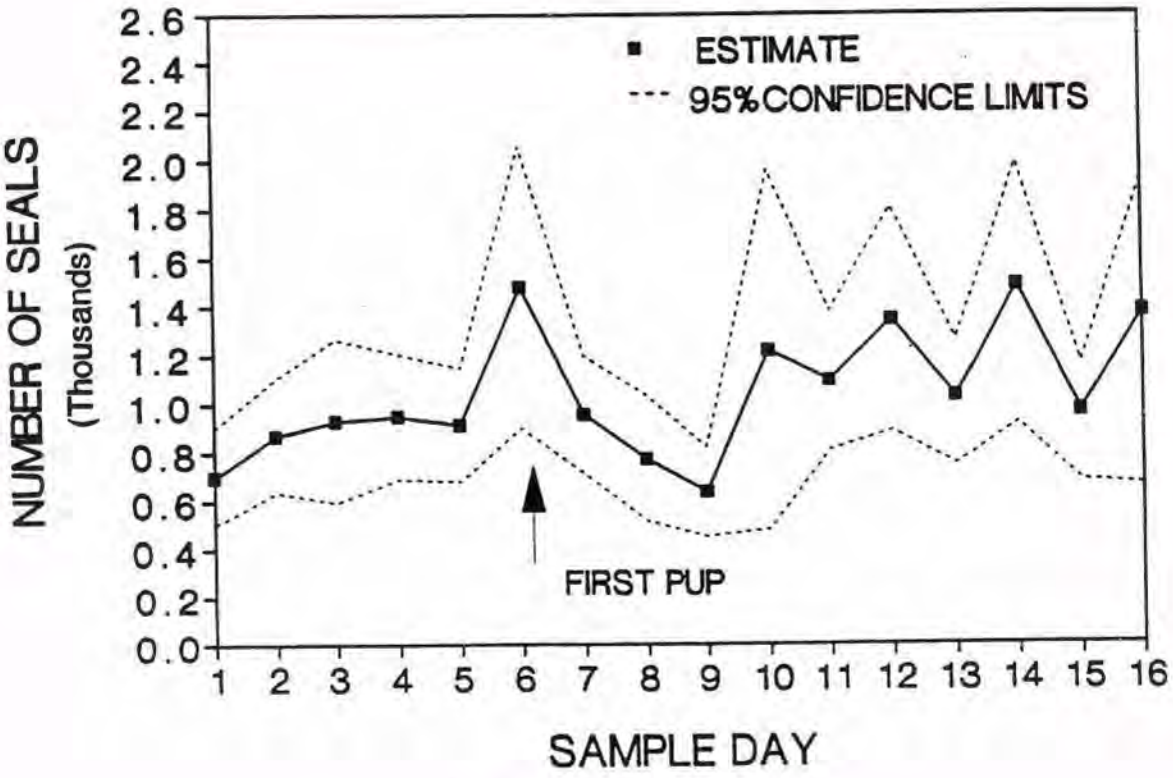

Figure 13. Estimates of absolute abundance of seals at Drakes Estero for March 1987.

Twenty of 28 adult, female seals (71%) tagged in March of 1987 were seen at least once with a pup. In addition, five of ten female seals (50%) tagged in July 1986, were seen with pups. Fifteen tagged seals were closely monitored throughout this season. The median pupping date for these females was April 23, and by April 28, 80% had given birth (range: April 16 to April 30). The median weaning date was May 25, and by May 28, 80% of the pups had been weaned (range: May 14 to May 30). The average number of days that females were seen with pups was 31 (SE = 0.6, n = 15; Table 15). Of the radio-tagged seals, only one (RT821) was observed separated from a pup; 24 days after giving birth, she was seen without pup and searching throughout the estero for two hours. On two subsequent days, she was again observed searching intermittently. All other females were seen in constant attendance with pups until the date of weaning. Weaning appeared to be abrupt. Characteristically, females departed for a minimum of one day from the estero on the day of weaning, and one female (RT432) relocated to PRH.

For the first two weeks after giving birth, females stayed exclusively within the estero, but after that time, they began to depart for an increasing number of hours during the night. Whether pups accompanied females on these excursions is not known. Spatial distribution of seals during the breeding season also changed with increasing use of several additional sites (Figure 2). Twenty-five percent of observations were of radio-tagged seals hauled out at sand bars up the estero, 33.6% at sand bar A1, 28.7% at sand bar A, and 13.4% at Limantour Spit (n = 261 observations). During the winter, though, 91.7% of the observations were of seals at sand bar A and only 8.3% at Limantour (n = 109 observations).

Though spatial segregation by sex was not absolute, the difference between spatial distribution of females with pups and males was significant ($X^2 = 33.55$, df = 3, $p < 0.0001$; Table 16). Females with pups tended to haul-out on sand bar A1 and to avoid Limantour Spit, which males tended to haul-out. During the winter, however, gender differences were not significant ($X^2 = 2.86$, df = 1, $p > 0.05$). Seven of ten females with pups also were remarkably site specific, hauling out at the same location on a subsite during more than 50% of the ground surveys conducted between April 29 and May 27. Female site tenacity was also demonstrated by a radio-tagged female (RT821) observed searching for her pup one day. Over a two-hour period, she investigated pups at two other subsites but returned each time to the locus on sand bar A where she had been seen with pup five times previously. Only one of three male seals expressed a preference

Table 15. Birthing and weaning dates of pregnant females radio- and flipper-tagged in July 1986 and March 1987.

Seal	Estimated Birthday	Estimated Wean Day	Days w/Pup
Radio-tagged			
024	4/28	5/26	30
090	4/30	5/28	29
116	4/28	5/28	31
432	4/22	5/18	27
467	4/27	5/30	39
821	4/26	5/19	24
844	4/23	5/22	30
856	4/21	5/23	33
874	4/23	5/25	33
Flipper-tagged			
RT046*	4/22	5/27	33
T365	4/16	5/14	29
T465	4/19	5/21	33
T454	4/28	5/25	28
RT645*	4/30	5/30	31

* Radio tag had ceased functioning.

Table 16. Spatial distribution of radio-tagged seals hauled out within Drakes Estero by sex and by season, 1986-87. Locations were identified during ground surveys. Number given is the number of days that individual radio-tagged seals were located at each site. A, A1, and U refer to specific sandbars, and L refers to Limantour Spit (see Figure 2).

	Breeding Location				Winter Location			
Sex	A	A1	L	U	A	A1	L	U
Female	55	76	14	52	48	--	3	--
Male	20	9	21	14	52	--	6	--
	$X^2 = 33.55$				$X^2 = 2.86$			
	$p < 0.0001$				$p > 0.05$			

for a location on a haul-out site during the breeding season; however, during the nonbreeding season several male and female seals showed a preference for a particular spot on a haul-out site, and one seal (RT821) continued using the same spot that she had used during the nonbreeding season and the previous breeding season.

During the first two weeks with pup, radio-tagged females hauled out for an average of 13.3 hrs per day (SE = 0.8, n = 10), and for the first couple of days after giving birth, females often hauled out for more than 20 hrs. Unexpectedly, males also hauled out for more hours between the median birthing date of April 23 and the median weaning date of May 25 ($\bar{x}$ = 13.1, S = 2.4, n = 3). For two weeks after pups were weaned, the average total number of hours hauled was 8.0 (SE = 0.7, n = 8) for females (from estimated weaning date to 14 d) and 6.2 (SE = 0.9, n = 4) for males (for period May 12 to May 27). Since mating occurs in the water, it is not surprising that males would spend less time hauled out during the weaning period; however, the difference between the sexes was not significant (p = 0.27, n = 12, Fisher's Exact Test).

DISCUSSION

The decline in seal numbers during winter months at Drakes Estero is related to both seasonal emigration and a reduction in the proportion of days that resident seals haul-out. Movements of greater than 25 km occurred more often in 1985 than in 1986, and instead, seals relocated for brief periods at Point Reyes Headland. The observed differences between years may be attributed to different individual preferences, to greater local food availability, or to some unknown factor. Similar to results in Orkney, Scotland (Thompson 1987), in Alaska (Pitcher and McAllister 1981), on San Nicolas Island in California (Yochem et al. 1987), and in Oregon (Harvey 1987), seals expressed a high level of site fidelity, using no more than three sites. All movements were to well established seal haul-out sites in estuaries, at river mouths, and at coastal sites (Miller 1983, Hanan et al. 1987). Use of more than three sites may have occurred and was not identified, if seals that relocated outside of the Point Reyes Peninsula visited other sites between aerial flights.

In 1985, the majority of long-range movements occurred just prior to the breeding season and after the molt, but in 1986, they occurred during all months except the height of the breeding season. At the

Klamath River, California, Herder (1986) observed that seals traveled significantly more times during the fall and winter and exhibited the greatest local movement during the period April to June. In Orkney, Scotland, Thompson (1987) also found that harbor seals (Phoca vitulina vitulina) made longer trips outside of the study area during the nonbreeding season. In my study more local movement occurred prior to the median birthing date and after the median weaning date, but virtually no movement occurred between those dates. Two of 12 seals (one adult male and one adult female) radio-tagged in March 1987 relocated to other haul-out sites prior to the breeding season but both returned within a few days of the median birthing date. Both Thompson (1987) and Beach et al. (1985) also noted daily attendance during the breeding season.

Herder (1986) and Pitcher and McAllister (1981) observed that immature harbor seals traveled greater distances than adult animals, but in my study, maximal distances were recorded for adults. Immature seals also did not appear to engage in exploratory migration (Baker 1978); however, our sample size was small. One first-year seal rarely departed from Drakes Estero and another relocated intermittently at PRH; one immature traveled to Duxbury Reef and Tomales Bay. Adult females made more long range movements than males in 1985, as was noted by Herder (1986); however, this tendency was not repeated in 1986. Harvey (1987) found no sexual difference in the distance moved by harbor seals in Oregon.

The observed movements indicate that Drakes Estero is an important breeding area for seals ranging as far south as Monterey Bay and north to the Klamath River, an overall distance of 690 km. Movements also indicate that there is substantial social mixing among harbor seal colonies both locally and at distances greater than 25 km; however, mixing did not appear to take place during the breeding season implying that genetic mixing may not be occurring. Brown and Mate (1983) and Herder (1986) also recorded movements of seals between sites in Oregon and Washington, and between colonies in the Klamath River and Alsea Bay, Oregon, respectively. Stewart and Yochem (1983), though, found that inter-island movement of seals on the southern Channel Islands was the exception but that considerable exchange occurred between sites within an island.

Maximum distances traveled by seals in this study were greater than those recorded by Herder (1986) of 300 km from the Klamath River to Alsea Bay, by Boulva and McLaren (1979) of 190 km from Sable Island to Nova Scotia, Canada, or by Beach et al. (1985) of 300 km from the Columbia River to Coos

Bay, Oregon. One seal, though, tagged in Netarts Bay, Oregon, traveled 550 km south to Humboldt Bay, California (Brown and Mate 1983).

In general, movements appeared to be motivated by a group preference for breeding and molting at Drakes Estero, and by an individual preference for feeding areas. Migrant seals were highly individual in distance of movement and final destination. Individual preference may be influenced by past experience and current food availability. Seals do not appear to be responding to a single prey item as was a suggested explanation of winter movements of seals in northern California, Oregon and Washington (Brown and Mate 1983, Beach et al. 1985, Herder 1986, Harvey 1987), but instead, individuals may be expressing a preference for location based on past experience, including foraging success. Fourteen percent of seals radio-tagged over two years, though, visited Tomales Bay during winter when Pacific herring (Clupea harengus) spawn (Spratt 1981). Herder (1986) also observed seals traveling to areas where herring were spawning in Crescent City Harbor, California. The fact that one seal (RT504) traveled great distances (and presumably expended considerable energy) but promptly returned, suggests that past experience may have motivated the initial movement, but that food availability then influenced where it subsequently spent the greater proportion of its time.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals during the breeding season (April and May) and the molt (June and July) than during other months of the year. Peak abundance during these periods have been documented for harbor seals in other areas (Stewart and Yochem 1983, Beach et al. 1985, Harvey 1987, Thompson 1987) and for other phocid seals (e.g. northern elephant seals Mirounga angustirostris (Le Boeuf and Panken 1977), grey seals Halichoerus grypus (Bonner 1981), and Weddell seals Leptonychotes weddelli (Thomas and DeMaster 1983).

The average percentage of total radio-tagged seals hauled out on any given day per month in this study was substantially higher than figures derived by most other researchers studying harbor seals with radio telemetry. Harvey (1987) estimated similar figures for seals radio-tagged in Oregon, hauled out in June (82%) and July (100%) but his percentages for all other months were less than 55%. Stewart and Yochem (1983) calculated that seals hauled out on San Nicolas Island, California, an average of 58% of the days in June and 41% in July. For seals in the Klamath River, Herder (1986) computed an average of 56% of days

in April and 65% in May, and for seals on Tugidak Island, Alaska, Pitcher and McAllister (1981) calculated seals were hauled out on an average of 50% of the days in June.

Dissimilarity between studies is partly explained by differences in sampling techniques and by months chosen for analysis. Harvey (1987) and Yochem et al. (1987) included nonresidents in their analysis, whereas Pitcher and McAllister (1981) eliminated nonresidents. Harvey (1987) argued that by eliminating nonresidents the data may be biased toward resident seals that may rest on shore for longer periods; however, I believe that if the location of nonresidents can be ascertained, then more accurate assessments of time spent ashore for seals in the immediate area can be obtained.

As did Yochem et al. (1987), I calculated the proportion of tagged seals onshore at intervals over 24-hr periods; however, their percentages (11-19%) were still lower than those for Drakes Estero (4-41%) during winter. The difference may be attributed to the larger number of immature animals tagged on San Miguel Island versus the larger number of adult animals tagged in this study (Stewart and Yochem 1983). The percentage of days per month that immature seals were hauled out at Drakes Estero was similar to figures derived by Stewart and Yochem (1983).

The decline in seal numbers onshore at Drakes Estero during the winter is partly a function of a reduction in the total number of hours per day that seals are hauled out. For all months except during the breeding and molt periods, seals spent 29% (7 hr) of each day resting onshore. During the molt, the change is explained by an increase in the duration of a haul-out bout; during the breeding season, though, the increase is due to seals hauling out more frequently. The increase in time spent ashore during the molt is likely related to physiological requirements. The proliferation of epidermal cells is greatly enhanced by maintenance of higher skin temperatures as has been demonstrated in vitro (Feltz and Fay 1966).

Stewart and Yochem (1983) observed seals hauled out for a higher proportion of the day (8.9 hr), than I recorded at Drakes Estero (7 hr). Differences may be attributed to more exposure to disturbance from humans at Drakes Estero; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human disturbance (Allen and Huber 1984b). Yochem et al. (1987) determined that time of initiation of a haul-out bout did not influence the length of the bout; however, I found that during all

months except December 1985, seals hauled out for longer periods when bouts were initiated between 0100 and 1200 hr than for other time periods during day or night.

Sexual differences in activity patterns associated with seasonal reproductive requirements were minimal. Harvey (1987) also found no significant difference in attendance patterns of male and female seals in Oregon during the breeding season; however, his sample size for females with pups was small (3). Intuitively, though, one would expect adult males to spend less time ashore during the breeding season since mating primarily occurs in the water (Allen 1985), and post-lactating females spend less time ashore after weaning pups to replenish fat layers. Thompson (1987) observed this pattern in Orkney, Scotland. At Drakes Estero, the percentage of days hauled out in March, April, and June and the total number of hours hauled per day were not significantly different between the sexes. Males appeared to spend slightly more time in the water immediately after the median weaning date than females, thereby maximizing the opportunity of mating with females either departing from or arriving at a haul-out site. Frequently I observed one radio-tagged male (RT894) resting alone at the mouth of a channel to a haul-out site attended by females with pups. Often he would enter the water and remain at the mouth of the channel.

Preference for location of haul-out was the only significant difference in haul-out behavior between males and females. Herd segregation by sex and age class has been documented by others during the breeding season (Knudtson 1977, Thompson 1987, Allen et al. 1988) and during the nonbreeding season (Sullivan 1979, Payne and Schneider 1984). Site fidelity of individuals within a haul-out site, though, has only been documented by Sullivan (1979) and Heinonen (1985) for adult male seals on offshore rocks in Humboldt and San Mateo Counties, respectively. At Drakes Estero, females with pups exhibited within site fidelity. A primary advantage for this behavior would be to maximize the opportunity for reunion of females with pups should they become separated. During the nonbreeding season, several seals, both male and female, also could often be located at the same position on a given haul-out site. Sullivan (1979) believed that adult males were expressing dominance over females and immatures by selecting rocks to haul-out on which were higher in the supralittoral zone; however, there is no such advantage for seals on sand bars where ample haul-out space is available. Instead, seals may simply be habituated to hauling out at the same

location or to hauling out in proximity to other individual seals, as has been reported by Wilson (1978) for seals in Maine.

The strong diurnal haul-out pattern documented at Drakes Estero previously (Allen and Huber 1984), and shown by many other researchers (e.g. Boulva and McLaren 1979, Fancher 1979, and Stewart 1984), was further confirmed by this study. Though seals hauled out at all hours, peak abundance, based on the percentage of tagged seals, occurred from early morning to mid-day. Yochem et al. (1987) found that 7 of 17 seals preferred hauling out at night and suggested that this behavior could influence estimates of abundance. We identified 4 of 21 seals (3 pups and 1 adult female) in August and 4 of 15 (2 pups and 2 adult females) in December that preferred hauling out at night. In May, higher percentages of seals hauled out at night, but in most cases, these were females with pups that also hauled out for extended periods during daylight hours. Thompson (1987) found that seals in Orkney, Scotland, hauled out primarily during the day and foraged at night during the breeding season; during the nonbreeding season, though, time of day ceased to be a factor in the haul-out pattern. Thompson (1987) speculated that this difference was related to seals foraging for longer intervals during the nonbreeding season. I also established that foraging trips were on average more numerous during the nonbreeding season but that seals were strongly diurnal regardless of season.

Harbor seals may chose to forage at night because of a preference for bottom dwelling fishes that migrate to the surface at night. From stomach content analysis, Jones (1981) determined that harbor seals in northern California foraged primarily on bottom dwelling fish. Families of fishes that are active at night (Moyle and Cech 1986) and that are eaten by harbor seals (Jones 1981, Harvey 1988) include Clupeidae, Scorpaenidae, Embiotocidae, Hexagrammidae, and Sciaenidae. Fishes that are active day and night and are eaten by seals include Salmonidae and Pleuronectidae.

Absences of resident seals from Drakes Estero averaged from one to two days suggesting absentees were foraging close by; local movement patterns observed during aerial and ground surveys also support this conclusion. All recorded foraging activities and movements of seals during aerial surveys were limited to within 3.2 km of shore. Though offshore movements of greater than 10 km by harbor seals have been recorded by others (Spaulding 1964, Wahl 1977, Pitcher and McAllister 1981), nearshore feeding may be

more typical of seals at Point Reyes. Immatures in this study appeared to take more trips than adults in August and September, but there are no comparable data for other months. Once female seals had given birth in 1987, seals of both sexes were present daily in Drakes Estero until pups were weaned.

A more reliable schedule for conducting surveys and minimizing biases is possible once seasonal attendance and activity patterns are understood (Ribic et al. 1986). California Department of Fish and Game has been conducting aerial statewide surveys of harbor seals since 1982 to detect trends in distribution and abundance (Hanan et al. 1987). Attention to population trends has been particularly important during recent years because of an increased incidence of marine mammal - fishery interactions resulting in seal mortality and damage to commercial fishing gear (Beach et al. 1985, Diamond et al. 1986, Harvey 1987). Correction factors, therefore, are desirable to adjust direct counts acquired during aerial surveys.

Boveng (1988) discussed several difficulties in correcting counts due to errors of heterogeneity and to violation of the assumption of a closed population. He considered the most serious problem for estimating total abundance from proportion of seals hauled resulted from sex- and age-specific differences. Ribic et al. (1986) defined several variables requiring correction factors including season, time of day, tide, and sex and age class. Field studies have not yet confirmed sexual or age related differences in attendance patterns (Pitcher and McAllister 1981, Harvey 1987, Thompson 1987, Yochem 1987, Allen et al. 1988). In the Drakes Estero study, the sample size was insufficient for testing age-related differences in behavior but immatures tended to haul-out for fewer days than adults in the fall. Deviations associated with gender were not significantly different except for movement patterns in 1985. Yochem (1987) noted sexual differences in molt sequence and Thompson (1987) demonstrated sexual and age related differences in molt completion dates which may influence the peak abundance for each class. I was unable to acquire reliable data on molt sequence of individuals because of tag loss at the time of molt (transmitters were shed and flipper tag loss was nearing 0.6). Adult females, though, shed transmitters on average 8.6 days earlier than males.

The best strategy for surveying seals in the Point Reyes area would be to census seals midday at the peak of the molt during late June or early July. Seals hauled out for significantly more days per month and more hours per day then than for any other period of the year. Peak abundance occurred between 0600 and 1400 hr which represented between 60% and 73% of the estimated number of seals at Drakes Estero. Ribic

et al. (1986) determined that July counts had lower coefficients of variation and were generally more stable than those for other months of the year. Based on the above and as suggested by Boveng (1988), a correction factor of 1.4 times the total number of animals hauled out could be applied for estimating adult animals at Drakes Estero. This figure, though, would likely underestimate the total population because the attendance patterns of immatures and pups have not been satisfactorily documented during the molt. From studies of immature seals of other species during the molt, one would expect their behavior to be very different from adults (King 1983).

To improve current population estimates, in light of the deficiencies delineated above, future radio-telemetry studies should be designed to include larger sample sizes of each age and sex class. Additionally, research should address biases associated with annual variation. Most telemetry studies are funded for one or two years, and as was demonstrated at Drakes Estero, movement patterns were very different between two years. Between year differences could have been due to different seals sampled or to variation in food availability.

CONCLUSIONS

Results of this study fulfilled the primary objectives delineated in the introduction. The apparent decline in seal numbers during the winter was a function of both migration and a reduction in the frequency of the haul-out pattern. During the nonbreeding season, seals hauled out on fewer days per month and for fewer total hours per day than during the breeding/molt season. The destination of departing seals was detected during most aerial surveys, and movements ranged over a 690 km distance between Monterey Bay and the Klamath River, California. More seals traveled to haul-out sites >25 km from Drakes Estero in 1985 than in 1986; however, several seals relocated intermittently at Point Reyes Headland in 1986.

Results affirm that haul-out behavior of seals varied with time of day and time of year. Seals exhibited a strong diurnal haul-out pattern, regardless of season, with most seals resting onshore mid-day and foraging at night. The amount of time that seals spent onshore, though, varied seasonally. During the nonbreeding season, seals spent about 30% of the day hauled out and 70% either traveling to feeding areas or engaged in foraging activities; during the breeding/molt season, though, they were hauled out 38 to 46%

of the day. During the breeding season, the increase was due to an increase in the frequency of haul-out bouts and during the molt to an increase in the duration of a single haul-out bout.

Age and gender accounted for some of the variation in seal haul-out behavior. Assessment of the influence of age on variation was limited by a small sample size; however, data collected during the fall indicate that immature seals hauled out on fewer days than adults. Once onshore, though, the length of a haul-out bout was no different between age classes. Immatures did not appear to travel longer distances or more frequently than adults. Sexual differences in activity patterns were not significant regardless of season. The total number of hours per day, the length of a single haul-out bout, and the proportion of days hauled out per month were similar for males and females. In 1985 more females migrated and traveled longer distances than males but this trend was not repeated in 1986. Preference for location of haul-out site was the only significant difference in haul-out behavior between males and females and segregation occurred only during the breeding season.

Recommendations for improvement in research design center around determining age-related differences in movement and activity patterns. This can be accomplished in future projects by radio-tagging equal numbers of immatures and adults and increasing the sample size for both. Additionally, a better method of attachment of transmitters and a longer lasting transmitter should be investigated so that individuals can be monitored through the molt and for multiple years. Currently, CDFG statewide aerial surveys occur during the molt; however, all transmitters in this study were shed about two weeks prior to the molt and no telemetry data have been collected through the entire cycle. Nevertheless, major changes in seal haul-out behavior occur during the molt. Attendance patterns during the molt may vary significantly between age and sex classes as was noted by Thompson (1987) and Yochem (1987). Research for several consecutive years would ascertain whether annual differences in movement patterns, as were observed in this study, are typical.

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NOAA Technical Memorandum
NOS MEMD 6

GULF OF THE FARALLONES NATIONAL MARINE SANCTUARY

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Washington, D.C.
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U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / Marine and Estuarine Management Division

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INTRODUCTION

Harbor seal colonies in the Point Reyes area, Marin County, contribute about 20% of the mainland California breeding population (Allen and Huber 1984, Hanan et al. 1986) and consequently deserve attention when devising regional management policies. Estimates for the size of the state and Point Reyes populations are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. Consequently, estimates are rough, and are likely low. In addition, it is difficult to relate numbers among seasons. This problem is not unique to the Point Reyes population.

Several researchers have addressed the problem using marked animals and have derived correction factors with varying attendance patterns based on location, time of day, and season of year (Brow.. and Mate 1981, Pitcher and McAllister 1981, Stewart and Yochem 1983, and Sullivan 1979). Stewart and Yochem (1983) for the Channel Islands and Sullivan (1979) for Humboldt Bay, California, found that seals spent about 40% of each day hauled out. Stewart and Yochem (1983) determined that marked seals hauled out on 65% of the days in May, 58% in June, and 35% from October through December. Pitcher and McAllister (1981) estimated that seals in Alaska hauled out on 50% of the days in June and 41% in August, and Herder (1986) found that seals in the Klamath River area hauled out on average 56% of the days in April and 64% in May.

These researchers determined that the differences between total number hauled out and the estimated population were a function of variations in

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daily haul-out patterns as well as movements to other areas. Brown and Mate (1983) determined that dispersal accounted for seasonal changes in the number of seals hauled out in Oregon. Movements appeared to be associated with seasonal changes in reproductive status and in response to feeding strategies (Brown and Mate 1983, Herder 1986). Seals at the Klamath River, California, moved locally to alternate haul out sites year round and dispersed long distances in winter months (Herder 1986). With the exception of one inter-island movement, Stewart and Yochem (1983) found seal movements were local, leading them to conclude that reduced hauling frequency accounted for the decline in seal numbers during the fall and winter months.

In the Point Reyes area we determined previously that seals displayed diurnal and seasonal variation in haul-out patterns (Allen and Huber 1983, 1984). Diurnal and tidal effects on seal haul-out behavior varied within an optimum range with most seal hauled out from mid-day to late afternoon at low to medium tides, depending on the physical attributes of each location. The diurnal pattern was similar to that of the southern Channel Islands (Stewart 1984), Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), and Bolinas Lagoon (Allen et al. 1985). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods. Maximum numbers reached 2449 in May and 2502 in June 1983-84. During the fall and winter, the maximum number of seals was around 1000 animals. It appeared that seals were either moving to other haul-out sites outside of Point Reyes in the winter, or spending more time at sea.

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Information on seasonal activity patterns and fall/winter movements would be invaluable for any long-term management program for seals in the Point Reyes area, and, in conjunction with results accumulated elsewhere (Stewart and Yochem 1983; Herder 1986), could provide more accurate estimates of the California harbor seal population.

In an effort to identify movement and seasonal activity patterns, we undertook a radio-tagging program of harbor seals in Point Reyes. We chose this method based on the successful results obtained from radio-telemetry studies by Brown and Mate (1983), Herder (1986), Pitcher and McAllister (1983), and Stewart and Yochem (1983). Our main objectives were to determine 1) if the apparent decline in seal numbers during the winter months was a function of dispersal and seasonal movements, or a reduction in the frequency of the haul-out pattern, 2) the destination of departing animals, 3) daily and seasonal variability in haul-out behavior, and 4) if gender accounted for variations in the above.

STUDY AREA AND METHODS

Drakes Estero is an estuary where seals haul out on tidal mud flats exposed at low, medium, and medium-high tides, as well as on the tip of Limantour Beach exposed at all tide levels. This location is one of the main breeding areas in the Point Reyes area (Figure 1). Significantly more seals were present during the spring and summer than during fall or winter; however, in contrast to the two other important areas, Tomales Point and Double Point, seals were present in substantial numbers year round (Allen and Huber 1983, 1984). A maximum of 122 pups was counted in May 1983, accounting for 19% (122/656) of the total numbers of seals present. Twenty-three percent (122/527) of all pups in the Point Reyes area occurred at Drakes Estero in 1983.

We chose to tag seals at Drakes Estero because of its significance to the Point Reyes population, because seals there exhibited the seasonal and diurnal activity patterns characteristic of seals elsewhere in the area, and because the capture technique we wished to use was only possible in an estuarine environment.

Over a two-day period (July 31 - August 1) in 1985, we successfully captured about 60 seals and affixed radio transmitters to 17 (nine males and eight females). Our intention was to obtain a sample size of 10 females and 10 males, rather than to randomly capture and tag whatever seals happened to be caught; therefore, we released unmolted and immature seals. Personnel from the Point Reyes National Seashore, the Point Reyes/Farallon Islands National Marine Sanctuary, the National Marine Fisheries Service, the California Department of Fish and Game, the Oregon

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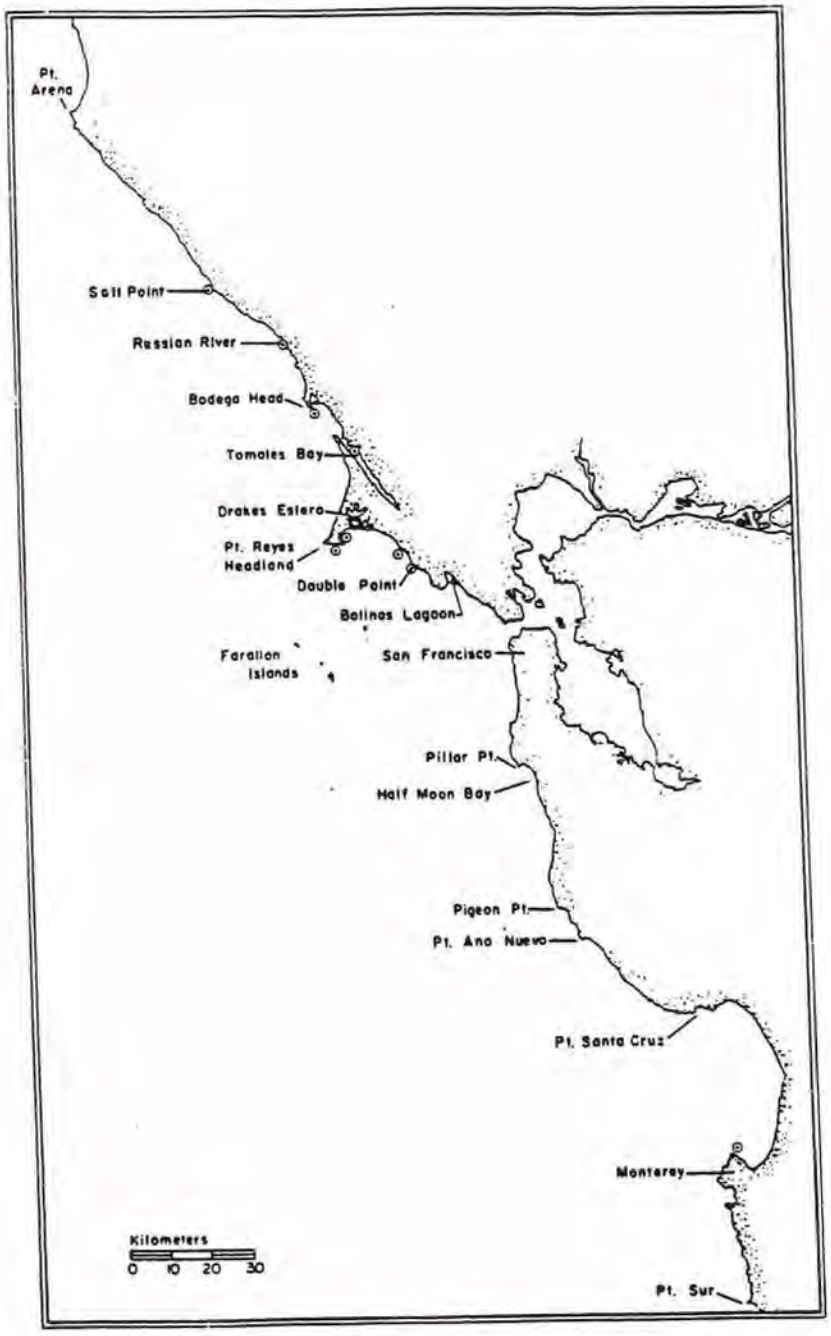

FIGURE 1. Capture site and locations of movement of harbor seals in California, 1985-1986.

Department of Fish and Wildlife, and the Point Reyes Bird Observatory assisted in the capture. We captured seals in a 60-fathom long gill net, with 8-inch mesh, set off the haul-out site and then pulled ashore. Two power boats were used to deploy the net adjacent to the haul-out site. The lead boat carried the net on a platform set above the transom. This boat approached the hauled out seals as rapidly as possible, set the net as the seals entered the water, and then landed on the far side of the haul-out beach. The second boat retrieved the other end of the net and landed. A third boat carried supplies and additional personnel for handling the seals. This method of capture was successfully developed and used in Washington and Oregon for capturing harbor seals in estuaries and enabled the researcher to capture a large number of seals over a short period of time, thereby minimizing the duration of disturbance days to the herd (Beach et al. 1985).

Captured seals were removed from the large net and individually placed in small hoop nets. This temporarily restrained the animals before they were tagged and reduced aggressive interactions between seals, thus reducing injury. Seventeen people were involved in handling the seals. One person recorded data, three weighed seals, two monitored the condition of seals retained in hoop nets, two marked seals with flipper-tags, two to three restrained seals being tagged, one attached the radio transmitter, and one supplied the equipment (tags, resin, etc.). All 17 people were needed to pull the net ashore and place seals in hoop nets.

Captured seals were weighed, measured (length and girth), sexed, flipper-tagged, dye-marked, and radio-tagged. The average time required to

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accomplish this was 15-20 minutes per seal. When the tide level began to flood the haul-out site, any remaining seals were transferred by boat to the mainland for processing. Red Woolite sheep dye which lasts for about three months was used to mark each seal for easy visual resighting. Fourteen seals were flipper-tagged with lime green "Riese" cattle ear tags supplied by NMFS. Two neoprene patches with an individual number code and a color code for gender were glued with "Lock-tight" super glue to the fur between the shoulder blades to provide an additional visual mark. A radio transmitter manufactured by Advanced Telemetry Systems, Inc. (Bethel, Minnesota) was glued to the fur on the back of the seal's head with "Devcon" 5-minute epoxy (for attachment procedures see Beach et al. 1985). By attaching the radio tag to the head of the seal we were able to locate seals when they were in the water. Radio transmitters were 9 x 3 x 3 cm, weighed 60 gms, had a 13-inch flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute.

We monitored seals with an automated recording station and aerial surveys. The automated recording station was established on a bluff overlooking Drakes Estero and consisted of an "Esterline Angus" 20-channel strip chart recorder, a programmable scanning receiver, a 12-volt marine battery, and a "Yagi" antenna. The station recorded seals within a two-mile radius on a 24-hour basis. Each frequency was monitored by the scanning receiver for 32 seconds and was scanned five to six times per hour. A seal was considered hauled out if it was recorded with two strong pen marks in a row within a half-hour period; a seal was considered in the

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vicinity but in the water if a strong pen mark in conjunction with two weak marks within a half-hour was recorded. We manually checked frequencies to determine if radio interference from the nearby radio communication facilities (U. S. Coast Guard Station and RCA Gobal Communications Center) triggered pens and found that interference did not hinder distinguishing whether a seal was hauled out. Radio interference on one frequency prevented our distinguishing whether one animal was in the water but did not hinder our distinguishing when it was hauled out; interpretation was not impaired for the other frequencies. A test transmitter was placed near the remote station to verify that the receiving system was functioning properly. The remote receiving station was in operation from July 31 through September 5, and from October 25 through December 31, 1985; and from January 1 through February 16, and February 21 through April 30, 1986.

We checked and maintained the remote station almost daily in August and semi-weekly for the rest of the study period. During visits we scanned all frequencies and checked for signal drift. Each signal was checked for a period of five to ten minutes to detect seals in the water. We based this scan period from averaging dive times of tagged seals during the first month of the project ($\bar{x}$ = 3 min, range = 5 sec - 9 min 45 sec, SD = 2 min, n = 76). We made visual searches for marked animals to check for transmitter loss or failure.

We also conducted all-day censuses at Drakes Estero to compare the diurnal haul-out pattern of the herd with those of individually marked seals. For both summer and winter, individual patterns were similar to those of the herd (Table 1). Consequently, we were confident in making

Table 1. Diurnal haul-out pattern of the herd in comparison to that of radio-tagged seals at Drakes Estero during the summer and winter seasons; herd = total number of seals hauled out, tagged = total number of tagged seals hauled out, and proportion = the proportion of tagged seals hauled out to the total number of resident, tagged seals.

	TIME (PST)									
	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
SUMMER										
Aug 6										
Herd	453	397	429	462	365	259	81	36	17	21
Tagged	8	8	8	9	7	7	3	3	0	0
Proportion	0.6	0.6	0.6	0.6	0.5	0.5	0.2	0.2	0	0
Aug 13										
Herd	387	378	325	94	24	106	89	173	192	70
Tagged	5	7	7	5	3	3	4	4	5	2
Proportion	0.5	0.7	0.7	0.5	0.3	0.3	0.4	0.4	0.5	0.2
Aug 20										
Herd	389	427	261	372	316	51	1	0	0	6
Tagged	8	8	5	9	8	4	0	0	0	0
Proportion	0.8	0.8	0.5	0.9	0.8	0.4	0	0	0	0
Aug 27										
Herd	257	241	174	56	60	72	211	248	265	157
Tagged	3	3	4	2	2	3	8	8	9	9
Proportion	0.3	0.3	0.4	0.2	0.2	0.3	0.8	0.8	0.9	0.9
Sep 3										
Total	100	230	355	252	210	48	0	0	3	24
Tagged	3	4	4	5	5	2	0	0	1	2
Proportion	0.3	0.4	0.4	0.6	0.6	0.2	0	0	0.1	0.2
WINTER										
Jan 1										
Herd	190	266	404	467	467	497	192	70	66	0
Tagged	4	4	7	8	8	8	3	1	1	0
Proportion	0.5	0.5	0.9	1.0	1.0	1.0	0.4	0.1	0.1	0
Jan 7										
Herd	0	0	0	0	157	329	419	497	498	506
Tagged	0	0	0	0	5	6	7	7	7	7
Proportion	0	0	0	0	0.7	0.9	1.0	1.0	1.0	1.0
Jan 15										
Herd	309	364	413	456	462	451	229	110	RAIN	
Tagged	3	3	4	4	5	6	5	4	0	
Proportion	0.4	0.4	0.6	0.6	0.7	0.9	1.0	0.6	0	
Jan 20										
Herd	0	0	14	124	310	372	464	476	467	445
Tagged	0	0	0	2	4	4	5	5	4	4
Proportion	0	0	0	0.3	0.6	0.6	0.7	0.7	0.5	0.6
Jan 18										
Herd		212	210	165	79	64	100	100	110	110
Tagged		4	4	3	3	3	3	3	3	4
Proportion		0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.6

assumptions regarding herd behavior from data derived from monitoring individuals at Drakes Estero until the spring (after the month of March) when two transmitters that were still functioning were too few to make valuable comparisons. During the all-day censuses we also verified the accuracy of the equipment in distinguishing the presence or absence of seals and whether they were hauled out or in the water.

To locate dispersing seals we attempted to make weekly aerial surveys along the California coast from Monterey Bay to the California/Oregon border. Seals were monitored with a scanning receiver and two wing-mounted, two-element antennae from Telonics (Mesa, Arizona), and frequencies chosen were continuously scanned for three seconds each. When a seal was located, activity, time, and location were recorded. Most flights ranged from Point Arena south to Half Moon Bay and into San Francisco Bay. The flights varied depending on which animals we were trying to locate. We scheduled flights on days when tides were low to medium to maximize numbers of seals hauled out.

DATA ANALYSIS

We defined seals as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" as those which departed in the fall but returned during the following breeding season, and "transients" as those present at Drakes Estero during the capture but which resided away from Drakes Estero during the rest of the study period. Seal behavior at Drakes Estero was classified as either 1) hauled out, 2) in the water, or 3) absent. All information recorded on the Esterline Angus strip charts

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was transferred to the "DBase III" database system. The "SPSS statistical program for micro-computers" was used for all analyses. Analyses presented here are exploratory and primarily descriptive since this is the first of a two-year study. Averages are expressed with ± standard error. We chose August and December data to illustrate some of the seasonal differences in haul-out behavior.

RESULTS

We captured and radio-tagged 17 seals (eight females, nine males) and flipper-tagged two additional males (Table 2). On average, males weighed 27.5 kg more, and were 10.2 cm longer than females. On the day after capture, all but two of the radio-tagged seals were hauled out again at Drakes Estero, and on the third day after capture all but one seal was hauled out. All but two transmitters (88%) remained attached to seals for a minimum of five months, nine (53%) for seven months, six (35%) for eight months, and one for nine months (Table 3). We were able to locate regularly, either visually or with a receiver, all but one animal through April 1986.

MOVEMENTS

All radio and flipper tagged seals were resighted at Drakes Estero at least once during the study period. Two seals with transmitters that ceased functioning within the first month of study were excluded from all analyses; the two animals involved remained at Drakes for the entire year. Radio-tagged seals moved both north and south of the capture site;

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Table 2. Standard measurements of harbor seals tagged at Drakes Estero, August 1985. (RT = Radio Tag, FT = Flipper Tag.)

Radio Tag	Age	Sex	Length(cm)	Girth(cm)	Weight(kg)	Comments
RT024	AD	F	146	98	63.5	
RT033	AD	F	138	95	56.7	
RT092	AD	F	148	96	55.8	
RT234	AD	F	147	120	86.2	
RT313	AD	F	145	103	63.5	
RT415	AD	F	131	94	50.0	
RT491	AD	F	121	94	56.7	
RT710	AD	F	138	96	63.5	
RT047	AD	M	150	108	74.8	
RT084	AD	M	154	112	93.0	Old shark bite
RT124	AD	M	148	125	77.1	
RT176	AD	M	148	118	84.4	
RT256	AD	M	146	105	74.8	Old shark bite
RT272	AD	M	167	117	90.7	
RT435	AD	M	168	106	79.4	
RT753	AD	M	147	118	9[illegible].0	
RT974	AD	M	163	114	90.7	
FT212	AD	M	155	111	90.7	
FT222	AD	M	144	107	77.1	
FT220	AD	M	150	-	83.9	
--	AD	M	173	117	102.0	
Total Average			149 ± 3	108 ± 2	77 ± 3	
Average for Females			139 ± 3	100 ± 3	62 ± 4	
Average for Males			155 ± 3	113 ± 2	86 ± 2	

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Table 3. Minimum estimated length of time transmitters were functional, and date/place seal last located visually or audibly with a receiver.

Seal	Date Last Recorded	Date Last Observed/Recorded	Location[a]	Minimum length of Attachment(days)
024	Nov/12/85	Apr/29/86	DE	101
033	Mar/3/86	Jul/10/86	DE	240
047	Mar/12/86	Jul/10/86	DE	221
084	Mar/27/86	Jul/10/86	DE	236
092	Mar/19/86	Jul/3/86	DE	228
124	Mar/6/86	Jul/ /86	DE	236
176	Jan/8/86	Jan/8/86	DE	158
234	Jan/24/86	Jul/10/86	DE	174
256	Aug/9/85	Jul/21/86	DE	7
272	Aug/28/85	Jul/10/86	DE	26
313	Dec/19/85	May/22/86	DE	138
415	Apr/18/86	Apr/18/86	RR	258
435	Jan/1/86	Jul/3/86	DE	151
491	Dec/19/85	May/10/86	DP	138
710	Mar/19/86	Jul/23/86	DE	228
753	May/3/86	Jul/10/86	DE	273
974	Apr/16/86	Jul/3/86	DE	256

[a] DE = Drakes Estero, DP = Double Point, RR = Russian River.

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movements were within 0.8 km of the shoreline (Table 4, Figure 1). Five seals (33%) were recorded exclusively at Drakes Estero, six others (40%) on a total of two haul-out sites, and four (27%) on three haul-out sites (Table 5).

We classified eight radio-tagged seals (53%) as residents (five males, three females). Of these, three were located once in the water near another, nearby, haul-out site and one (a female) traveled greater than 25 km. We classified four seals (27%) as breeders (three females, one male); all of which traveled greater than 25 km away from Drakes Estero. We classified two females and one male as transients (20%), and these moved both locally and further than 25 km (Table 5).

Long-range movements of greater than 25 km were recorded for 6 of 15 seals. Although females traveled longer distances than males, both sexes moved about the same number of times (Table 5). One female moved north to the Klamath River (480 km) and one traveled south to Monterey Bay (210 km) for the winter months. Both were observed (without transmitter) at Drakes Estero in April 1986. The seal at Monterey Bay was observed on almost a weekly basis hauled out in front of Hopkins Marine Station from mid August to mid-March (Alan Baldridge, Hopkins Marine Station, CA; C. Deutsch, Univ. of Calif., Santa Cruz, CA, pers. comm.). Five seals traveled to nearby haul-out sites at Point Reyes; three to the Tomales Bay haul out site and two to the Double Point haul-out site. Seals were also recorded in the water near the Point Reyes Headland, Wildcat Beach, Bolinas Point, and Drakes Bay near the fish docks.

More movements both local and long distance (20) were recorded during

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Table 4. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys. Behavior is classified as A = active/swimming, I = inactive/hauled out.

FLIGHT DATE/PLAN		SEAL BY RADIO FREQUENCY NUMBER												
		024	033	047	084	092	124	176	234	313	415	435	491	710	753	974
1985																
Aug	9 1	DE/I				DE/I	PRH/A			DE/I			DE/I	DE/I		DE/I
	15 1								DE/I	TB/A						TB/I
	29 1						DP/I	DE/I	DE/I	TB/I		DE/I		DE/I		TB/I
Sep	12 1		DE/I	PRH/A		MB/I							DP/I			
	13 2				DE/A							DE/I	DP/A	DE/I	DE/I	TB/I
	19 1				DE/I			DE/A	DE/I				PRH/A	TB/A		TB/I
	26 1		DE/I	DE/I	DE/I		DP/I			TB/A			DP/A		DE/I	
Oct	4 1				DE/I		DP/A	DB/A	DE/I	TB/I	SR/I			DE/A		
	10 3	KR/A	DB/A	DE/A	DE/I	MB/I						DB/A			DE/A	TB/I
	22 1											BP/A			DB/A	BH/A
	23 2									BH/A		DE/I		DE/I		TB/I
	28 1			DE/A	DE/A			DE/I		TB/A		DE/I		DE/I	DE/I	TB/I
	31 1		DE/I	DP/A	DE/I			DE/I							DE/I	
Nov	8 1		DE/I	DE/I	DE/I			DE/I		SP/I						
	21 1				DE/I			DE/I								TB/I
	26 1	equipment failure					DP/I			SP/I	RR/I		DP/I			TB/A
Dec	10										RR/I			DE/A	DE/I	TB/I
	19 1			PRH/A										DE/I	DE/I	.
Feb	7 1			PRH/A							RR/I				DE/I	
	27 1		DE/I		DE/I										DE/I	TB/I
Mar	20 1		DE/I		DE/I	MB/I					RR/I				DE/I	TB/I
	23 2		DE/I								RR/I				DE/I	TB/I
	25 1										RR/I				DE/I	DE/I
Apr	2 1														DE/I	
	18 1															
May	9 1															

Locations with distances (km) from capture site:

DE = Drakes Estero	0	BP = Bolinas Point	20
DB = Drakes Bay	<10	BH = Bodega Head	40
DP = Double Point	16	MB = Monterey Bay	210
KR = Klamath River	480	RR = Russian River	55
SP = Salt Point	65	TB = Tomales Bay	48
SR = Sea Ranch	85	PRH = Pt Reyes Head	12

Flight Plan:

Half Moon Bay to Pt. Arena	= 1
Drakes Estero to Monterey Bay	= 2
San Francisco to Klamath R.	= 3

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Table 5. Distance of movement and locations of individual seals.

Seal	No. of moves	Average distance (km)	Locations[a]	Number of Locations
Females:				
024	2	480 ± 0	KR DE	2
033	-0-	-	DE	1
092	2	210 ± 0	MB DE	2
234	-0-	-	DE	1
313	3	47 ± 11	TB SP DE	3
415	2	58 ± 28	SR RR	3
491	3	24 ± 4	DP PRH DP	3
710	2	48 ± 0	TB DE	2
Totals	14	128 ± 43		
Males:				
047	4	12 ± 0	PRH DE PRH DE	2
084	-0-	-	DE	1
124	4	18 ± 0	PRH DP DE DP	3
176	-0-	-	DE	1
435	2	20 ± 0	BP DE	2
753	-0-	-	DE	1
974	2	48 ± 0	TB DE	2
Totals	12	26 ± 4		

[a] BP = Bolinas Point, DE = Drakes Estero, DP = Double Point, KR = Klamath River, MB = Monterey Bay, PRH = Point Reyes Headlands, RR = Russian River, SP = Salt Point, SR = Sea Ranch, TB = Tomales Bay.

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the fall (August-October) than during the winter (November-February) or the spring (March-April), i.e. eight versus six movements, respectively. Most long distance movements were made by breeders during the fall and the spring when seals were departing to wintering sites after the molt and returning for the breeding season (Table 6). One transient seal that traveled 85 km did not return to Drakes during the breeding season.

ACTIVITY PATTERNS

Resident seals exhibited distinct seasonal and circadian trends in haul-out behavior at Drakes Estero. Resident seals were hauled out an average of 0.92 $\pm$ 0.03 of the days from August through October but only 0.77 $\pm$ 0.04 of days from November through February (Tables 7, 8) ($p = .0081$, $n = 8$, Wilcoxon matched-pairs sign-rank test). The change in number of days that seals were hauled out in winter was more pronounced for females than males but sample sizes were too small to test for significance. If one looks at the individual patterns, there is variation, but the trends are similar. The proportion of tagged seals hauled out per day relative to the total number of tagged resident seals was also greater for August through November than from December through March (Table 9).

When resident seals were not hauled out, they were in the water in the vicinity of the haul out or they were absent from Drakes Estero. The length of absences averaged 1.4 to 1.9 consecutive days for over six months; the longest absence was 10 days (Table 10). Length of absences was similar for females and males.

When seals were present in Drakes Estero, the haul-out was strongly

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Table 6. Movements of resident, breeding, and transient seals by season.[a]

	Resident	Breeder	Transient	Totals
Number of seals	8	4	3	15
Number moves <25 km	11	3	7	21
Number moves >25 km	2	9	2	13
Number of moves by season:				
Aug-Oct				
<25 km	6	2	5	13
>25 km	2	4	1	7
Nov-Feb				
<25 km	5	1	-0-	6
>25 km	-0-	1	1	2
March				
<25 km	-0-	-0-	2	2
>25 km	-0-	4	-0-	4

[a] Local movements not recorded after March because transmitters ceased functioning.

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Table 7. Proportion of days resident seals were hauled out at Drakes Estero during the fall and winter and March, based on number of days monitored. Only resident seals included.

	SEAL BY RADIO FREQUENCY								AVERAGE		
SEASON	033	234	710	047	084	176	435	753	Female	Male	Total
Fall (Aug-Oct)	0.9	0.9	0.9	1.0	0.8	1.0	1.0	1.0	0.9±0.0	0.9±0.0	0.9±0.0
Winter (Nov-Feb)	0.7	0.6	0.7	0.7	0.8	0.9	0.8	0.9	0.7±0.1	0.8±0.0	0.8±0.0
Spring (March)	0.7	-	0.6	0.5	0.7	-	-	0.9	0.7±0.5	0.7±0.1	0.7±0.1

Table 8. Proportion of days per month each seal was hauled out at Drakes Estero.

	MONTH							
Seal	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Females:								
RT033	0.9	1.0	1.0	0.9	0.7	0.8	0.6	0.7
RT234	0.9	0.6	0.9	0.5	0.5	0.7	*	
RT491	0.5	0.4	**					
RT710	0.9	0.8	0.9	0.5	0.9	0.7	0.6	0.6
Males:								
RT047	0.9	1.0	1.0	0.9	0.8	0.7	0.3	0.5
RT084	0.8	0.8	0.6	0.8	0.9	0.8	0.7	0.6
RT176	1.0	1.0	1.0	0.8	0.9	**		
RT272	0.8	*						
RT435	0.9	1.0	1.0	0.9	0.8	*		
RT753	0.9	1.0	1.0	0.9	0.9	0.8	0.9	0.9
Total Average	0.9	0.8	0.9	0.8	0.8	0.7	0.6	0.7
SE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
n	10	9	8	8	8	6	5	5
Female Average	0.8	0.7	0.9	0.6	0.7	0.7	0.6	0.7
SE	0.1	0.1	0.1	0.1	0.1	0.0	0.5	0.5
n	4	4	3	3	3	3	2	2
Male Average	0.9	0.9	0.9	0.8	0.9	0.8	0.6	0.7
SE	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1
n	6	5	5	5	5	3	3	3

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.

Table 9. Proportion of resident radio-tagged seals hauled out each day (seals with transmitters that are no longer functional, breeders, and transients are excluded).

	MONTH							
Date	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1		0.9		1.0	0.6	0.7	1.0	1.0
2	0.9	0.9		1.0	0.4	-	0.6	1.0
3	1.0	0.9		1.0	0.9	0.6	0.6	0.8
4	0.7	0.9		0.9	1.0	0.4	0.8	1.0
5	0.7	0.8		1.0	1.0	1.0	0.8	1.0
6	0.7			1.0	0.9	1.0	1.0	1.0
7	0.9			1.0	0.7	0.9	0.8	0.2
8	0.8			0.6	1.0	1.0	0.2	0.4
9	0.9			0.9	1.0	0.7	0.8	0
10	0.4			0.6	0.9	0.7	0.8	0
11	0.3			0.8	0.4	0.6	0.8	0
12	0.6			0.8	-	0.6	0	1.0
13	0.8			0.5	0.7	0.7	0.6	0.8
14	0.9			0.5	1.0	0.3	0.2	1.0
15	0.9			0.6	1.0	0.9	0.6	1.0
16	0.8			0.8	1.0	0.4	1.0	0.8
17	0.9			0.8	1.0	0.7		0.8
18	1.0			0.9	1.0	0.9		0.8
19	1.0			1.0	0.9	0.4		0.8
20	1.0			0.9	1.0	0.7		0.5
21	1.0				0.7	0.7	0.8	1.0
22	1.0				0.9	0.6	0.6	
23	1.0				1.0	0.7	0.4	
24	1.0				0.6	0.7	0.4	
25	1.0		0.9		0.6	0.3	0.6	
26	1.0		0.9		0.5	0.6	0.8	
27	0.8		0.9		0.2	0.6	0.6	
28	0.9		0.9		0.2	0.7	0.2	
29	0.9		0.9		0	-		
30	1.0		0.9	0.4	0.5	0.7		
$\bar{x}$	0.9	0.9	0.9	0.8	0.7	0.6	0.6	0.7
SE	0.0	0.0	0	0.0	0.1	0.0	0.1	0.1
Adjusted figures including breeders and transients:								
$\bar{x}$	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.3
SE	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.1

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Table 10. Average length of time resident seals were absent from Drakes Estero, measured in consecutive days. Seals were neither in the vicinity in the water nor hauled out. Insufficient data were available for September and October. Averages and modes for days absent are presented for seal and for each month.

	AVERAGE BY MONTH						AVERAGE ALL MONTHS				
Seal	Aug	Nov	Dec	Jan	Feb	Mar	$\bar{x}$	SE	mode	range	n
033	1	1	2	1	2	1	1.4	0.2	1	1-3	19
234	1	2	3	0	*		2.6	0.8	1	1-10	10
710	2	1	0	1	0	2	1.4	0.3	1	1-3	6
047	1	1	2	1	2	*	1.5	0.3	1	1-4	13
084	2	0	1	1	2	1	1.3	0.2	1	1-3	14
176	0	0	1	*			1.0	0	1	1	2
435	1	0	1	*			1.0	0	1	1	5
Average days by month (all seals combined):											
$\bar{x}$	1.5	1.4	1.9	1.0	1.8	1.4					
SE	0.3	0.3	0.6	0.0	0.5	0.2					
mode	1	1	1	1	1	1					
range	1-3	1-4	1-10	1	1-4	1-2					
n	10	9	16	13	13	8					

* Transmitter ceased functioning.

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diurnal in all months monitored, and most hauled out during mid-day regardless of season. The proportion of tagged seals hauled out over a 24-hr period was largest 0800 to 1400 hr in August, and 1000 to 1600 hr in December (Table 11). On average, seals hauled out for a total of seven hours per day; however, seals would often haul-out more than once per day. The duration of a single hauling bout averaged 4.8 to 5.6 hrs (Table 12). The averages for hours-per-day and length-of-hauling-bout were not significantly different between August and December (hour, $p = .88$; length, $p = .84$; Wilcoxon matched-pairs sign-ranks test, $m = 3$, $n = 5$). Our sample was too small to test for differences between males and females; however, in December two pregnant females (RT234 and RT710) that gave birth in April spent fewer hours on shore per day than males. Individuals hauled out for up to 34 hrs in August, but never more than 17 hrs in December. The average number of hauling bouts per day was similar in August ($\bar{x} = 1.6 \pm 0.05$) and December ($\bar{x} = 1.4 \pm = 0.05$) and for both sexes (females in August, $\bar{x} = 1.7 \pm = 0.08$, and December, $\bar{x} = 1.4 \pm 0.09$; males in August, $\bar{x} = 1.5 \pm 0.06$; and December, $\bar{x} = 1.4 \pm 0.07$) and ranged between one and four. Ninety-five percent of the 372 hauling bouts in August, and 96% of the 212 in December were 12 hrs or less; 20% of the hauling bouts were less than two hrs in both August and December.

The length of a hauling bout was affected by the time of initiation in August such that seals that first hauled out between 0500 and 0900 hr were on shore longer than seals that initiated a haul-out between 0900 and 2400 hr; in December, though, time of initiation did not appear to influence length of bout (Table 13). Though seals initiated a hauling bout

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Table 11. The proportion of resident seals hauled out per day during two-hour intervals.

Hours	August			December		
	$\bar{x}$	SE	n	$\bar{x}$	SE	n
0000-2000	0.1	0.0	30	0.1	0.0	28
0200-0400	0.1	0.0	30	0.1	0.0	28
0400-0600	0.2	0.0	30	0.2	0.1	28
0600-0800	0.5	0.1	30	0.2	0.1	28
0800-1000	0.7	0.1	30	0.3	0.1	28
1000-1200	0.7	0.1	30	0.5	0.1	28
1200-1400	0.6	0.0	30	0.6	0.1	28
1400-1600	0.5	0.1	30	0.5	0.1	28
1600-1800	0.5	0.0	30	0.5	0.1	28
1800-2000	0.3	0.1	30	0.3	0.1	28
2000-2200	0.2	0.0	30	0.2	0.0	28
2200-2400	0.1	0.0	30	0.2	0.0	28

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Table 12. Average number of hours per day and the average duration of haul-out bouts presented for individuals and by season.

	FEMALES			MALES					
	033	234	710	047	084	176	435	753	ALL SEALS
AUGUST:									
Hours/Day									
$\bar{x}$	6.7	8.0	7.1	7.2	7.8	7.6	7.6	7.8	7.5
SE	0.6	0.7	0.7	0.8	0.9	0.8	0.7	0.7	0.2
Median	6.5	8.2	6.5	6.3	8.0	7.5	7.5	7.0	7.0
Range	1-13	1-20	1-17	1-19	1-19	1-19	1-16	1-17	1-20
n	28	27	27	28	24	30	27	28	219
Length of Bout									
$\bar{x}$	4.7	5.4	4.6	6.5	6.3	6.9	6.0	5.5	4.8
SE	0.7	0.7	0.4	1.1	0.9	1.1	0.8	0.7	0.2
Median	4.2	5.0	4.0	4.8	5.0	7.0	5.0	5.0	0.4
Range	1-13	1-20	1-10	1-28	1-19	1-34	1-16	1-17	1-34
n	38	49	52	32	35	40	40	53	339
DECEMBER:									
Hours/Day									
$\bar{x}$	7.0	5.3	5.5	7.8	7.6	8.1	8.1	8.0	7.3
SE	0.8	1.2	0.8	0.6	0.5	0.6	0.6	0.7	0.3
Median	6.0	4.0	5.0	9.0	7.8	7.8	8.0	8.3	7.5
Range	1-15	1-16	1-14	1-13	1-13	1-13	1-16	1-15	1-16
n	19	11	21	26	22	22	23	26	170
Length of Bout									
$\bar{x}$	4.8	4.5	5.0	6.8	7.0	6.7	7.1	5.5	5.6
SE	0.6	1.3	0.8	0.8	0.6	0.9	0.6	0.7	0.2
Median	5.0	2.5	4.5	7.5	7.5	7.3	7.8	5.5	5.5
Range	1-8	1-16	1-14	1-17	1-13	1-13	1-13	1-12	1-17
n	19	11	24	28	27	30	29	40	208

[a] Season is represented by data from one month.

Table 13. Length of haul-out in relationship to time of initiation.

	August					December				
Hours	n	$\bar{x}$	SE	$\tilde{x}$	Range	n	$\bar{x}$	SE	$\tilde{x}$	Range
0100-0500	32	6.88	.89	5.25	1-19	12	5.38	1.14	3.75	1-13
0500-0700	74	7.09	.65	6.0	1-34	33	5.30	.58	5.5	1-13
0700-0900	86	5.63	.39	5.5	1-26	29	6.65	.76	7.0	1-16
0900-1100	47	3.39	.34	3.0	1-12	36	6.96	.49	7.5	1-13
1100-1300	33	3.39	.47	2.5	1-9	44	5.71	.42	6.0	1-13
1300-1500	44	3.74	.39	3.5	1-13	19	5.26	.79	5.0	1-13
1500-1700	28	3.41	.39	3.5	1-8	14	4.89	1.4	2.0	1-17
1700-1900	20	2.83	.77	1.5	1-16	5	5.0	1.49	4.0	1-10
1900-2400	25	1.94	.44	1.0	1-12	20	3.98	.71	2.75	1-12

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at all hours of the day most initiations occurred during daylight hours between 0400 and 1600 hr for August and between 0600 and 1400 hr for December (Table 14). The pattern was similar for both males and females.

DISCUSSION

Results from one survey year indicate that the decline in seal numbers during the winter months is related to both a seasonal movement away from Drakes Estero and a reduction in the number of days spent hauled out for the remaining animals. Among radio-tagged animals, equal numbers remained in and moved away from Drakes Estero; departees were composed of more females than males. Similar to results in Alaska (Pitcher and McAllister 1981) and on San Nicolas Island (Stewart and Yochem 1983), we found a high level of site fidelity, with seals using no more than three sites. Exclusive use of one haul-out site has also been noted in other studies (Boulva and McLaren 1979, Herder 1986, Stewart and Yochem 1983). In contrast to seals at the Klamath River (Herder 1986), most movements of seals from Drakes Estero occurred from August to October; however, we have no data for the period from April to June when Klamath seals exhibited the greatest local movement. We found, as did Herder (1986), that females made more long distant moves than males. Immature seals may travel greater distances than adult animals, as suggested by Pitcher and McAllister (1981), but we have no information on this.

In general, we observed that if a seal moved to a location greater than

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Table 14. Frequency of initiation of haul-out bouts in relationship to time of day by season for females, males, and all seals.

Time	August 1985 n = 28d			December 1985 n = 30d		
	Female	Male	Total	Female	Male	Total
0000-0200	2	5	7	4	6	10
0200-0400	3	7	10	4	1	5
0400-0600	24	17	41	8	10	18
0600-0800	35	72	107	8	21	29
0800-1000	24	36	60	7	23	30
1000-1200	10	1,	27	11	39	50
1200-1400	10	30	40	10	22	32
1400-1600	13	24	37	3	7	10
1600-1800	10	18	28	5	13	18
1800-2000	8	9	17	2	8	10
2000-2200	9	2	11	2	3	5
2200-2400	4	1	5	3	3	6

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25 km away from the capture site, it remained there for an extended time rather than continuing to travel. The majority of these long-range movements occurred after the molt and prior to the breeding season. The movements were to well established haul-out sites in estuaries (Tomales Bay), at river mouths (Klamath and Russian rivers), and at coastal sites (Double Point, Hopkins Marine Station).

The localities at which seals relocated may be preferred winter foraging areas. However, because migrant seals were highly individual in the distance of their movement and their final destination, we suggest that seals were not responding to a single prey situation as was noted in winter movements of seals in Oregon and Washington. Instead, individuals may be expressing a preference for location based on past experience, including foraging success (Beach et al. 1985, Brown and Mate 1983).

The observed movements indicate that Drakes Estero is an important breeding area for seals between Monterey Bay and the Klamath River, an overall distance of 690 km. The three seals which did not return to Drakes Estero in the following breeding season may visit Drakes Estero only during the molt, or use it only as a secondary haul-out site as did one transient which visited Drakes Estero twice after capture but resided at Double Point through the breeding season. The movements also indicate that there is substantial mixing among harbor seal colonies along the central and northern California coast, and that seals in central and northern California may represent a subpopulation of harbor seals in California. Herder (1986) and Brown and Mate (1983) also found movement of seals between colonies in the Klamath River and Alsea Bay, Oregon,and between

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seals in Oregon and Washington.

All recorded foraging activities and movements of seals in the Point Reyes area appeared to be limited to within 0.8 km of shore. Though pelagic movements of harbor seals have been recorded by others (Pitcher and McAllister 1981, Spaulding 1964, Stewart and Yochem 1983, Wahl 1977), our results suggest nearshore feeding and migration are more typical than offshore.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals in the fall than the winter months. Our figures on the proportion of days per month spent hauled out and on the proportion of radio-tagged seals hauled out per month were substantially higher than those derived by both Stewart and Yochem (1983) and Pitcher and MacAllister (1979); if we include in our analyses animals that departed from Drakes Estero, our figures would be similar (see Table 9 for adjusted figures). We eliminated these animals from analyses, though, since the location of the departed animals had been ascertained, thereby allowing for more accurate assessments of time spent ashore for seals in the immediate vicinity.

When hauled out, the number of hours per day that seals spent on shore was similar for fall and winter, as was the haul-out time interval. This suggests that despite high tides during the day in winter, with winter storms accentuating high tides, seals were regular in the length of time they hauled out, but not in the number of days hauled out. Both Sullivan (1979) and Stewart and Yochem (1983) observed a higher average time per day that seals were hauled out, 44% and 39%, respectively, than we found for

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seals at Drakes Estero (29%). Differences may be attributed to stronger tidal influences at Drakes Estero or to exposure to disturbance from humans; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human distubance. Seals at Drakes Estero may, therefore, be forced to spend more time in the water. Females may haul-out for shorter periods both in number of days and number of hours per day than males in the winter (see also Stewart and Yochem 1983). The small differences between means coupled with the small sample of animals result in insignificant differences at this time. Pregnant females may require more time feeding than males.

The strong diurnal haul-out pattern documented at Drakes Estero previously (Allen and Huber 1983), and shown by innumerable other researchers (Boulva and McLaren 1979, Fancher 1979, and Stewart and Yochem 1983), was further confirmed in this study. Though seals hauled out at all hours of a day, peak abundance, based on the proportion of tagged animals, occurred mid-day. Stewart and Yochem (1983) determined that time of initiation of a haul-out bout did not influence the length of the bout; however, we found that in August, seals hauled out for longer periods when bouts were initiated between 0100 and 0900 hr than for other time periods during the day or night. In December, time of day did not appear to influence the length of bout during daylight hours but did during the night. Differences may be attributed to changes in day length, and/or frequency of human disturbance at Drakes Estero.

Absences of resident seals from Drakes Estero, averaged about one day suggesting that absentees were foraging fairly close by; the local movement

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patterns observed during aerial surveys also support this conclusion.

SUMMARY

1. Evidence from movement patterns indicates that Drakes Estero is a focal breeding area for seals ranging as far south as Monterey Bay and as far north as the Klamath River, and therefore, that northern and central California may represent a subpopulation of harbor seals in California. It is also likely that some mixing between seals from Oregon and this subpopulation occurs (Herder 1986).

2. A larger proportion of tagged seals hauled out on a daily basis in August (92%) than in December (77%), and this difference appeared to be more pronounced for females than for males.

3. The largest proportion of seals were hauled out between 0400 and 1600 hr in August and this represented between 53% and 71% of the estimated number of seals in the area.

4. Seasonal changes in abundance are a function of the movement of seals away from Drakes Estero and of a decrease in the number of days that seals spent hauled out in the winter.

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PINNIPED ASSESSMENT IN POINT REYES, CALIFORNIA, 1983 TO 1984

Washington, D.C.
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NOAA Technical Memorandum
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PINNIPED ASSESSMENT IN POINT REYES, CALIFORNIA, 1983 TO 1984

Sarah G. Allen

Point Reyes Bird Observatory
4990 Shoreline Highway
Stinson Beach, CA 94970

Washington, D.C.
August 1987

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REPORT TO
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

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U.S. DEPARTMENT OF COMMERCE
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NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
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ABSTRACT

We surveyed three species of pinnipeds (harbor seals, California sea lions, and northern sea lions) for a second year in Point Reyes, California, from March 1983 through February 1984. Information gathered for both years (1982-83, 1983-84) are compared. Harbor seals, though present year round, were most abundant during the breeding season; the maximum count for the season was 2449 including 527 pups. The majority of breeding seals migrated to coastal locations rather than estuarine ones. At Double Point the breeding population has expanded three-fold since 1976; the annual rate of growth, though, has not been constant. During the non-breeding season, population numbers have remained stable. Sea lions also were seasonally abundant in Point Reyes. Northern sea lion numbers peaked during the breeding season; California sea lion numbers peaked during the southern spring migration and the northern fall migration when traveling to and from breeding grounds, and peaked again in December during the herring run in Tomales Bay. A significantly larger number of California sea lions, composed of mostly immatures, was present in 1983-84 than in 1982-83. The optimum time to census sea lions in Point Reyes was between 1100 and 1600 hr when low tides occurred mid day.

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PART A. HARBOR SEALS

Sarah G. Allen

INTRODUCTION

Throughout historical times, harbor seals, Phoca vitulina, have resided at Point Reyes, California. Scammon (1874) was the first to record their presence (1850's), but only in recent years have researchers attempted to document the seasonal abundance of this species in the California coastal zone (Carlisle and Alpin 1966 and 1971, Dohl et al. 1982, Frey and Alpin 1970, Hanan 1985, Mate 1977, and Miller 1983). The results of these surveys, however, are insufficient for designing a reliable management plan for harbor seals specific to the Point Reyes area. With the more generalized state-wide emphasis of present information, we lack insight into the peculiarities of this local population. In addition, little information has been available on the reproductive rates of harbor seals in the region. Incidental information on pinnipeds in Point Reyes has been noted by Chan (1979) in reports on Areas of Special Biological Significance (ASBS) and by Allen et al. (1985).

Our two-year survey, 1982-1984 was designed to provide comprehensive information on abundance and seasonal use patterns of harbor seals in the coastal zone of the Point Reyes area. In the first survey year, we refined our census techniques by evaluating the tidal and diurnal differences in seal haul-out behavior as well as identifying haul-out sites and the

significance of each. Data from the second survey year validated findings on seasonal and spatial trends. We include in this report analyses of data collected since 1976 at Double Point, the largest breeding site in the region.

STUDY AREA AND METHODS

Study Area

The coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary extends from Bodega Bay (38° 30'N) south to Bolinas Bay (37° 30'N) (Figure 1). Included are embayments such as Tomales Bay, Drakes Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PRNS), the Golden Gate National Recreation Area (GGNRA), and the Marin County Department of Parks and Recreation share boundaries with the Sanctuary over segments of this coastline. In addition to the protection afforded by Park and Sanctuary status, Bird Rock, Point Reyes Headland, and Double Point were designated as Areas of Special Biological Significance (ASBS) by the California Department of Fish and Game (CDFG) and the State Water Resources Control Board.

Much of this coastline remained largely undeveloped even before inclusion into PRNS and GGNRA during the 1960's and 1970's. An agricultural character and the inaccessibility of much of the area afforded protection from human disruption. Consequently, use of habitat by seals has probably has not changed significantly over the past few decades.

The topographical diversity of this coastal zone contributed to the broad range of substrates in seal habitat, including tidal mud flats, offshore tidal ledges, and sandy beaches. Coastal locations included Tomales Point, Point Reyes Headland, Double Point, and Duxbury Reef; estuarine locations included Tomales Bay, Drakes Estero, and Bolinas Lagoon (Figure 1).

Data Collection

We counted seals twice each month at all locations from March 1983 through February 1984. Censuses occurred simultaneously in the afternoon during low to medium-low tides except on a few occasions when weather conditions hindered human access to remote sites. Days when low to medium-low tides occurred mid-day to early afternoon were chosen to maximize counts (Ainley et al. 1977, Allen et al. 1985, Fancher 1979, Stewart 1984). In addition, an all day census at primary locations was conducted in June when seal numbers reach their annual maxima in the area (Allen and Huber 1983, Miller 1983). This all-day census was undertaken to confirm that there were no diurnal and tidal differences in haul out patterns between locations and to provide a maximum estimate of seals in the Point Reyes region.

Whenever possible we classified seals in three categories based on size and color: adults, subadults, and pups. Seals in the eastern Pacific are purported to reach sexual maturity between three and six years of age (Bigg 1969). At locations other than Double Point, Drakes Estero, Point Reyes Headland, and Tomales Point, distance from observer and the oblique angle

of view made it difficult to distinguish subadults. Pups were easily identified at all locations during the breeding season because of their bright coloration and diminutive size.

We counted seals on four to five consecutive days at Double Point during the breeding season (March through June) and molting period (June through August) in 1983 and 1984 in order to determine daily variability in the haul out pattern.

Data Analysis

For analysis of seasonal trends, we divided the year into three seasons: breeding (March through June), summer (July through October), and winter (November through February). We examined seasonal means for the region and for each site and used a t-test to compare the average abundance for spring, summer and winter of 1982 with that of 1983. Age class representation for subadults and pups was expressed as a percentage of the total herd. Maximum counts of pups for the region were based on simultaneous censuses in the event that females with pups might travel between locations. To test whether the seasonal haul-out pattern was different at coastal compared to estuarine locations during breeding and non-breeding seasons (summer and winter seasons combined) in 1982 and 1983, we made two 2 x 2 contingency tables. We used a log-linear model to analyze the tables and then we used Freeman-Tukey deviates to see which cells did not fit the model (Fienberg 1981).

Examination of trends in abundance at Double Point included data collected by Allen (unpublished data) from January 1976 to June 1984.

During that period seals were censused on 325 days with over 625 hours of observation. Seasonal coverage was similar for all years except 1979 and 1980. Most censuses were confined to the hours 0700-1630 because the remoteness of the area required three hours of hiking, round trip. We estimated the increase in the number of seals at Double Point from 1976 to 1984 by dividing the seasonal mean of 1984 by that of 1976. The change in abundance for each year was determined from the formula $\lambda = \frac{\bar{N}_{t+1}}{\bar{N}_t}$, where N is the mean population size and t is the year (Caughley 1977).

We examined the representation of sex and age classes at Double Point in spring 1984 to identify more accurately which animals accounted for this annual peak. The period was divided into early (March to mid-April), middle (mid-April to mid-May), and late (mid-May to June). Seals were categorized as male, female, female with pup, subadult, and pup. We then calculated the percent representation of each category by dividing the number identified for each category by the total number of animals classified. Since male and female adult seals are almost identical in size, we were not able to sex all adult animals and did not attempt to sex subadults.

The daily variability in the number of seals hauled out at Double Point during the breeding season was compared with that of the molt period (late June through July) and the end of molt (August) using the coefficient of variation $CV = \frac{SD}{\bar{x}}$ (Snedecor and Cochran 1967). Only counts from 1200-1400 hr and from 1-3 hr after low tide were used in the analysis. For comparison, we calculated an analogous CV from data gathered at Bolinas

Lagoon by Allen (unpubl. data).

We were able to identify a number of individual females at Double Point by scars and unusual spot patterns. For eight years we noted the recurrence of many of these animals during successive breeding seasons (Allen, unpubl. data). To verify the accuracy of our ability to identify individuals, we compared the presence of known females during consecutive three-day periods during the 1977, 1983 and 1984 breeding seasons, excluding days when excessive disturbance occurred. We calculated the probability of sighting, P, by the formula:

$$P = \frac{N_{1 \text{ and } 3}}{N_{1-3}},$$

where $N_{1 \text{ and } 3}$ is the number of females seen only on days one and three, and N_{1-3} is the number seen on all three days. The average for all three-day periods was used as the probability of sighting (P). Our estimated average probability of sighting was 0.9 (n = 3, range 0.8-1.0). The sample size of known individuals was small (7, 5, 6), but these animals were easily distinguished within a herd composed of 400-700 animals. Since our probability of sighting was within an acceptable range, we felt confident in calculating the pupping frequency of known females and the probability of pupping.

The pupping frequency (pf) of females was figured from the conditional probabilities for successive samples of females in three-year sets using the formula:

$$pf = \frac{\text{No. of same females in denominator seen w/pup in yr}_{i+1}}{\text{No. of females seen in yr}_{i}}$$

Known individual adult females identified from 1977 to 1979 represented set 1, and from 1982 to 1984 represented set 2. We eliminated from our tabulations two groups of known females: 1) females not seen all three years (Siniff et al. 1977); and 2) those that did not have pups in year 1 because they may not have been sexually mature then. We included these two groups of females, however, when presenting a summary of pupping success. The probability of pupping (X) was estimated from a binomial pupping model (Siniff et al. 1977) with the equation $Xp = \frac{\sum P_i}{n}$, where P_i is years with pup for female$_i$ divided by total years female$_i$ was present, and n = the number of known females. Only known females present in three successive years were included in the model. If a female was determined to be pregnant by the size and shape of her abdomen, but was not seen attending a pup later, she was included in the sample as having pupped.

RESULTS

Seasonal and Spatial Use Patterns

Regional

Harbor seals were present year round at all locations censused within the Point Reyes area in 1983 and, as determined in the 1982 survey, the numbers fluctuated seasonally with more seals hauled out in spring ($\bar{x}$ = 1653.4, SE = 121.0, n = 9) and summer ($\bar{x}$ = 1270.1, SE = 210.6, n = 8) than in winter ($\bar{x}$ = 1089.1, SE = 70.1, n = 8)(Table 2). Seasonal means in 1982 versus those in 1983 were not significantly different (spring: t = 1.225, p > 0.1; summer: t = .3318, p > 0.1; winter: t = .7421, 0.2 > p > 0.1). The

highest counts for the region in 1983 occurred in May (2449) and July (2323) (Figure 2). Tomales Point, Drakes Estero, and Double Point were the areas of highest seal concentration contributing most to the total number of pups (Tables 1 and 3). Pups were first identified at haul-out sites in late March, and their numbers peaked during the first week of May for both years with 566 in 1982 and 527 in 1983. Pups represented 24% of the total count (2339) in 1982 and 22% (2449) in 1983 (Table 3). The mean percentage representation of subadult seals at Tomales Point, Point Reyes Headland, Drakes Estero, and Double Point was much the same for all seasons in 1983 (spring: $\bar{x}$ = 18.0, SD = 7.0, n = 8; summer: $\bar{x}$ = 17.4, SD = 3.0, n = 8; winter: $\bar{x}$ = 15.0, SD = 4.4, n = 9). As was observed in the 1982 survey, subadult representation declined in May 1983 ($\bar{x}$ = 8.5%) (173/1820, 79/1101).

The all day census conducted in June 1983 confirmed that more seals were present at all haul-out sites mid-day, a couple of hours after low tide, with only Tomales Bay being exceptional, but did not provide a maximum estimate for the seal population in the Point Reyes region (Table 4). More seals were counted in Tomales Bay early in the morning, but the numbers were only slightly lower mid-day. Though mid-day yielded maximum numbers, many seals remained at haul-out sites into mid-afternoon, despite rising tides. Duxbury Reef could accomodate large numbers of seals until about four hours after low tide when it was awash. Seals that hauled out on offshore rocks at Bird Rock and Double Point shifted to higher ground as the tide rose and consequently, even at five hours after low tide, many seals were hauled out. At estuarine locations haul-out space was reduced slightly beginning a couple of hours prior to high tide, and so a substantial number of seals

remained until late afternoon.

Coastal areas accomodated a large influx of seals during the breeding season ($\bar{x}$ = 992.7, SE = 75.8, n = 9) in comparison to estuarine sites ($\bar{x}$ = 660.8, SE = 59.0, n = 9). During the non-breeding season the coastal populations declined substantially ($\bar{x}$ = 618.3, SE = 83.1, n = 15), whereas estuarine ones declined only slightly ($\bar{x}$ = 595.9, SE = 37.6, n = 15). The log-linear model comparing coastal and estuarine locations during breeding and non-breeding seasons for 1982 and 1983 revealed that none of the variables were equal (X^2 = 26.45, $p < 0.001$). The variable which least fit the model was the figure for estuarine locations during the breeding season in 1983 (Table 5). The estuarine pattern changed significantly in 1983 with fewer seals recorded during the breeding season and more during the non-breeding season compared to that of 1982. Thus, the coastal pattern was similar though not identical for both years. These findings suggested that more seals were migrating to coastal areas than to estuaries during the breeding season.

The seasonal pattern for each haul-out site reflected this difference between coastal and estuarine groups, and when examining each we can identify where the deviation from the 1982 estuarine pattern took place.

Bodega Rock

Seals were seen hauled out on tidal reefs of this offshore sea stack. We counted a maximum of 54 seals in February 1984. Pups were not seen in 1983 (Table 1).

Tomales Bay

Seals hauled out predominantly on tidal sand bars extending from Toms Point to Sand Point in 1983. They were seen infrequently at Hog Island. Seasonal means revealed that numbers remained relatively stable throughout the spring and summer months and were slightly higher in winter (Table 2). The winter peak in 1983 was in contrast to a distinct decline in numbers in the winter of 1982. Here is where the main divergence from the estuarine model occurred. In 1983 both spring and summer numbers were markedly lower than those in 1982 (Appendix I), possibly because of disturbance. Though the frequency of disturbance was similar in 1982 and 1983 (1982: 16 of 26 censuses; 1983: 16 of 28 censuses), the level of human activity was much greater in 1983 (Allen and Huber 1984). A maximum of 45 pups was counted in May which is slightly lower than the figure in 1982 (58) and represents 16% (45/275) of the population in Tomales Bay and 10% (45/527) of all pups censused in the Point Reyes area. A graph of the average number of seals by month, combining data for 1982 and 1983, displays the apparent decline in attendance in early winter and again in June and July when visitor use in the area is high (Figure 3). Seal numbers in January through March were higher than for most other months. Herring, Clupea pallasii, spawn in Tomales Bay at this time [a known prey item of seals in the area (Miller 1983)], and may be related to increased seal abundance.

Tomales Point

The largest concentrations of seals in the vicinity of Tomales Point hauled out on Bird Rock, north tidal rocks and Driftwood Beach. The

seasonal haul-out patterns were nearly identical in 1982 and 1983 with most seals recorded during the breeding season (Table 2). A graph of the average number of seals present by month, combining data for 1982 and 1983 illustrates the rapid increase that occurs there in May, June and July, and the equally rapid decline from August through February (Figure 4). Tomales Point is one of the three most important breeding areas in the Point Reyes region with pups representing 24% (122/514) of total seals censused at the Point and 23% (120/527) of all pups censused in 1983.

Point Reyes Headland

Point Reyes Headland is a minor coastal haul-out area where seals were scattered along offshore rocks and in pocket beaches around Split Rock and Sea Lion Coves. Counts were highest during the breeding season (Table 2); one pup was seen in June. In contrast to 1982, the mean count during winter 1983 was slightly larger than that of the summer. The combined data of 1982 and 1983 reveal an irregular pattern: small numbers of seals were present during April and May, the peak of breeding, and again in winter, but were most abundant just prior to and just after the breeding season (Figure 5). Geographically, this point bisects the distance between two major coastal haul-out sites, and may be frequented by animals moving to or from breeding grounds. We often observed harbor seals sharing pocket beaches here with northern elephant seals, Mirounga angustirostrus, and occasionally observed them displaced by these larger seals.

Drakes Estero

Drakes Estero is one of the three largest breeding areas in the Point Reyes area. Seals hauled out on virtually every sand bar far up into the estero during the breeding season, and Limantour Spit was used primarily then. The 1983 pattern resembled closely that of 1982 with high counts during spring and summer and lower counts during winter (Table 2). A maximum of 122 pups was counted in May 1983, accounting for 19% (122/656) of the total breeding population there. Twenty-three percent (122/527) of all pups in the Point Reyes area occurred at Drakes Estero in 1983. A graph of the combined data from 1982 and 1983 reveals that seals were present in large numbers year round in contrast to the two other most important breeding areas, Tomales Point and Double Point (Figure 6).

Duxbury Reef

The majority of seals hauled out on an intertidal reef extending from Bolinas Headland; we identified a secondary haul-out site in 1983 which was another reef 1/2 mi further north at Bolinas Point. Duxbury Reef was the only coastal site in 1983 where the seasonal mean number of seals was higher in summer than in spring; the average in winter was similar to that in spring (Table 2). The monthly pattern exhibited in Figure 7 displayed a peak in September and October and a decline in July; numbers varied greatly, however, within July. Few pups ($\leq$5) were observed in 1982 and 1983.

Bolinas Lagoon

Bolinas Lagoon is an estuarine habitat where seals haul out on tidal mud

flats bordering two islands, Kent and Pickleweed. In a previous study, Kent Island was the preferred site for all seasons (Allen et al. 1985). In 1982 and 1983, however, Pickleweed Island was the preferred location. The seasonal pattern in 1983 was nearly identical to that of 1982 with a summer annual peak, rather than one in spring, and a much reduced number in winter (Table 2). Bolinas Lagoon was not an important pupping ground; only 17 pups were counted in May both of 1982 and 1983. Bolinas Lagoon, like Drakes Estero, did not display the monthly extremes in seal numbers characteristic of coastal colonies (Figure 8).

Double Point

The seasonal variation in the average number of seals at Double Point in 1983 followed the pattern recorded since 1976 with a large influx of animals occuring in spring and then dispersing rapidly in summer and winter (Table 2). Maximum numbers in 1982 and 1983 occurred during the months from April through July; we observed fewer seals from September through January (Figure 9). The months August/September and February/March were transition periods when numbers declined or increased, respectively. Counts during November reached the annual low. Pups accounted for 32% (262/832) of all seals censused at Double Point in May 1983 and 50% (262/527) of all pups censused in the Point Reyes area (Table 3).

Since 1976, pups have been initially sighted each year in late March or early April; the maximum pup count has occurred consistently during the first two weeks of May. The May peak for all years coincided with the annual peak for all age classes combined, but surprisingly more adult seals

hauled out in June (74%) and July (80%) than in May (59%). The peaks coincided with the mating period and the onset of molt, respectively (Figure 9, Table 6). Females come into estrus after pups are weaned, and mating apparently extends into August (Bigg 1969). We observed mating on four occasions in late May and early June 1983 (Allen 1985). Seals at Double Point molted from early June to early August.

The mean number of subadult seals was largest during the months flanking the breeding season, February and March and June and July (Figure 9, Table 6). During May, the number of subadults declined only slightly, but their proportion to all seals counted then was much lower than in other months. The percent representation of subadults was highest in September, October, and December (Table 6).

A closer examination of sex and age classes of the main herd at Double Point during the breeding season in 1984 revealed distinct trends in the representation of each category (Table 7). Early in the season females (33%), males (30%), and subadults (27%) were equally abundant. At the height of the season, though, the herd consisted primarily of females (38%), particularly females with pups (33%), and pups (39%). Late in the season, the herd also consisted mostly of females (38%) and pups (33%), but fewer females were with pups and the percentage of subadults began to increase. The representation of males remained low from April 17 through May 31.

A comparison of the mean number of seals counted during the 1976 breeding season ($\bar{x}$ = 195.2, SE = 17.6, n = 14, range = 112-320) with that of 1984 ($\bar{x}$ = 578.3, SE = 41.5, n = 22, range = 101-897) showed a three-fold increase. The change in abundance for each year, however, was not linear

over this nine-year period (Table 8). For most years there was no change, but in 1977 and 1982 seal numbers rose. The summer and winter seasonal means for 1976 (summer: $\bar{x}$ = 165.7, SE = 35.7, n = 13; winter: $\bar{x}$ = 123.8, SE = 34.0, n = 9) and 1977 (summer: $\bar{x}$ = 222.6, SE = 35.9, n = 21; winter: $\bar{x}$ = 106.8, SE = 22.1, n = 10) were not substantially different from those of 1983 (summer: $\bar{x}$ = 174.3, SE = 53.7, n = 14; winter: $\bar{x}$ = 215.8, SE = 32.2, n = 15).

Daily Variability

The variability in the number of seals hauled out at Double Point over successive days was greater during the breeding season than during the molt (Table 9). The same was true for the herd in Bolinas Lagoon. At the end of the molting period (August), the daily variability increased substantially at Double Point, but in Bolinas Lagoon it remained the same. Disturbance and inclement weather at Double Point are partially responsible for the increased variation during the breeding season. Because of these uncontrolled factors influencing the daily variability, we are not completely confident with the results of these analyses.

Reproductive Rates

A summary of pupping success of known individual females is presented in Table 10. The proportion of known females observed in a given year that had pups was similar for all years. A small proportion of females were not seen in successive years with the exception of 1984. A larger proportion of females also did not bear pups in 1984. A total of 13 females (present all

three years) were observed with pups in 1977. Eleven of the females were resighted with pups in the second year, yielding a pupping rate of 0.85 (11/13). The proportion of known females that pupped all three years for this set was 0.77 (10/13). In the second set, a total of 11 females (present all three years) were seen with pups and all of these were resighted with pups in 1983. This yielded a pupping rate of 1.0 (11/11); the proportion of females that pupped all three years was 9/11 for a rate of 0.82. Both three-year sets yielded a high probability that females with pups in year 1 would have a pup in successive years. The probability of pupping was 0.89 for set 1 and 0.92 for set 2.

DISCUSSION

The results of the 1982 survey in combination with those of 1983 provide a much clearer understanding of harbor seal aggregations in Point Reyes. We have identified when and where seals are seasonally abundant and when is the optimum time to census. In 1982 we determined that diurnal and tidal effects on seal haul-out behavior vary within an optimum range from mid-day to late afternoon at low to medium tides depending upon the physical attributes of each location. This was verified in the all day simultaneous census in June, 1983. The diurnal pattern was similar to that of other locations in California: Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), Bolinas Lagoon (Allen et al. 1985), and San Miguel Island (Stewart 1984).

It is apparent that the Point Reyes area accomodates a large harbor seal breeding population. Peak figures tabulated in May (2449) and

July (2323) 1983 and in May (2339) and June (2502) 1982 are comparable. Population estimates by the California Department of Fish and Game (CDFG) based on aerial surveys in April and June, 1982 and 1983 (Miller 1983; D. Hanan 1985), are similar to our censuses for those months. The Point Reyes harbor seal population during the breeding season represented 19% of the total estimated California population, excluding the Channel Islands, in 1982 considered to be the largest concentration in the state (Miller 1983). Preliminary analysis of the CDFG survey in 1983 confirms this estimate with a state-wide figure of 9,010 animals in April and 10,763 in June, including an estimated 1852 and 1985 seals, respectively, in Point Reyes (D. Hanan, pers. comm.). Miller calculated an estimate of 1309 pups in California, excluding the Channel Islands, in April 1982. The April 1983 pup count for the state was 642 (D. Hanan pers. comm.). The respective pup estimates calculated by CDFG for Point Reyes were 217 (10% of the total state pup estimate) in 1982 and 157 (25% of the total pup estimate) in 1983. Nearly three-quarters of pups censused by CDFG in Point Reyes in 1983 were at Double Point. The representation of pups at Point Reyes to the state-wide estimate is likely even greater because most pups are born in May rather than April. Consequently, Point Reyes is perhaps even more important as a breeding ground for harbor seals.

Coastal areas accomodated the major portion of migratory animals again in 1983. There was no evidence that estuarine animals shifted to coastal areas to breed. However, a subadult, male seal, rescued from Tomales Bay on 4 March 1984 by the California Marine Mammal Center and released the following day at Point Reyes Headland with a rear flipper tag was identified

by us at Double Point on April 11 and 12, 1984 (L. Amaya, California Marine Mammal Center, Fort Cronkhite, CA., pers. comm.). That the animal arrived at a major coastal haul-out site rather than returning to an estuarine one indicates that the animal was probably familiar with the area. Although seals radio-tagged by Brown and Mate (1983) traveled locally between a coastal haul-out site and estuarine ones, the majority of migrants in the Point Reyes area likely travel from outlying areas. A comparison of aerial surveys conducted by Dohl (1982) in May and January suggested a northward movement of seals from this region to Sonoma and Mendocino Counties in winter. Slater and Markowitz (1983) believed that adult seals dispersed from San Mateo County haul-out sites during the breeding season.

The large influx of animals to coastal areas in Point Reyes during the breeding season is composed primarily of adult seals. The absence of subadult seals during the breeding season also has been documented in other harbor seal populations (Naito and Konno 1979, Slater and Markowitz 1983). Based on our analysis of herd composition at Double Point, adult females may be the primary migrants to the region in April and May. "Nursery" herds in harbor seals have been remarked upon by others (Brown and Mate 1983, Knudtson 1975, Naito and Konno 1979, Slater and Markowitz 1983). In addition, we have documented seasonal breeding site fidelity in females at Double Point where several known females were resighted over successive years. We did not gather information on the sex composition of the herd in June at Double Point; we would expect, though, that males would represent an increasingly larger proportion then because June is the mating season and the onset of molt. The larger number of adult animals at Double Point in

June and July rather than May corroborates this. Thus there may actually be two distinct waves of migrants to rookeries in coastal areas, the first one consisting of mostly pregnant, adult females, and the second one mostly of adult males.

There is little information available for determining whether seal abundance has been increasing in the Point Reyes region. Earlier surveys (Carlisle and Alpin 1966 and 1971, Mate 1977, Risebrough et al. 1978) and data collected at Double Point indicates an increase during the breeding season, but there is no indication that the resident population has changed because summer and winter averages at Double Point have been about the same since 1976. Nevertheless, the rate of expansion in seal numbers at Double Point has not been constant. Instead, 1977 and 1982 are remarkable as years when seal numbers rose substantially and then leveled out during the intervening years. Why these increases occurred is not known.

SUMMARY

1. The optimum time during a day to census seals in Point Reyes is from mid-day to late afternoon at low to medium tides depending upon the physical attributes of each location.

2. Day to day variability in the number of seals at haul-out sites appears to be less during the molt than during the breeding season. We feel a minimum of three successive-day censuses are required for more reliable estimates during the breeding season because of the unpredictable influences of other factors such as human disturbance and extreme weather conditions.

3. Seals should be censused in the first two weeks of May, when pup representation is highest in order to determine an index on the health of the breeding population. A second census in late June or early July, when more adult seals are present at haul-out sites to molt, would provide more reliable estimates for the total population.

4. Annual censuses would provide data for determining trends in abundance. Data at Double Point indicate that the growth rate is not constant.

5. Information on summer and winter movements of breeding animals would be invaluable for any long-term management programs since the breeding population in Point Reyes represents a sizeable proportion of the state population and since these animals migrate from unknown areas. Radio-tagging is the most reliable method for tracking seal movements.

PART B. SEA LIONS

Harriet R. Huber

INTRODUCTION

A two-year survey of the California (Zalophus californianus) and northern (Steller) sea lion (Eumetopias jubatus) populations in the Point Reyes/Farallon Islands National Marine Sanctuary was initiated in March 1982. This survey was designed to determine the size of the Point Reyes sea lion population, its breeding status, seasonal and diurnal fluctuations in haul-out patterns, and how the Pacific herring (Clupea pallasi) run in Tomales Bay affects sea lion numbers along the coast.

Historical information on the Point Reyes sea lion population is sketchy, because identification of the two species was frequently confused during the 1800's. However, both species were present at the Farallones and at Seal Rock in San Francisco, and so presumably they were present at the Point Reyes Headlands as well. During the 1800's northern sea lions apparently bred on the Farallones and California sea lions hauled out in large numbers during the non-breeding season (Allen 1870, Scammon 1874, Allen 1880). In the early twentieth century, mostly northern sea lions occupied what is now Marine Sanctuary waters and only northern sea lions bred there (Everman 1921, Starks 1921, Rowley 1929). California Department of Fish and Game censuses of breeding sea lions along the California coast between 1930 and 1970 (Bonnot 1937, Bonnot et al. 1938, Bureau of Marine Fisheries 1947, Bonnot and Ripley 1948, Carlisle and Alpin

1966, 1971, Frey and Alpin 1970, Ripley et al. 1962) and other censuses (Chan 1979, Dohl 1982, Mate 1977, BLM 1981) are summarized in Allen and Huber 1983, as are the results of the first year of this study (March 1982 to February 1983). These articles describe fluctuations in numbers on the mainland in recent years.

METHODS

We censused California and northern sea lions at the Point Reyes Headlands (Figure 1) twice a month for the first year (March 1982-February 1983) and weekly during the second year (March 1983-February 1984). During both breeding seasons we censused once a week, checking for evidence of births. One census each month lasted from 0700 h to 1800 h to assess sea lion haul-out patterns, to discover when maximum numbers haul out and to determine how seasonal, diurnal and tidal changes affect each species. Some censuses were incomplete because weather (fog, rain, high winds or heat waves) impeded the count. We censused California sea lions at Bodega Rock once a month during the first year and twice a month during the second year. During the herring run in Tomales Bay (December to March) we conducted censuses by boat of California sea lions in the water; nine occurred during the first year and five during in the second year.

All counts of the Point Reyes Headlands were made from Sea Lion Overlook with a 25X spotting scope. In August 1982, a hidden cove containing up to 100 animals was found south of the main haul-out site; from then on we censused regularly from the antenna emplacement north of Sea

Lion Overlook. Descriptions of animals with distinctive scars or marks were recorded whenever seen. Weather and tidal conditions were also noted.

Whenever possible, we separated both sea lion species into five age and sex classes: adult male, subadult male, female-size, immature, and pup. Adult males were defined as full-grown males with completely developed sagital crests, sub-adult males were animals with the beginnings of a sagital crest, female-size were large immature animals of either sex without evidence of sagital crest (this size also included adult females), immatures were small animals of either sex (yearlings and 2 year olds) and pups were pups of the year (May through December). These categories were fairly easy to distinguish among northern sea lions and all animals of this species described as female were indeed females. With California sea lions almost all female-size animals were, in fact, immature males. If we assume that sex ratios of animals hauled out at Point Reyes are similar to animals hauled out at the Farallones, then the number of females changed from virtually no females in the years prior to 1983 to a proportion of one female to every three males in 1983-84 in the female-size and smaller category. We compared mainland censuses with weekly sea lion censuses from the Farallones during the same time period. Because of the difficulty in separating age classes when counting thousands of animals, California sea lions on the Farallones were divided into only four age classes: male, female-size, immature, and pup. Males were defined as any animal with a sagital crest.

RESULTS

California sea lions

Major differences in the number of California sea lions present and the seasonal variation in age/sex classes occurred in all three areas during the second year of censusing (March 1983 to February 1984).

The peak number of animals was 763 on 5 August 1983 at the Point Reyes Headlands (Table 11), 1530 on 31 October at Bodega Head (Table 12), and 5570 on 28 July at the Farallones. These counts are all two to three times greater than peak numbers counted in the first year of the study. Up to 116 Zalophus (95% of them immatures) were counted at Double Point between May and August 1983, another indication of increased numbers at Point Reyes. No California sea lions had been seen at Double Point during theprevious seven years (Allen, unpubl. data).

At Bodega Rock the two years were similar with peaks during the spring and fall migration. Numbers during the second year, however, exhibited a third peak coincident with the Tomales Bay herring run (Figure 10). At the other two sites there was less similarity between years. The monthly mean number of California sea lions was significantly larger during the second year from May to August at Point Reyes (Mann-Whitney U-test $p<0.05$) and from July to September at the Farallones (Mann-Whitney U-test $p<0.025$).

At Point Reyes and the Farallones, not only did the number of animals change between the two years but so did the yearly pattern. In the first year there were three peaks at Point Reyes: in March at the beginning of

the southward migration to the breeding rookeries, in early September during the northward migration, and in late December during the herring run in Tomales Bay (Figure 11). In 1983-84, there was one large peak from May to August which began during the southward migration and lasted through the period of the northward migration. This was followed by a much smaller peak coinciding with the herring run in late December (Figure 11). At the Farallones during 1982-83, there were two peaks, which corresponded to the spring and fall migrations (Figure 12). In 1983-84, a peak persisted through the breeding season when there is normally a decline in numbers (Figure 12), similar to the situation at Point Reyes Headlands.

In looking at the proportion of different age classes in the Point Reyes Zalophus population during 1982-83, we found adult males present in large numbers from March through the first week of June, when numbers dropped dramatically. Numbers remained low during the summer breeding season except for a short peak in August. These peaks in the number of adult males coincided with migration to and from southern rookeries and is the same pattern we have found on the Farallones from 1972 to 1982. The pattern for adult males in 1983-84 was quite different. The southward migration peak began earlier (in March) and was essentially completed by mid-May. During the summer of 1983 the actual number of adult male California sea lions was three times larger than in 1982 but the proportion of adult males in the population dropped significantly from about 20% in 1982 to 10% in 1983 (t-test, $p<0.05$). This indicates that the increase in total numbers was due to a tremendous influx of immature animals rather than an equal increase in all age classes.

At the Farallones, where census results for adult and subadult males were combined into a single category, the changes are not quite as clear. The Farallon situation appears to be similar, however, for during the first year the highest monthly mean number of males and the highest proportion of males (over a third of the population) occurred during the same months, May and October. This indicates that peak numbers were the result of males stopping briefly at the Farallones during migration. In 1983-84, the highest monthly means were in June, July, and August, when adult males comprised only 12 to 14% of the population, again indicating that peak numbers in the summer of 1983 were due to higher numbers of immature animals.

During censuses we noted the presence of up to 22 immature California sea lions tagged on the Channel Islands. Ten of these were tagged at San Miguel Island and 12 were tagged at San Nicolas Island.

Northern sea lions

The difference between 1983-84 and the previous year of study was not as distinct with the northern sea lions as with the California sea lions. The northern sea lion population is quite small at both Point Reyes and the Farallones, and the numbers remained essentially the same for the two years. The yearly patterns in both areas were similar: low numbers in fall and winter with a peak during the breeding season (Figure 13, Figure 14). Maximum numbers reached 20 on 8 May at Point Reyes (Table 13) and 141 on 2 June at the Farallones in 1983-84. When comparing the monthly mean numbers we found no significant differences between the two years in either area (Mann-Whitney U-test, $p>0.05$).

Patterns in occurrence of the various age and sex classes differed between years. At Point Reyes, in 1983 adult males arrived three weeks later and remained six weeks longer than in 1982 whereas subadult males arrived earlier and stayed into November. This was three months longer than in 1982, a "normal" year. Immature animals, seen throughout the year in 1982, disappeared in 1983 after the end of August. Adult females were present the entire year (Table 13). These changes at Point Reyes Headlands reflect similar changes on the Farallones.

Two adult females, one adult male, and one subadult male northern sea lion recognizable by distinctive scars were seen on both Point Reyes and the Farallones.

All day watches

Regardless of season, the sea lions exhibited a strong diurnal haul-out pattern, with low counts morning and evening and a sustained peak from 1100 h to 1600 h (Table 14, Table 15). Two other factors affected numbers at Point Reyes as well: tidal and weather conditions. Lower numbers occurred when the haul-out area was reduced by high tides or large swells, as well as on calm hot days when sea lions frequently went into the water.

No pupping or breeding was observed in either species in 1983-84 at Pt. Reyes.

Tomales Bay

During the winter herring run we censused California sea lions in Tomales Bay five times. A peak number of 37 Zalophus were seen on 20

January 1983. Few Zalophus were seen on other censuses. Five percent of all animals seen in December 1983 and January 1984 were adult males compared to 20% in the previous year.

DISCUSSION

It was fortunate that this study took place between 1982-1984, for we were able to document some dramatic changes in the sea lion populations within the Point Reyes/Farallon Islands National Marine Sanctuary. The changes, which we attribute to the effects of warm waters associated with El Nino, include a remarkable three-fold increase in the California sea lion population and a shift in the haul out pattern of age and sex classes in both species.

The warmer than usual water temperature measured at the Farallones (PRBO, unpublished) and throughout the northeast Pacific altered the distribution of fish species and reduced numbers and breeding success of marine birds and mammals in California (Heath and Francis 1983, DeLong pers. comm., Stewart pers. comm., PRBO unpubl.). Both California and northern sea lions are at the edge of their breeding ranges in the Point Reyes/Farallon Islands National Marine Sanctuary, therefore any unfavorable perturbation to food supply such as occurred during El Niño, may have significant effect on local populations. California sea lions breed primarily south of Point Conception with major rookeries at San Miguel and San Nicolas Islands, California, and the islands off Baja California, Mexico; major breeding areas of northern sea lions are on the Aleutian and

Pribilof Islands in Alaska (Scheffer 1958). Both species have small breeding colonies on the Farallon Islands where up to 27 northern and up to 3 California sea lion pups have been born each year since 1974 (Huber et al. 1985). Ten northern sea lion pups and 3 Zalophus pups were born in 1983 on the Farallones. No cows of either species gave birth on the mainland in 1982 or 1983.

California sea lions

The population of California sea lions has increased throughout its range in the last 50 years; since 1960 the increase has been about 5% each year in California (DeMaster et al. 1982). In the past, only adult and subadult males migrated north, while adult females and juveniles remained near the southern rookeries (Bartholmew 1967). A change in migration pattern was first noted at the Farallones in 1978 when large numbers of immature sea lions began to haul out in the fall. By 1981 the population at the Farallones had tripled. Ainley et al. (1981) proposed that the increase in numbers and in the proportion of immatures at the Farallones was due primarily to changes in the availability of Pacific whiting (Merluccius productus), a primary prey species, near the islands. The availability of whiting to sea lions increased dramatically when the foreign whiting fishery, which was competing directly with sea lions, was eliminated by the imposition of the 200 mile fishing limit in 1977. Unfortunately we do not have comparative censuses for the mainland sea lion population to see if similar changes occurred there.

Changes in the Farallon California sea lion population from 1972 to

1984 are summarized in Figure 12. Prior to 1978 there was only one peak (in the spring) at the Farallones. Between 1978 and 1981 the number of Zalophus on the Farallones grew by 15 to 20% each year, a much higher rate than the rest of the state. This growth which was due primarily to immature animals created a second peak (in the fall). The remarkable increase that occurred during the 1983 breeding season was unprecedented, although the numbers for the rest of the 1983 were within normal ranges. Most of the summer increase in both areas was due to large numbers of one to four year old animals, the number of adult males increased to double the number seen the previous year.

The population at Point Reyes (Figure 11) reflected the same trend that we saw on the Farallones 1982-84. During this time, Heath and Francis (1983) reported reduced numbers of breeding animals at the Channel Islands. Apparently many adult Zalophus remained in central California rather than migrating to southern rookeries during the El Nino summer of 1983. We do not know for certain why so many immature sea lions congregated at the Farallones and Point Reyes, but we can speculate that it was likely the result of an altered distribution of prey.

High numbers of California sea lions seen at Bodega Head and Point Reyes Headland during the 1983-84 winter were probably attracted to the herring spawn in Tomales Bay. That this peak was not recorded at Bodega Head in December 1982 (Figure 10) is probably due to the large winter swells which reduced available haul-out area during censuses.

Northern sea lions

At Point Reyes, little change in the numbers of northern sea lions occurred between 1982-83 and 1983-84 despite great changes in the marine environment during the second year. The population on the mainland is quite small and as a result it was difficult to discover what effects, if any, El Nino had. In 1983-84, peak numbers of animals occurred in May, before the breeding season, whereas in 1982-83 the peak occurred in August, after the breeding season. Numbers during the rest of the year were similar (Figure 13).

The mortality of northern sea lion pups born on the Farallones was higher in 1983 than at any time in the last 10 years but that may be related more to a problem of premature pupping in Eumetopias (Huber et al 1984) than to the effects of El Nino. Although numbers during the breeding season in 1982-83 were higher than in 1983-84 (Figure 14), neither year was significantly different from the monthly means during 1972-81 (t-test $p>0.05$).

In fall 1983 the absence of immature northern sea lions and the extended attendance of subadult males at both coastal and off-shore sites may possibly be related to the El Nino conditions and their effect on prey availability.

We suspect that sea lion populations within the Sanctuary will return to pre-1983 numbers and age-class ratios after the widespread residual effects of El Nino recede.

SUMMARY

1. The California sea lion population hauling out at mainland sites in the Point Reyes/Farallon Islands National Marine Sanctuary is comprised primarily of migrating animals. Numbers peaked at 338 in 1982-83 and at 1530 in 1983-84 at the Point Reyes Headlands. The northern sea lion population reached a maximum of 20 animals at Point Reyes. There is some interchange of animals between the Farallon and Point Reyes populations.

2. Neither species gave birth nor bred at Point Reyes from 1982-84. On the Farallones up to three California sea lion pups and up to 27 northern sea lion pups have been born each year since 1974.

3. Peak numbers of Zalophus occurred during the southern spring migration and northern fall migration to and from breeding rookeries in southern California and Mexico. The population peak of Eumetopias occurred during the summer breeding season.

4. Maximum numbers of both species hauled out between 1100 h to 1600 h. Where high tides and large swells decreased the haul out area, the highest numbers were counted when low tides occurred at mid-day. Numbers decreased on hot, calm days when many animals went into the water.

5. A peak in California sea lions on the coast in December corresponded to the herring run in Tomales Bay. A winter peak was not observed at the Farallones.

6. Numbers of California sea lions within the Sanctuary were greatly inflated during 1983-84, due to an influx of immature animals. This was probably related to the warm waters of El Niño; "normal" numbers are probably closer to the results of censuses in 1982-83.

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Table 1. Harbor seal counts for all sites in the Point Reyes region for 1983-84. Census days during which disturbance occurred are noted with an asterisk. Numbers following a slash indicate pups.

		LOCATION											
DATE	Bodega Rock	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total Pups	Totals
1983													1337
March 9		146	54	123	123	92	363	0	273	99	64		1701
25		148*	25*	162/1	252	179	414	0	404	41	76	1	
31	47								313/22	101	67/1	26	1242
April 7	12	202/2*	0*	102/1	165	71	209*	0	634/128	67	65/3	189	1771
21	30	189/11*	0	164/13	196/14	92/1	334/19	0	104*				
2/3				142	56				387/33				
9/10		148/3*	0	163/1	120		322*	0	250/65				
16/17		105/3*	0	55/7*			168/4*	0	595/144*				
21									634/107*				
23/24				189/18			485/36*	0	623/167				
30/1				193/29*					820/241	116	97/17	527	2449
May 6		275/45	0	229/42	285/78	25	461/104	141/8	551/157	122/3	70/10	362	1462
20		169/34*	0	161/48	171/48	fog	218/62*	fog	716/226*				
7/8		156/24*		207/38*			480/102*	176/20					
12	25						370/90	122/16	267/118*				
14/15		89/19*		159/48*			249/71*	238/25*	567/173*				
21/22	16	152/5*		204/38			83/7*	362/28	335				
28/29		148/23*		161/17*			71/3	340/14	463/48	166/3	67/3	102	1467
June 3		84/2*	0	137/12	70/16	69/1	354/8	150/10	455/103	100/2*	95/2*	135	1600
16		93/2*	0	229/6*	74/2	50	270/3	350	438/91	85/3	136	115	1894
30		--	-	269/14	122/3	74/1	69/3*	345/6					
4/5													
17	15								583/20				
18/19													
25/26		158*		132/13									
30	44												

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DATE	Bodega Rock	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total Pups	Tota
1983 (cont'd)													
July	5	74	0	336	255	68	516	115	747	61	151		2323
	18	93	0	315	265	45	422	150	316	118	174		1898
	16/17	89*		215									
	19 50												
	22						410						
	30/31						305*	250	353				
Aug	1 22	54*	0	232	131	60	324	207	301	138	122		1591
	15	168	0	fog	fog	fog	362	0	51	fog	80		661
	29/30	241	0	33	74	35	310	63	13	0	102		871
	6/7			215									
	13/14	268*							77*				
	17 30												
	27/28	213		41*			380						
	31 2												
Sept	9	--	--	19	84	16	240	0	155	92	54		660
	19	134	0	fog	81	46	298	45	50	270	70		994
	3/4												
	6 21												
	18 14*												
	24/25			26*			252*	74					
Oct	3	113	0	48	167	65	322	0	34	220	102		1071
	17	122	0	38	47	58	137	0	33	254	85		774
	15/16								32				
	22/23 15	95*									60*		
	29/30 35						141	40					
Nov	2	93	0*	51	15	113	415	0	0	235	107		102
	16	136	0	64	163	84	198	48	1	87	74		85
	5/6			49									
	15 47												
	26/27						246*	59					
	29 31												

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DATE		Bodega Rock	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total Pups	Totals
1983 (cont'd)														
Dec	1		--	--	30	67	5	243	15	136	79	46		621
	15		135	0	46	143	fog	248	24	244	100	38		978
	29		150	0	46	59	fog	250	25	283*	104	38		955
	3/4				48					142				
	17/18		118*											
	20	11												
	27	49								348*				
	28													
	31				71*			368	0	281				
1984														
Jan	12		105*	250	63	129	29	313	0	267	45	2		1203
	26		226*	0	50	100	70	321	0	285*	76	26		1154
	14/15				56*									
	17						57							
	21/22													
	23	35						387/1*	0	32*			1	
	28/29						66							
	31						83	363	13	395	106	73		1498
Feb	10		195	0	78	192	34	286	0	237	91	38		1041
	24		202	0	60	93		206						
	3						100							
	8													
	11/12		188*											
	16	54												
	18/19													
	23		331	0										
	25/26				63			250*		303				
	28	41												
Mar	17		195	0										
	25		100	0										

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Table 2. The average number of harbor seals hauled out by season during censuses in the Point Reyes area in 1983-84; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size. Tomales Bay includes Hog Island, Tomales Point includes Bird Rock, and Drakes Estero includes Limantour Estero.

	LOCATION							
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon	All Sites
Breeding								
$\bar{x}$	155.7	337.1	81.5	420.2	501.9	99.7	81.9	1653.4
SE	12.3	31.6	15.9	34.3	32.8	11.7	8.0	121.0
n	16	9	8	17	30	9	9	9
range	84-275	207-514	25-179	168-656	104-832	41-166	64-136	1230-2449
Summer								
$\bar{x}$	138.7	265.6	49.1	393.1	174.3	144.1	100.0	1270.1
SE	19.9	77.4	6.2	41.0	53.7	34.0	12.4	210.6
n	12	8	8	14	14	8	10	8
range	54-268	81-591	16-68	181-631	13-747	61-270	54-174	661-2323
Winter								
$\bar{x}$	193.5	161.0	64.1	304.6	215.8	101.2	49.1	1089.1
SE	84.0	21.9	10.6	16.1	32.2	17.7	11.0	70.1
n	11	9	10	14	15	9	9	8
range	93-355	66-270	5-113	206-415	0-395	44-235	2-107	855-1498

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Table 3. Maximum number of harbor seal pups counted at each haul-out site by month in 1982 and 1983.

Date	LOCATION					
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Bolinas Lagoon
1982						
April	22	19	1	101	262	0
May	58	135	19	170	263	17
June	23	54	18	60	90	4
1983						
April	11	29	1	36	186	3
May	45	120	0	122	262	17
June	2	28	1	18	103.	3

Table 4. The hourly presence of harbor seals at primary locations in the Point Reyes area on June 16, 1983. Low tide was -.7' at 1032 hr, and high tide was 5.2' at 1803 hr. An asterisk (*) indicates disturbance.

	HOUR											
LOCATION	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800
Tomales Bay	91	93	77*	72*	64	81	82	85	77	70	--	--
Bird Rock	133	169	72*	108	173	146	200	234	212	159	148	165
Drakes Estero	151	274	343	370	430	504	491	332	316	218	39	30
Double Point	275	318	325	330	348	375	408	434	455	426	397	212
Duxbury Reef	84	93	95	100	82	54	95	14	0	0	0	0
Bolinas Lagoon	51	65	76	88	91	95	86	87	80	59	43	11
TOTALS	785	1012	988	1068	1188	1255	1362	1186	1140	932	627	418

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Table 5. Freeman-Tukey deviates (FT) for the deviation of the observed from the expected for a log-linear model of independence of year, seal location, and seal reproductive status. The numbers given are the total number of seals counted for each zone during each season.

	Coastal	Estuary
1982		
Breeding	9299	7213
F-T	-1.67	1.93
Non-breeding	7957	7592
F-T	1.83	-1.85
1983		
Breeding	8934	5947
F-T	1.73	-2.09*
Non-Breeding	9275	8938
F-T	-1.68	1.73

* F-T deviate is significant at $\alpha = 0.05$.

Table 6. The average monthly number of harbor seals hauled out at Double Point from 1976 to 1984 for adults, subadults, and all age classes combined. Only those censuses when immatures were distinguished were included in the sample; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size.

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
n	13	15	25	51	52	28	20	15	12	12	9	16
All Age Classes												
$\bar{x}$	128.2	252.2	239.0	372.8	517.9	413.3	397.2	143.6	123.3	82.2	32.7	151.9
SE	26.4	25.4	16.7	25.8	24.4	36.4	29.3	17.2	21.5	21.1	5.2	27.0
Adults												
$\bar{x}$	99.5	204.9	191.9	241.5	304.7	304.3	317.2	97.6	76.7	50.2	22.7	110.5
SE	21.9	21.9	12.7	16.0	16.3	29.6	24.7	15.1	16.9	14.8	5.4	22.3
Subadults												
$\bar{x}$	22.8	41.8	41.5	36.0	36.0	52.5	40.6	19.3	31.4	17.3	4.6	31.6
SE	7.4	6.8	5.4	4.2	3.2	8.8	6.6	3.6	6.4	7.8	1.3	7.0
% Subadult to Total	17.8	16.6	17.4	9.7	7.0	12.7	10.2	13.4	25.5	21.1	14.1	20.8
% Adult to Total	77.6	81.3	80.3	64.8	58.8	73.6	79.9	68.0	62.2	61.1	69.4	72.8

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Table 7. The average percentage of sex and age classes of harbor seals at Double Point during the early, middle, and late periods of the breeding season, 1984; $\bar{x}$ is the mean percent of each class, SD is the standard deviation, and n is the sample size.

		CATEGORY				
		Males	Females	Females w/pups	Subadults	Pups
EARLY	$\bar{x}$	29.8	32.6	7.6	26.6	10.2
n = 6	SD	5.5	2.2	9.0	6.5	9.2
MIDDLE	$\bar{x}$	12.8	37.9	32.7	10.0	39.3
n = 7	SD	3.9	3.9	4.2	2.1	6.2
LATE	$\bar{x}$	11.9	37.9	25.3	16.9	32.9
n = 5	SD	3.9	4.0	10.6	8.5	7.2

Table 8. The yearly changes in abundance at Double Point during the breeding season, 1976 to 1984; $\bar{x}$ is the average number of seals censused for the season and n is the sample size. Rate of increase is calculated from $\lambda = \frac{\bar{N}_{t+1}}{\bar{N}_t}$

Year	n	$\bar{x}$	Rate of Increase
1976	14	195.2	
1977	30	304.5	1.6
1978	19	330.1	1.1
1979	10	287.7	0.9
1980	5	318.0	1.1
1981	13	383.8	1.2
1982	33	525.1	1.4
1983	29	512.7	1.0
1984	22	578.3	1.1

Table 9. The daily variability in the number of seals hauled out at Double Point and Bolinas Lagoon during the breeding season, the molt (July), and the end of molt (August).
CV = coefficient of variation. All censuses were taken from 1200-1300 hrs and 1-3 hrs after low tide.

	Breeding CV	Molt CV	Molt end CV
Double Point	.18	.07	.45
Bolinas Lagoon	.44	.24	.30

Table 10. Summary of pupping success of known female harbor seals at Double Point first identified in 1977 or 1982 and observed over the next two years (Siniff et al. 1977). $\bar{x}$ is the average for the two three-year sets.

	YEAR						
PARAMETER	77	78	79	82	83	84	$\bar{x}$
Females seen with pup	14	14	14	16	15	11	
Females seen without pup	2	2	1	2	1	3	
Females not seen in given year	--	0	1	--	2	4	
TOTAL	16	16	16	18	18	18	
Proportion of total with pup	.88	.88	.88	.89	.83	.61	.83
Proportion of those seen in given year that had pup	.88	.88	.93	.89	.94	.79	.89
Proportion not seen in given year	--	0	.06	--	.11	.22	.10

Table 11. Maximum counts of California sea lions at Pt. Reyes Headlands, 1983-84.

Date	Total	Adult Male	Subadult Male	Female Size	Immature	Unidentified
1983						
Mar 5	188	72	46	56	14	
11	201	101	46	44	9	
20	150	62	38	34	16	
31	112	68	25	15	4	
Apr 7	103	44	22	14	23	
12	88	14	56	9	6	
23	211	70	45	39	17	45
May 8	547	20	121	100	16	290
12	662	119	104	265	35	150
18	569	114	156	227	57	128
24	485	120	107	110	13	38
Jun 1	587	150	148	116	130	43
8	584	36	172	38	110	264
23	164	2	16	78	68	
27	428	19	13	75	271	50
Jul 15	389	28	41	46	186	88
22	412	25	45	68	226	48
28	499	40	31	79	310	39
Aug 5	763	52	98	191	96	326
11	595	23	117	206	112	57
19	523	27	103	174	76	143
26	460	13	123	191	38	95
Sep 6	190	15	15	51	47	12
12	420	35	29	69	104	183
23	417	28	108	165	72	44
27	489	27	104	286	45	27
Oct 6	316	18	44	151	31	72
14	368	86	38	116	51	77
19	207	7	28	112	18	42
26	176	7	43	111	15	
Nov 5	128	42	37	30	19	
15	105	27	39	23	16	
21	61	22	21	12	6	

Table 11. (cont'd)

Date	Total	Adult Male	Subadult Male	Female Size	Immature	Unidentified
1983 (cont'd)						
Dec 5	103	30	29	36	8	
15	321	153	97	62	9	
20	262	49	74	126	13	
27	180	106	46	17	11	
1984						
Jan 2	228	116	40	58	14	
13	18	15	2	1		
18	110	67	20	14	9	
26	81	51	10	13	7	
Feb 1	204	79	30	48	49	
14	239	86	30	85	38	
23	304	159	69	47	29	

Table 12. Maximum counts of California sea lions at Bodega Rock, 1983-84.

Date	Total	Adult Males	Unidentified
1983			
Mar 3	198	14	184
Apr 7	84	4	80
21	13	3	10
May 12	529	8	521
22	427	19	408
Jun 17	71	9	62
30	21		21
Jul 19	100	11	89
Aug 1	420	32	388
17	707	15	692
31	781	24	734
Sep 6	864	26	838
18	685	15	670
Oct 22	1270		1270
31	1530		1530
Nov 15	820		
29	635		
Dec 20	1295		
27	1100		
1984			
Jan 23	421		421
Feb 16	684	10	674
28	275		275
Mar 21	135		135

Table 13. Maximum counts of northern sea lions at Pt. Reyes Headlands, 1983-84.

Date	Total	Adult Male	Subadult Male	Female Size	Immature
1983					
Mar 5	3		2	1	
11	5		1	4	
20	4		1	3	
31	3			3	
Apr 7	3		1	1	1
12	1		0	1	0
23	4		2	2	0
30	3		2	1	0
May 8	20	2	7	7	4
12	19	5	9	5	0
18	17	2	6	5	4
24	19	2	6	6	5
Jun 1	11	4	1	1	5
8	9	1	1	4	3
23	9	0	3	4	1
27	16	3	3	7	3
Jul 7	13	2	3	6	2
15	10	0	3	4	3
22	13	1	2	5	5
28	11	1	1	7	2
Aug 5	13	1	3	7	2
11	8	1	2	5	0
19	9	0	3	5	1
26	8	1	3	4	0
Sep 6	3			3	
12	2			2	
23	7		4	3	
27	14		4	9	
Oct 6	6		2	4	
14	4		2	2	
19	1		1		
26	10	1	1	8	
Nov 3	1			1	
5	2			2	
15	2			2	
21	4			1	

Table 13. (cont'd)

Date	Total	Adult Male	Subadult Male	Female Size	Immature
1983 (cont'd)					
Dec 5	2			2	
15	4			4	
20	5		2	3	
27	2			2	
1984					
Jan 2	2			2	
13	1			1	
18	2			2	
26	3			3	
Feb 1	5		1	4	
14	7	1	1	5	
23	5		1		

Table 14. Hourly counts of California sea lions at Pt. Reyes Headlands, 1982-83 and 1983-84.

	1982-83			1983-84		
	$\bar{x}$	S.D.	n	$\bar{x}$	S.D.	n
0700	59.0	17.4	4	66.7	40.6	4
0800	67.2	61.8	9	176.6	160.1	11
0900	91.5	71.6	11	199.4	177.8	12
1000	94.6	72.8	12	216.4	181.4	12
1100	116.5	70.6	13	229.9	156.3	12
1200	121.3	60.5	13	256.0	171.1	12
1300	115.5	66.4	12	260.3	166.1	12
1400	104.4	65.6	13	267.6	184.4	12
1500	102.9	67.4	10	270.1	177.7	11
1600	102.1	71.9	8	248.4	176.1	12
1700	75.4	21.8	7	208.3	179.9	9
1800	69.2	18.5	6	239.6	162.5	5

Table 15. Hourly counts of northern sea lions at Pt. Reyes Headlands, 1982-83 and 1983-84.

	1982-83			1983-84		
	$\bar{x}$	S.D.	n	$\bar{x}$	S.D.	n
0700	1.0	0.0	3	2.2	2.6	4
0800	3.3	2.1	6	3.1	3.4	9
0900	4.1	2.9	8	3.5	5.0	12
1000	6.4	4.8	9	4.0	5.2	12
1100	7.7	3.9	9	4.5	5.1	12
1200	7.5	5.2	10	4.3	4.4	12
1300	7.8	5.6	10	4.4	5.3	12
1400	7.0	4.8	10	4.3	5.4	12
1500	7.3	5.9	9	4.5	5.2	10
1600	7.3	5.7	7	4.4	5.8	10
1700	5.6	4.8	6	3.0	5.0	9
1800	5.2	4.1	6	3.2	4.1	5

FIGURE 1

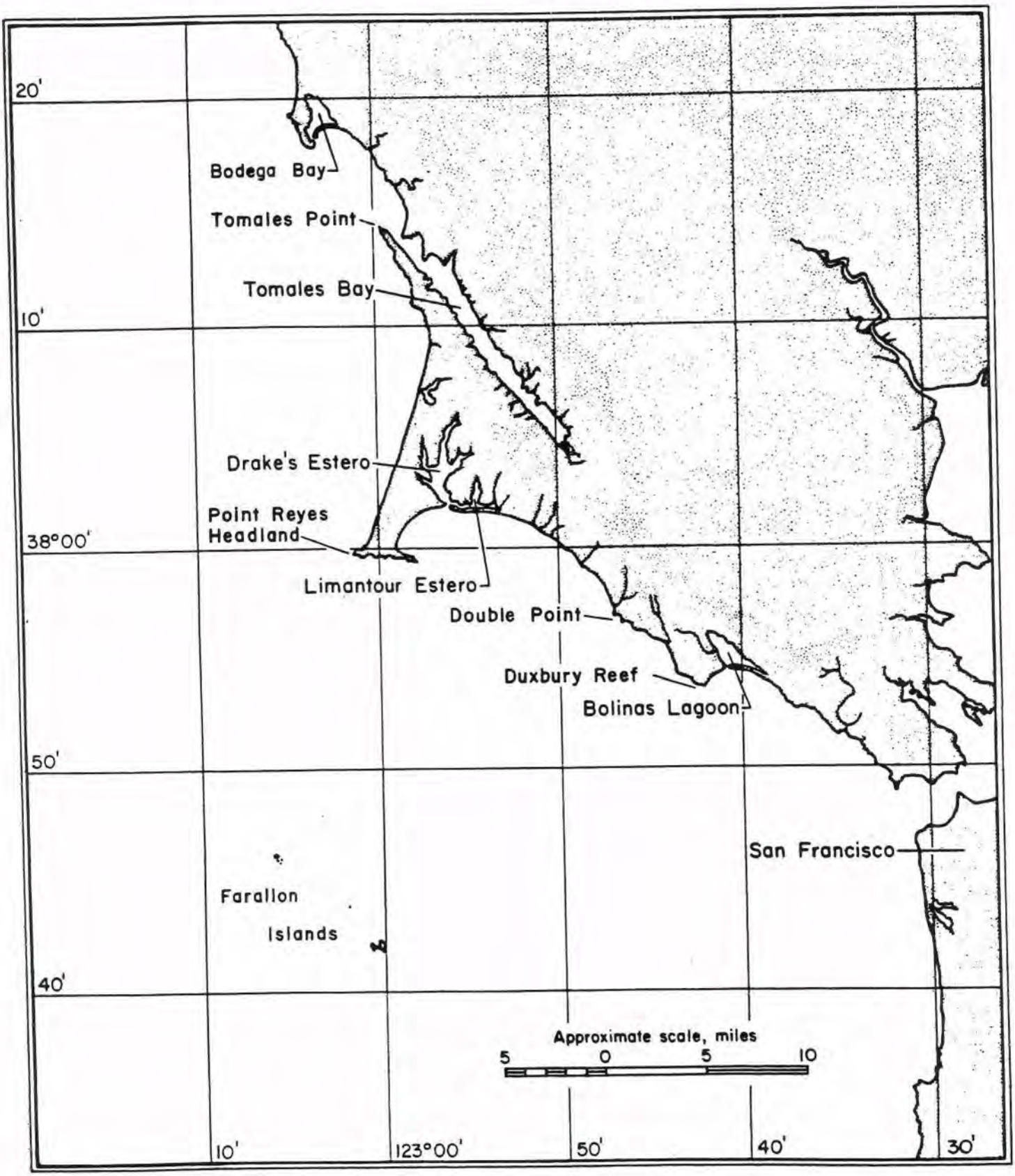
20'
Bodega Bay
Tomales Point
Tomales Bay
10'
Drake's Estero
Point Reyes
Headland
38°00'
Limantour Estero
Double Point
Duxbury Reef
Bolinas Lagoon
50'
San Francisco
Farallon
Islands
40'
Approximate scale, miles
5 0 5 10
10'
123°00'
50'
40'
30'

FIGURE 2

MAXIMUM NUMBER OF HARBOR SEALS BY MONTH POINT REYES, 1983-84

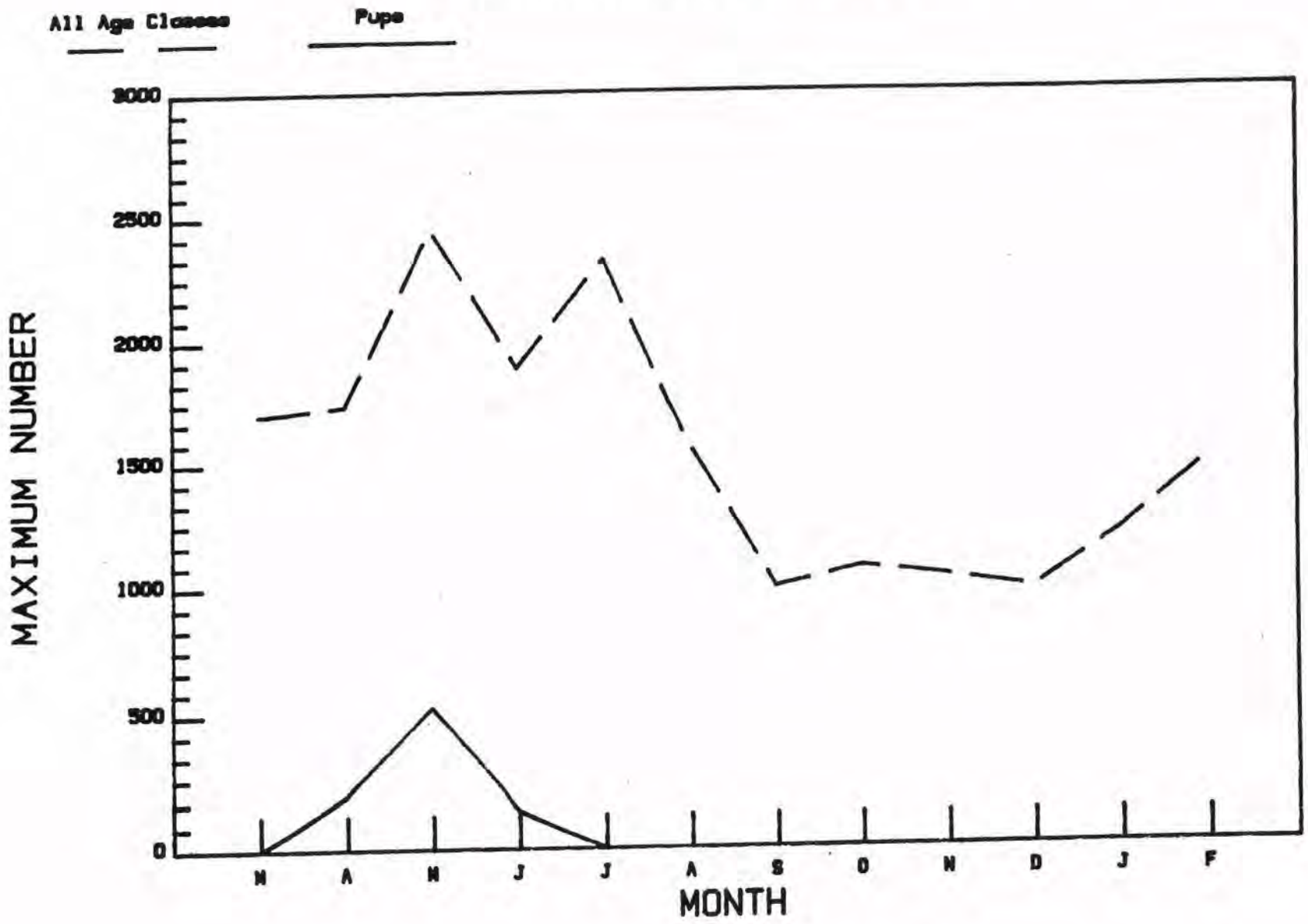

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FIGURE 3

Monthly Mean Number of Harbor Seals 1982-84
Tomales Bay

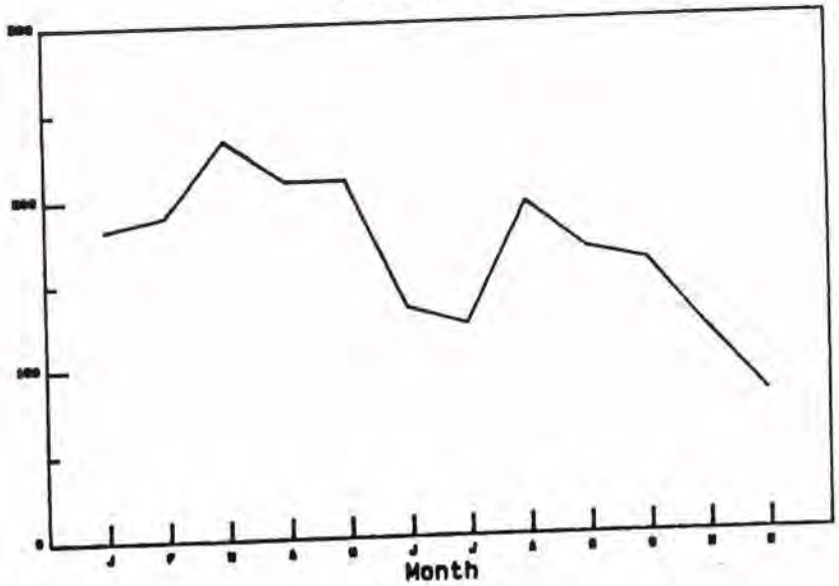

FIGURE 4

Monthly Mean Number of Harbor Seals 1982-84
Tomales Point

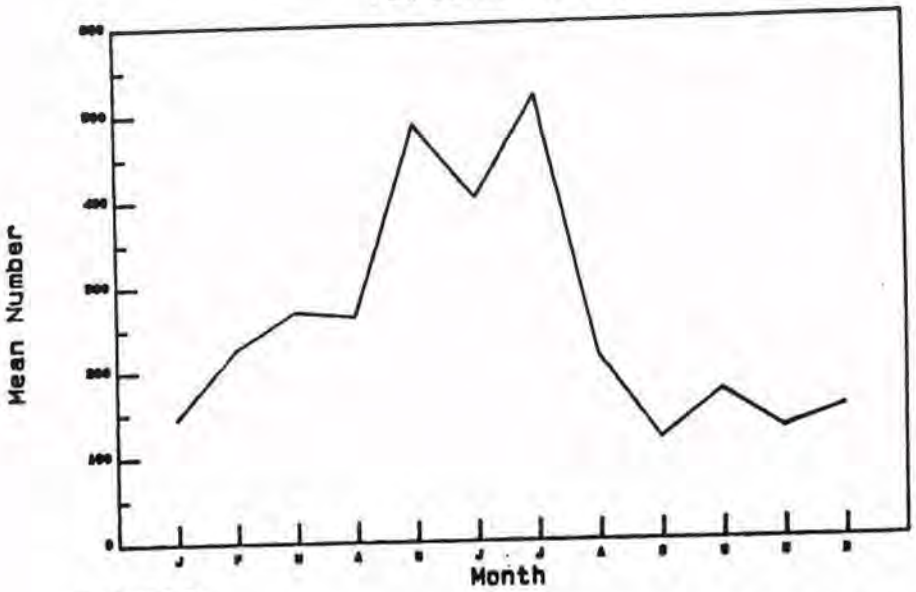

FIGURE 5

Monthly Mean Number of Harbor Seals 1982-84
Point Reyes Headland

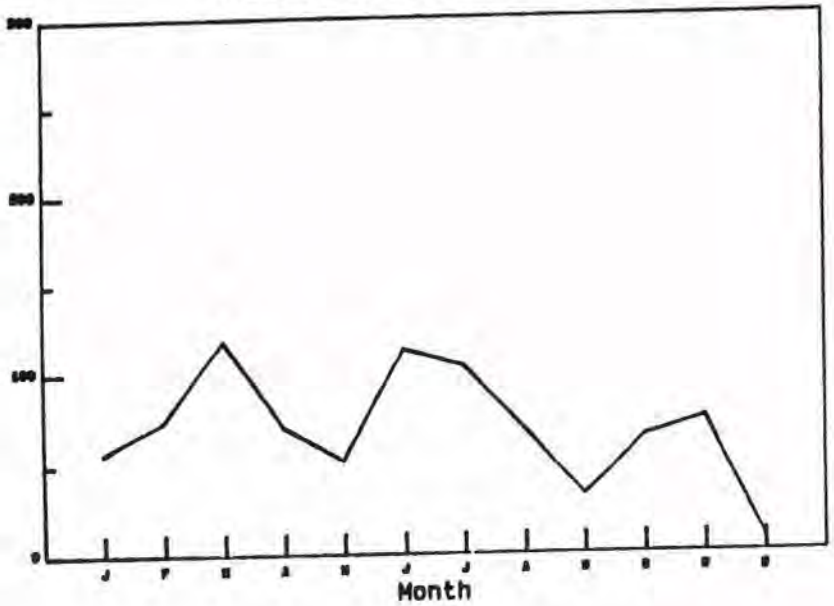

FIGURE 6

Monthly Mean Number of Harbor Seals 1982-84
Drakes Estero

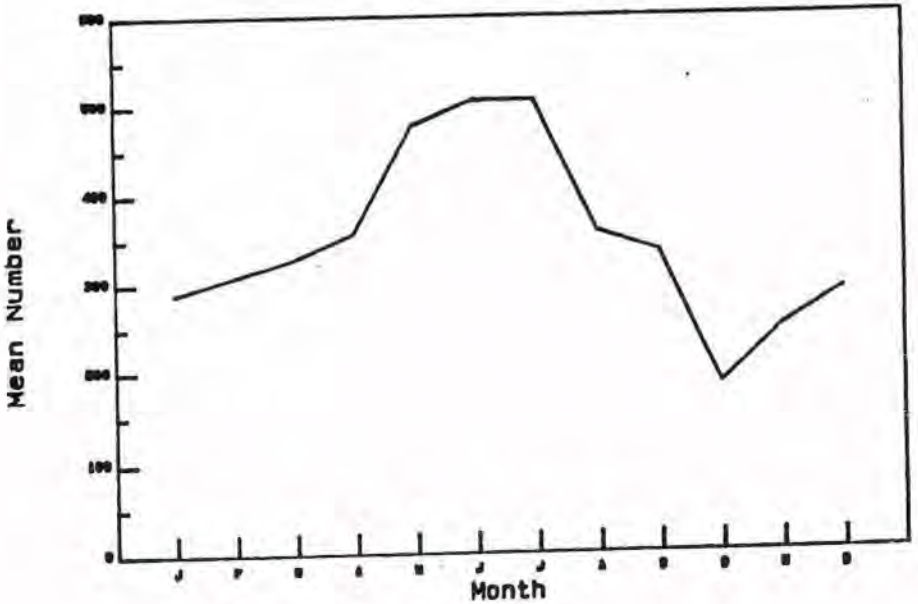

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FIGURE 7

Monthly Mean Number of Harbor Seals 1982-84
Duxbury Reef

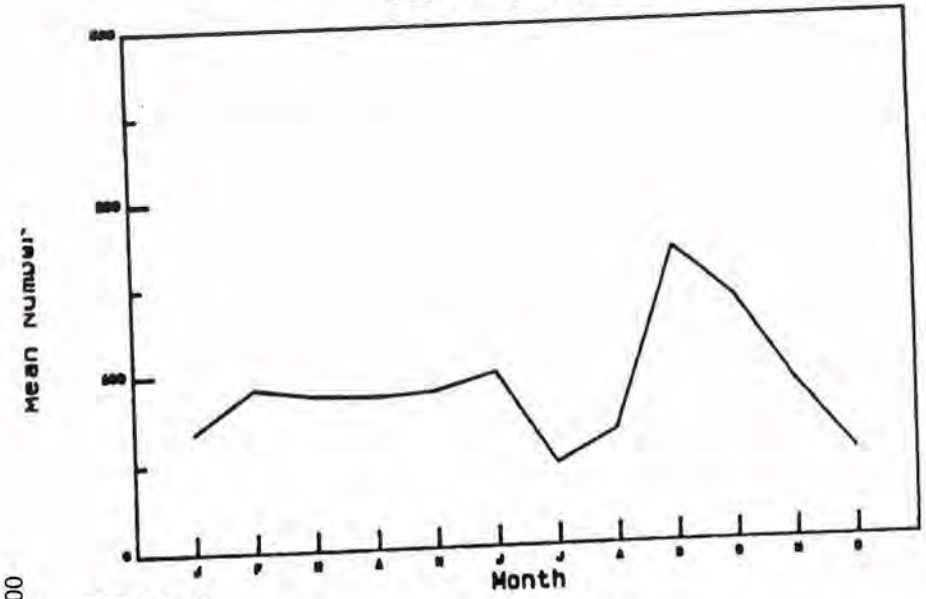

FIGURE 8

Monthly Mean Number of Harbor Seals 1982-84
Bolinas Lagoon

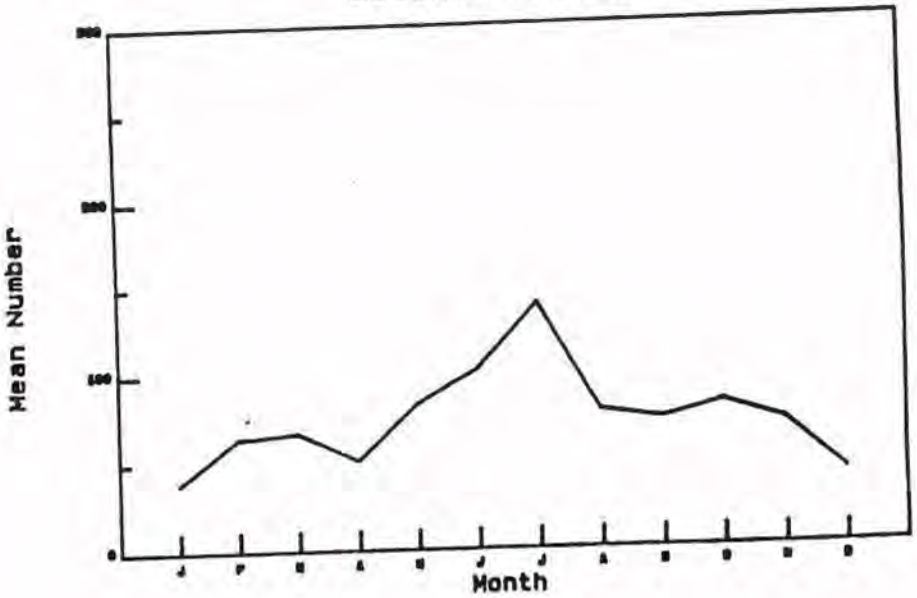

FIGURE 9

Monthly Mean Number of Harbor Seals 1976-84
Double Point

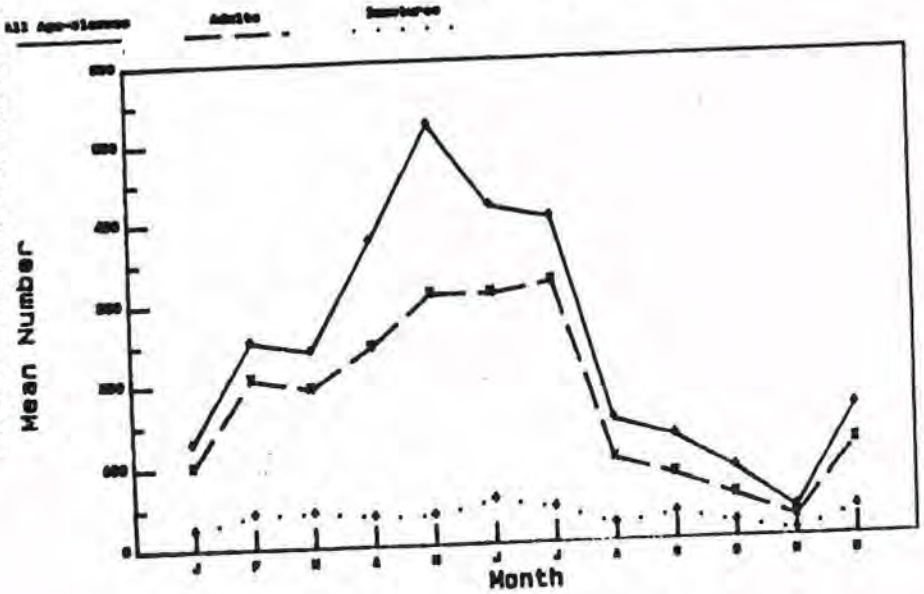

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FIGURE 10

MONTHLY MEAN NUMBER OF CALIFORNIA SEA LIONS AT BODEGA ROCK

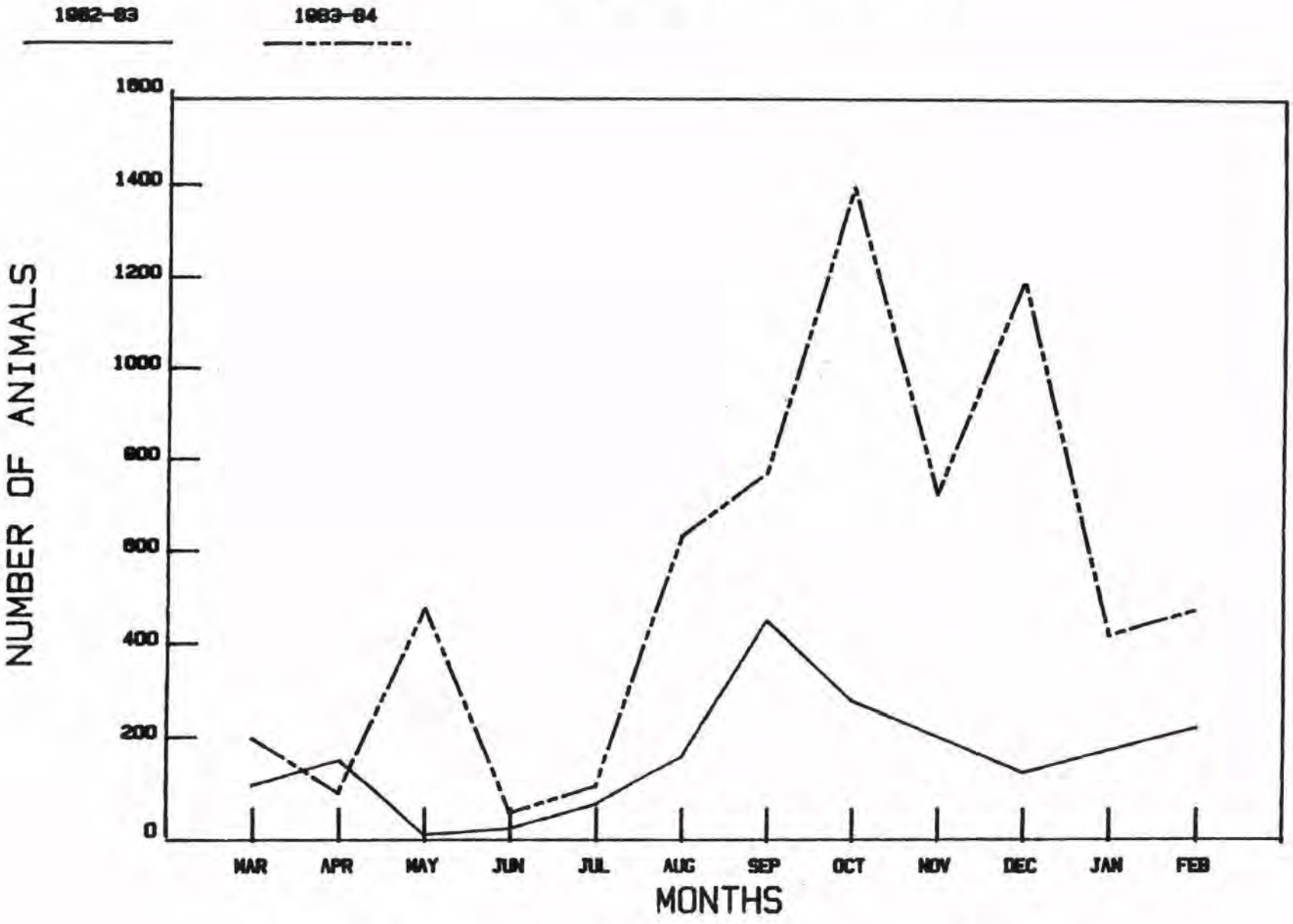

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FIGURE 11

MONTHLY MEAN NUMBER OF CALIFORNIA SEA LIONS AT POINT REYES

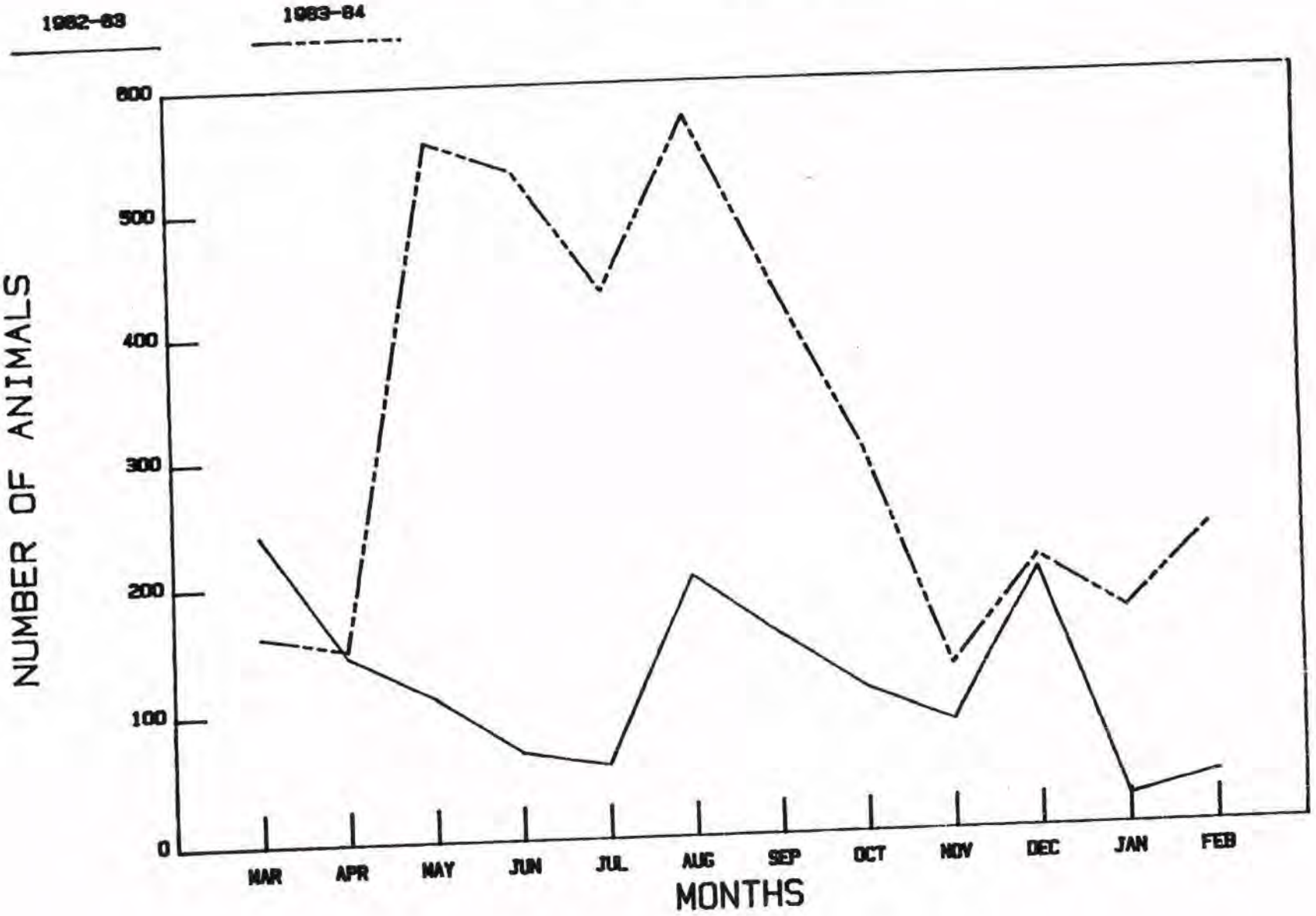

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FIGURE 12

MONTHLY MEAN NUMBER OF CALIFORNIA SEA LIONS AT THE FARALLONES

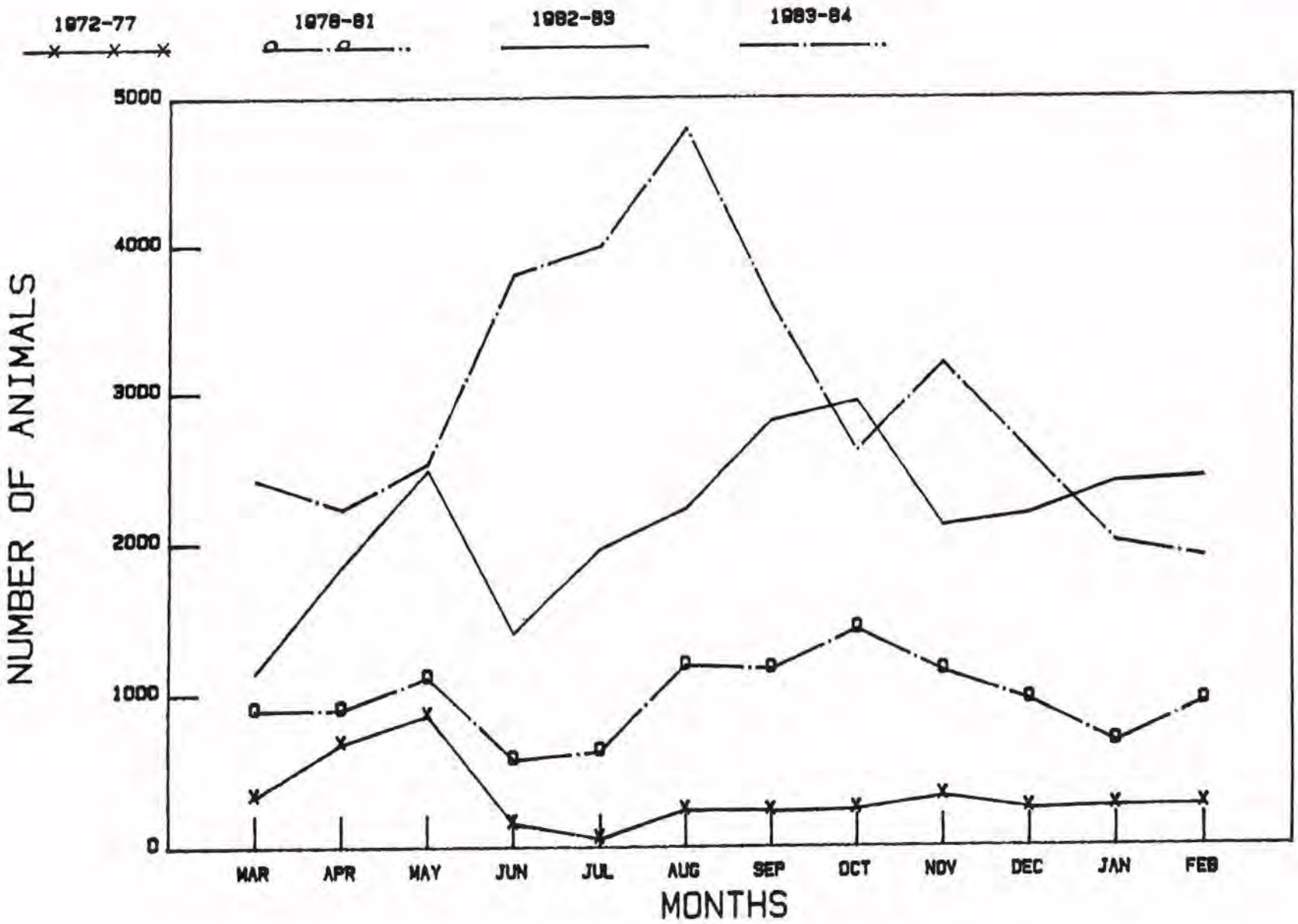

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FIGURE 13

MONTHLY MEAN NUMBER OF NORTHERN SEA LIONS AT POINT REYES

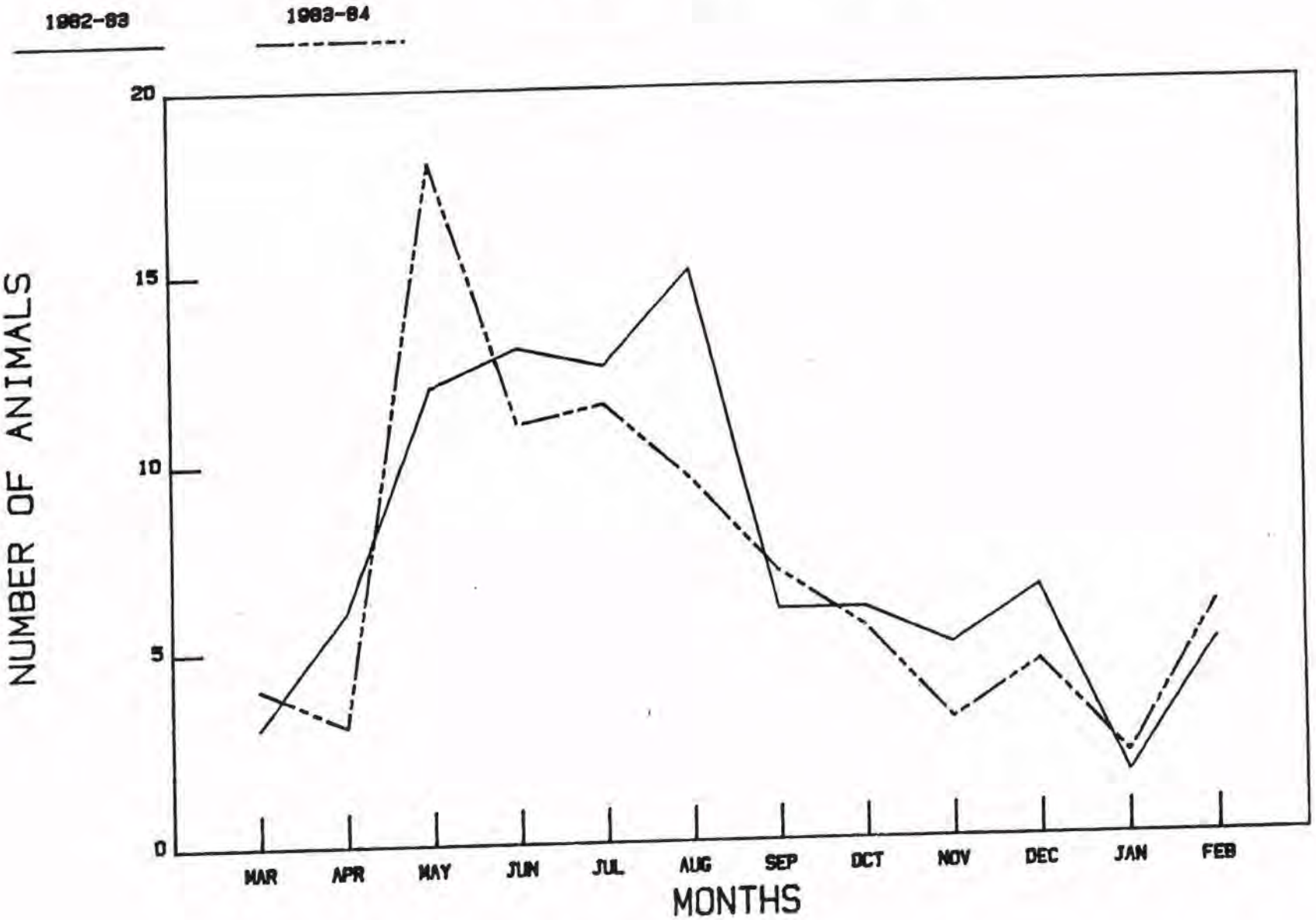

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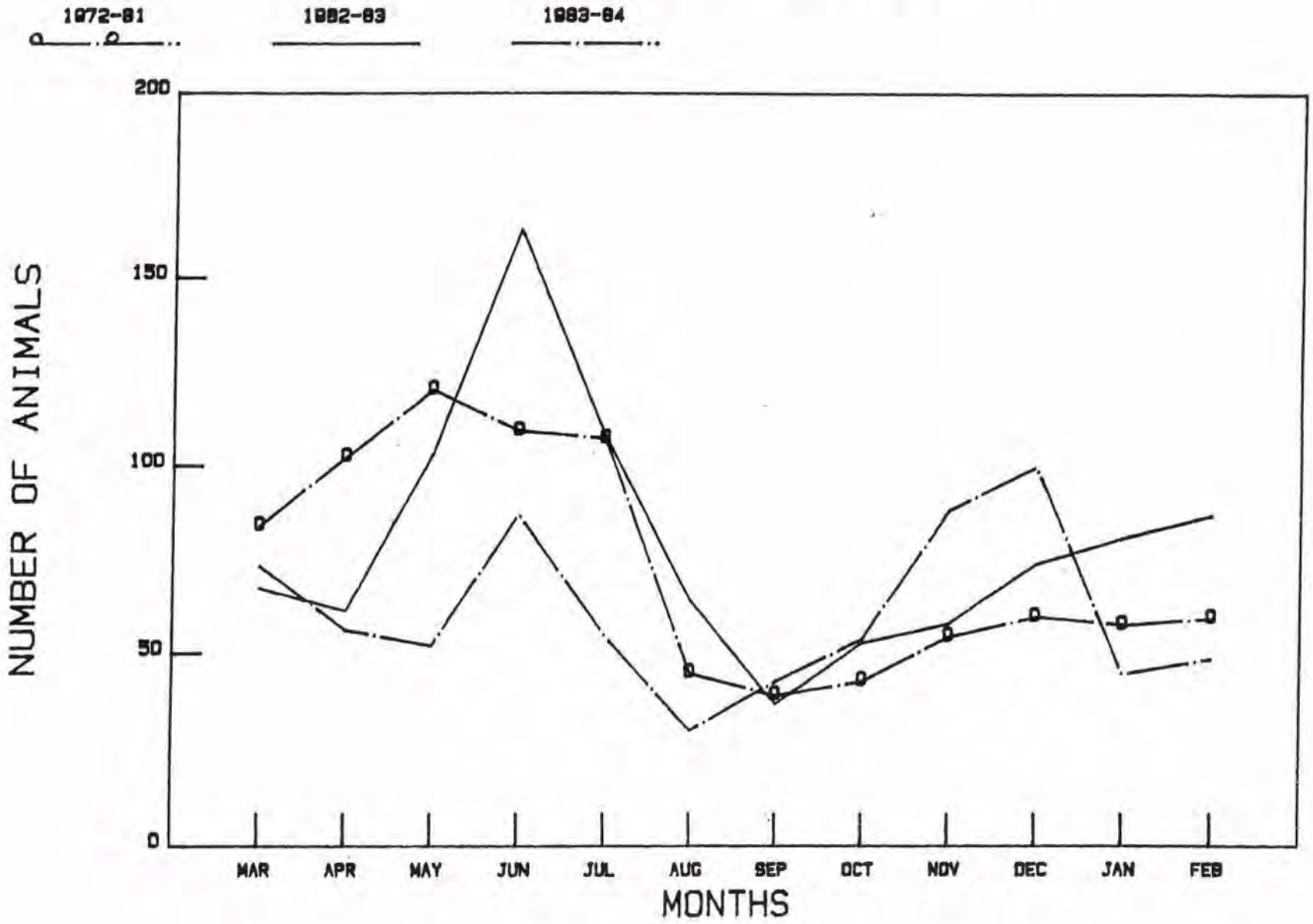
FIGURE 14

MONTHLY MEAN NUMBER OF NORTHERN SEA LIONS AT THE FARALLONES



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Appendix 1.

Table 2. The average number of harbor seals hauled out by season during simultaneous censuses in the Point Reyes/Farallon Islands Marine Sanctuary in 1982 - 83; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size. Tomales Bay includes Hog Island, Tomales Point includes Bird Rock, and Drakes Estero includes Limantour Spit.

	LOCATION							
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon	All Sites
Breeding								
$\bar{x}$	213.0	376.2	104.5	436.7	517.5	82.6	73.8	1839.4
SE	13.3	50.8	16.8	25.3	30.6	9.5	9.6	150.1
n	10	10	10	30	33	10	10	10
range	149-285	151-563	44-232	116-726	228-851	19-109	30-126	
Summer								
$\bar{x}$	191.6	242.9	71.7	331.1	246.5	62.3	83.3	1191.5
SE	21.5	45.5	18.4	39.1	46.1	23.8	10.3	108.5
n	8	8	6	12	8	8	8	8
range	102-281	137-454	13-149	146-469	69-469	0-164	24-138	
Winter								
$\bar{x}$	92.3	158.3	49.1	257.4	142.9	49.5	56.4	692.4
SE	30.7	22.2	17.9	34.5	47.7	21.5	6.1	164.1
n	8	8	8	12	8	8	8	8
range	31-271	80-240	8-155	93-421	30-359	0-148	29-83	

PINNIPED ASSESSMENT IN THE POINT REYES/FARALLON ISLANDS NATIONAL MARINE SANCTUARY, 1982 - 83.

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Point Reyes Bird Observatory
4990 Shoreline Highway
Sinson Beach, CA 94970

ABSTRACT

From March 1982 to February 1983 we censused three species of pinnipeds [harbor seal, California sea lion, and northern (Steller) sea lion] found on the coast of the Point Reyes/Farallon Islands National Marine Sanctuary. We censused harbor seals semi-monthly and simultaneously at all traditional haul out sites. Seals were present throughout the year with most seals recorded in the breeding season; the maximum count for the season was 2502 with 566 pups. An enormous influx of animals occurred primarily at coastal locations during the breeding season and appeared to be from areas outside of the Sanctuary. The diurnal haul out pattern varied depending upon time of day, tide level, and physical features of the hauling ground. Disturbance also modified the seals' diurnal pattern and was considered a factor in reproductive success. Preliminary recommendations for management are presented.

California and northern sea lions were censused weekly during the breeding season (May-August) and semi-monthly during the rest of the year at Sea Lion Overlook, Point Reyes. We divided animals into five age-classes and compared coastal counts to counts on the Farallon Islands. Peak numbers were 338 at the

Headlands in April and 3725 at the Farallones in January for California sea lions; for northern sea lions high counts were 19 at the Headlands in July and 192 at the Farallones also in July. No pups were observed at Point Reyes. Censuses were analyzed to clarify seasonal, diurnal and tidal fluctuations. Sea lions were censused in Tomales Bay during the herring run, December to March.

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INTRODUCTION

The presence of harbor seals, Phoca vitulina richardsi , within the coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary has been documented sporadically since Scammon (1968) first visited Point Reyes in the 1850's. Bonnot (1928) recorded numbers of seals for the California Division of Fish and Game but made only cursory observations in Point Reyes. More recently, Carlisle and Alpin (1966, 1971), Frey (1970), Mate (1977) and the Bureau of Land Management (BLM) (1981; Dohl 1982) conducted aerial surveys of pinnipeds in California. The focus of Mate's survey was on sea lions, and accordingly, the figures for harbor seals were low for the entire region. He distinguished only three seal haul out areas: Drakes Bay, Tomales Bay, and Tomales Point. BLM conducted aerial surveys of marine mammals in central and northern California in 1980 and 1981, and their survey was the first attempt to determine seasonal variability. Their estimates from latitude 37 ^{o}30' to 38 ^{o}30' for harbor seals in 1981 were 1333 in January, 1262 in May, 2559 in June, and 658 in September. Incidental information on pinnipeds was presented by Chan (1979) in reports on Areas of Special Biological Significance (ASBS) in the Point Reyes region, and detailed information on the population at Bolinas Lagoon was provided by Allen (1980). This survey, however, is the first comprehensive assessment of numbers and seasonal use patterns of harbor seals for the entire coastal zone of the Sanctuary. Management plans can be designed from this baseline information in conjunction with that to be collected in the second survey year.

STUDY AREA AND METHODS

The coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary extends from Bodega Bay (38° 30'N) south to and including Bolinas Bay (37° 30'N). Coastal embayments such as Tomales Bay, Drakes Estero, and Bolinas Lagoon, also under the jurisdiction of the Marine Sanctuary, were included. The Point Reyes National Seashore (PRNS), the Golden Gate National Recreation Area (GGNRA), and the Marin County Department of Parks and Recreation share jurisdiction with the Sanctuary over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game (CDFG) and the State Water Resources Control Board as Areas of Special Biological Significance (ASBS) because of their unique biological attributes.

Because of its agricultural character, much of this coastline has remained largely undeveloped even prior to its inclusion in the 1960's and 70's in PRNS and GGNRA. This character and the inaccessibility of much of the area have afforded protection from human disruption to the seals' terrestrial resting periods. Consequently, seal habitat usage probably has not changed significantly over the past century.

The topographical diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out in large groups. These include tidal mud flats, offshore tidal ledges, and sandy beaches. We censused harbor seals from the ground semi-monthly at recognized haul out sites within the coastal zone of the Sanctuary from March 1982 to March 1983. "Haul out site" is defined as a terrestrial location where seals

aggregate on a daily basis. These sites were Hog Island, sand bars in Tomales Bay near Toms Point, Bird Rock and adjacent beaches, Point Reyes Headland, Drakes Estero, Limantour Estero and Limantour Spit, Double Point, Duxbury Reef, and Bolinas Lagoon (Figure 1). In addition, we counted seals monthly at Bodega Rock. Censuses at Limantour Estero, though initially included in this project, were discontinued because seals were absent during low tides and were noted only incidentally during medium tides. The change in seal presence at Limantour Estero can be attributed to the high rate of siltation precipitated by severe storms in 1982 which rendered the area inaccessible.

Seals were censused on weekdays in order to minimize the chance of human disturbance. Censuses occurred simultaneously during low tides except on the few occasions when weather conditions prevented human access to remote sites. Low tide is usually the time when maximum numbers of seals haul out in the San Francisco Bay region (Allen 1980, Fancher 1979, Risebrough 1978).

We categorized harbor seals into three age classes: adults, subadults, and pups. Pups, born April through June, were considered subadults at the end of July because their size and coloration were then indistinguishable from first year immatures (i.e., immatures began to molt, and pup pelage became faded). Harbor seals reach maturity between three and five years, so division of this age group was based solely on size in comparison to adult animals which are about 160 cm long. We excluded information on immature seals for Tomales Bay, Limantour Spit, and Duxbury Reef; age-classes were difficult to separate consistently in these areas because of distance from the observer and glare from the afternoon sun.

Individual animals, those with distinct coloration or scars, were identified whenever possible to determine seal movement between locations. We consistently observed individuals with distinct scars only at Double Point where the observer was on a cliff overlooking the seals 70 m away. "Red" seals, those with a deep russet hue to the pelage, however, were easily counted at all locations. Unfortunately, when seals molted from July through September, the red also disappeared and did not reappear in the population until November (for a description of red seals, see Risebrough 1978).

For analysis of seasonal trends, the year was divided into three seasons: breeding (March through June); summer (July through October); and winter (November through February). We examined seasonal means for the region and for each site. To test whether the seasonal haul out pattern was different at coastal versus estuarine locations, we compared the total number of seals for each habitat during breeding and non-breeding seasons, using a Chi-square test.

Data collected at Bird Rock, Tomales Bay, Drakes Estero, and Bolinas Lagoon by National Park Service (NPS) personnel in 1981 were examined as a reference to that gathered in this study.

Hourly counts during 13 full-day censuses at Drakes Estero were conducted to ascertain diurnal and tidal differences in haul out patterns between Double Point, a coastal habitat, and from Bolinas Lagoon, an estuarine one, where data have been collected previously (Allen unpubl. data, Allen et al. ms.). When examining the daily haul out patterns at Drakes Estero, hourly means were compared combining all seasons. To determine the tidal effect on the hauling pattern at Drakes Estero and at

Double Point, we compared the mean number of seals on land at hourly intervals from one hour prior to four hours after low tide on those days when disturbance did not have a major effect on the seals.

Data collected by Allen (unpubl. data) from January 1976 to March 1982 were included in the analysis of seasonal and diurnal haul out patterns at Double Point. During this seven-year period, seals were censused on 247 days with over 410 hours of observation. Seasonal coverage of the area was regular for all years but 1979 and 1980. The majority of the censuses took place during the breeding season: 1976 (16 d), 1977 (44 d), 1978 (19 d), 1979 (9 d), 1980 (5 d), 1981 (13 d), and 1982 (32 d). Sufficient data for analysis of daily haul out patterns were available only for the breeding season since early morning censuses were rarely conducted during the months of November through February. Most censuses were confined to the hours 0700-1630 because the remoteness of the area required 3 h hiking time round trip, and most were conducted during low to medium tides when access by foot along the beach was possible. We estimated the increase in harbor seal usage at Double Point from 1976 to 1982 by dividing the seasonal means of 1982 by those of 1976, 1977, and 1978.

Harbor seals are well known for their avoidance of humans when hauled out on land, and thus, during censuses we monitored any disruption to their haul out pattern. Disturbance was defined as any activity, human or non-human, that caused at least two seals to stampede into the water. Sources for disturbance were classified as hiker, fisherman (including abalone diver and clam digger), boat (power, non-power), aircraft (plane, helicopter), dog, marine salvagers, natural, and unknown. Marine salvagers were a separate category because of a unique incident when a sailboat

washed ashore in the midst of the haul out area at Double Point.

During April and May, 17 additional censuses (three per week) were made to determine whether pup mortality was higher at a disturbed haul out site (Drakes Estero) than at an undisturbed one (Double Point). The expected relative levels of disturbance were reversed because of the wrecked sailboat at Double Point. The presence of the boat attracted much attention from the news media, the U. S. Coast Guard (which conducted rescue operations), and curiosity seekers. The boat remained on the beach from 11 to 21 April when marine salvagers and PRNS personnel removed it.

During these additional censuses, we collected information on the number of dead pups and on mother-pup separations. We estimated the mortality rate of pups before weaning based on the proportion of the number of dead to the number of live pups. Mother-pup separations were inferred from the presence of lone pups. Harbor seal females characteristically remain in close proximity to their offspring until pups are weaned from three to six weeks after birth. An unattended pup with an estimated age of from 1 to 10 d was considered a lone pup. Lone pups often vocalized and traveled through the herd attempting to nurse from seals of all age-classes. Thus they were easily recognized. We also identified pups which retained the lanugo pelage, normally shed in utero for this subspecies, because we suspected that disturbance might affect premature parturition. Since the reaction of females to disturbance also would have some bearing on pup survival, we compared the number of mother-pup pairs retreating to the water or remaining on land after disturbance versus the reaction of other seals, using a Chi-square test.

We examined human/seal fishery interactions in Tomales Bay by boat from

December through March when herring, Clupea harengus pallasii, spawn (Spratt 1981). Seals were counted on haul out sites and in the water where herring were spawning on nine separate days.

RESULTS

Seasonal and Spatial Use Patterns

Regional

Harbor seals were present year round at all sites censused within the Marine Sanctuary; however, the number of animals predictably fluctuated seasonally (Tables 1 & 2, Figure 2). A comparison of the seasonal means showed that more seals used haul out sites in the breeding ($\bar{x}$ = 1839.4) and the summer ($\bar{x}$ = 1191.5) seasons than during winter ($\bar{x}$ = 692.4). Maximum counts for the region occurred during the pupping season [May (2339) and June (2502)] with Tomales Point, Drakes Estero, and Double Point contributing most of the total number of pups (Tables 1 & 3).

Pups were first sighted during the first week of April and the seasonal peak was in May (566 and 564) with pups representing 24% of the total count (2339) (Figure 2). These two pup counts were remarkably similar, though made two weeks apart. Pups were easily distinguished in the field because their bright pelage contrasted with pre-molt immatures and adults, and because herds were loosely spaced out during this season.

A seasonal trend was not apparent, though, in the number of immature seals for either the breeding or the summer seasons; the presence of subadults at haul out sites averaged from 196.3 (SE = 24.8, range = 141-296, n = 7) to 203.7 (SE = 23.1, range = 128-282, n = 6). During the winter season their representation declined slightly to 155.7 (SE = 21.1, range = 83-257, n = 7). Monthly maximum counts of immatures were suggestive of trends only since not all locations were included in the analysis; nevertheless, they were surprisingly similar with 283 in March,

296 in April, 282 in August, 200 in September, 256 in October, and 257 in February. The numbers were slightly lower for May (177) and June (152) and for December (174) and January (149).

The representation of "red" seals at haul out sites varied considerably and did not prove a good indicator of seal movement between locations. Nonetheless, their presence at certain haul out sites suggested that seals were resident for prolonged periods. For example, at Bolinas Lagoon, one red seal was sighted during most censuses throughout the year except in May and during the molt. Similar examples were noted at Double Point where known individual animals have been followed since 1976. On three occasions in May and June 1982, a flipper-tagged and dye-marked harbor seal was sighted at Point Reyes Headland. The animal had been picked up in San Mateo and rehabilitated at the California Marine Mammal Center. It was subsequently released in January 1982 at the site of retrieval, 80 km south of Point Reyes Headland (M. Weber, pers. comm.). Sighting of the seal was the first confirmation that seals may travel from areas south of San Francisco Bay to Point Reyes.

A comparison of coastal (Tomales Point, Point Reyes Headland, Double Point, and Duxbury Reef) and estuarine (Tomales Bay, Drakes Bay, and Bolinas Lagoon) locations mirrored the seasonal pattern for the region. The degree of change in numbers, though, was significantly greater for coastal areas than for estuaries ($X^2 = 85.01$, $p<0.001$), indicating that more seals were migrating to coastal areas than to estuaries during the breeding season. The mean number of seals counted at coastal areas during the breeding season was 929.9 and was 721.3 for estuarine sites, but during the non-breeding season the means were nearly equal (Table 4, Figure 3).

The seasonal pattern of each haul out site reflected this coastal/estuarine model in most cases, as described below.

Bodega Bay

Bodega Rock is an offshore sea stack situated at the mouth of Bodega Bay. Seals hauled out only on tidal reefs on the east and southeast portions of the island. Our maximum count was 48 seals in February. Only three pups were seen in May (Table 1).

Tomales Bay

Harbor seals hauled out in Tomales Bay on the southeast side of Hog Island and on tidal mud flats extending from Toms Point to Sand Point. Both areas were used throughout the year, but most seals were counted on the tidal mud flats. The seasonal pattern for this area, though similar to the estuarine model, was more difficult to interpret due to frequent disturbances. Seals were disturbed during 16 of the 26 censuses. Nevertheless, seasonal means showed that numbers remained relatively stable during the breeding and summer seasons, and declined in winter months (Tables 1 & 2). A maximum of 58 pups was counted in May. Censuses conducted in 1981 showed a spring peak and a winter decline; however, numbers were also substantially reduced during summer months (Table 5).

Tomales Point

Seals hauled out on a diversity of substrates at Tomales Point. North and South Rocks are examples of rocky intertidal substrates. Rope Beach and South Beach are sandy pocket beaches, and Bird Rock is comprised of

both rocky and sandy features. The largest concentration of animals hauled out on Bird Rock, North Rocks, and South Beach throughout the year. The geographic diversity of this point as well as its juxtaposition to Tomales Bay may explain the significance of the area to seals; it was a major site used by seals during the breeding season with counts ranging from 151 to 563 including 135 pups (Tables 1 & 2). The number of seals declined in summer to an average of 242.1, and dramatically so in winter months. A similar trend was observed during censuses in 1981, but the largest count (647) was made in early July rather than in June (Table 5).

Point Reyes Headland

Point Reyes Headland is another coastal location characterized by offshore rocks and pocket beaches. The largest gathering of seals occurred around the promontory at Split Rock Cove with some seals scattered along offshore rocks at Sea Lion Cove. This was a minor haul out area compared to nearby Tomales Point and Drakes Estero; however, the seasonal pattern resembled the coastal model with a peak during the breeding season ($\bar{x}$ = 104.5) including 19 pups, and a sharp reduction in summer ($\bar{x}$ = 71.7) and again in winter ($\bar{x}$ = 49.1) (Tables 1 & 2). Point Reyes Headland was not censused in 1981. This is the only location within the Sanctuary where other pinniped species haul out on the mainland. Harbor seals did not intermingle with sea lions at Sea Lion Overlook but preferred offshore rocks. Harbor seals did share pocket beaches with a few northern elephant seals at Split Rock Cove.

Drakes Estero

Drakes Estero is an example of an estuarine environment where seals hauled out on tidal mud flats exposed at low, medium, and medium high tides. Numerous sand bars extending far up into the estero were used, but the preferred site was a bar near the estero mouth. Seals were also noted hauled out in large numbers at the tip of Limantour Spit but only during the breeding season (14 of 30 censuses). Surprisingly, seals were absent from Limantour Spit during summer and winter months.

Drakes Estero was a major haul out area year round for harbor seals in the Sanctuary. Maximum numbers during the breeding season ranged from 116 to 726 including 150 pups (Tables 1 & 2). In contrast to coastal populations, the summer decline was more gradual, and numbers during winter were still much higher than those at Double Point and Tomales Point, the other two major rookeries. The same trend was seen in 1981, but the extremes were more pronounced (Table 5).

Double Point

Double Point is a coastal habitat named for its concave, steep, cliff-backed beach enclosed by two jagged promontories, and encompasses a variety of substrates preferred by seals to haul out on. The seals frequented a number of sites within the Double Point area: South Point (a rocky outcrop with tidal reefs); tide pools (exposed at low to medium low tides); south Bolsa Beach (a sandy pocket beach); north Bolsa Beach (an extension of the south beach but separated by the outfall from Pelican Lake); Stormy Stack (an offshore sea stack); and offshore rocks in the bay just south of South Point.

The degree to which each subsite was frequented varied seasonally.

Seals were found at all subsites during the breeding season, though south Bolsa Beach was the area of highest concentration. The tide pools and north Bolsa Beach were used only during this season and almost exclusively by mother-pup pairs. During summer, south Bolsa Beach, South Point, and Stormy Stack were the preferred haul out sites, but seals also were noted on offshore rocks south of South Point. During winter months, the level of use was nearly equal at South Point and south Bolsa Beach.

Studies at Double Point since 1976 (Allen, unpubl. data) reveal a distinct seasonal variability in the number of seals which parallels the seasonal change in subsite preference. Maximum counts for each year consistently occurred during the breeding season from April to the onset of July. Greatly reduced numbers were observed during winter months from October through January. The months August/September and February/March were transition periods when numbers were declining or increasing, respectively (Table 6, Figures 4 & 5). The seasonal means in 1982 were 517.5 for breeding, 246.5 for summer, and 142.9 for winter (Table 2). Pups represented 31% (263/851) of all seals counted in May 1982 at Double Point and 47% (263/566) of all pups censused in the Sanctuary (Tables 1 & 3).

Each year, pups were initially sighted in late March or early April and the maximum pup count consistently occurred in the first two weeks of May. The May peak coincided with the annual peak for all age-classes combined, but surprisingly more adult seals hauled out in July ($\bar{x}$ = 308.4) than in May ($\bar{x}$ = 265.5) (Table 6, Figure 5), which coincides with the mating season and the onset of molt. Females come into estrus after pups are weaned, and mating is purported to extend into August (Bigg 1969). Seals at Double Point molted from July to September.

The mean number of immature seals present at Double Point was largest in February, March, and July and declined during August and the winter months. During the breeding season the numbers declined only slightly, but the proportion of subadults to all seals counted then was much lower than in summer or winter (Table 5).

Based on monthly maximum counts since 1976, the number of seals appeared to increase gradually during the breeding season except in 1979 and 1980. The slight decline during those two years was probably attributable to the small sample size and to frequent disturbances that seals experienced during those censuses; seals were disturbed on five of nine days and three of five days, respectively.

A comparison of the mean number of seals counted during the 1976 breeding season ($\bar{x}$ = 195.2, with 85 pups) with that of 1982 ($\bar{x}$ = 517.5, with 236 pups) revealed almost a three-fold increase in the presence of all seals (2.7) and of pups (3.1) over the seven-year period (Table 7). In 1977 there was a two-fold increase for all seals (1.7) but less so for pups (1.5). The average for 1978 was similar to that of 1977. The maximum number of pups counted each year was 85 (1976), 175 (1977), 177 (1978), 142 (1979), 159 (1980), 229 (1981), and 263 (1982). The annual increase was also complemented by changes in spatial haul out patterns. For example, more seals hauled out at north Bolsa Beach in 1982 (205) than in 1977 (8) or in 1976 (2).

The average numbers of seals hauled out in summer in 1976, 1977, and 1978, however, were similar to those in 1982 (Table 7). The winter seasonal means for 1976 and 1977 also were not substantially different from those of 1982.

Duxbury Reef

Duxbury Reef is a coastal intertidal reef jutting out from Bolinas Point. Though a seasonal pattern was exhibited, numbers varied greatly within each season, and maximum counts were made in September (164) and January (148) rather than during the pupping season (Tables 1 & 2). This wide variation was in part due to disturbance. Seals were disturbed on six of the 28 census days. Duxbury Reef was probably not a pupping ground because the number of pups counted was minimal (5), and pups were noted in June, a weaning period at all other sites within the Sanctuary.

Bolinas Lagoon

Bolinas Lagoon, like Drakes Estero, is an estuarine habitat where seals hauled out on tidal mud flats bordering two islands, Kent Island (KI) and Pickleweed Island (PWI). In a previous study (Allen et al. 1980), KI was the preferred haul out site for all seasons. In 1982, however, PWI was used almost exclusively during winter months; seals were counted at KI on only one of eight winter censuses. Seasonal variation in 1982 followed the pattern of prior years, and in contrast to all other locations within the Sanctuary, the annual peak occurred in summer rather than during the breeding season (Tables 1 & 2). As at all other locations, numbers declined in winter. Bolinas Lagoon was not a major pupping ground, with only 17 pups counted in 1982.

The average numbers of seals censused at Bolinas Lagoon in 1978-79 during the breeding and summer seasons were 38.3 (SE = 2.8, range = 8-101, n = 46) and 59.4 (SE = 5.4, range = 5-105, n = 29), respectively (Allen,

unpubl. data). The maximum number of pups counted in 1979 was 12. When one compares breeding and summer means for 1978 and 1982, the increase in usage over this five-year period is nearly two-fold for the breeding season (1.9) but not very different for the summer season (1.4). The increase in the presence of pups was insubstantial.

Daily Usage

Harbor seals were sighted year round at all locations monitored. On only four occasions were seals not hauled out (three at Duxbury and one at Tomales Bay), though they were seen in the vicinity. On each of these occasions, seals were disturbed prior to our census and failed to rehaul during the census interval.

Seals at Drakes Estero hauled out more frequently at 1300 h ($\bar{x}$ = 324.0, SD = 171.2, n = 13) than in the morning at 0800 h ($\bar{x}$ = 127.3, SD = 165.6, n = 11) or in the late afternoon at 1700 h ($\bar{x}$ = 143.5, SD = 158.0, n = 13) (Figure 6). Only when sand bars were reduced in size at medium to medium-high tides were seals diverted from this pattern, and even when areas were awash, seals would congregate above submerged bars. The mean number of seals hauled out at -1 hour prior to low tide ($\bar{x}$ = 414.0) was not much different from that at +3 hour after low tide ($\bar{x}$ = 457.8), but at +4 hour the numbers began to decline ($\bar{x}$ = 393.8) (Table 8). Disturbances occurred on six of the 13 all-day censuses, but disturbances were short in duration, and seals quickly rehauled.

At Double Point we had sufficient data on the hourly presence of seals only for the breeding season from 0700 to 1600 h. The pattern revealed

there was quite different from that at Drakes Estero, with more seals present on land in the late afternoon at 1600 h ($\bar{x}$ = 683.4) than at 1300 h ($\bar{x}$ = 475.8) (Table 9). Tide, too, seemed to influence the seals' hauling out pattern. When combining all subsites, the mean number of seals hauled out at +3 hour ($\bar{x}$ = 465.7) was higher than at -1 hour prior to low tide ($\bar{x}$ = 374.8): at +4 hour the numbers were higher still ($\bar{x}$ = 567.1) (Table 8). Conversely at the subsite South Point, where rising tides had a more direct effect on haul out space, more seals were hauled out at low tide ($\bar{x}$ = 37.4) than at +3 hour ($\bar{x}$ = 27.6) or at +4 hour ($\bar{x}$ = 21.0) after low tide. As the tide rose, seals shifted from offshore rocks, tide pools, and tidal ledges at South Point to south Bolsa Beach which provided ample space at medium to medium-high tides.

Disturbance

Seals at all haul out sites within the study area experienced some degree of disturbance from human or non-human sources. The activities of fishermen (all categories) caused the greatest disturbance to seals, representing 32% of the 79 disturbances observed (Table 10). Seals on sand bars in Tomales Bay received the highest level of disturbance (46%), the major source being the activities of people digging for clams. More than 100 people on a single day were ferried by boat from Lawson's Landing on the eastern shore of Tomales Bay to these sand bars to dig for clams. Clam diggers also frightened seals at Drakes Estero, as did people canoeing and hiking.

Sources for disturbance at Double Point were almost entirely related to

the presence of the wrecked boat. The majority of these disturbances were from Coast Guard helicopters (6), and personnel involved in the salvage operation (4). Though a dog was observed flushing seals only once, dogs commonly accompanied clam diggers at Tomales Bay and fishermen at Duxbury Reef when seals were disturbed.

Natural sources for disturbance included large birds such as Turkey Vultures, Cathartes aura, and Brown Pelicans, Pelecanus occidentalis, alighting near seals at Drakes Estero; a black-tailed deer, Odocoileus hemoinus, swimming by the Point Reyes Headland herd; and a sudden land slide in the vicinity of the Double Point herd. Thirteen percent of the disturbances were of unknown origin.

During April and May when additional censuses were made, seals were disturbed on six days at Drakes Estero and on nine days at Double Point. At Drakes Estero, these disturbance days occurred throughout the season; disturbances usually resulted from a single event and were short in duration. In contrast, seven disturbance days at Double Point took place during an eight-day period in April. Multiple disturbances occurred on a single day, and marine salvagers remained on the beach for three entire days and one night. The salvagers were 350 m from the south Bolsa Beach herd and 250 m from the north Bolsa Beach herd. Seals were constantly aware of their activities, though salvagers made every attempt to minimize their impact. During eight days prior to the salvage operation, U. S. Coast Guard, U. S. Army, and news media helicopters flew daily over Double Point below 300'. At least twice, helicopters landed on south Bolsa Beach.

The degree to which these disturbances caused mother-pup separations, disrupted nursing periods, and ultimately contributed to pup mortality, could

be inferred from the incidental information that was collected during observations.

Of the 150 pups counted at Drakes Estero, none were found dead and only one lone and one lanugo pup were noted in April. The lone pup was just born when the herd of seals, including the mother, was flushed into the water by a canoer. The pair was permanently reunited 1 h 45 min after separation.

In contrast, 34 dead pups were counted at Double Point (14 in April, 19 in May and 1 in June), representing 13% of all pups (263) counted in 1982. Two of the dead pups displayed lanugo pelage. The majority of dead pups (20) was seen from 29 April to 14 May which coincided with the peak of the pupping season. When the wrecked sailboat was present, seven dead pups were counted. Most pups likely died from starvation, since many were small and very thin.

Most lone pups were counted on 21 April (11), 23 April (11), 29 April (10), 30 April (12) and 2 May (10). Only two lone pups were seen reunited with females. Pups with lanugo pelage were primarily seen in April (32) with only seven seen in May. Our estimate for pups born with lanugo in 1982 was 15%.

On 21 April when salvagers were most active, the number of seals on land was never stable except at South Point, the area most distant from the operation. Seals stampeded <u>en masse</u> six separate times during the 3.5 h observation period, and individual animals, particularly females with pups, were continually retreating to the water. The highest number of seals resting on land on this day was 248, including 31 mother-pup pairs. On 22 April, the day after the salvagers had left, a total of 605 seals,

including 133 mother-pup pairs, were hauled out. The percentage increase in mother-pup pairs hauled out was nearly quadruple. Females with pups were significantly more reactive to disturbances than were other seals. When combining data from eight separate instances, 74 females with pups retreated to the water and 47 pairs remained on shore, whereas only 135 adults/immatures entered the water and 321 remained on shore ($X^2 = 39.85$, $p<0.001$).

Fishery/Seal Interactions

The presence of harbor seals hauled out in Tomales Bay when the herring were spawning fluctuated widely from 0 to 271 (Table 1); however, the numbers were no greater then than during other months (see section on Tomales Bay). Seals were more difficult to census when in the water because they did not travel in compact groups, and instead surfaced randomly and usually alone. Our rough estimates for seals noted in the vicinity of boats involved in commercial herring operations and for seals feeding near spawning fish ranged from four to 50 on nine separate census days. At this time a small group of seals was seen hauled out far up the bay near Papermill Creek, an area hitherto unused.

DISCUSSION

Point Reyes accommodates a significant harbor seal breeding population. Our maximum figure recorded in late June was 2502 and was substantially higher than that collected during most recent surveys (Mate 1977, BLM 1980), but similar to that observed in early July 1981 by Dohl (1982). Dohl, however, reported much lower numbers in May 1981 compared to NPS simultaneous censuses in 1981 and to this survey, particularly for specific locations such as Double Point where only 243 seals including 30 pups were noted. Preliminary data collected in the most recent CDFG aerial survey in 1982 were similar to that presented here (D. Miller, Department of Fish and Game, Menlo Park, CA, pers. comm.).

For some locations within the study area, the CDFG aerial survey figures proved more accurate than ground surveys because of distance from shore and angle of view. Our information on harbor seals at Bodega Rock, for example, was unreliable because seals primarily hauled out on the back side of the island, out of view. Miller recorded 115 seals in May of 1982. The most seen there by us was 48.

All aerial survey estimates failed to equal the number of seals recorded in ground surveys at Double Point and Drakes Estero during the breeding season. Our figures indicated that Double Point was the largest harbor seal pupping ground in the state. Combined with seals recorded at Drakes Estero, Tomales Point, and Tomales Bay, the Point Reyes population of harbor seals represented a significant proportion (14%) of the state population which Miller estimated to be 19,000 in 1982 (Miller, pers. comm.). Miller's estimates for the number of pups in Marin County,

however, were unduly low (224) compared to our counts (566 and 564) because the CDFG survey was in April rather than May.

These figures are not absolute, though, and indicate only trends because we do not know what percentage of the total population is hauled out in a given area even under optimal conditions. Sullivan (1979) estimated that harbor seals spent 50% of daylight hours in the water, and Pitcher's data revealed that radio-tagged seals hauled out 50% of the days during June. Consequently, the harbor seal population in Point Reyes may be substantially higher than our estimates.

Though little information was available for determining whether the reproductive population has been increasing in the Point Reyes area, data collected at Double Point and from Bolinas Lagoon suggest that on a local level there has been an expansion in usage during the breeding season. There is no indication, however, that the size of the resident population at Double Point has changed, because summer and winter means were similar. The increase is explainable, therefore, by the emigration of animals to the area. Because the population of subadults remained relatively stable year round, breeding animals likely represent a major part of the influx. Each year, distinctively marked and scarred adult animals arrived at Double Point, and if present in previous years, would easily have been identified. A rapid increase in the number of harbor seals has also occurred on S. E. Farallon Island during the past decade, also attributable to emigration because only two pups have been observed there in any given season since 1971 (PRBO, unpubl. data).

The seasonal fluctuation in numbers throughout the area was expected. Unexpected, however, was the degree of seasonal change in coastal versus

estuarine aggregations. Coastal populations appeared to receive a significant influx of transient animals in the breeding season, whereas estuarine populations experienced a lesser influx. There was no evidence that estuarine animals shifted to coastal areas to breed, nor that coastal animals moved into estuaries such as Tomales Bay to feed on herring since the number of seals counted there in winter was no greater than during breeding and summer seasons.

Studies by Everitt and Jefferies (1979) in Washington State showed that seasonal movement occurred between Grays Harbor/Willapa Bay and the Columbia River with the former the preferred breeding ground and the latter a wintering area. Movement from bays to coastal locations was not indicated in their study. The same pattern could exist for the Point Reyes region with exchange occurring between Tomales Bay, Drakes Bay, and Bolinas Lagoon. Certainly the post-pupping increase of animals at Bolinas lasting until late October suggests that seals were migrating there for reasons other than pupping. However, the degree of decline in numbers at both Tomales and Drakes Bays during the winter months did not equal the elevation at Bolinas. More likely, seals were traveling to areas outside the Sanctuary. A comparison of aerial surveys conducted by BLM (1980) in May and January denoted a northward movement of seals from this region to Sonoma and Mendocino Counties in winter. In January, seals were using more locations and forming smaller groups; in May, seal haul out sites were reduced 10% and population size increased 25%. The number of haul out sites in Point Reyes did not increase during winter months, further suggesting that seals were migrating to other areas.

Pitcher's (1979) study of radio-tagged harbor seals in Alaska revealed

substantial variation in distances that individuals moved. Some seals moved long distances (194 km) to one or two other locations from the site of capture, and some were year round residents. Year round site fidelity of known seals over a seven-year period has also been documented at Double Point, as has seasonal emigration of known females, demonstrating that seals here may also display breeding site fidelity (Allen, unpubl. data). Information gathered from radio-tagging revealed too that seals spent more time hauled out in June (50%) and less in September (41%) (Pitcher 1979). Winter numbers likely are reduced at Point Reyes both by dispersal and by alterations in daily hauling patterns.

From our analysis, time of day, tide, and substrate type were the determining factors in the diurnal haul out pattern of seals. The influence of each factor, alone and in combination, differed tremendously as is indicated by the variety of patterns documented in other studies (Ainley et al. 1977, Allen et al. 1980, Boulva and McLaren 1979, Calambokidis et al. 1978, Fancher 1979, Pitcher 1979, and Sullivan 1979).

Sullivan (1979) determined that seals hauling out on rocky intertidal areas in northern California were influenced only by tides and did not follow a diurnal pattern. Conversely, on Sable Island along the eastern seaboard of Canada, seals hauled out on sandy beaches independently of tides and daylight hours, but were not present at night (Boulva and McLaren 1979). Calambokidis (1978) found that seals preferred various sites depending upon access at different tide levels.

At Drakes Estero, an estuarine site, more seals were hauled out at mid-day, and tide became a limiting factor primarily when sand bars were inundated. A similar pattern was demonstrated at Bolinas Lagoon in spring

and summer but not in winter (Allen et al. ms.). During the breeding season at Double Point, the number of seals increased progressively throughout the day so that even at medium tides more seals were present. At South Point, a rocky intertidal subsite, seals decreased in number after low tide because of limited hauling out space, and would then shift to the beach. In Point Reyes, therefore, seals seem to haul out within an optimum range from mid-day to late afternoon at low to medium tides. The physical features of each location, though, must be assessed when evalutating daily trends in seal behavior.

Disturbance to seals must also enter into the analysis when distinguishing daily haul out patterns. At heavily disturbed areas such as Strawberry Spit in San Francisco Bay, seals have adapted by hauling out at night (Paulbitski 1975). In this study, seals do not appear to experience levels of disturbance which would preclude their daytime presence. Though seals were often flushed from sand bars in Tomales Bay and Drakes Estero, these were primarily incidental occurrences, subject to seasonal human activites. Alternate haul out sites in the vicinity allowed for some flexibility in seal haul out opportunities, and were believed important to seal adaptability in Bolinas Lagoon (Allen et al. 1980). Certain locations in the Sanctuary, however, lack suitable alternate sites, and consequently, are more vulnerable to disturbances. This is the case primarily for coastal locations where haul out space is limited, as was evidenced at Double Point in 1982 where seals were unable to accommodate to prolonged disturbances. Adequate alternate sites were unavailable, and instead, seals spent more time in the water.

Disturbance was also an important consideration in reproductive

success. The deleterious effects of human-related disturbance on pup survival have been addressed in studies by others (Boulva and McLaren 1979, Kenyon 1972, Johnson 1977). Though no areas in this survey suffered undue pup mortality, deaths were higher at Double Point in 1982 than in 1977 when the percentage was estimated to be 7.4% (Allen 1980). In the 1977 breeding season, seals were flushed into the water on 13 separate days, but in contrast to 1982, disturbances were short in duration. Our 1982 estimate is probably low because carcasses removed by wave scouring and those pups predated upon by sharks would be missed. The 1982 mortality rate was similar to that recorded by Boulva (1979). His research, though, involved manipulation of pups which caused separations and ultimately death in some cases, and therefore, his figures are not representative of an undisturbed population.

Pup mortality at Double Point was probably exacerbated by greater levels of disturbance occurring early in the season. Interruption of nursing periods would tend to weaken young pups, and pup separations/ desertions were likely related to disturbance since females with pups were highly reactive to disturbances. Johnson (1977) reported that the major cause of pup deaths at Tugidak Island, Alaska, was starvation due to disturbance induced separations/desertions of young pups. Some premature births could have been precipitated by disturbance since the percentage of pups with lanugo in 1982 was double that in 1977 (6.3%) (Allen unpubl. data).

The absence of dead pups at Drakes Estero was probabluy due to a combination of strong tidal flushing near the mouth of the estero and haul out sites being completely awash during high tides so that carcass

deposition would be in areas other than the haul out site.

Fishery/seal interaction in Tomales Bay during the herring season was minimal in this study since the numbers of seals censused near fishing vessels were few. Miller (1981) also found little interaction between harbor seals and herring operations in Tomales Bay in 1980, and in fact, fishermen followed the activities of pinnipeds in order to locate concentrations of herring.

Though not included in the scope of this study, pinnipeds did interact with commercial gill net fishing operations from late May to mid-July. Gill nets were constructed of 4" monofilament line and extended up to 2 mi in length. We gathered information from various agencies and organizations involved in collecting beach-cast marine mammals in order to determine whether these fishing operations were incidentally killing marine mammals. The number of dead animals (40) that washed ashore in the area was much higher than expected, with 18 harbor porpoises, 19 harbor seals, and three sea lions. All but three of the 19 harbor seal specimens were of weaner or yearling size (4'). Size may be an important consideration since smaller marine mammals are believed to be susceptible to entanglement and drowning in nets, whereas large animals are able to break away. A few of these specimens were actually entangled in netting when they washed ashore. The incidental take of harbor seals in Alaska, Washington, and Oregon is associated primarily with gill net fishery interactions in which seals are either entangled in nets or shot by fishermen (NMFS 1980).

SUMMARY

Preliminary recommendations are presented here based on results from the first year survey. From these we can modify censusing techniques for the second survey year. Our initial results indicate that diurnal and tidal effects on the hauling out behavior of seals vary within an optimum range from mid-day to late afternoon at low to medium tides. The physical attributes of each location seem to determine when is best to census within this optimum range. Thus more attention will be given to the interplay of these factors when conducting simultaneous censuses.

The breeding population represents a sizable proportion of the state population, and a tremendous number of seals appear to migrate to the Sanctuary to breed from unknown areas. Radio-tagging and tracking of seals could provide valuable information on where these transient breeding animals disperse in summer and winter months. Only with this information can one determine whether resource plans in areas outside of the Sanctuary are in conflict with Sanctuary management plans.

The qualities that attract seals to Point Reyes to breed in large aggregations at Double Point, Drakes Estero and Tomales Point are numerous including suitable habitat and food availability. Likely another important reason is lack of human intrusion since none of these areas have been developed nor are they readily accessible. Consequently, reasons for preserving and protecting existing haul out locations are enhanced. First, however, we must identify present levels of disturbance. From the second survey year we will collect specific data on whether disturbance is severely impacting seals. At the completion of the second survey year, we

will be able to forward recommendations on long term monitoring techniques and on management considerations.

INTRODUCTION

In the past, information on the status of California (Zalophus californianus) and northern (Steller) sea lions (Eumetopias jubata) at Point Reyes has been sketchy. Mention of the historical presence of sea lions in the area is made by Scammon (1874). California Fish and Game censused breeding sea lions along the California coast between 1930 and 1970 (Bonnot, 1937; Bonnot et al., 1938; Bureau of Marine Fisheries, 1947; Bonnot and Ripley, 1948; Ripley et al. 1962; Carlisle and Alpin, 1966, 1971; Frey and Alpin, 1970); but it was not until 1974-75 (Mate, 1977) that aerial surveys to look at seasonal fluctuations in the sea lion population began. Aerial surveys of northern and central California continued in 1980 and 1981 (BLM 1981; Dohl 1982). These and other censuses (Chan, 1979) are summarized in Table 11.

The first year (March 1982 - February 1983) of the sea lion assessment program was set up to initiate close scrutiny of seasonal, diurnal and tidal fluctuations in numbers and age classes of sea lions in the coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary. We also wanted to determine whether Point Reyes is a breeding rookery or just a haul out area, to establish what interchange occurs between the Point Reyes and the Farallon Island sea lion populations, and to determine how the herring (Clupea harengus) run in Tomales Bay affects sea lion numbers along the coast.

METHODS

We censused California and northern sea lions at the Point Reyes Headlands (Figure 1) twice a month throughout the year (March 1982 - February 1983). During the breeding season we censused once a week checking for evidence of pupping. One census each month lasted from 0700 to 1800 h to assess sea lion haul out patterns, discover when maximum numbers haul out and determine how seasonal, diurnal and tidal changes affect each species. Some censuses were incomplete because weather (fog, high winds or heat waves) impeded the count. California sea lions were censused once a month at Bodega Rock. During the herring run (December to March) there were nine censuses of Zalophus in Tomales Bay by boat.

All counts of the Point Reyes Headlands were made from Sea Lion Overlook with a 25X spotting scope. In August a hidden cove containing up to 100 animals was found south of the main haul out; from then on it was censused regularly from the antenna north of Sea Lion Overlook. Descriptions of animals with distinctive scars or marks were recorded whenever seen. Weather and tidal conditions were also noted.

Whenever possible, both sea lion species were separated into five age-classes: adult male, subadult male, female-size, immature, and pup. These censuses were compared with weekly sea lion censuses on the Farallones during the same time period. Because of the difficulty in separating age classes when counting thousands of animals, California sea lions on the Farallones were divided into four age classes: male, female-size, immature, and pup.

herring nets.

Northern (Steller) Sea Lion

Unlike the California sea lions at Point Reyes whose numbers peak during migration, northern sea lions reach peak numbers during the breeding season from May to August (Fig. 13). This is similar to the pattern on the Farallones (Fig. 14). The high count at the Headlands was 19 animals on 27 August (Table 13) and 192 animals on 24 June at the Farallones.

Female and immature northerns were present year around at Sea Lion Overlook. We counted up to six adult males between May and August. Subadult males were present primarily from April to August with a few sightings in late winter. No pups were observed during the breeding season. Three animals with distincitive marks or scars were recognized at both Point Reyes and the Farallones: a female in January and two subadult males during the breeding season.

During 12 all-day watches the numbers of northern sea lions varied irregularly, depending on the initially chosen haul out sites. If they hauled out on low, off-shore rocks, numbers decreased as swells and tide rose to cover the rocks. If, however, the northerns were hauled out on high rocks, numbers remained high after 1000 h regardless of tide or swell. On calm, hot days animals went into the water as the air temperature increased.

In general, numbers were lowest before 1000 h, then increased and remained high throughout the rest of the day depending on temperature, swells, and haul out area.

Adult and subadult males were seen in the water more frequently than females and immatures. On three days in May a bull was seen feeding on unidentified fish near Double Point.

DISCUSSION

Both California and northern sea lions are at the edge of their breeding ranges in the Farallon/Point Reyes National Marine Sanctuary. California sea lions breed primarily south of Point Conception with major rookeries at the Channel Islands, California and the islands off Baja, Mexico; major breeding areas of northern sea lions are on the Aleutian and Pribilof Islands in Alaska (Scheffer, 1958). Both species have small breeding colonies on the Farallon Islands: 12 northern pups and 2 Zalophus pups were born in 1982. No cows of either species pupped on the mainland in 1982.

The population of California sea lions has increased throughout its range in the last 50 years; for the last several years the increase has been about 5% each year in California. In the past, only adult and subadult males migrated north, while the adult females and juveniles remained near the southern rookeries (Bartholomew, 1967). A change in migration pattern was first noted at the Farallones in 1978 when large numbers of immature sea lions hauled out in the fall. Since then the population at the Farallones has tripled. Ainley et al. (1981) propose that the increase in numbers and in the proportion of immatures at the Farallones is due primarily to the abundance of Pacific whiting Merluccius productus) near the islands. The availability of whiting to sea lions increased dramatically when the foreign whiting fishery, which was competing directly with sea lions, was eliminated by the imposition of the 200 mile fishing limit in 1977. Unfortunately we do not have comparative censuses for the mainland sea lion population.

In general, fluctuations in the number of California sea lions are similar at the Farallones and the Headlands (Figures 7, 9) but there is a sharp peak in numbers at the Headlands in December - January which does not occur at the Farallones. This may be a result of animals concentrating in the area to take advantage of seasonally abundant herring spawning in Tomales Bay.

The age-class distribution between the Farallones and the mainland is quite different. When looking at the age-classes at the Farallones (Figure 12), it is apparent that the adult and subadult males are essentially gone during June and July, begin to return in August, and migrate through in several waves during the fall. These waves decrease by winter as the males head further north and then increase again in April and May as the males return south to the breeding grounds (Mate, 1977). For immatures the pattern is different: numbers increase from August to December. The majority of these animals are young of the year dispersing from pupping areas in Baja and the Channel Islands. Numbers are low during winter and spring.

At Point Reyes the picture is a little more confusing. The adult males follow a similar pattern to the Farallones but immatures peak in number in July rather than in August as they do at the Farallones. This may indicate that dispersing juveniles haul out at the coastal site before moving to the Farallones. The number and percent of female-size animals (primarily 3-5 year old males) is lower throughout the year on the mainland. Conversely, there is a significantly higher number of adult and subadult males at the coast than off-shore ($p<.01$). Although statistically significant, this

difference may not have biological significance. For most of the year the Point Reyes population is less than a tenth the size of the Farallon population and the apparent difference in haul out patterns may merely be due to movements of animals the 18 miles between the two points. It is also possible that it is a real difference and that juveniles concentrate where food is more abundant and consequently easier to catch.

Tomales Bay and San Francisco Bay are the major spawning areas for herring in California. From December to March, herring migrate in large numbers to Tomales Bay where they lay eggs in the eel grass beds. After spawning they return to the open ocean (Spratt 1981). Censuses of sea lions in Tomales Bay during the 1982-83 spawning season were difficult because of severe winter storms. Maximum counts were 33 sea lions on 10 December. Only one sea lion was observed taking fish fron a net, although all the sea lions concentrated at the mouth of the bay near the herring fishing fleet. Only California sea lions were observed. Twenty percent of these were adult males.

In central and southern California waters, the range of California and northern sea lions overlap. While California sea lions have increased, northern sea lions have suffered a concomitant decline in the last half century. Speculation on the causes of this shift include a warming trend in water temperature, a change in food resources, and diseases causing reproductive failure. The northern population at the Headlands is now small (maximum count 19) compared to previous years. Although Chan (1979) recorded observations of pups in June 1975, we did not see evidence of pupping during weekly censuses in May and June. It appears the Headlands

populations since it has changed their environment so drastically. But exactly what these changes are and how they might affect the population in the long term we can only begin to guess at. Continued censuses to compare the interrelationship and differences of the Farallon and Point Reyes populations will improve our chances of understanding population fluctuations of the sea lion populations within the Sanctuary.

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Table 1. Harbor seal, Phoca vitulina richardsii, counts for all sites within the Point Reyes/Farallon Islands Marine Sanctuary. Census days during which disturbances occurred that affected numbers are noted with an asterisk (*); numbers following a slash (/) indicate pups.

	LOCATION											
Date	Bodega	Tomales Bay	Hog Is.	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Liman. Estero	Double Point	Duxbury Reef	Bolinas	Total Pups	Totals
1982													
3 March		246	39	104	47*	78*	193*	0	337	105	65		1214
7 March							116*	0					
19 March		275*	0	102	167	122	489*	0	356	102	63		1676
22 March	36												
7 April						12			428/25*				
8 April									228/53*				
13 April		155/2*	48/1	104/7	121/1	70/1*	336/3	65	274/57*	81	46	68	1254
14 April									346/67*				
15 April						100	455/9	0	279/66*				
17 April									300/60				
18 April							241/17	0					
20 April		242/22*	0	97/14	176/5	44/1	543/36*	0	465/136*	92	24	214	1683
21 April									391/110*				
22 April						70*	479/43	0	639/159				
23 April						70			694/168				
25 April							232/77	0					
27 April						32	338/47	12	375/158		0		
29 April	1*						447/101*	0	720/238		30		
30 April							533/95*	0	749/262*				
1 May						77/7	324/77	78/6					
2 May									722/225				
4 May		147/46	45/12	266/52	297/83	63/5	445/88	96	851/263	19*	77/17	566	2306
5 May									783/251				
6 May						12							
8 May						182/19	260/50	0					

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Table 1 cont.

11 May						70/18	591/127	0	454/166			
13 May						47/9	507/148*	54/10	609/228			
14 May									481/191	81	54/11	
15 May							447/111	75				
16 May						24						
17 May									565/186			
18 May	26/3	151/37	48/9	265/58	269/74	93/11	537/150	94/20	676/205	94	86/17	564	2339
19 May									685/204			
20 May						20	439/63	54/5				
22 May							348/95	0				
25 May							291/40*	0	270/78	32/1*	51/11	
27 May									433/90		62/12	
28 May							559/29*	0				
31 May									626/83*			
1 June		91/15	58/8	283/28	250/26	139/18	224/30	292	566/90	86/3	85/4	221	2074
2 June						113/17	162/21*	312/29	679/80				
3 June						131/17	271/33	145/20					
15 June	31	150	50	211/27	196/16	112/13	57/2	426	577/31	109/5	90/4	98	2009
28 June		185	0*	318/9	243/7	232/15	620/38	106	621/28	39	138	97	2502
12 July		54*	48	235/18	205/14*	149	310*	fog	469/29	0	126/9	41	1596
23 July		219/2	0*	276	178	fog	447/32	0	373/9	1	107	43	1601
27 July							545/48*	0					
29 July	32												
6 Aug		119	0	111	79	87/13	190/6	0	185*	15*	30	19	816
22 Aug							349*	0					
23 Aug		281*	0	136	58	fog	371	0	175	101	77*	0	1199
30 Aug					100								
31 Aug							175	0					
6 Sep		206*	Fog	62	81	51	402	0	141*	164	67*		1174
21 Sep		192	0*	36	101	13*	469*	0	288	141	98		1338
23 Sep	6												
30 Sep							413*	0					
2-4 Oct		168	0	55	116	65	146	0	270*	3	89		912
15-16 Oct		246	0	49 *	165	65	156	0	69	74	72*		896
26 Oct		105	20	100									
30 Oct	26												
31 Oct							365*	0					

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Table 1 cont.

1 Nov		144	0	42	86	22	93	0	49	0*	65*	501
23 Nov				200	135							
29-1 Nov										6*	34*	
29 Nov												
8 Dec	21											
10 Dec		49	0	52	149	8	322	0	47	4	54	685
11 Dec							351*	0				
28 Dec		0*	0	69	72	12	215*	0	31*	1*	29*	429
1983												
7 Jan		60										
10 Jan		76*	38	72	82	75*	130*	0	253	148	62	936
12 Jan							235	0				
19 Jan		45										
22 Jan						60						
24 Jan		150				50						
25 Jan		34*	0*	45	35	38	341	0	84	2	61*	640
9 Feb		0*	31	75	165	10	208	0	290	121	83	983
22 Feb		230*	41	109	129	155	386	0	359	89	61	1559
24 Feb	48						421	0				
4 Mar							326*	157				
9 Mar		146	54	123	123	92	363	0	273	99	64	1337
31 Mar	47											

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Table 2. The average number of harbor seals hauled out by season during simultaneous censuses in the Point Reyes/Farallon Islands Marine Sanctuary in 1982 - 83; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size. Tomales Bay includes Hog Island, Tomales Point includes Bird Rock, and Drakes Estero includes Limantour Spit.

	LOCATION							
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon	All Sites
Breeding								
$\bar{x}$	213.0	376.2	104.5	436.7	517.5	82.6	73.8	1839.4
SE	13.3	50.8	16.8	25.3	30.6	9.5	9.6	150.1
n	10	10	10	30	33	10	10	10
range	149-285	151-563	44-232	116-726	228-851	19-109	30-126	
Summer								
$\bar{x}$	191.6	242.9	71.7	331.1	246.5	62.3	83.3	1191.5
SE	21.5	45.5	18.4	39.1	46.1	23.8	10.3	108.5
n	8	8	6	12	8	8	8	8
range	102-281	137-454	13-149	146-469	69-469	0-164	24-138	
Winter								
$\bar{x}$	92.3	158.3	49.1	257.4	142.9	49.5	56.4	692.4
SE	30.7	22.2	17.9	34.5	47.7	21.5	6.1	164.1
n	8	8	8	12	8	8	8	8
range	31-271	80-240	8-155	93-421	30-359	0-148	29-83	

Table 3. The maximum number of harbor seal pups counted by month at each haul out site in the Point Reyes/Farallon Islands Marine Sanctuary in 1981 and 1982. Data for 1981 were provided courtesy of Gary Fellers, National Park Service.

		LOCATION						
		Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon
1981	April	0	0	*	0	5	0	1
	May	25	83		84	196	0	12
	June	0	106		4	54	0	3
1982	April	22	19	1	101	262	0	0
	May	58	135	19	150	263	1	17
	June	23	54	18	60	90	5	4

* Seals at Point Reyes Headland were not censused in 1981.

Table 4. The average number of harbor seals at coastal and estuarine locations during the breeding and non-breeding seasons; $\bar{x}$ is the mean number of seals, SE is the standard deviation, and n is the sample size.

	Coastal	Estuarine
Breeding		
$\bar{x}$	929.9	721.8
SE	85.6	41.0
n	10	10
Non-breeding		
$\bar{x}$	497.3	474.5
SE	62.5	48.4
n	16	16

Table 5. Simultaneous censuses of harbor seals in the Point Reyes National Seashore conducted in 1981 and 1982. Data courtesy of Gary Fellers of the National Park Service.

		LOCATION									
	Date	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total
1981	May	47	225	181	72	295	0	522	-	56	1398
	Jun	50	50	213	181	199	344	577	-	76	1690
	Jul	95	12	419	228	695	0	-	-	85	1534
	Aug	37	35	0	53	326	178	168	0	84	881
	Sept	63	0	17	74	108	0	144	30	45	481
	Oct	6	10	32	12	148	0	31	25	62	326
	Nov	0	0	11	35	191	0	26	0	1	264
	Dec	0	0	56	40	257	0	9	-	25	387
1982	Jan	36	0	62	59	106	0	-	-	-	263
	Feb	149	0	103	149	-	-	317	104	71	893

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Table 6. The average number of harbor seals hauled out at Double Point by month combining data from 1976 to 1982 for adults, subadults, and all age-classes. Only those censuses when immatures were distinguished were included in the analysis; $\bar{x}$ is the mean number, SD is the standard deviation, SE is the standard error, and n is the sample size.

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
n	10	12	23	38	29	21	17	12	10	9	8	9
ADULTS												
$\bar{x}$	87.0	191.8	185.9	207.1	265.5	261.1	308.4	91.4	80.2	60.0	25.4	48.4
SD	71.5	88.1	62.0	105.6	128.8	120.5	101.4	48.7	59.7	56.1	14.9	51.3
SE	22.6	25.4	12.9	17.1	23.9	26.3	24.6	14.1	18.9	17.7	5.3	17.1
SUBADULTS												
$\bar{x}$	13.6	38.7	40.0	24.1	24.6	30.1	36.9	14.0	25.8	19.0	5.1	13.4
SD	16.2	23.5	27.3	15.8	16.1	20.7	19.7	10.1	22.5	31.3	3.6	9.6
SE	5.1	6.8	5.7	2.6	3.0	4.5	4.8	2.9	7.1	10.4	1.3	3.2
ALL AGE CLASSES												
$\bar{x}$	108.3	237.3	231.7	319.8	465.7	349.8	383.9	138.3	133.3	98.0	41.5	79.2
SD	75.9	100.0	82.0	169.0	188.0	147.4	109.8	63.3	71.6	78.7	15.2	60.5
SE	24.0	28.9	17.1	27.4	34.9	32.2	26.6	18.3	22.6	26.2	5.4	20.2
PERCENTAGE OF SUBADULTS TO TOTAL POPULATION												
	12.6	16.3	17.3	7.5	5.3	8.6	9.6	10.1	19.4	19.4	12.3	16.9

Table 7. The seasonal average number of harbor seals at Double Point in 1976, 1977, 1978, and 1982; $\bar{x}$ is the mean, SE is standard error, and n is the sample size.

		Breeding	Summer	Winter
1976				
	$\bar{x}$	195.2	165.7	123.8
	SE	17.6	35.7	34.0
	n	14	13	9
	range	112-320	28-408	26-347
1977				
	$\bar{x}$	304.5	222.6	106.8
	SE	22.1	35.9	22.1
	n	30	21	10
	range	109-594	54-544	36-212
1978				
	$\bar{x}$	330.1	217.6	*
	SE	29.1	67.2	
	n	19	8	
	range	114-556	38-512	
1982				
	$\bar{x}$	517.5	246.5	142.9
	SE	30.6	46.1	47.7
	n	33	8	8
	range	228-851	69-469	30-359

* Insufficient sample size for comparison.

Table 8. The relationship between tide and the number of seals hauled out at Drakes Estero, Double Point, and subsite South Point from -1 hour prior to +4 hour after low tide; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size.

	HOURS OF LOW TIDE					
	-1	0	+1	+2	+3	+4
Drakes Estero						
$\bar{x}$	414.0	412.3	406.7	417.3	457.8	393.8
SE	29.8	32.3	24.4	28.6	31.0	31.3
n	12	13	13	8	6	5
Double Point						
$\bar{x}$	374.8	435.9	427.8	451.2	465.7	567.1
SE	44.8	42.9	41.4	41.4	43.7	63.2
n	10	16	17	18	14	7
South Point						
$\bar{x}$	27.0	37.4	36.9	32.3	27.6	21.0
SE	6.6	6.6	6.6	6.7	6.6	11.6
n	7	12	14	13	11	6

Table 9. The relationship between time of day and the number of harbor seals hauled out at Double Point in the breeding season during low to medium tides: $\bar{x}$ is the mean number of seals, SD is the standard deviation and n is the samle size. Census days when disturbance occurred were excluded.

	TIME									
	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
$\bar{x}$	261.6	200.3	285.7	260.8	329.5	391.3	475.8	453.0	483.7	683.4
SD	102.5	86.9	85.6	93.1	139.7	144.4	154.9	196.4	186.7	124.6
n	7	12	13	12	13	12	14	16	14	8

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Table 10. The incidence of disturbance to harbor seals at each haul out site within the Point Reyes/ Farallon Islands Marine Sanctuary in 1982-83.

	LOCATION										
	Tomales Bay	Hog Is	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limantour Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Totals
SOURCES											
Hiker	1			2	2	5			3		13
Fisherman	11					8		1	3	2	25
Boat		4	1	1		4		1		2	13
Aircraft						1		7			8
Marine Salvage								4			4
Dog										1	1
Natural					1	3		1			5
Unknown				1	2	3		3		1	10
TOTALS *	12	4	1	4	5	24	0	17	6	6	79
TOTAL DISTURBANCE DAYS	12	4	1	3	5	20	0	14	6	6	71
TOTAL CENSUS DAYS	26	26	26	26	37	54	54	48	29	32	358
% DAYS DISTURBED	46	15	4	12	14	37	0	29	21	19	20

* More than one disturbance occurred on census days at Drakes Estero, Tomales Point and Double Point.

Table 11. Population of sea lions at Pt. Reyes, 1936 - 1981.

Year	Date	Northern sea lion	California sea lion	Total Number
1936	21 June - 1 July	45	9	54
1938	13 - 26 June	6	-	6
1946	June			111
1947	June	2		2
1958	June			936
1958	7 Dec		1800	1800
1959	7 Dec		105	105
1960	June			625
1961	June			795
1965	1 - 3 June			259
1967	12 Dec	78		78
1969	3 - 6 June			420
1970	9 - 11 June			197
1975	7 - 18 June	~150	~400	~550 *
	8 - 18 July	10		10 *
1975	4 - 17 Jan	~100	~1000	~1100 *
	14 - 27 Feb	~100	~1500	~1600 *
1981	17 Jan		513	513
	19 - 21 May		518	518
	30 June and 1, 8 July	0	0	0
	28 - 30 Sept		356	356

* Includes animals at Point Arena.

Data from Bonnot, 1937; Bonnot et al., 1938; Bureau of Marine Fisheries, 1947; Bonnot and Ripley, 1948; Ripley et al., 1962; Carlisle and Alpin, 1966; Frey and Alpin, 1970; Carlisle and Alpin, 1971; Chan, 1979; Dohl, 1982.

Table 12. High counts of California sea lions at Point Reyes Headlands, 1982 - 1983.

Date	Total	Adult male	Subadult male	Female size	Immature	Unknown
15 March	234	74	52	94	14	
31 March	244	77	63	92	12	
7 April	338	107	25	116	7	83
15 April	141	27	39	63	12	
27 April	151	52	42	47	10	
6 May	96	60	17	12	7	
16 May	169	65	50	40	14	
20 May	66	40	12	10	4	
30 May	106	56	38	10	1	
1 June	129	24	94	7	4	4
10 June	28	16	9	3		
24 June	64	8	15	20	16	5
1 July	105	2	8	26	69	
8 July	41	6	10	9	16	
23 July	49	28	14	3	4	
3 August	163	91	48	4	0	20
20 August	195	49	71	35	7	33
27 August	262	37	113	61		51
23 Sept	207	43	80	55	28	
29 Sept	118	16	4	69	29	
17 Oct	132	22	12	65	33	
28 Oct	111	18	4	39	41	
12 Nov	144	39	69	32	4	
22 Nov	37	2	24	9	2	
20 Dec	138	21	65	47	4	
28 Dec	270	12	224	31	3	
27 Jan	22	5	12	4	1	
11 Feb	46	8	20	16	2	
17 Feb	39	5	26	6	2	

Table 13. High counts of northern sea lions At Pt. Reyes Headlands, 1982 - 1983.

Date	Total	Adult male	Subadult male	Female size	Immature
15 March	0				
31 March	3		1	2	
7 April	2			1	1
15 April	8		1	6	1
27 April	8	1	2	3	2
6 May	11	3	4	2	2
16 May	12	3	5	3	1
20 May	14	6	4	2	2
30 May	11	4	5		2
1 June	14	3	3	6	2
10 June	11	3	3	4	1
24 June	14	2	4	5	3
1 July	10	3	1	2	4
8 July	11	1	0	4	6
23 July	14	1	5	4	4
3 Aug	14	2	3	7	3
20 Aug	12	1	3	4	4
27 Aug	19	1	6	10	2
23 Sept	7			6	1
29 Sept	4			3	1
17 Oct	6			5	1
28 Oct	5			4	1
12 Nov	7			7	
22 Nov	3			3	
20 Dec	8			4	4
28 Dec	6			4	2
27 Jan	1			1	
11 Feb	6		1	5	
17 Feb	4			3	1

From Allen et al. ms.

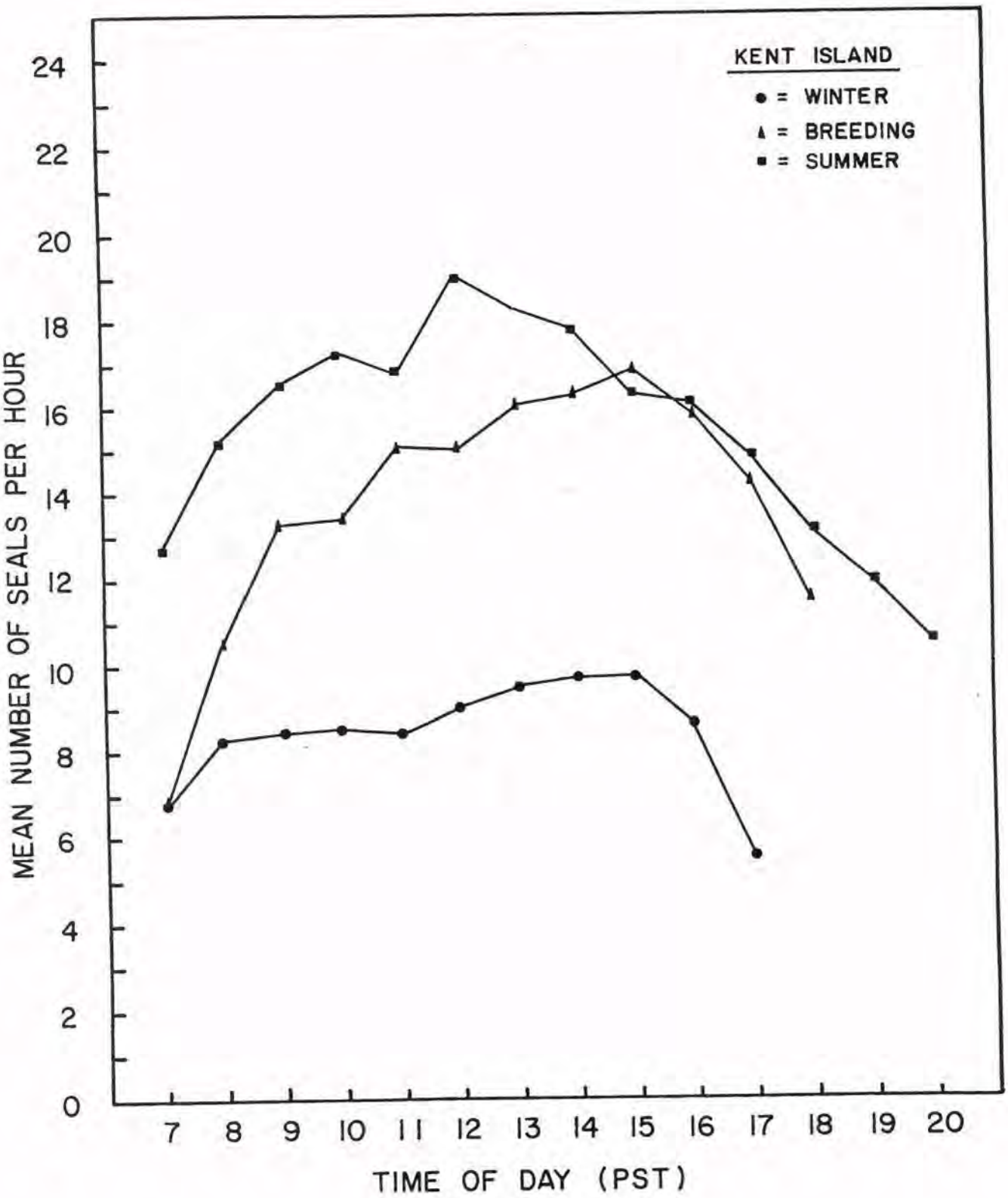


FIGURE I.

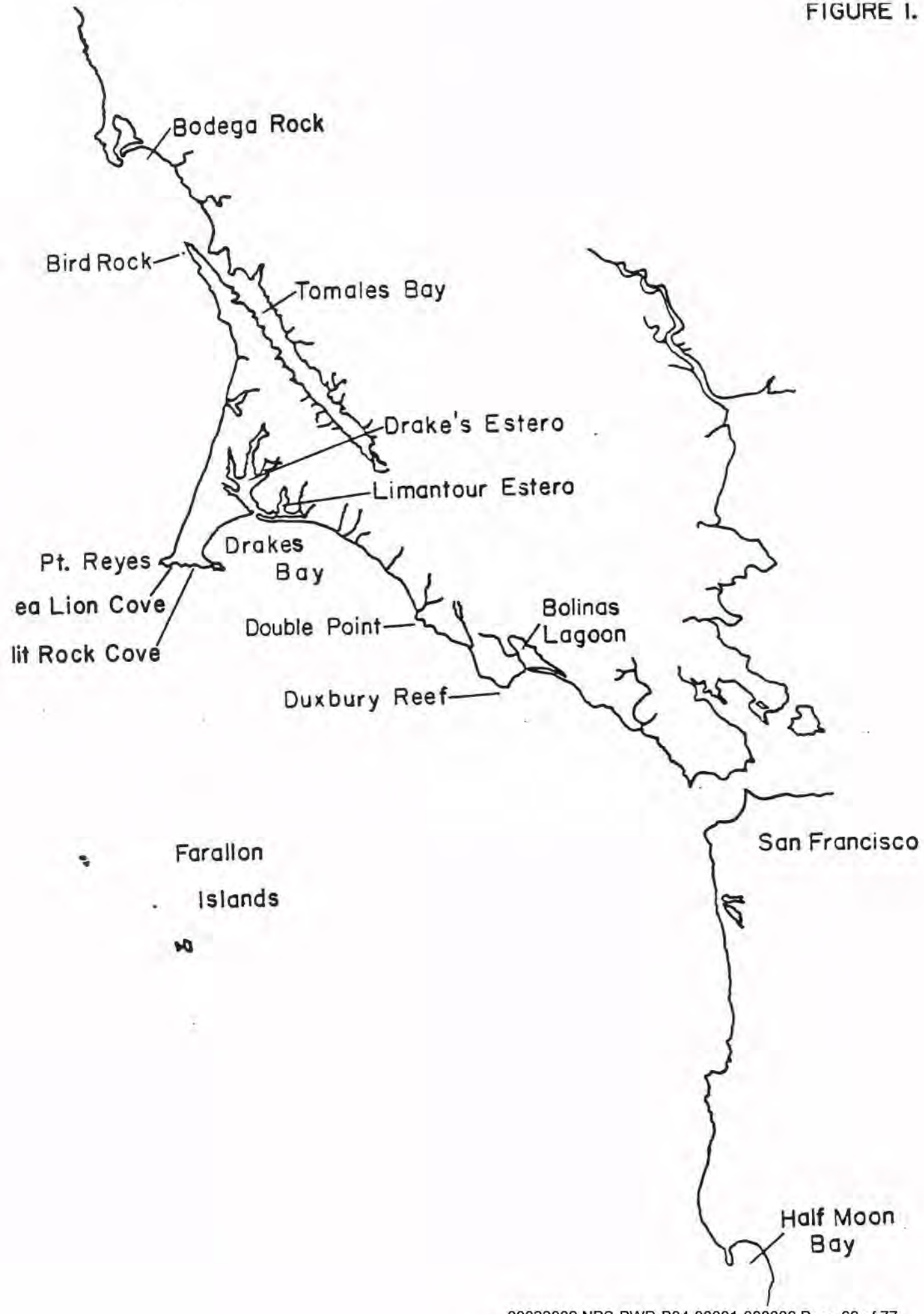

Bodega Rock
Bird Rock
Tomales Bay
Drake's Estero
Limantour Estero
Drakes Bay
Pt. Reyes
ea Lion Cove
lit Rock Cove
Double Point
Bolinas Lagoon
Duxbury Reef
Farallon Islands
San Francisco
Half Moon Bay

FIGURE 2.

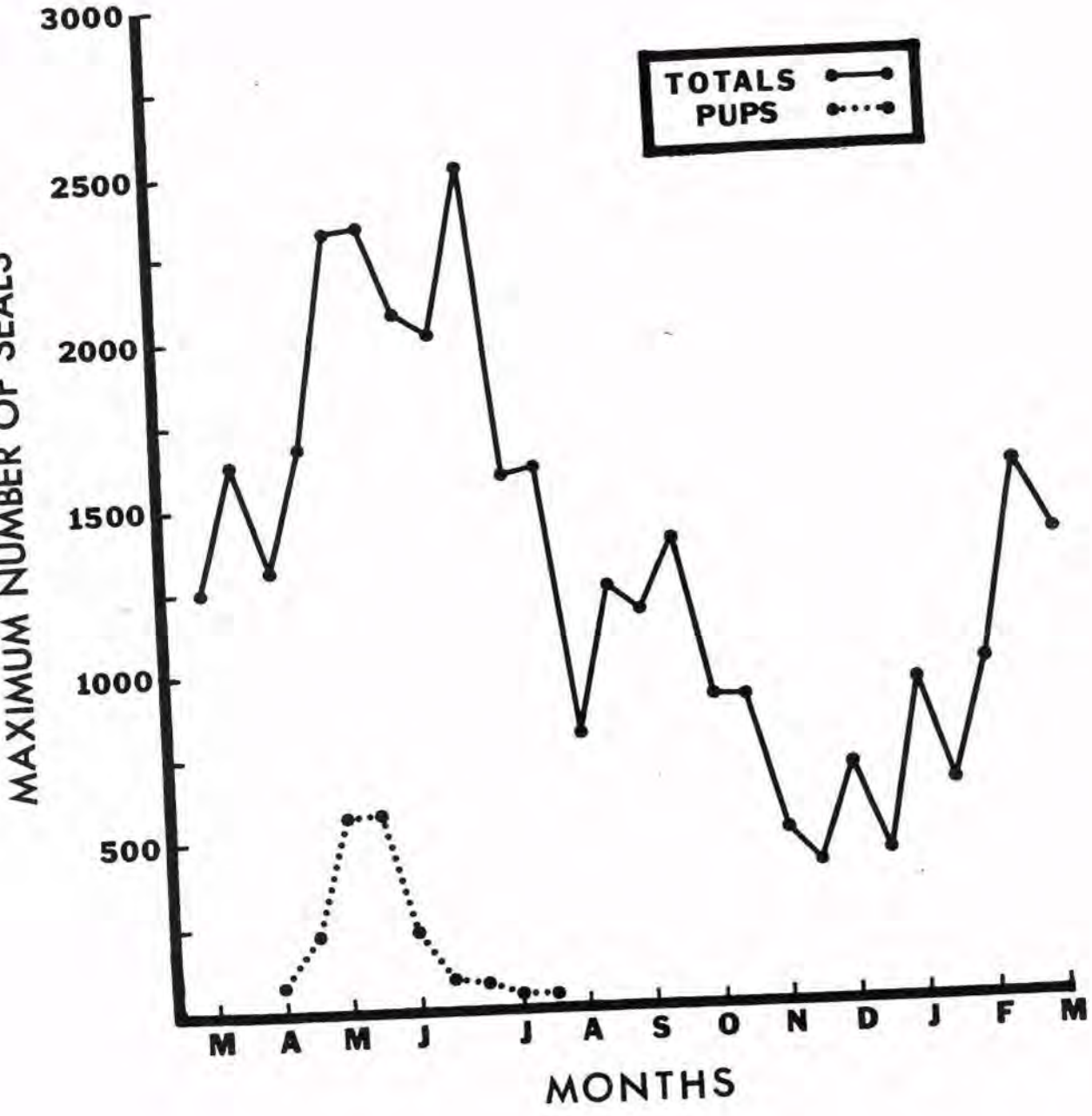

3000
2500
2000
1500
1000
500
MAXIMUM NUMBER OF SEALS
TOTALS
PUPS
M
A
M
J
J
A
S
O
N
D
J
F
M
MONTHS

FIGURE 3.

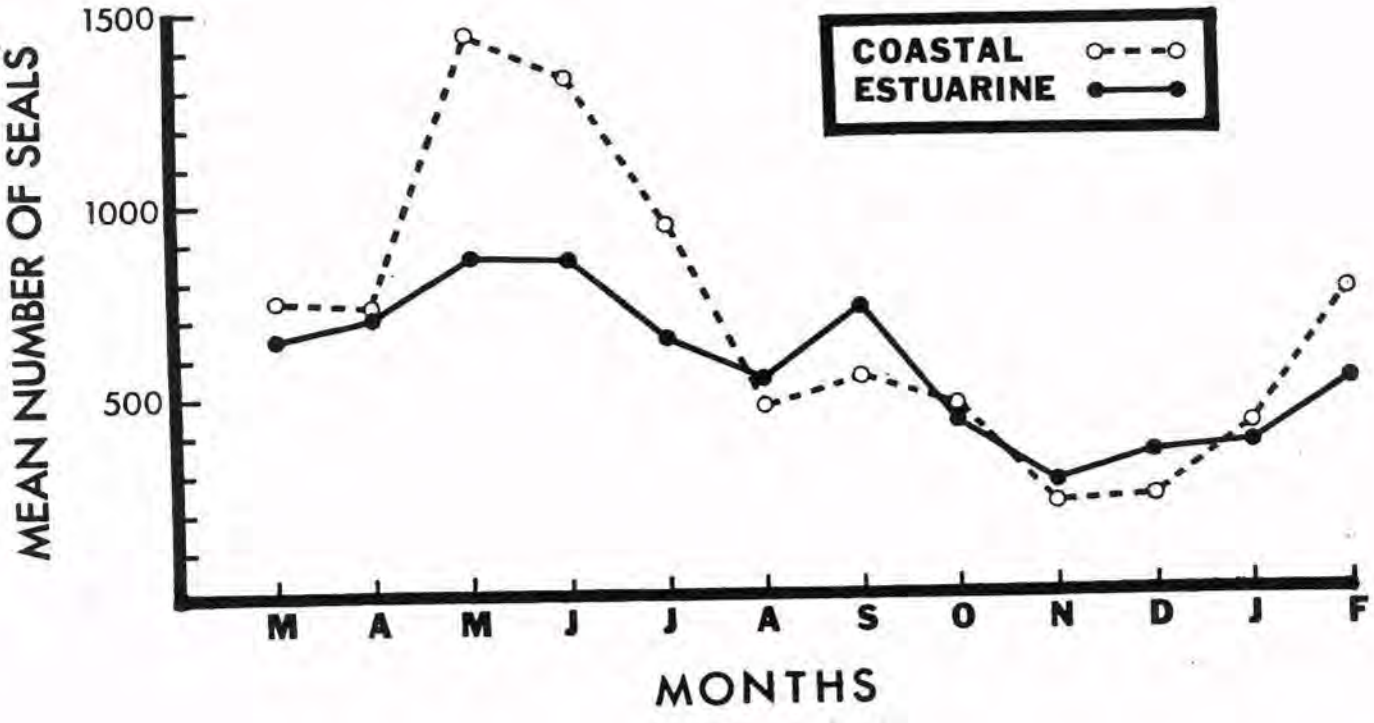

1500
1000
500
MEAN NUMBER OF SEALS
COASTAL
ESTUARINE
M
A
M
J
J
A
S
O
N
D
J
F
MONTHS

FIGURE 4.

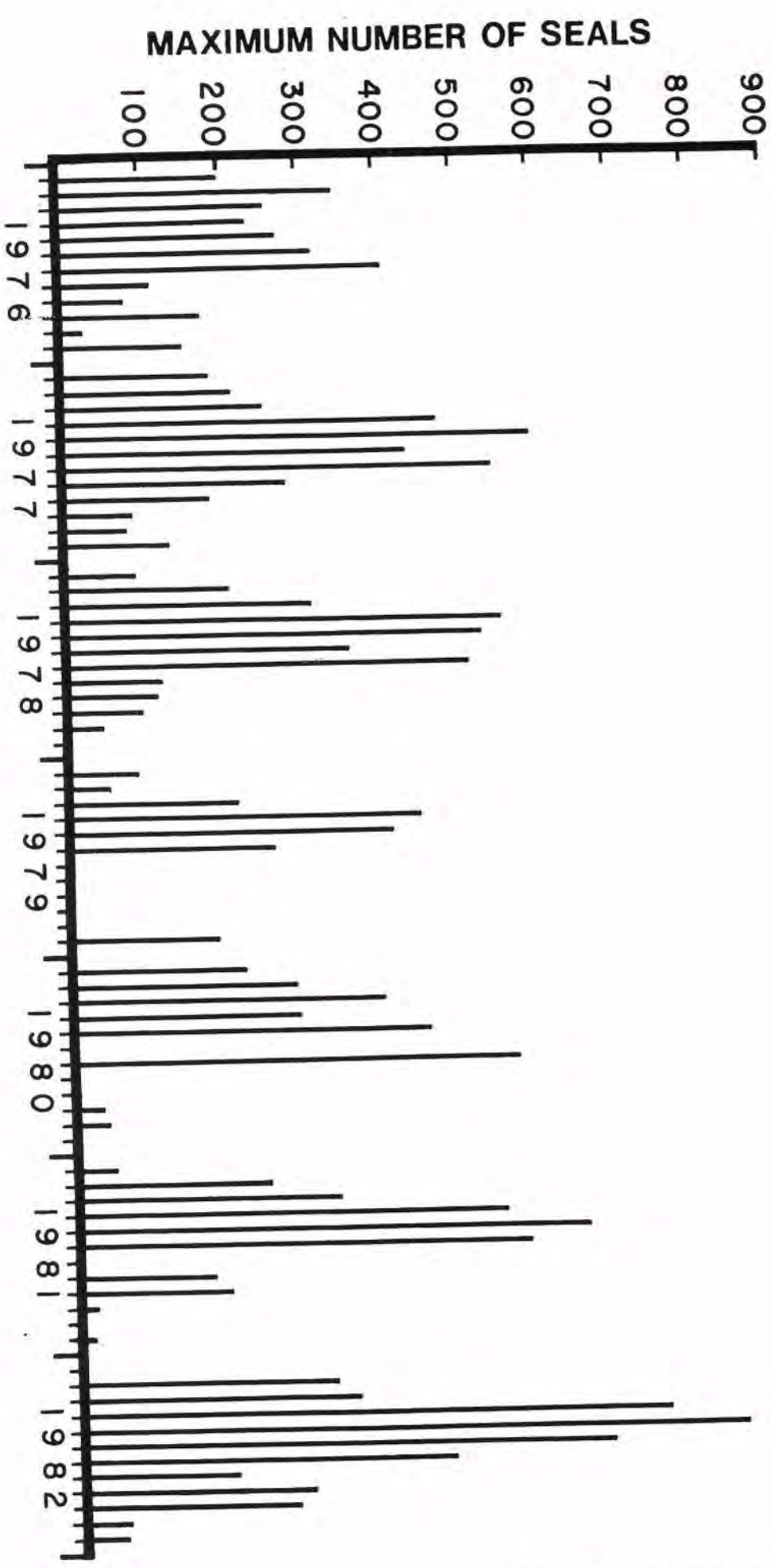

MAXIMUM NUMBER OF SEALS
100
200
300
400
500
600
700
800
900
1976
1977
1978
1979
1980
1981
1982

FIGURE 5.

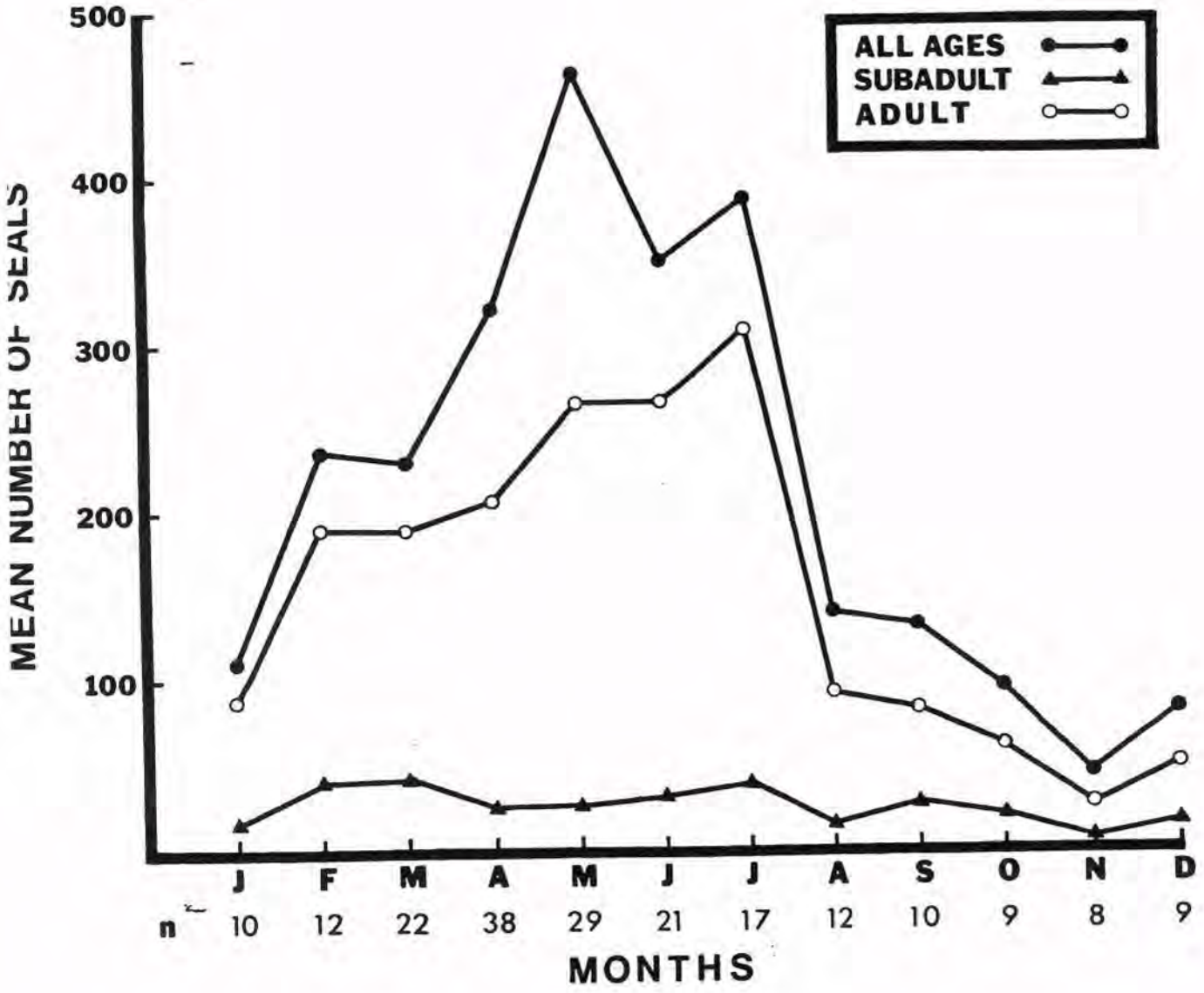

MEAN NUMBER OF SEALS
500
400
300
200
100
ALL AGES
SUBADULT
ADULT
J F M A M J J A S O N D
n 10 12 22 38 29 21 17 12 10 9 8 9
MONTHS

FIGURE 6.

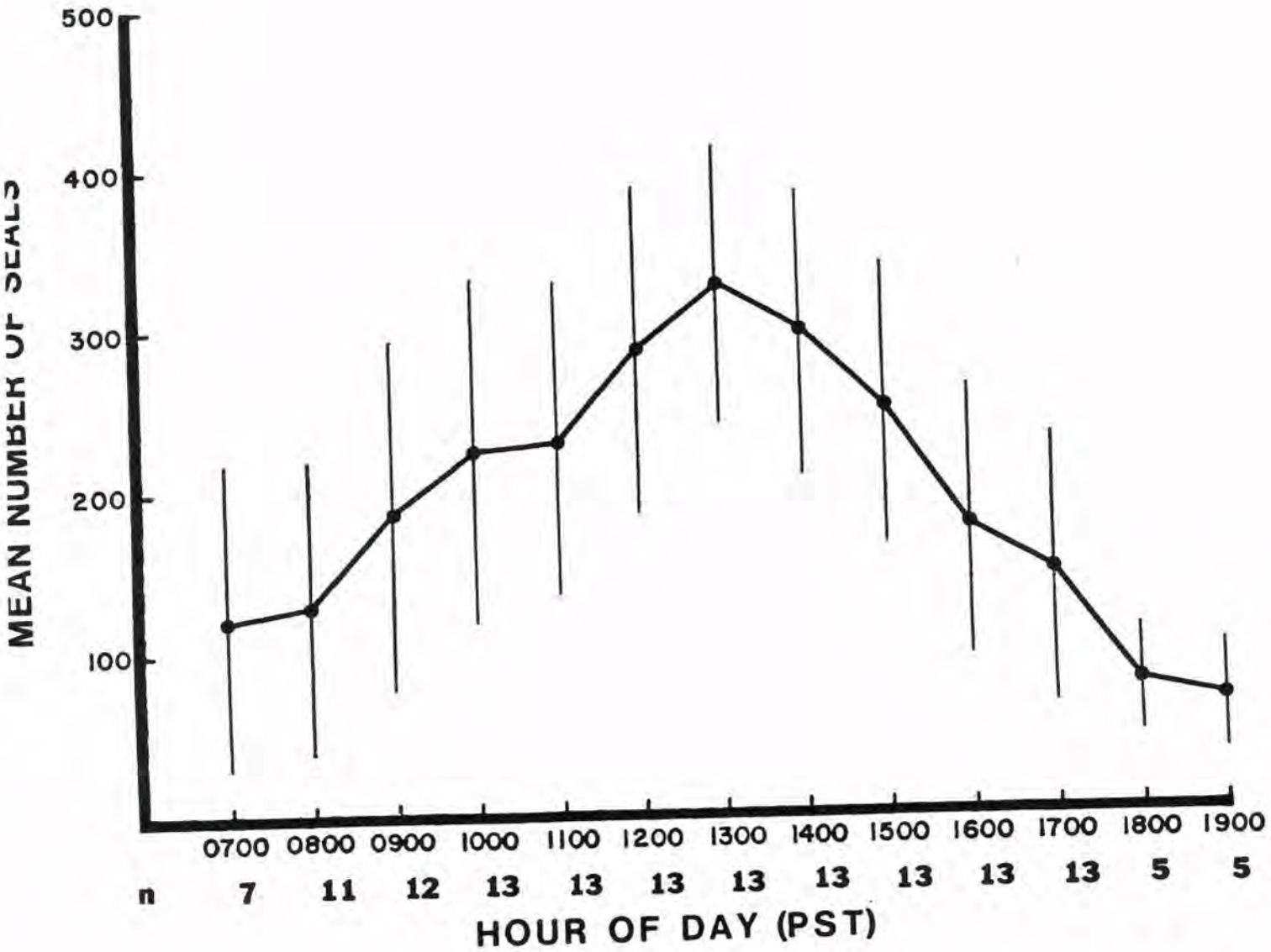
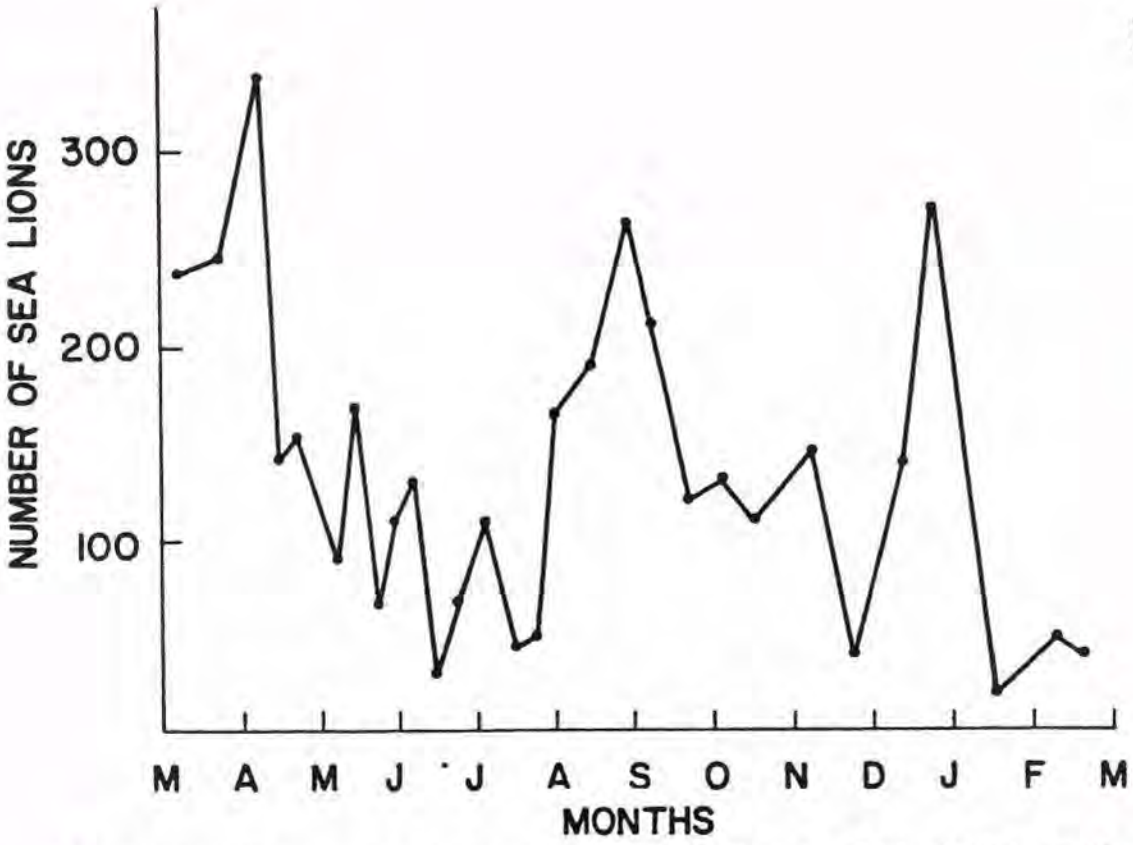
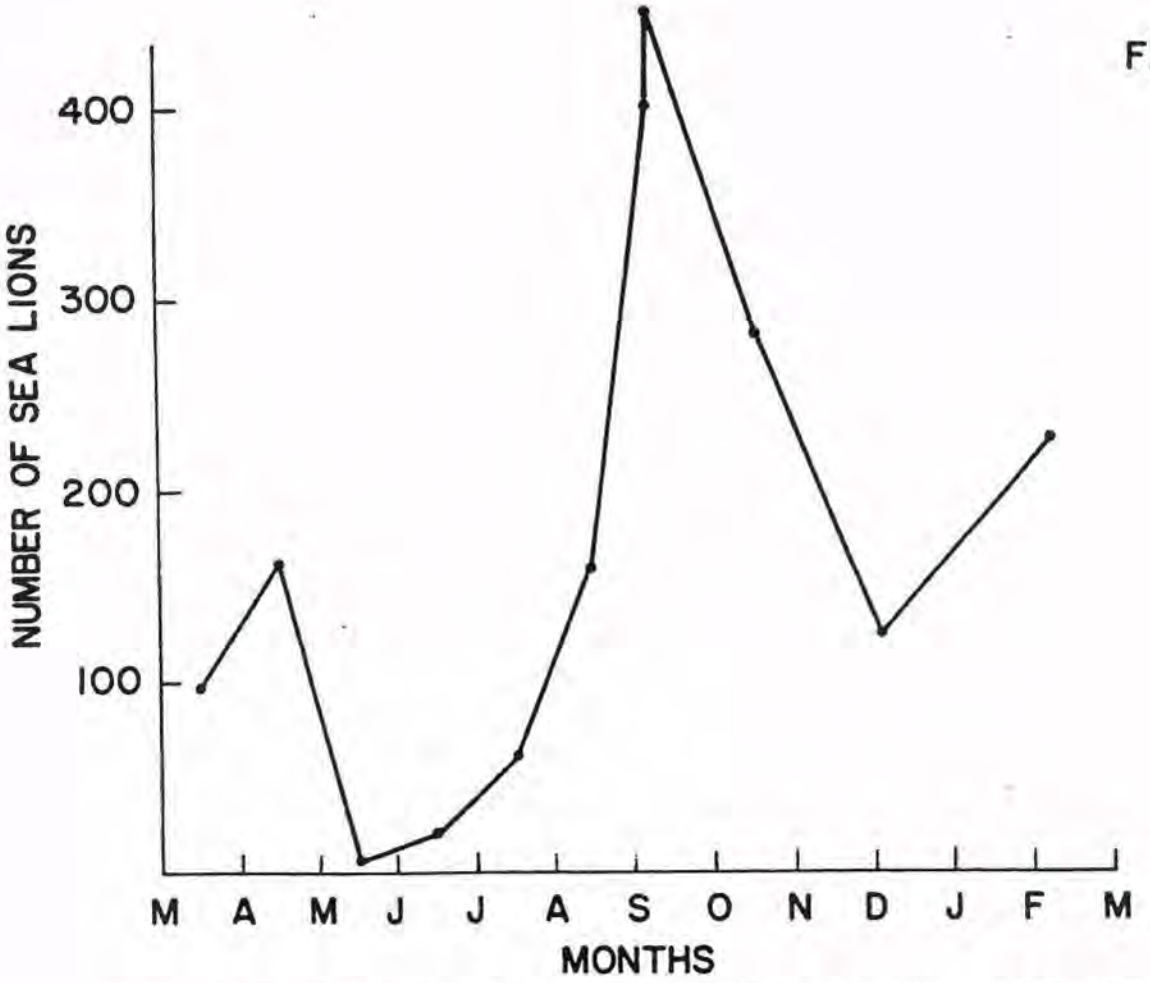

MEAN NUMBER OF SEALS
500
400
300
200
100
0700 0800 0900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900
n 7 11 12 13 13 13 13 13 13 13 13 5 5
HOUR OF DAY (PST)

FIGURE 7.



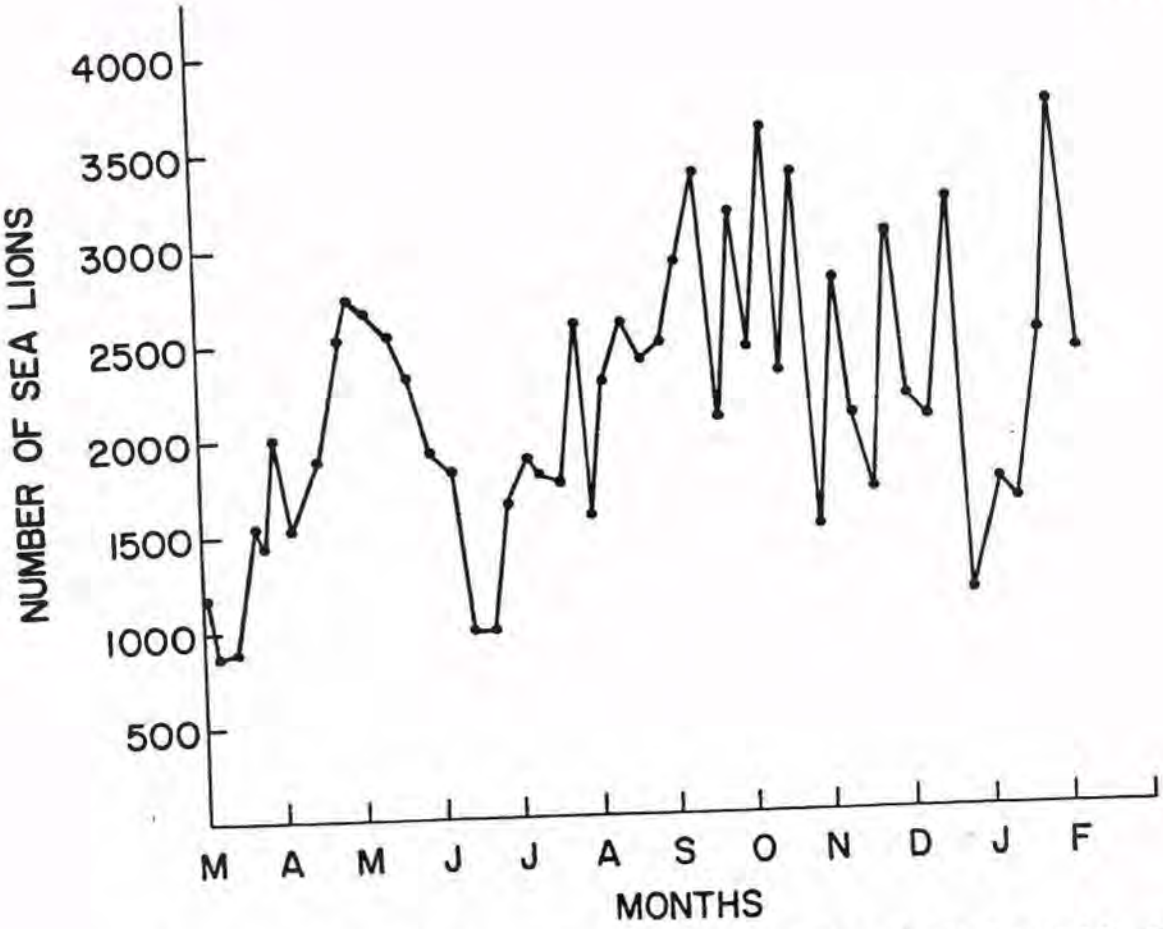
CALIFORNIA SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

FIGURE 8.

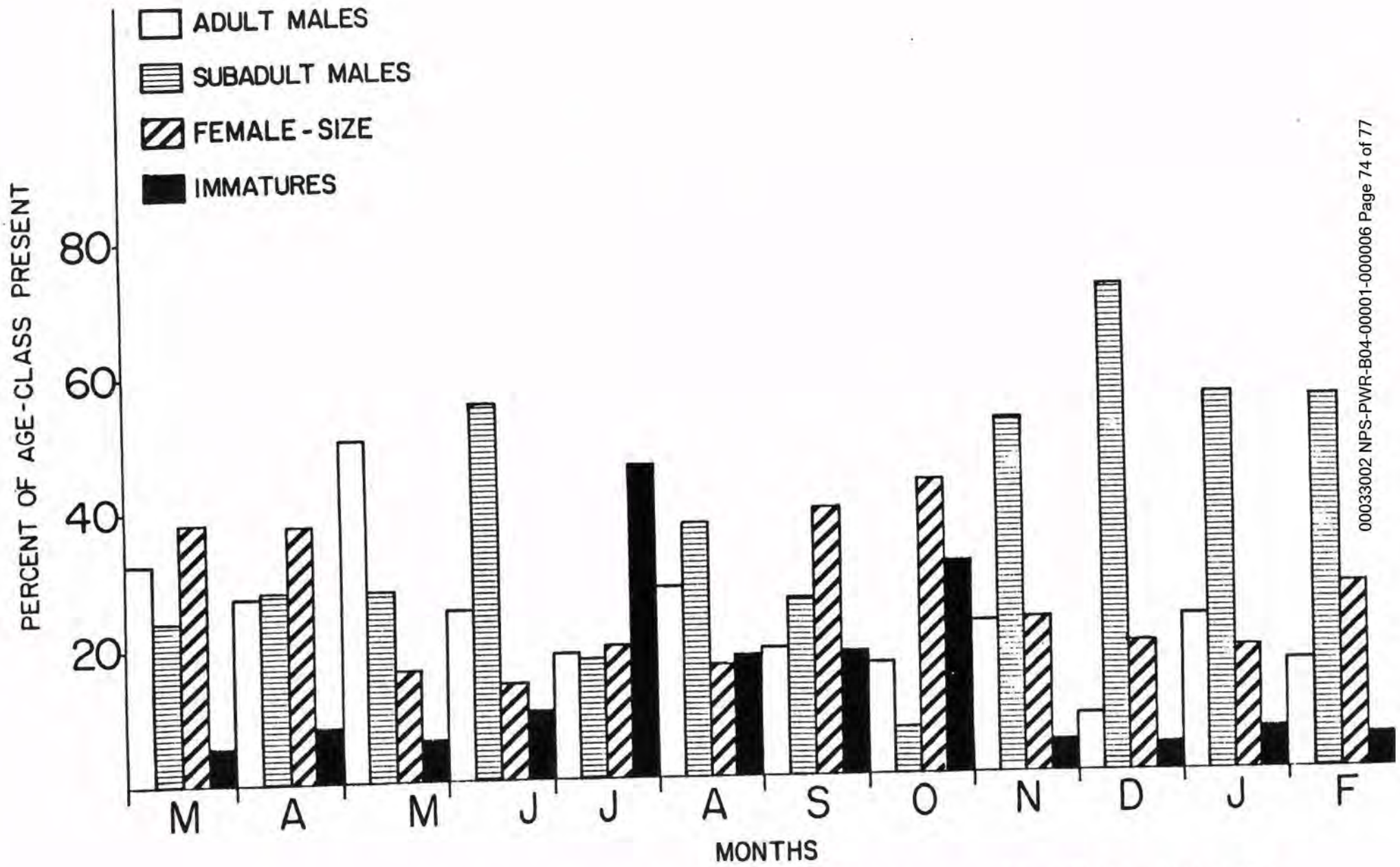


CALIFORNIA SEA LIONS AT BODEGA ROCK, 1982-1983

FIGURE 9.



CALIFORNIA SEA LIONS AT THE FARALLONES, 1982-1983



AGE CLASSES OF CALIFORNIA SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

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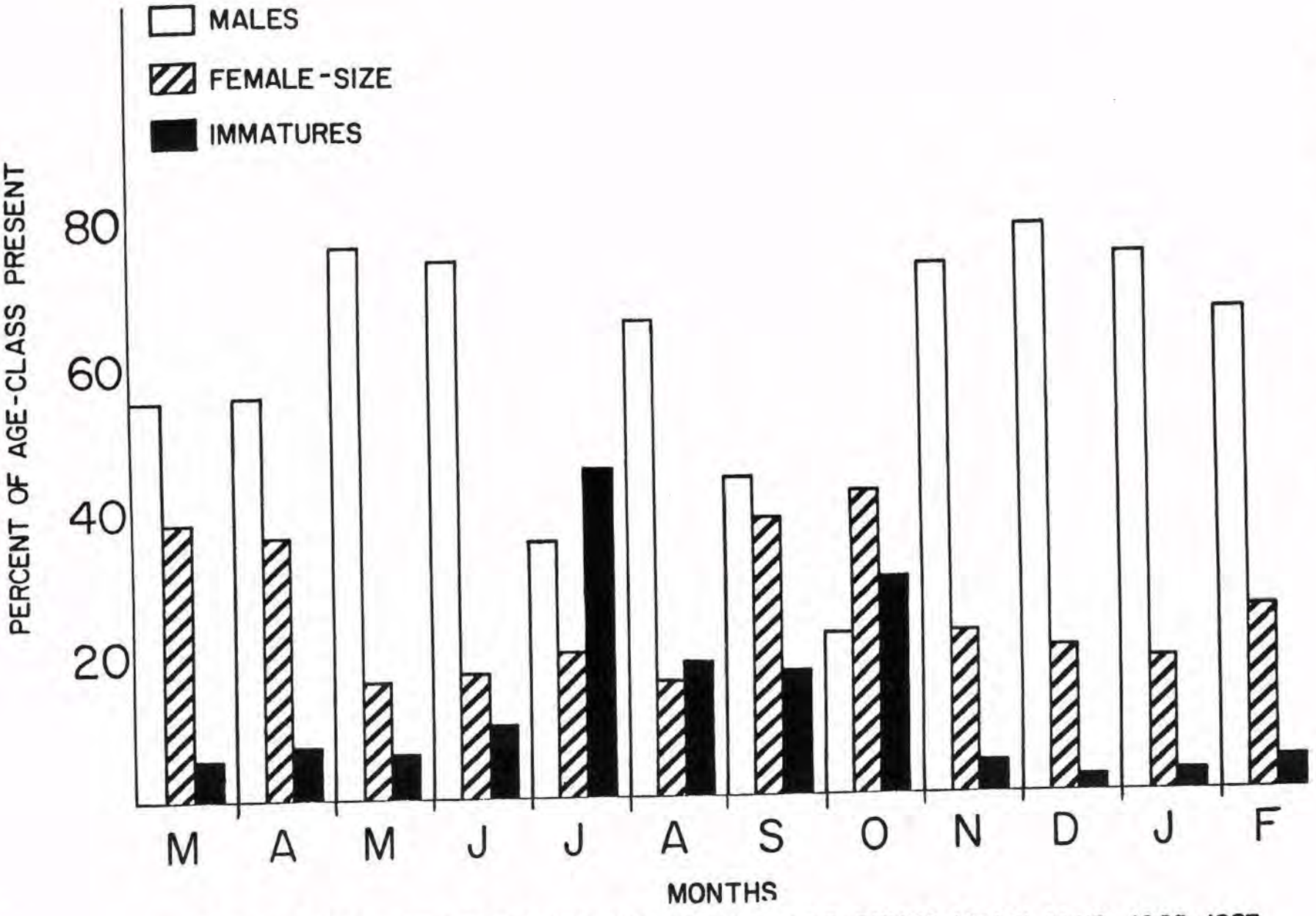
FIGURE 11.



AGE CLASSES OF CALIFORNIA SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

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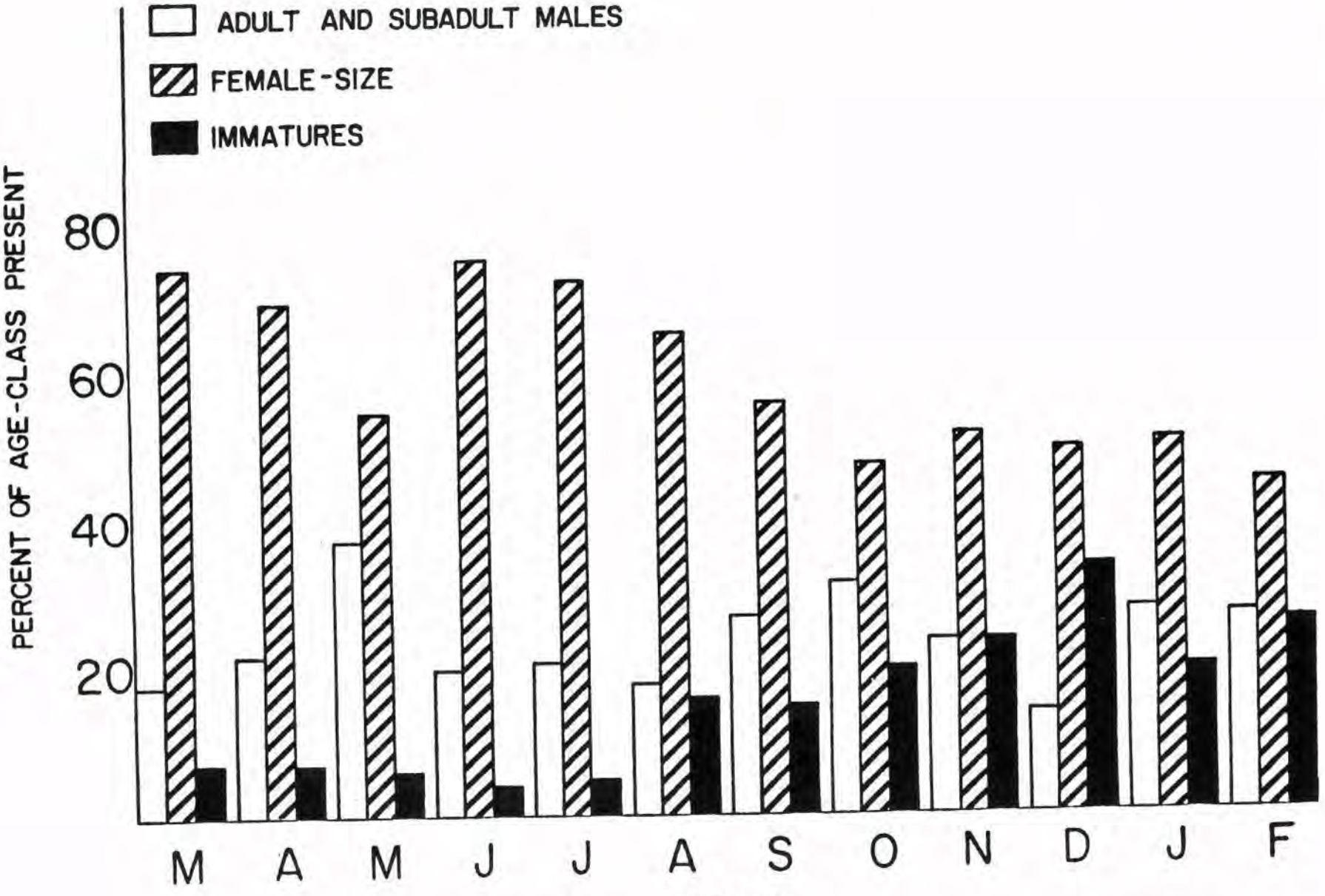
FIGURE 12.



AGE CLASSES OF CALIFORNIA SEA LIONS AT THE FARALLONES, 1982-1983

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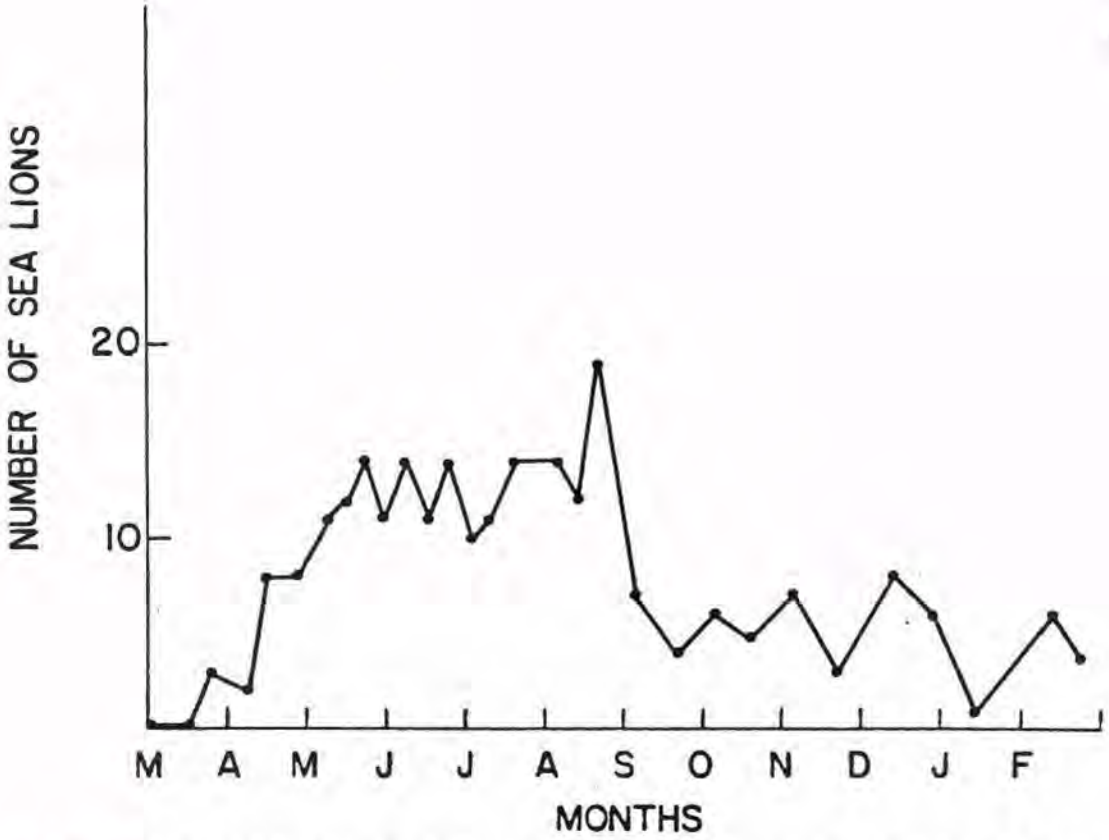
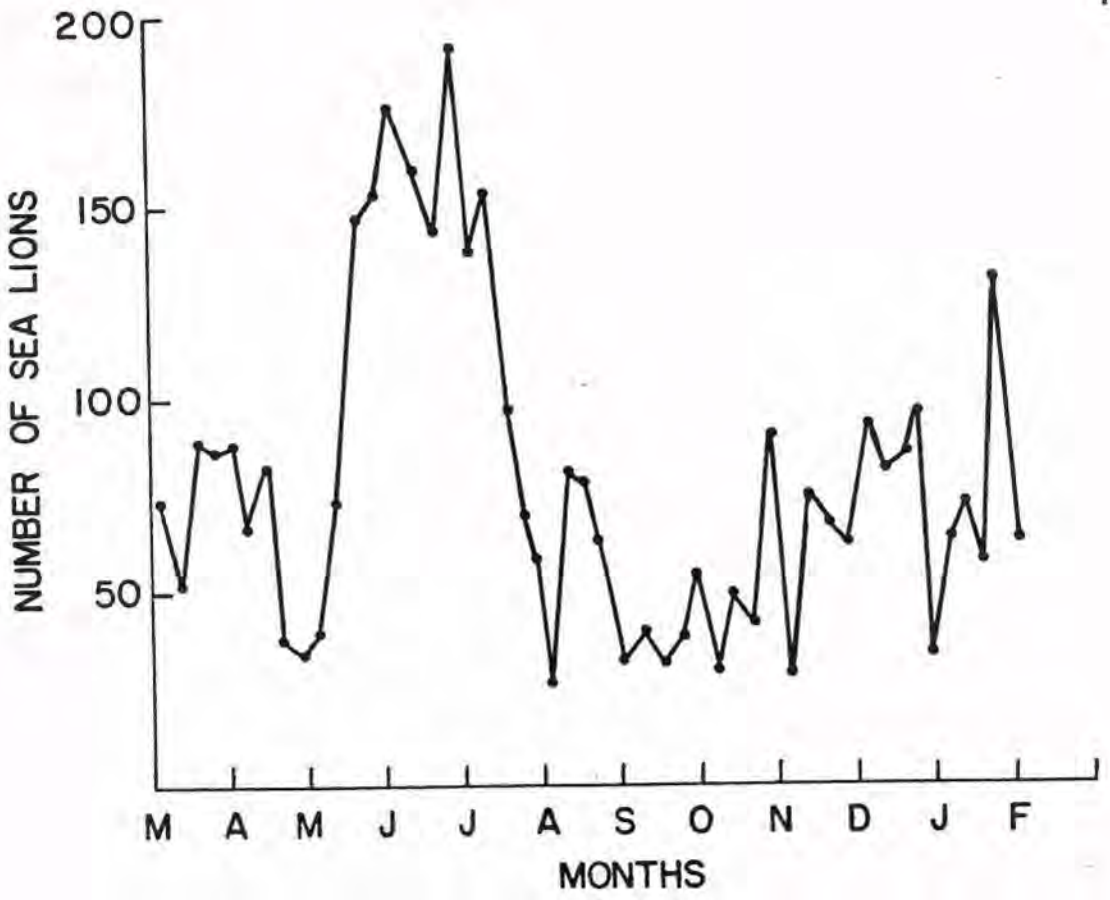
FIGURE 13.



NORTHERN (STELLER) SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

FIGURE 14.



NORTHERN (STELLER) SEA LIONS AT THE FARALLONES, 1982-1983

ASSESSMENT OF PINNIPED/HUMAN INTERACTIONS IN POINT REYES, CALIFORNIA, 1983-84

Sarah G. Allen and Harriet R. Huber

Point Reyes Bird Observatory
4990 Shoreline Hwy.
Stinson Beach, CA 94970

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Final report to the Sanctuary Programs Office,
National Oceanic and Atmospheric Administration
1984.

ABSTRACT

The breeding population of harbor seals in the Point Reyes area, California, is one of the largest in the state and because of its proximity to a large urban area, there is significant potential for human impact. We examined sources for disturbance to seals and the degree to which these sources affect seal behavior at each major haul out site. Recreational fishermen and boats were the major causes for disturbance, and Tomales Bay was the primary area where seals were disturbed. Seals responded to frequent disturbance by using alternative haul out sites and usually rehauled within 30 min. At Tomales Bay, though, a lower proportion of the herd was likely to rehaul in comparison to other locations, and often seals never rehauled. The reproductive rate was depressed and the pup mortality rate was inflated at Tomales Bay compared to more remote haul out areas such as Double Point. Disturbance to California and northern sea lions at Sea Lion Overlook, Point Reyes Headlands, was minimal because of the inaccessibility of the area to hikers and boats. No conflict was observed between pinnipeds and commercial herring fishing activities in Tomales Bay. Commercial gill net fisheries in the area incidentally killed many small marine mammals in 1982, 1983 and 1984.

INTRODUCTION

The breeding population of harbor seals in the Point Reyes area, California, (i.e., the outer coast of Marin County) is one of the largest in the state (Allen and Huber 1983, Miller 1983), and because of proximity to a large urban area, the potential for human impact is great. Much of the outer coast of Marin County is within the Point Reyes National Seashore and the Golden Gate National Recreation Area, and as a consequence, is heavily frequented by tourists. Human activities near harbor seal haul out sites include commercial and recreational boating and fishing, sport diving, flying (military helicoptors, private aircraft), and hiking (birdwatchers, tidepoolers) (Kaza 1984).

Harbor seals, when hauled out on land, are sensitive to the presence of humans, and when disturbed they will characteristically retreat into the water en masse. Seals exposed to frequent and intense levels of human intrusion may change diurnal haul out patterns (Calambokidis et al. 1978, Paulbitski 1975), move to alternative haul out sites (Allen et al. 1984), abandon pups (Johnson and Jefferies 1977, Boulva and McLaren 1979, Slater and Markowitz 1983), or leave an area entirely (Bartholomew 1949, Newby 1971).

The degree to which human activities affect seals in the Point Reyes area has not previously been examined except at Bolinas Lagoon (Allen et al. 1984). At present, the sea lions that haul out at Point Reyes Headland are not breeding there (Allen and Huber 1983) and thus are not as sensitive to disturbance as the harbor seals. Nevertheless, it is still important to

know the degree to which sea lions are affected by human activities because they are as likely as seals to desert haul out areas because of repeated disturbance (Peterson and Bartholomew 1967, Kenyon 1962). Our objective, therefore, was to gather data on the present levels of human/pinniped interactions. From this information, specific management plans can be designed to provide adequate protection for seals and sea lions and informative interpretive programs for park visitors.

METHODS

Visitor use is highest on weekends, and thus, we censused harbor seals one weekend a month from March 1983 to March 1984 at Tomales Bay, Bird Rock, Drakes Estero and Double Point, to determine those locations where seals are most subjected to human disturbance (Figure 1). We chose these areas because they are the primary haul out locations in the Point Reyes region (Allen & Huber 1983). All human/seal interactions were recorded. More than one seal flushed into the water because of nearby human activities was counted as a disturbance. We noted type of disturbance, recovery rate, percent of recovery (proportion of animals rehauling within 1 hr), and the use of alternate haul out sites. During the breeding season, seven additional weekend censuses were made to determime whether disturbance was affecting pup survival.

From March 1983 to March 1984, we also noted any disturbance to California or northern sea lions during weekly censuses at Sea Lion Overlook and semi-monthly censuses at Bodega Rock, identifying the source of

disturbance whenever possible.

Human/pinniped interactions during the herring (Clupea pallasi) spawn in Tomales Bay were observed from December 1983 through February 1984. Seven separate censuses by boat were originally scheduled; the herring fishery, however, failed to materialize and we were able to monitor interactions on only five days.

When analyzing the effects of disturbance on seal and sea lion haul out behavior, we classified disturbance sources as hiker, fisherman (including abalone diver and clam digger), boat (power, non-power), aircraft, dog, natural (landslide, bird), and unknown. The year was divided into three seasons: spring (March through June), summer (July through October), and winter (November through February). The seasonal frequency of disturbance was estimated for each location and expressed as a percentage of the number of days seals were disturbed divided by the total number of census days for each season. The recovery rate for seals at each location was based on the time it took at least 25% of the original herd to rehaul. Excluded from the analyses were times when fewer than 25% rehauled and times when the disturbance source remained for an extended time period. The percent recovery for each location was based on the average proportion of the original members to rehaul within 1 hr. When multiple disturbances occurred, the last disturbance within a sequence was used as the starting time.

As an index of seal sensitivity at different locations, we recorded the number of "head alerts" during five minute intervals within randomly chosen groups of 10 seals. A "head alert", as defined by Sullivan (1979), is a

stereotyped behavior: the seal raises its head and scans from side to side while in a resting posture on land. We then compared the mean number of "head alerts" per minute at each site using one-way analysis of variance with Scheffe's Test for multiple comparisons at $\alpha = 0.05$ (Snedecor and Cochran 1967).

During the breeding season, we also collected information on the number of dead pups and on mother/pup separations precipitated by disturbances. We estimated the mortality rate of pups before weaning for each location based on the proportion of the number of dead to the maximum number of live pups counted for the breeding season.

Information on disturbance collected over eight years, 1976-1983, at Double Point was also analyzed. The frequency of disturbance was expressed as a percentage of the days disturbed divided by the days censused per month for each year, and we then calculated the monthly mean percentage combining all years. Sources for disturbance were categorized as previously described; the frequency for each category combining all years was expressed as a percentage. We then divided the year into three seasons (spring, summer, winter) and determined the seasonal frequency for each disturbance category.

RESULTS

Harbor seals were flushed from haul out sites in Point Reyes on 107 occasions and on 24% of all census days in 1983-84. After combining data from all locations (Table 1), fishermen, including clam diggers, abalone

divers, eel fishermen and crab fishermen, were the primary source of disturbance (41%) (43/107). Hikers and boats (power and non-power) were equally disturbing to seals primarily in Tomales Bay and Drakes Estero. Seals were disturbed more frequently at all locations during the spring (45%) than during either the summer (18%) or winter (19%) (Table 2).

Seals in Tomales Bay experienced the highest level of disturbance for all seasons except winter, and clam diggers were the greatest cause. In a single day, up to 500 people were observed digging for clams on the sand bars preferred by seals between Sand Point and Toms Point. A barge from Lawson's Landing ferried people to the sand bars. Boats passing along the channel bordering haul out sites also disturbed seals. Tomales Bay was the only location in this study where people were observed overtly and maliciously harassing seals. One seal was reported shot with an arrow by people in a boat and on one occasion children were observed harassing a pup left on the beach after the herd was actively flushed by the same children.

At Bird Rock, abalone divers disturbed seals most frequently, while at Drakes Estero they were disturbed equally by fishermen (clam diggers, crab fishermen), boats (power and non-power), and hikers. Hikers were the main disturbance at Double Point. Disturbances from aircraft, dogs, and non-human-related sources (birds, landslides, deer, rain) were incidental at all locations (Table 1).

In most instances, seals rehauled after they were flushed from haul out sites (Table 3). Seals in Tomales Bay, however, were least likely to rehaul during the census time period and most likely to use alternate sand bars on which to rehaul. In many instances, clam diggers in Tomales Bay remained

for entire low tide cycles, thereby precluding the return of seals. In most cases, seals at Drakes Estero, Bird Rock, and Double Point returned to haul out sites and did not move to alternate sites.

The average time, in minutes, for at least 25% of the herd to rehaul after disturbance was similar for all locations:

Tomales Bay $\bar{x}$ = 18.2, SD = 8.5, n = 14

Bird Rock $\bar{x}$ = 29.2, SD = 14.0, n = 6

Drakes Estero $\bar{x}$ = 22.3, SD = 17.9, n = 17

Double Point $\bar{x}$ = 21.7, SD = 11.2, n = 12

The percent of recovery (the proportion of the original herd to rehaul within 1 hr) varied, though, for each location. A lower proportion of the herd was likely to rehaul at Tomales Bay ($\bar{x}$ = 36.0, SD = 38.8, n = 42) than at Bird Rock ($\bar{x}$ = 75.4, SD = 29.0, n = 9), Drakes Estero ($\bar{x}$ = 58.0, SD = 39.5, n = 31), or Double Point ($\bar{x}$ = 66.2, SD = 37.2, n = 16). Furthermore, 42% of the time seals did not rehaul in Tomales Bay (Table 3).

Analysis of the sensitivity of seals at each location based on the number of "head alerts" revealed differences between the areas: seals alerted significantly more often at Tomales Bay (Table 4).

Despite the higher level of disturbance at Tomales Bay, the number of times pups were observed separated from females was equal to that of other locations (Table 3). The number of separations was expectedly higher at Double Point because more pups were present there than at any other location. A survey of pups recovered by the California Marine Mammal Center, however, revealed that a large number of pups (7) were removed by people from Tomales Bay (Lynne Amaya, CMMC, Fort Cronkite, CA, pers.

commun.). This represents 16% (7/45) of the pups counted there in 1983. There are no records of pups removed from the other locations.

Very few dead pups were observed during this survey. The most reliable information on dead pups was gathered at Double Point since distance, poor visibility, and the tide washing pups away precluded accurate counts at other sites. At Double Point the mortality rate was 8.7% (23/264) in 1983.

Observations began at Double Point in 1976, and the level of disturbance there has fluctuated. Nevertheless, a monthly and seasonal pattern is apparent in the sources for and frequency of disturbance relative to the seasonal presence of seals. Disturbance levels were similar for all months except November, when seals were virtually absent (see report Pinniped Assessment 1984 by Allen and Huber) (Table 5). As expected, most disturbances occurred in spring (61% of all disturbances observed) since more censuses were conducted then. However, the proportion of days on which disturbance occurred relative to total census days was similar for all seasons (Table 6).

The primary identifiable reasons for disturbance in spring were hikers, aircraft, and an assortment of non-human causes including landslides, birds alighting too closely to the herd, and wind-whipped debris. Western Gulls (Larus occidentalis) were responsible for many disturbances in their attempts to consume afterbirths of seal pups during spring. Low flying military helicopters as they traveled north or south along the coastline were the main aircraft disturbing to seals. Though abalone are plentiful in this area, we rarely saw abalone fishermen venture as far as Double Point from the Palomarin access trail. During summer, all sources of disturbance

were nearly equal in their effect, but during winter, landslides, rain, and hikers were the main sources. We were unable to identify reasons for disturbance in many instances, but we suspect that non-human-related causes were responsible, such as falling rocks, since slides in this area are common. The marine salvage operation of April 1982 is separated from all other categories because of its unique effect on the seals (see report Pinniped Assessment 1983 Allen and Huber).

During censuses at Sea Lion Overlook and Bodega Rock, northern and California sea lions were flushed into the water ten times (Table 7). The source of disturbance was hiker, abalone diver, sailboat, and low flying helicopter (one occasion each), non-human (four times), and unknown (twice). Most often it was the immature California sea lions which headed into the water and then quickly (within a half hour) rehauled. The percent of days disturbed was 7.7% at Bodega Rock and 12.7% at Sea Lion Overlook. All of the disturbances with known human cause occurred during the spring. Of the non-human disturbances, three were caused by rock slides and one by the resounding splash of a northern sea lion bull as he dove off a rock.

Fishery Interactions

Fishery/pinniped interactions in Tomales Bay during the 1983-84 herring spawning season were minimal because few herring entered the bay to breed. Preliminary data revealed that only 10% of the fishing quota for Tomales Bay was reached in 1983-84 (Pacific Coast Federation of Fisherman's Association, Inc. 1984). On the five occasions when we monitored interactions (December 17, January 12, January 20, February 23, February

24), 5-20 harbor seals and 1-45 California sea lions were observed in the vicinity of fishing boats. Both species were observed actively maneuvering around boats as fishermen pulled nets from the water, but none were observed taking fish from the nets.

The interactions of pinnipeds with commercial gill net fishing operations from May through October 1983 were similar to 1982 (Allen and Huber 1983). We gathered information from various organizations involved in collecting beach-cast marine mammals to determine whether entanglement in set gill nets was incidentally killing marine mammals. Thirty-three dead pinnipeds washed ashore in Marin County between May and October, including 18 harbor seals and 15 California sea lions. More than 75% (14/18) of the dead harbor seals were small, either weaners or immatures, and therefore, more likely to become entangled in the nets since larger animals apparently could break away. Of the total, only three were fresh enough to identify traumas to the head. The others were too decomposed to determine cause of death; they were found, however, in close proximity to other marine mammal carcasses such as harbor porpoises (Phocoena phocoena) which had distinct gill net marks impressed on their skin. Nearly half (7/15) of the California sea lions found washed ashore were immature and four of those were also found in close proximity to other dead marine mammals, indicating death from gill net entanglement.

DISCUSSION

With the exception of Tomales Bay, harbor seals in the Point Reyes area

were not severely disrupted from their normal diurnal or seasonal haul out patterns by human disturbance. Primarily in Tomales Bay, but also in Drakes Estero, however, seals were more frequently disturbed than at coastal sites probably because these estuaries are more accessible to the public and because of the recreational pursuits offered there (Kaza 1984). The low incidence of disturbance to seals at Limantour Spit, normally a popular beach, was an artifact of the beach being temporarily inaccessible to the public during this two year study period. The primary sources for disturbance varied for each location, but, in general, recreational fishermen flushed seals more often than any of the other categories. Double Point was the only exception; here seals were equally disrupted by hikers, aircraft, and non-human causes. Fishing activities by park visitors in the vicinity of seal haul out sites ususally consisted of clam digging in estuaries and abalone diving at Bird Rock. Boats traveling close by haul out sites were the second major source for disturbance. In Tomales Bay, power and sail boats were the main type of craft responsible, and in Drakes Estero, kayaks/canoes and power boats were equally disturbing to seals.

The sources for disturbance observed in the Point Reyes area were much the same as those documented in other studies (Allen et al. 1984, Calambokidis et al. 1978 and 1983, Chapman 1979, Johnson and Jefferies 1977, and Paulbitski 1975, Risebrough et al. 1979). The unique attributes which attracted people to each of the areas studied, as well as the accessibility of each, dictated what activities were most likely to flush seals.

Spring was the time of year seals were most likely to be disturbed at all locations in 1983, even though recreational use of the Point Reyes

National Seashore is consistently heavy throughout the year (National Park Service 1978). Clam digging is legal in Drakes Estero and Tomales Bay year round (National Oceanic and Atmospheric Administration 1980); the level of use in Tomales Bay, though, is greatest from February through June when barges carrying up to 500 people per day run from Lawson's Landing to the sand bars of Toms Point. These are the months also when the tides are most favorable for clam digging. Spring tides are also frequently low enough for people to hike along the rocky shore to Double Point and for sport divers to easily collect abalone at Bird Rock.

The ability of seals to adjust to human activities was similar to findings in a study at Bolinas Lagoon (Allen et al. 1984) where seals sought alternate locations to haul out and usually rehauled within about 30 min. The recovery rate of seals in Tomales Bay, however, was much lower than that of the other sites. We did not conduct night-time censuses in Tomales Bay but would suspect that seal numbers may be higher then because this was the only site in the Point Reyes region with more seals present in the early morning than at mid-day (see report on Pinniped Assessment by Allen and Huber 1984). Paulbitski (1975) also found this to be the case for harbor seals at Strawberry Spit in San Francisco Bay.

Our information suggests that there is a relationship between harbor seal reproductive success and human disturbance. At both Tomales Bay and Drakes Estero, the pupping rates were depressed compared to Double Point and Tomales Point where disturbance levels were lower (see report on Pinniped assessment by Allen and Huber 1984). Slater and Markowitz (1983) also calculated a reduced reproductive rate for a harbor seal population in San

Mateo County compared to an undisturbed one in Santa Cruz County. At Bolinas Lagoon where seals are often disturbed, the reproductive rate was also depressed (Allen et al. 1984). The large percentage of pups removed by humans from Tomales Bay (16%) also compounds the deleterious effects of disturbance on pup survivorship. Many of the pups recovered by the CMMC were most likely separated/abandoned due to disturbance. If these pups are included in calculations, our estimate for the pup mortality rate is 22.2% (10/45) for Tomales Bay. The estimated pup mortality rate at Double Point was 13% in 1982 when an intensive marine salvage operation occurred, compared to 1977 and 1983, when the levels of disturbance were low, and the mortality rates were only 7.4% and 8.7%, respectively (Allen 1980, Allen and Huber 1983).

The sea lions at Sea Lion Overlook are naturally protected in their chosen haul out area since it is inaccessible to hikers because of steep cliffs and to boaters because of hazardous rocks and surf. Nonetheless, several hundred California sea lions stampeded into the water one day at the sound of a loud whistle from a sightseer on the cliffs 200 feet above. The source of most other disturbance (3/7) was small rock slides from crumbly cliffs. Sea lions were disturbed less frequently than harbor seals at all sites.

Fishery/pinniped interactions in Tomales Bay during the herring season were minimal in both 1982 and 1983 because the numbers of seals and sea lions near fishing vessels were low. Miller (1981) also found little interaction between pinnipeds and herring operations in Tomales Bay.

The incidental take of pinnipeds along with other marine mammals in

association with the commercial gill net fishing operations, however, has increased substantially in this area over the past three years. Public concern over this issue has been so great that recent legislation has been passed in California (Senate Bill 2266) to mitigate the adverse effects on marine bird populations. Concern has since increased, though, that measures to lower bird mortality have inadvertently increased mammal mortality (Marine Mammal Commission Annual Meeting, 1984). In general, restrictions were enacted on the length of net, depth of net set (which varies from 10 to 15 fathoms), and the number of fishing permits. The California Department of Fish and Game was authorized to continue a monitoring program to evaluate the effectiveness of these measures. Preliminary analyses of the Marine Mammal Commission and CDFG indicate that harbor seals are equally succeptible to entanglement at depths deeper than 15f and in all types of gear excluding small-mesh monofilament netting (Bishop 1983, Wild 1983). These findings suggest that current legislation is insufficient in curtailing the incidental take of pinnipeds in gill nets. Information is not yet available to determine whether this fishery is adversely affecting local harbor seal and California sea lion populations.

SUMMARY

The qualities that attract seals to Point Reyes to breed in large aggregations are numerous, including habitat and food availability. Likely another important reason is lack of human intrusion because most of these areas have not been developed nor are they readily accessible.

Consequently, reasons for preserving and protecting existing haul out locations are enhanced. Based on this two-year survey and a previous study, we have determined that with the exception of Tomales Bay and Bolinas Lagoon, the seals in Point Reyes presently do not experience levels of disturbance that severely disrupt their normal diurnal or seasonal haul out patterns. Note, however, that we were unable to assess the situation at Limantour because the beach was temporarily inaccessible to humans during this study. To maintain present low levels of human impact, a series of options are possible:

1. Posting of educational and informative signs regarding harbor seal behavior and sensitivity at the access routes of each haul out location. Most human-related disturbances that we observed were non-malicious in intent and were merely the desire to interact with wildlife by persons unaware of adverse effects those interactions might precipitate (e.g. pup abandonment). Signs were placed at the south end of Double Point in 1978 and have proven effective. Access routes would include access by foot and various boat launches in the vicinity of haul out areas, i.e. Lawson's Landing in Tomales Bay and Johnson's Oyster Farm in Drakes Estero.

2. Pamphlets including more detailed information on harbor seal behavior, haul out locations, and the effects of human disturbance could be available at various facilities in the Point Reyes National Seashore frequented by visitors.

3. Restriction of future access to seal haul out areas. This would include plans for boat ramps in Drakes Estero providing increased access for power and non-power boats.

4. Because Tomales Bay has already been identified as a sensitive area, special programs could be instituted there to minimize existing human pressures. We, therefore, recommend more frequent patrolling of this area on weekends during the clam digging season by personnel responsible for the enforcement of the Marine Mammal Protection Act. Another option would be to encourage the owners of Lawson's Landing to transport clam diggers to sand bars other than the primary haul out areas used by seals during the peak pupping season during April and May.

5. Primary haul out sites should be monitored on an annual basis during the pupping season to determine the health of this major population. If censuses were conducted in early May, one could determine whether the reproductive success of the population was similar to or depressed in comparison to this study period.

6. Support continued monitoring efforts by the California Department of Fish and Game of commercial gill net fishing operations in the area, because the potential adverse effects are likely high.

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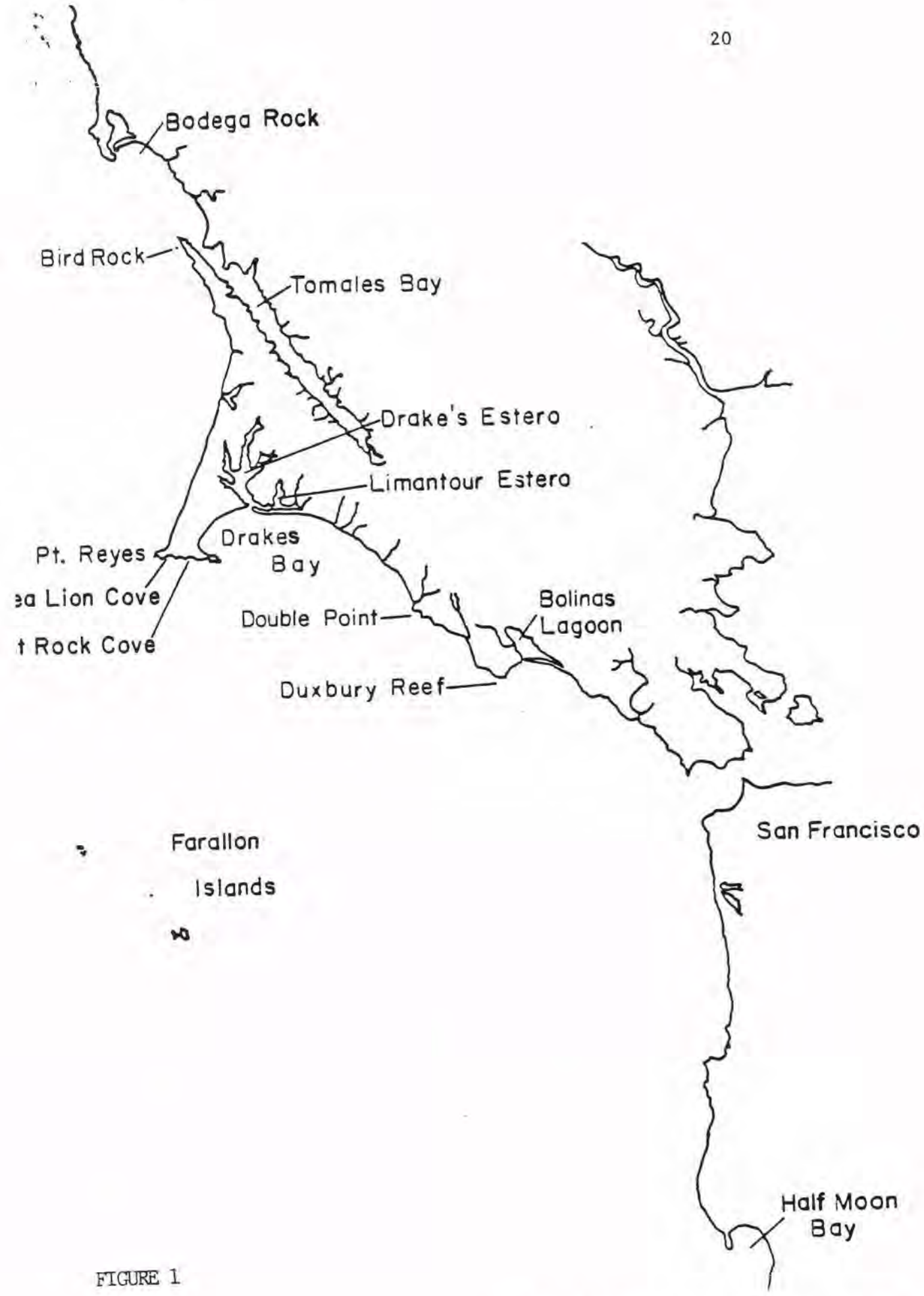
Bodega Rock
Bird Rock
Tomales Bay
Drake's Estero
Limantour Estero
Drakes
Bay
Pt. Reyes
ea Lion Cove
t Rock Cove
Double Point
Bolinas
Lagoon
Duxbury Reef
Farallon
Islands
San Francisco
Half Moon
Bay

FIGURE 1

Table 1. The occurrence of disturbance to harbor seals at four major haul out sites in Point Reyes, March 1983 - March 1984.

	LOCATION					
Sources	Tomales Bay	Bird Rock	Drakes Bay	Limantour	Double Point	All Sites
Hiker	6	1	7	0	9	23
Fisherman	22	8	12	0	1	43
Boat	13	1	9	1	0	24
Aircraft	0	1	0	0	3	4
Dog	2	0	0	0	1	3
Non-human	0	0	3	0	4	7
Unknown	0	0	1	0	2	3
Totals	43	11	32	1	20	107
Days Disturbed	19	9	13	1	15	57
Days Censused	46	44	45	45	59	239
% Days Disturbed	41.3	20.5	28.9	2.2	25.4	24.0

Table 2. The level of disturbance by season to harbor seals at four major haul out sites in Point Reyes, 1983 - 1984.

	LOCATION				
	Tomales Bay	Bird Rock	Drakes Estero	Double Point	Totals
Spring					
Days Disturbed	14	5	8	10	37
Total Census Days	17	19	17	30	83
% Days Disturbed	82.4	26.3	47.1	33.3	45.0
Summer					
Days Disturbed	4	2	2	1	9
Total Census Days	12	11	14	14	51
% Days Disturbed	33.3	18.2	14.2	7.1	18.0
Winter					
Days Disturbed	1	2	3	4	10
Total Census Days	10	14	14	14	52
% Days Disturbed	10.0	14.2	21.4	28.5	19.0

Table 3. A summary of the effects of disturbance on harbor seals in Point Reyes, 1983-84.

	LOCATION				
	Tomales Bay	Bird Rock	Drakes Estero	Double Point	Totals
Total Disturbances	43	11	32	20	106
Times Not Rehaul	18	0	5	3	26
% Times Not Rehaul	42.0	0	15.5	15.0	24.5
% Times Rehaul	58.0	100.0	84.5	85.0	75.5
Times Use Alternate Site	12	3	1	0	16
Times Pups Separated	3	2	3	3	11
Total # Pups Separated	3	2	3	8	16
Total Pups Dead	3	5	2	23	33

Table 4. A comparison of the frequency of "head alerts" per minute at each harbor seal haul out site using one-way analysis of variance with Scheffe's Test for multiple comparisons; df = degrees of freedom, SS = Sums of Squares, MS = Mean Square.

Source	df	SS	MS	F	F-probability
Total	63	8.91			
Alerts/min	3	1.64	0.55	4.51	0.006
Error	60	7.27	0.12		

Area	Mean	Sample Size	Separation
Drakes Estero	.276	17	a
Tomales Point	.350	8	ab
Double Point	.447	19	ab
Tomales Bay	.680	20	b *

* Significant at $\alpha = 0.05$

Table 5. The average monthly percentage of disturbance days to total census days at Double Point combining data from 1976 to 1984; $\bar{x}$ = mean percentage for each month, SD = standard deviation, and N = number of years.

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
$\bar{x}$	34.3	40.7	41.7	53.2	32.9	27.6	40.3	58.3	30.6	26.2	8.3	27.0
SD	41.3	34.5	26.0	27.8	24.9	33.5	33.5	34.6	24.5	38.3	20.4	38.9
N	9	9	9	9	9	8	6	6	6	7	6	6

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Table 6. A summary of disturbances to seals at Double Point by season, 1976 to 1984; TD = total disturbances, TCD = total census days, DD = days seals were disturbed, and %DD = the percentage of disturbance days to total census days.

	SOURCE										
	Hiker	Boat	Fisherman	Aircraft	Non-Human	Unknown	Marine Salvage	TD	TCD	DD	%DD
Spring											
Number	21	2	1	30	20	18	8	100	190	75	39.5
% of Total	21.0	2.0	1.0	30.0	20.0	18.0	8.0	61.4			
Summer											
Number	6	6	3	6	4	20		45	75	29	38.7
% of Total	13.3	13.3	6.7	13.3	8.9	44.4		27.6			
Winter											
Number	6	0	1	1	5	5		18	60	16	26.7
% of Total	33.3	0	5.6	5.6	27.8	27.8		11.0			
Total Disturbances for each category											
Number	33	8	5	37	29	43	8	163	325	120	36.9
% of Total	20.2	5.0	3.1	22.7	17.8	26.3	5.0				

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Table 7. Disturbance to California and northern sea lions at Sea Lion Overlook and Bodega Rock in Point Reyes, March 1983 to March 1984.

Sources	Sea Lion Overlook	Bodega Rock
Hiker	1	0
Fisherman	0	1
Boat	0	1
Aircraft	1	0
Dog	0	0
Non-human	4	0
Unknown	1	1
Days Disturbed	6	2
Days Censused	47	26
% Days Disturbed	12.7	7.7

DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Pollution Studies of Drakes Estero, and Abbotts Lagoon Point Reyes National Seashore, California, USA

by

Roberto J. Anima[1]

Open File Report 91-145

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Stratigraphic Code. Any use of trade, product or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

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Acknowledgments

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Pollution Studies of Drakes Estero and Abbotts Lagoon Point Reyes National Seashore, California

Abstract

Pollution Studies of Drakes Estero and Abbotts Lagoon were initiated as a research project on the sediments of Drakes Estero. The National Park Service (NPS) wanted to further the baseline study to include a compilation of information on possible pollution and sedimentation inputs into Drakes Estero and Abbotts Lagoon. The study called for a compilation of literature of research conducted on lagoons and estuaries of the Pacific Coast of the United States. The study investigated sedimentation patterns and sediment accumulation rates for the two areas, the amounts of herbicides and pesticides in the sediment of the systems, and the concentrations of plant nutrients in creeks entering the the study sites during storm events.

The study compiled an annotated bibliography, with over 490 entries, of literature on research conducted in lagoons and estuaries of the West coast of the United States (Anima, 1990). Based on interpretations of geophysical records, Pb^{210} and $Carbon^{14}$ dating, the study determined that sediment input into Drakes Estero and Abbotts Lagoon over the last 8,000 years was about 35 cm/100 yrs, and fluctuated from 12 cm/100yrs to 30 cm/100yrs over the last 120-150 years.

Sedimentation rates calculated for the two study areas are similar to sedimentation rates calculated by other researchers working in similar environments. Laboratory analysis of sediment samples collected on the upper reaches of Drakes Estero and the bottom of Abbotts Lagoon indicate that the amounts of herbicides and pesticides is below the limits for ingestion by organisms as set by the National Academy of Sciences and the Environmental Protection Agency.

The nutrient study indicates that conductivity values were higher during storm events of water year 1988, probably due to washout of soil salts built over the summer. Hagar (1990) has a complete report on the nutrient study.

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Section I Introduction

There are few areas along the California coast where man has not had a significant impact on the estuarine or lagoonal environment. Drakes Estero and Abbotts Lagoon, to a degree, are exceptions to this in that they are in a nearly natural setting. However, even here the effects of human intrusion may exist. This study investigated the environmental and chemical inputs into Drakes Estero and Abbotts Lagoon to determine if the area has potential pollution problems that need to be addressed. The results of the study have potential application to other lagoons and estuaries along the Pacific Coast of the United States.

Drakes Estero and Abbotts Lagoon are part of Point Reyes National Seashore, located approximately 45 km northwest of the mouth of San Francisco Bay and 30 km south of Bodega Bay Harbor (fig. 1). The land around Drakes Estero, originally part of the Berry Spanish land grant, consists of farm lands used for grazing dairy and beef cattle. The area came under the control of the National Park Service in 1962 when 259 km^2 (64,000 acres) of land were acquired. Today the area includes 284 km^2 (70,187 acres) of land (Don Neubacher,

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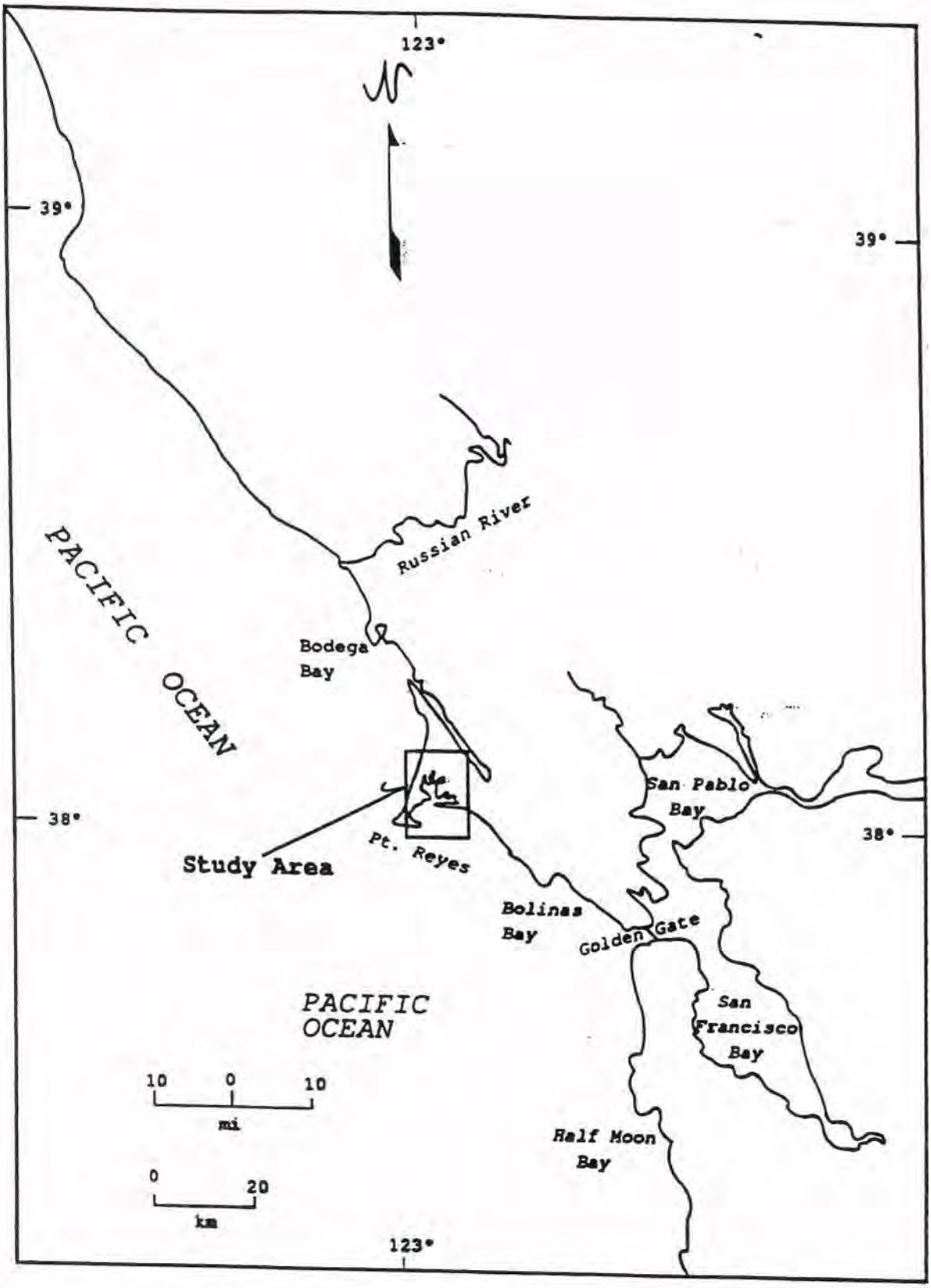

Figure 1. Map show location of the study area.

Point Reyes National Seashore staff, 1990, personal communication). The National Park Service attempts to protect the natural beauty of the area and preserve it for the good of the visiting public. This research was conducted to develop a baseline of environmental characteristics and monitor the area to identify potential future problems and what can be done to maintain the area in its nearly natural state.

1. Background;

Drakes Estero and Abbotts lagoon are aesthetically very pleasing localities, for which the National Park Service bears the responsibility for formulating a comprehensive management plan to benefit the thousands of visitors that visit the park yearly and to preserve the seashore environment.

This report results from a two year study requested by the National Park Service, Point Reyes National Seashore, to investigate pollution inputs into Drakes Estero and Abbotts Lagoon. The work was conducted by the U.S. Geological Survey with funding provided by the National Park Service under a two-phase program.

This study utilized coring, bathymetric profiling, geophysical profiling, and chemical and physical sediment analyses to establish an overall sedimentologic and pollution input baseline. This information can be used to support or initiate ongoing monitoring and management programs. The

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study gathered over 18 km of geophysical and bathymetric tracklines, 48 vibracores, 26 box cores, sediment size analysis was conducted on 39 sample sites. Of the 48 vibracores, 14 cores were selected for herbicide and pesticide analysis as well as for PB^{210} analysis. Numerous SCUBA dives were made both to obtain box and vibracores and to make visual observations.

The first year was directed at conducting a pollution study focused on herbicide inputs, later expanded to include pesticide inputs, and the compilation of an annotated bibliography. The second year examined nutrient inputs from surrounding grazing land and sedimentation rates in the lagoons.

The research benefited from two previous years of work on sediment textural variations and inlet morphological changes of Drakes Estero (Anima, 1989). Abbotts Lagoon was added to the research area when the pollution studies project was started.

2. Field Procedures

The initial work on the sediments and morphology of the study area was conducted during the summer months of 1984-86. During this time vibracores, box cores, lagoon inlet surveys, observational SCUBA dives, and geophysical profiling was conducted. Most of the coring and all of the diving and seismic profiling were done from the R/V Fast Eddy, a 6.4 m (21 ft) boat, with support for the vibracoring from a 4.0 m

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(13 ft) boat. The oyster farm located on Schooner Bay (fig. 2) served well as an accessible launch site for the boats when the tides were sufficiently high.

a. Navigation - Navigation and surveying stations on-land were initially surveyed to existing bench marks. Stations were selected according to accessibility, the ability to tie the point to an existing survey marker, and maximum visibility from the areas being worked. The stations allowed for precise coring site locations with the use of a surveying instrument, and geophysical trackline locations with the use of navigation trisponders. Geophysical tracklines were restricted by channel depths and the location of dense beds of *Zostera marina*, which fouled the electronic equipment rigged over the side of the survey vessel. The tracklines were run in a manner that would give the optimum coverage over the tidal channels, but were restricted to the deeper tidal channels in which the research vessel could transit.

Three U.S. Coast and Geodetic Service bench marks provided reference points of navigation (fig. 2) These bench marks were utilized to locate four temporary survey stakes with a Hewlett Packard 3802a Total Station. This instrument uses infrared light reflected off of either a single prism or prism array to give horizontal distances, vertical elevation differences, and azimuth readings from a pre-set zero mark, such as a known north point or another survey stake. When

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the total station was not available, a nautical sextant was used from the boat to triangulate between flags set up at the survey stakes. The survey stakes aided in locating coring sites, geophysical profile lines, and dive sites, and in barrier spit surveying.

When conducting geophysical surveys from a boat a Del Norte 504 navigational system was used. This system uses microwave trisponders (transmitters) located at known reference points that interact with a boat-mounted receiving antenna to measure distances between trisponders for exact location. The trisponders were set up at the U.S. Coast and Geodetic Survey bench mark at the west end of the entrance and at each of the three temporary survey stakes. The boat-mounted trisponder was connected to a microprocessor with paper recorder. The system tracked the exact location of the boat that was simultaneously collecting geophysical and bathymetric records. Accuracy of the system in this configuration is within 1 m.

b. Geophysical Profiling High-resolution single-channel seismic reflection profiles totaling 18.8 line km were run in Drakes Estero to provide a graphic representation of the shallow subbottom (fig. 3) These profiles were obtained with an EG&G double plate Uniboom system with a power output of 600 J. A one-quarter second sweep rate was used for all profiles. The incoming signal was filtered and

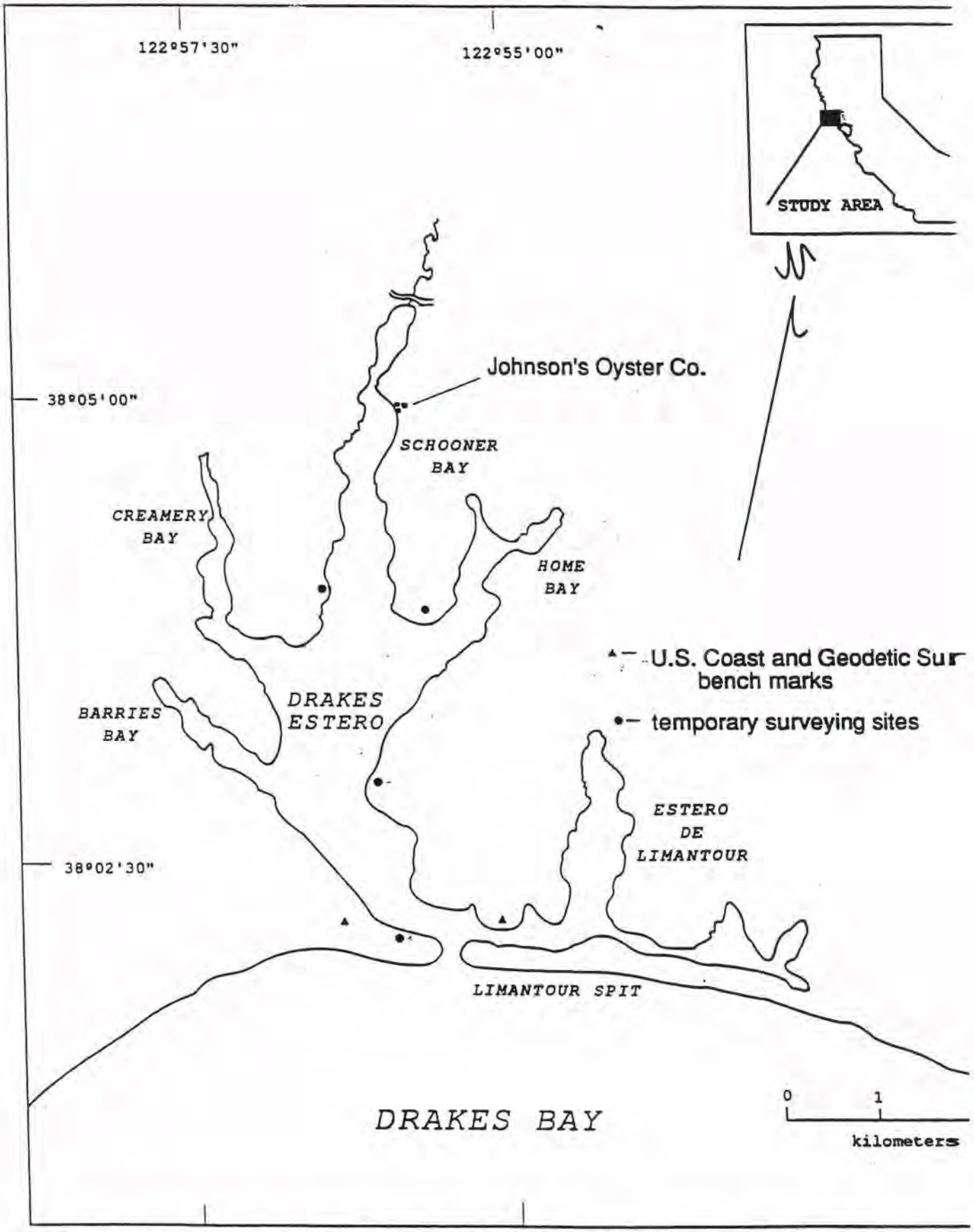

Figure 2. Location of bench marks and temporary survey stations in both surveying of the spits and in running geophys surveys in Drakes Estero.

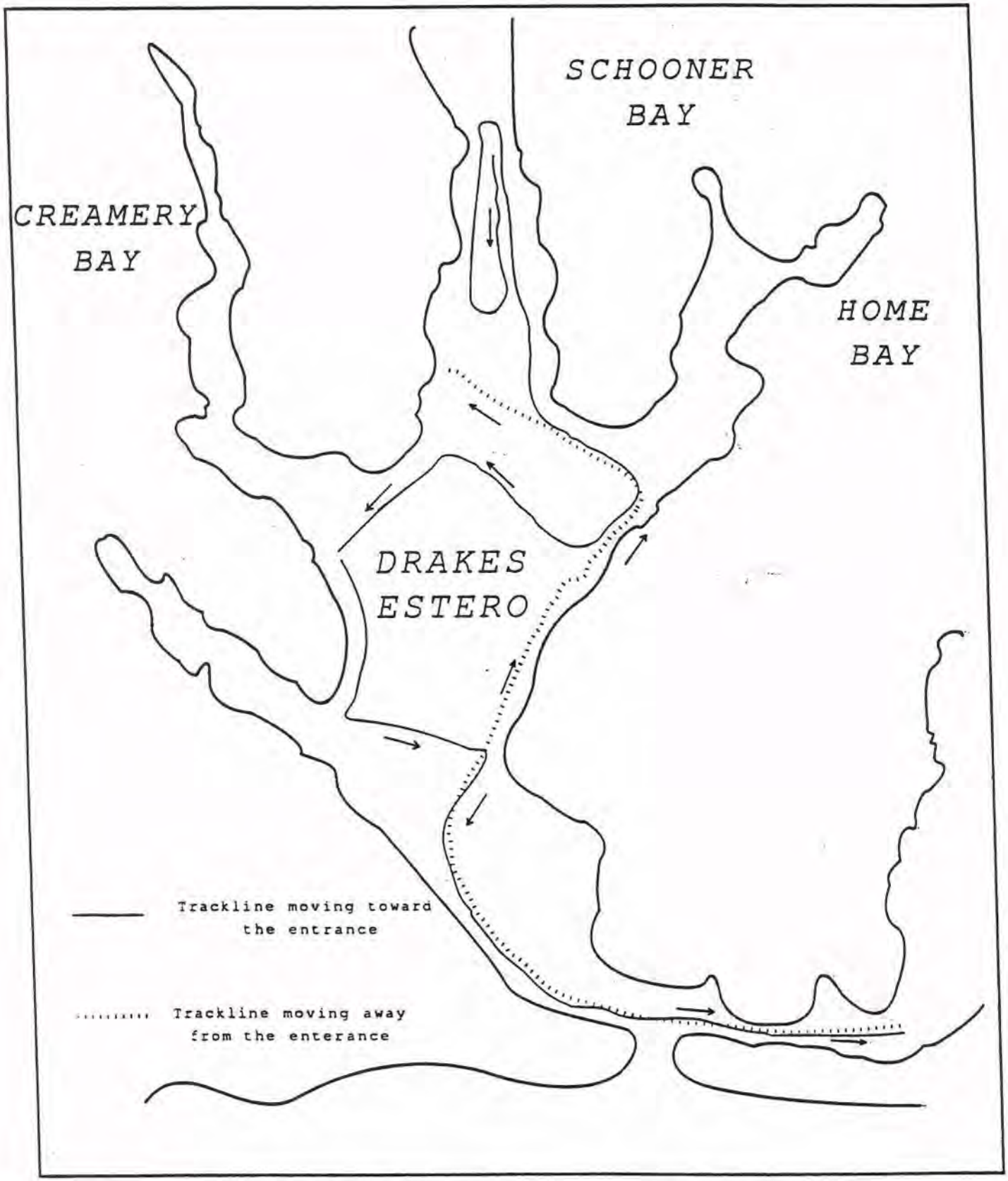

Figure 3. Map showing geophysical and bathymetric tracklines in Drakes Estero.

pre-amplified between 550-1200 Hz. The system was also equipped with a 3-element hydrophone, 502 amp amplifier, and an EPC-4100 graphic recorder. The seismic profiles were run with accompanying bathymetry to aid in geophysical record interpretation by comparing water depths. Event marks were coordinated using radio communication to keep reference points for integration of navigation, geophysics, and bathymetry records.

c. Bathymetry Twenty line kilometers of bathymetric records were acquired in Drakes Estero (fig. 3), and 6.2 line kilometers in Abbotts Lagoon (fig. 4). Bathymetric tracklines were run using a Lowrance X-15B computer sonar with variable scale. Examples of bathymetry records (Appendix A1) used to produce the preliminary bathymetric map of Drakes Estero (fig. 5) show in detail those areas where subaqueous bedform features are found in the main channels of the estero. The preliminary bathymetric map of Abbotts Lagoon (fig. 6) was produced from bathymetric records shown in Appendix A2, (refer to trackline maps and bathymetric profiles). The bathymetric profiles were used to produce the sediment textural maps (Appendix B) with information gathered by sediment sampling and diving. All tracklines were tied into surveying stations using event marks coordinated through radio communication.

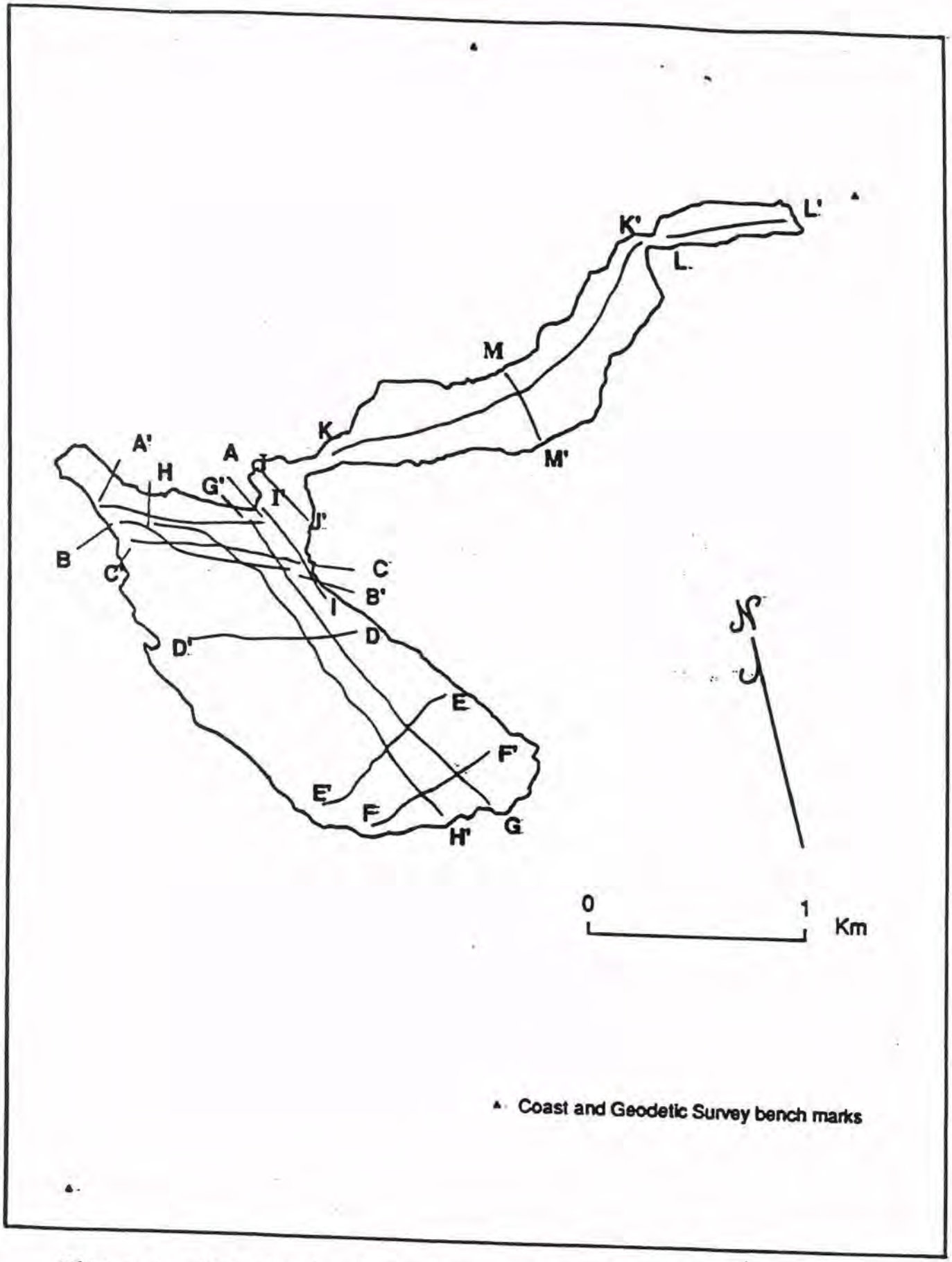

Figure 4. Map showing bathymetric tracklines in Abbotts Lagoon.

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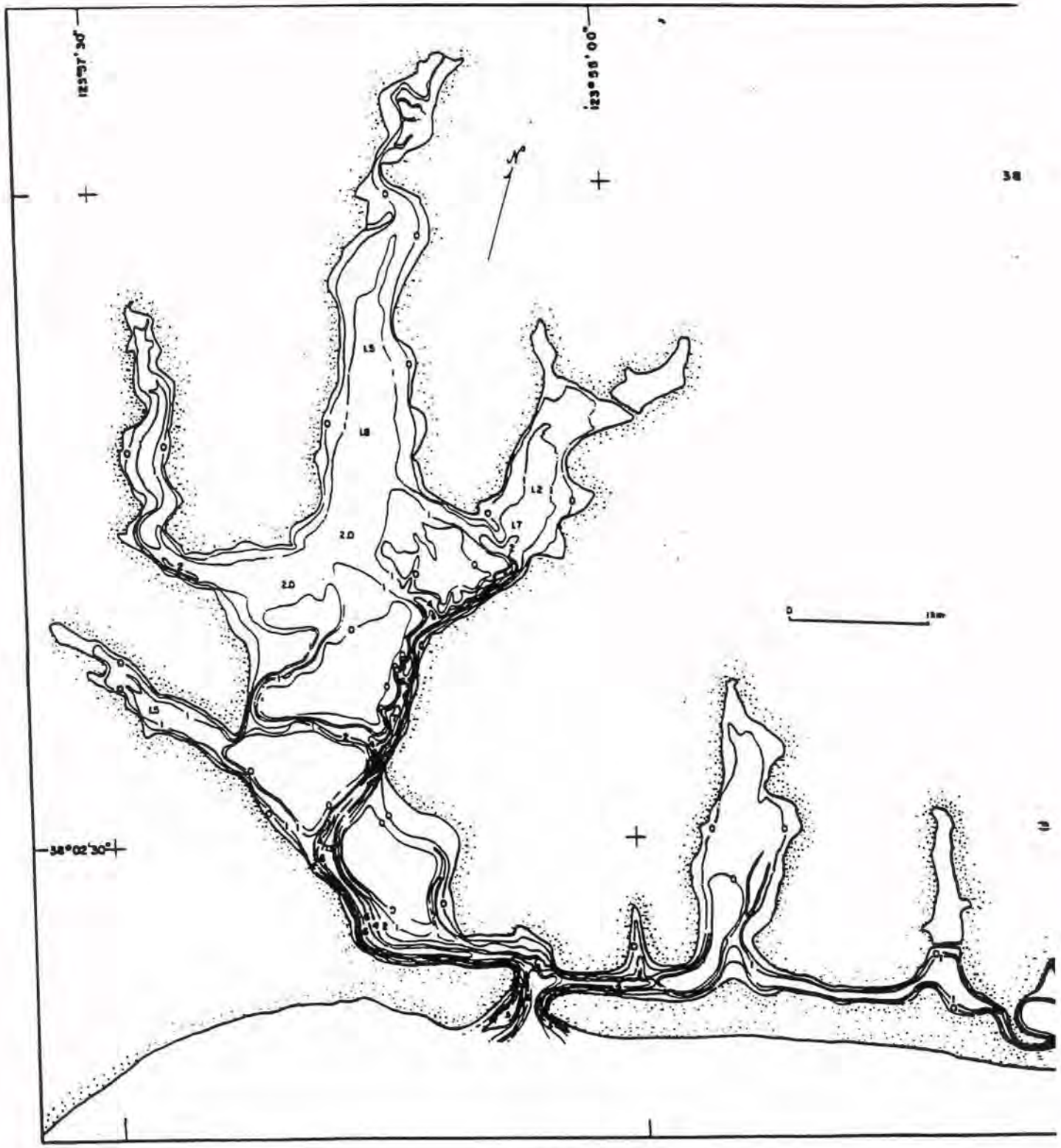

Figure 5. Preliminary bathymetric map of Drakes Estero.

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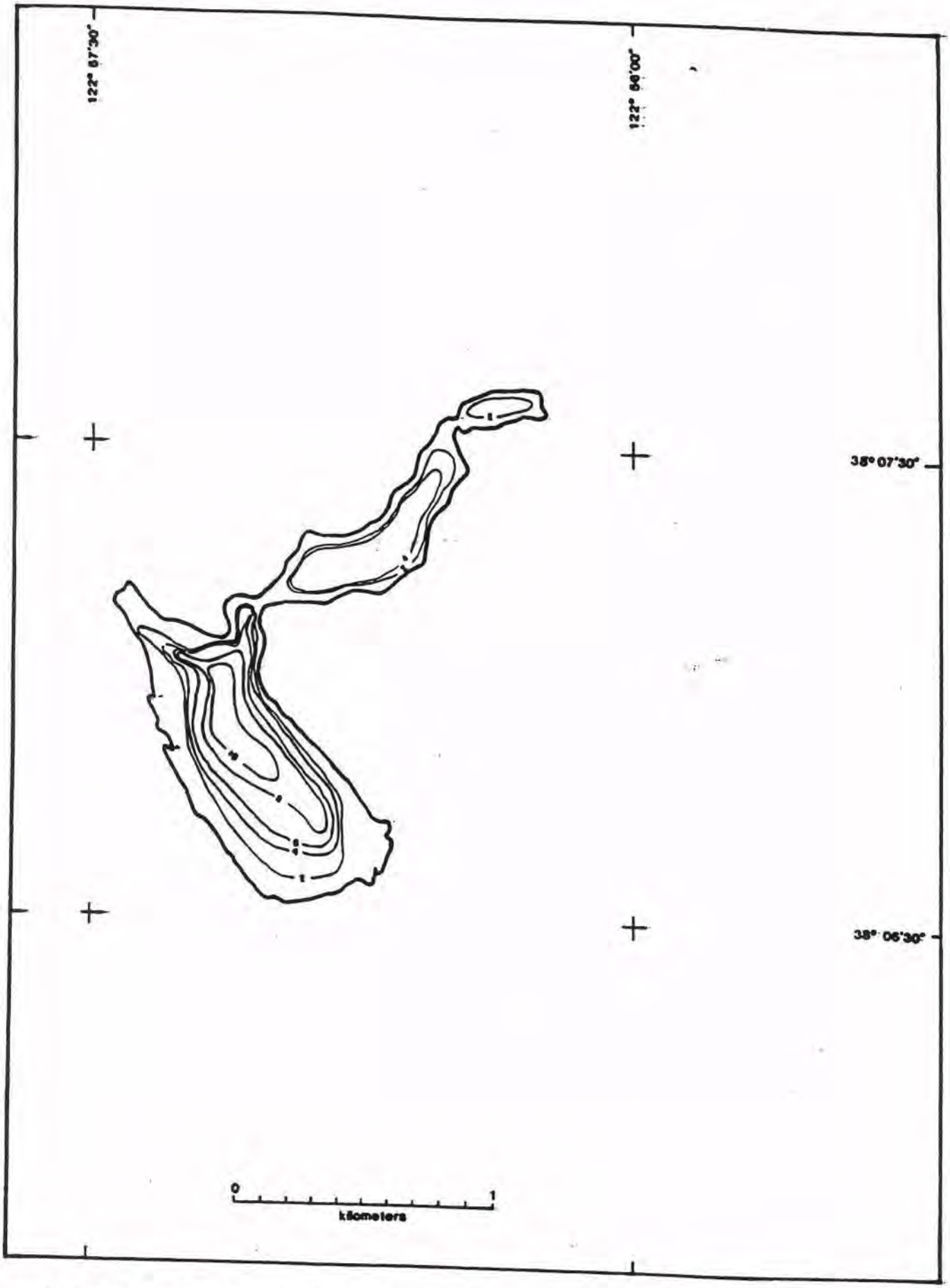

Figure 6. Preliminary bathymetric map of Abbotts Lagoon.

d. Coring - Three types of coring devices were utilized to collect sediment samples. Senckenberg box cores (8 cm X 16 cm X 21 cm), were used to acquire sediment samples of the uppermost part of the sediment column (Bouma, 1964, 1969; Clifton, 1971). A sliding-hammer type of coring device was used to collect 8.5 cm diameter tube cores, and a hydraulically powered vibracorer having a 24 kg jackhammer was used to collect 7.45 cm diameter aluminum tube cores. The best penetration achieved by either tube coring system was 2.20 m. The cores were collected over a three summer period. Sediment samples were taken from the cores to run the various laboratory analyses required. Selection of coring sites (Appendix C) was based on environmental characteristics and the potential of the core to give the most representative sedimentologic and stratigraphic example of the depositional setting. The selection of sub-samples used for sediment textural analysis, age dating, and herbicide and pesticide analyses was dictated by the requirement of the analysis procedure being utilized. The age dating and herbicide and pesticide analyses required the finest grain sizes for optimal results.

3. Estuary Uses

a. Surrounding Farmland - Six ranches surrounding Drakes Estero support an approximate total of 1,185 head of cattle. (Table 1). The Murphy (340 head of cattle), Gallagher (200 head of cattle), and Horic (370 head of

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cattle) ranches are the largest ranches adjacent to the estero. The Nunes (100 head of cattle), and Lunny (175 head of cattle) ranches utilize very little range land on the estero (Point Reyes National Seashore personnel communication, 1988).

Abbotts Lagoon is surrounded by three ranches: McClures (590 head of cattle), Evans, (200 head of cattle), and Lunny (175 head of cattle), totalling 965 head of cattle. The Lobaugh ranch is located within the Abbotts Lagoon drainage basin and has 450 head of cattle.

b. Oyster Industry - The Johnson Oyster Company has grown oysters on Drakes Estero since 1940, and, prior to that time, the Drakes Bay Oyster Company conducted oyster farming in the early 1930's (Barrett, 1963). The lagoon offers an environment suitable for a mariculture industry. Presently the lagoon supports approximately 26 racks, 20 beds of staked oysters, and an unknown number of bagged oysters on its subtidal channels and intertidal flats. The main headquarters for the company is located on the upper northeast shore of Schooner Bay. The company supports approximately 25-30 employees involved in various aspects of the industry.

c. Recreation - The estero is infrequently used as a launching point for canoes, and kayaks. Clams are dug on the intertidal flats during the lower tides of the year. The

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Table 1. Numbers of livestock on Ranches surrounding Dr Estero and Abbotts Lagoon

Drakes Estero	Head of Cattle(*)	Acres(#)	Hectares (Ha)	Animals Per/Ha
Murphy	340	3,012.82	1,219.77	.
Gallagher	200	1,656.27	670.55	.
Horic	370	1,211.41	490.45	.
Nunes	100	1,472.40	596.11	.
Abbotts Lagoon				
McClures	590	1,691.97	685.00	-
Evans, Grossi, Rodgers	200 + ~13 goats	2,745.00	1,111.34	-
Lunny	175	<1,473.92	596.73	-

*- Based on data provided by the National Park Service

#- Based on 1960 land ownership (Mason,1970)

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Park Service has maintained a trail system around the estero that allows hikers to enjoy the beauty of the estero itself.

Section II. Hydrology and Morphology of the Study Area

1. General Description

a. Drakes Estero - Local geomorphology and recent offshore surveys (McCulloch , 1984) indicate that Drakes Estero is the exposed part of a drowned stream valley that was inundated during the post-Wisconsinan sea-level rise. In its present configuration, it represents a stage of sedimentary filling intermediate between a broad unfilled trough with poorly developed intertidal flats and marsh, like Tomales Bay, and of a basin that has been extensively filled with broad intertidal marsh and flats, like Elkhorn Slough.

The estero is protected from the open coast by Limantour Spit (fig. 7), a barrier 4.1 km long by approximately 200 m wide covered by beach dune ridges. The inlet to the estero has migrated in an east to west direction and then reversed during historic times. Figures 7 and 8 show a comparison of historic maps, photographs, and recent surveys of the entrance of the estero. During the course of this study, surveys of the barrier spits were conducted and the barriers were found to have migrated approximately 80 meters in 1 year. Historic map comparisons show up to 800 meters of spit building to the east over a twenty year period. The variation of the

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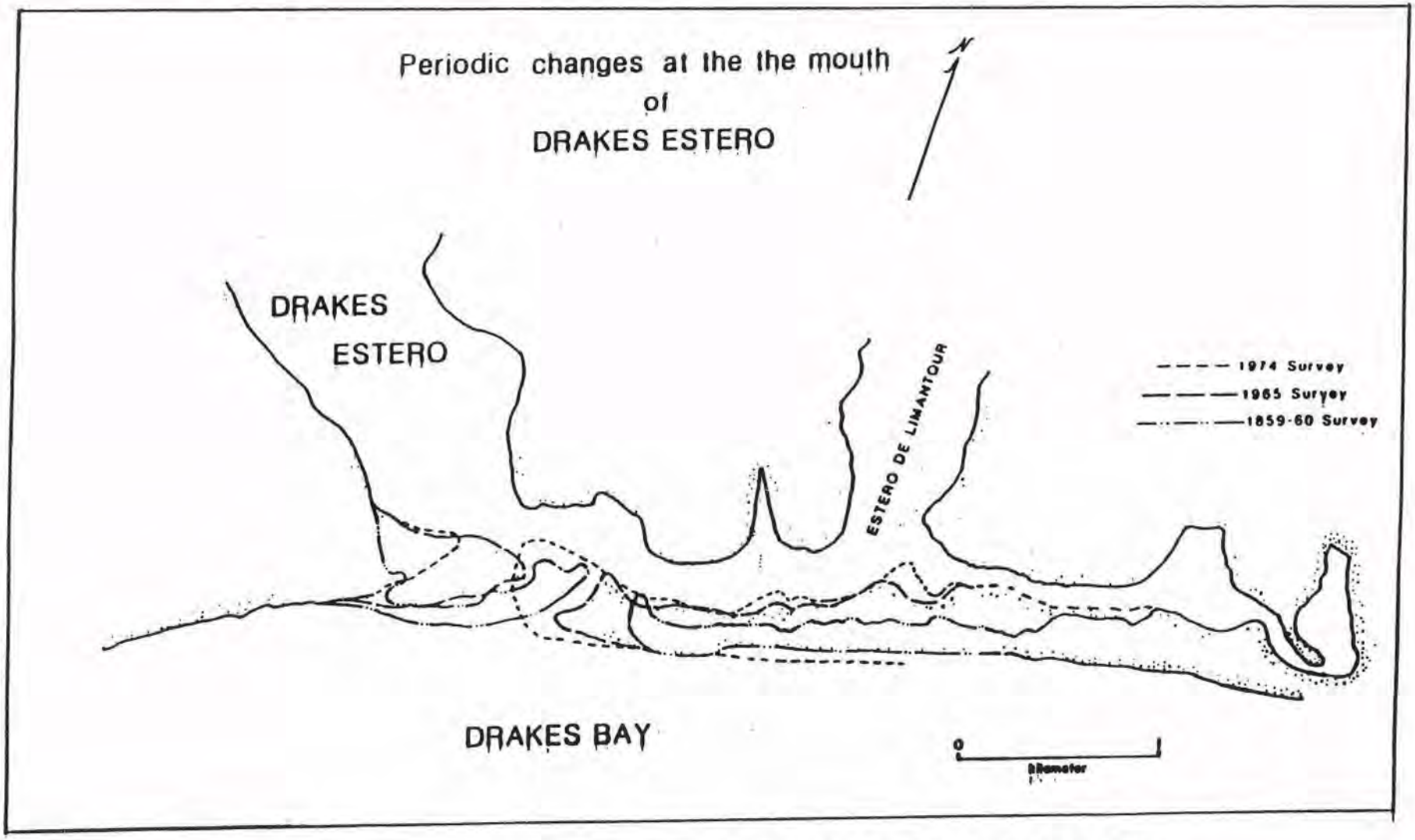

Figure 7. Map showing changes in the inlet to Drakes Estero compiled from both aerial photographs and historic

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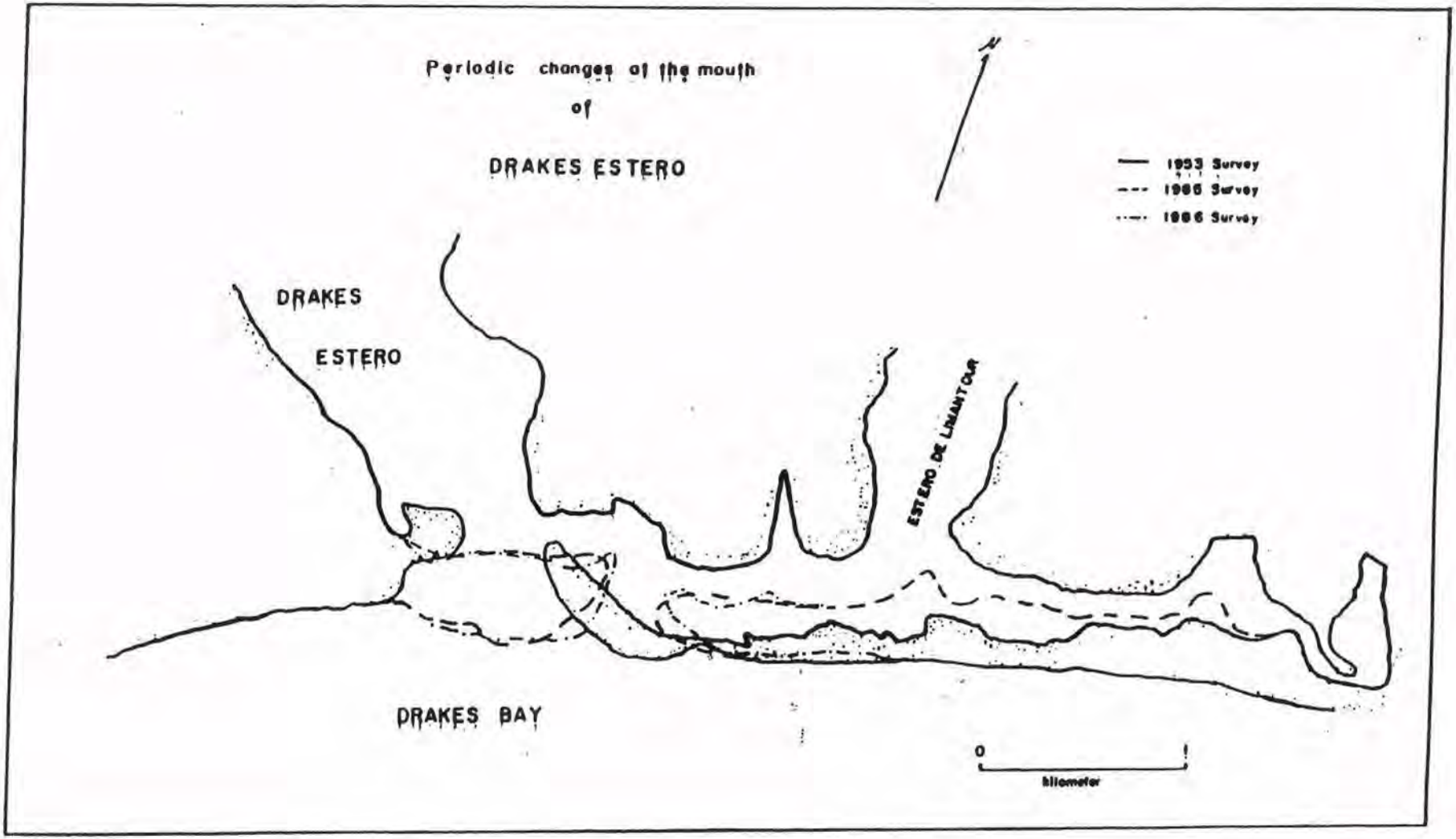

Figure 8. Map showing changes at the entrance to Drakes Estero as compiled from historic maps and surveys conducted in 1985 and 1986.

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position and depth of the entrance of the estero has a significant role in the sediment distribution within the lagoon.

The estero is defined as a coastal lagoon because of the minimal influx and dilution of sea water by fresh water. The estero consists of five branching bays that have intertidal mud flats and sand flats around their margins. The branching bays converge into a central area that also has sandy to muddy intertidal flats along its margins and three large sand to silty sand intertidal flats in the central area. From west to east within the estero the branches are; Barries Bay (.35 km^2), Creamery Bay (.54 km^2), Schooner Bay (1.58 km^2), Home Bay (.77 km^2), and Estero de Limantour (.91 km^2) (Table 2). The total area of the lagoon at higher high tide is 9.4 km^2. Of this area, approximately 4.8 km^2 consist of intertidal flats that are exposed during low tide. Maximum water depths in Drakes Estero were found at the entrance and near the first major bend in the main channel west of the inlet, where the water depth is between 7.0 and 7.9 m (fig. 5)

b. Abbotts Lagoon - The Abbotts Lagoon system is composed of two arms that range in depth from 11.0 m to 2 m, and have a combined area of approximately .91 km^2 (fig. 6). The largest (approximately .64 km^2) and deepest (11 m near its center) arm lies closest to the ocean. Normally it is not open to the sea and is not tidally influenced, but occasionally Abbotts Lagoon has opened to the sea either by

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natural erosion or by digging through the barrier by the local inhabitants. The last known breach of the barrier is reported to have occurred in 1982 when a combination of high rainfall and large waves eroded the barrier bar causing most of the water in the oceanside arm to drain (Evans, D, 1988, personnel communication). The upper arm extends to the northeast from the main arm. This arm has an area of approximately 0.64 km^2 and a maximum depth of 5.9 m (fig. 6). At its upper end a small unnamed stream flows into it from the northeast.

c. Tides and Currents -

The tides in the study area are semidiurnal with a tidal range of between -2.0 to 2.2 meters in Drakes Estero. The highest currents measured were near the mouth of the lagoon and ranged between 32 cm/sec. and 46 cm/sec (Table 3). The tidal currents have formed an ebb tidal delta at the entrance of the lagoon that extends 400 meters into Drakes Bay. Inside the entrance there is no typical flood tidal delta, but as will be detailed later, the intertidal flats located inside the mouth might be the remnants of a former flood tidal delta.

Abbotts Lagoon is not tidally influenced and is not normally open to sea, although sedimentary features in the lagoon adjacent to the location of the most recent (1982) break in the barrier are remnant berm overwash features that developed as the barrier closed (Appendix A2, lines B-B', & C-C').

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Table 2. Current Measurements

Current measurements were taken just inside the mouth of the lagoon and along the straight portion of the main channel. Measurements were taken during an ebbing tide.on August 16,1986.

Current measurements at a point just inside the mouth:

Time	Distance (m)	time (t^1)	Velocity (t^2) (cm/sec.)
0930	30	1 min 33 sec.	32.3
0955	30	1 min 21 sec.	37.0
1003	30	1 min 21 sec.	37.0
1011	30	1 min 13 sec.	41.1
1016	30	1 min 08 sec.	44.1
Measurements along the main channel at trisponder station 2 (Refer to Figure 2)			
1110	30	1 min 14 sec.	40.5
1113	30	1 min 04 sec.	46.9
1125	30	1 min 05 sec.	46.2
		average Velocity	40.6

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Table 3. Drainage Basin Area for Drakes Estero and Abbotts Lagoon Water shed area

Location	Drainage area (km^2)
Glenn brook creek	5.68
Barries Bay	3.43
Creamery Bay	5.71
Schooner Bay	12.83
Home Bay	11.68
Estero de Limantour	7.59
Total drainage area	46.92
Abbotts Lagoon	10.51

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b. Streams - Six perennial streams flow into the Drakes Estero system: Summit Creek, Bayview Creek, Glennbrook Creek, a small unnamed creek that flows into Estero de Limantour, Home Ranch Creek, and the stream that roughly parallels Sir Francis Drake Highway and flows into Schooner Bay. Four ephemeral streams flow into the system, including two small creeks west of Home Ranch Creek that flow into Home Bay and small creeks that flow into Creamery and Barries Bays. The creeks drain into Drakes Estero from the high-relief topography that surrounds the estero (fig. 9) and flow into the estero at the heads of each of its five bays.

Abbotts Lagoon has two small unnamed streams that drain the surrounding rolling topography. One empties into the southern end of the ocean-side arm, the other flows into the uppermost onshore arm (fig. 10).

The total drainage basin area of Drakes Estero is approximately 46.9 km^2 (Table 2), and the total drainage basin area of Abbotts Lagoon is 10.5 km^2. The average stream gradient is 90 m/1000 m with an average stream discharge of $<10\ m^3\ s^{-1}$, (Johnson, 1976).

e. Salinity - Water sampling in Drakes Estero was conducted during October 1987 and again on September 1988. (refer to fig. 26, & 27 for sampling sites). The salinity differs little in water samples collected in the upper intertidal zone and on the open coast (Table 4).

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Abbotts Lagoon is a brackish or nearly fresh water lagoon with some increase in the salinity in its bottom waters from 1984 to 1987. The northeastern arm is less saline than the main arm and the salinity in the lagoon overall was less in 1989 than in 1987 (refer to tables 5, & 6, and fig. 12).

Section III. Results

General Description

Site selection was important for sediment samples destined for laboratory analysis in that fine-grained materials give optimal results for Pb^{210}, herbicide, and pesticide analysis. For this reason the cores selected for those analysis were obtained form the upper intertidal areas of Drakes Estero, and from the cores from Abbotts Lagoon that contained the finest grain sizes. The herbicide and pesticide analysis was conducted by the U. S. Geological Survey Water Resources Division Central Laboratories in Denver Colorado under Schedule 1305 for the herbicides, and Schedule 1325 for pesticides.

Samples collected for nutrient and grain size analysis were collected either from the creeks selected for monitoring or from cores collected from the study area.

1. Sediment

Textural analysis was conducted on thirty box cores, tube cores or grab samples collected in Drakes Estero (fig. 13) and nine samples from Abbotts Lagoon (fig. 14). Samples

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Figure 9. Topographic map of the area surrounding Drakes Estero showing the streams that flow into the estero and the relief of the area.

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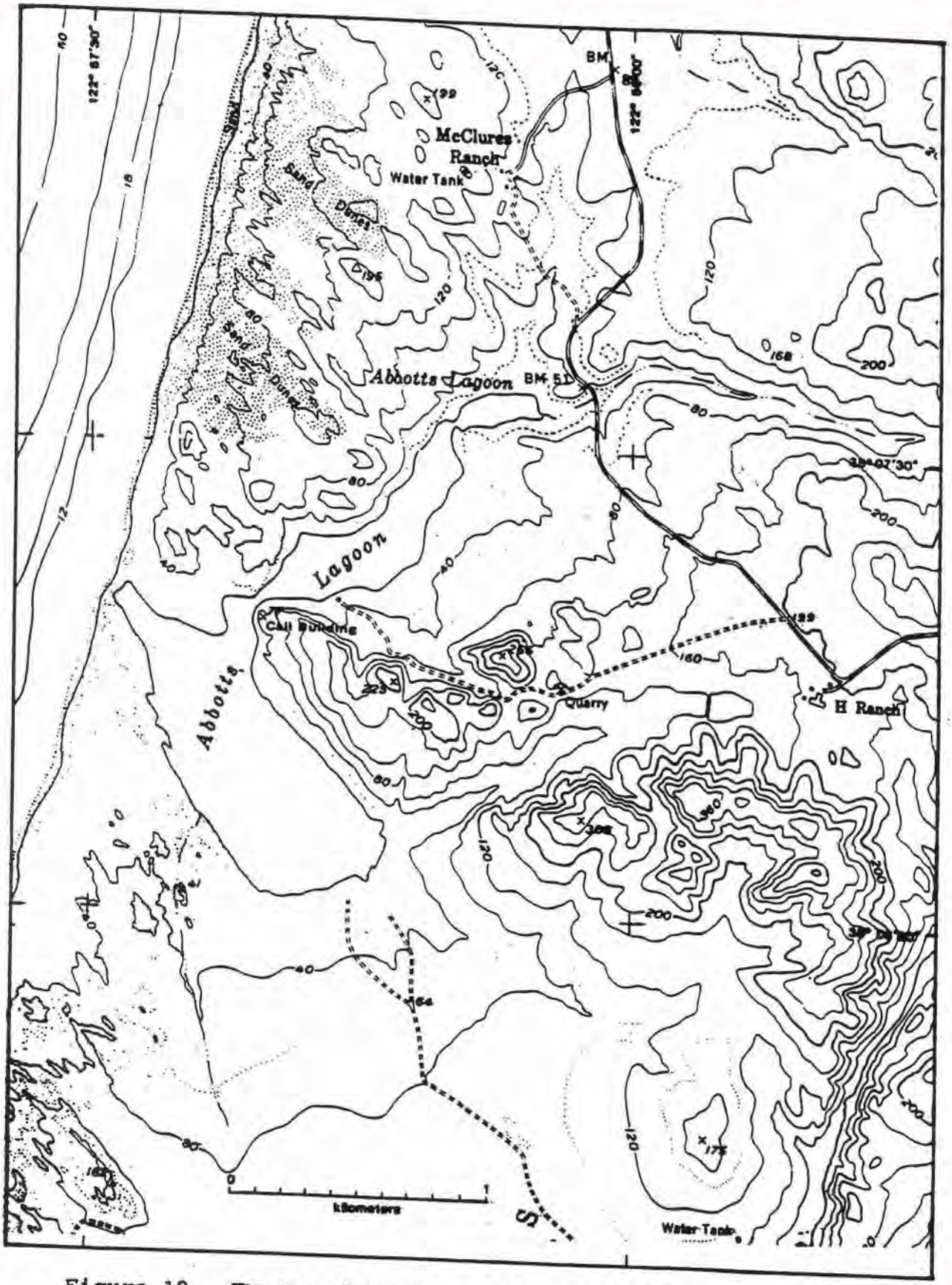

Figure 10. Topographic map of the area surrounding Abbotts Lagoon showing the two streams that flow into the lagoon and the topography of the area.

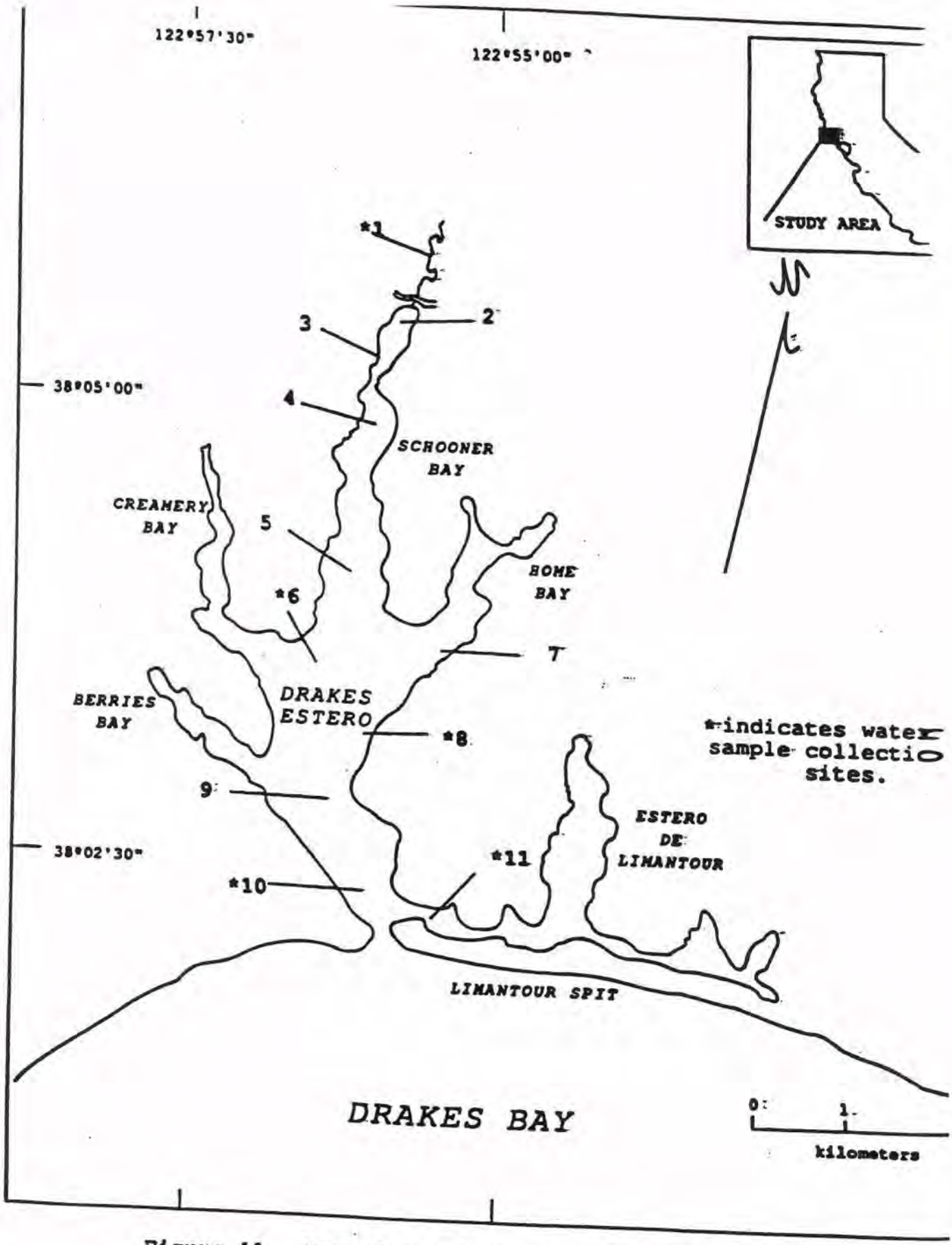

Figure 11. Map of sample locations used for salinity measurements in Drakes Estero.

Table 4. Salinity and Conductivity, measurements taken in Drakes Estero

Salinity, conductivity, and temperature measurements carried out on June 18,1987. Measurements were made during low tide and continued into the beginning of flood tide. Refer to map for sample and measurement stations. Five calibration water samples were also collected and measured in the laboratory using a Guildling Autosal model 8400A. The field measurements were made using a Beckman Electrodeless induction salinometer that measures salinity in $^{o}/_{oo}$, temperature in ^{o} C, and conductivity in milli-mhos / cm. Stations with (*) correspond to calibration water samples.

Corrected salinities were calibrated by performing linear regression analysis, forced through the origin, on the five calibration samples, which yielded; Field Salinity = 1.078 Lab Salinity. Therefore Corrected Salinity = Field Salinity/1.0784.

Laboratory calibration measurements:

Station	H_2O depth (m)	Salinity	Conductivity	Temp(°C)
1	0.0	33.670	.96626	
2	0.0	34.308	.98256	
3	0.0	34.356	.98379	
4	0.0	34.101	.97729	
5	0.0	33.969	.97394	

Field measurements:

				Corrected Salinity		
1*-1		0.0	36.1	33.5	46.8	18.0
	2	0.0	38.9	36.1	48.7	16.6
	2bott.	0.5	38.9	36.1	48.7	16.6
	3	0.0	39.3	36.4	48.5	16.1
	3bott	0.5	39.5	36.6	48.5	15.9
	4	0.0	38.1	35.3	47.9	16.5
	4bott	1.1	38.0	35.2	47.8	17.0
	5	0.0	37.1	34.4	47.3	16.8
	5bott	1.5	36.0	33.4	46.0	16.8
2*-6		0.0	36.7	34.0	46.2	16.3
	6bott	1.0	36.8	34.1	46.0	16.2
	7	0.0	36.8	34.1	45.2	15.3
	7bott	1.5	34.8	32.3	42.8	15.2
3*-8		0.0	37.0	34.3	47.5	17.3
	8bott	1.5	37.4	34.7	47.5	17.5
	9	0.0	37.3	34.6	46.3	16.1
	9bott	7 0	33.0	30.6	41.7	15.9
4*-10		0.0	37.0	34.3	45.4	15.3
	10bott	6 0	37.1	34.4	45.0	14.8
5*-11		0.0	37.0	34.3	44.8	15.0
	11bott	6 0	37.0	34.3	43.6	13.6

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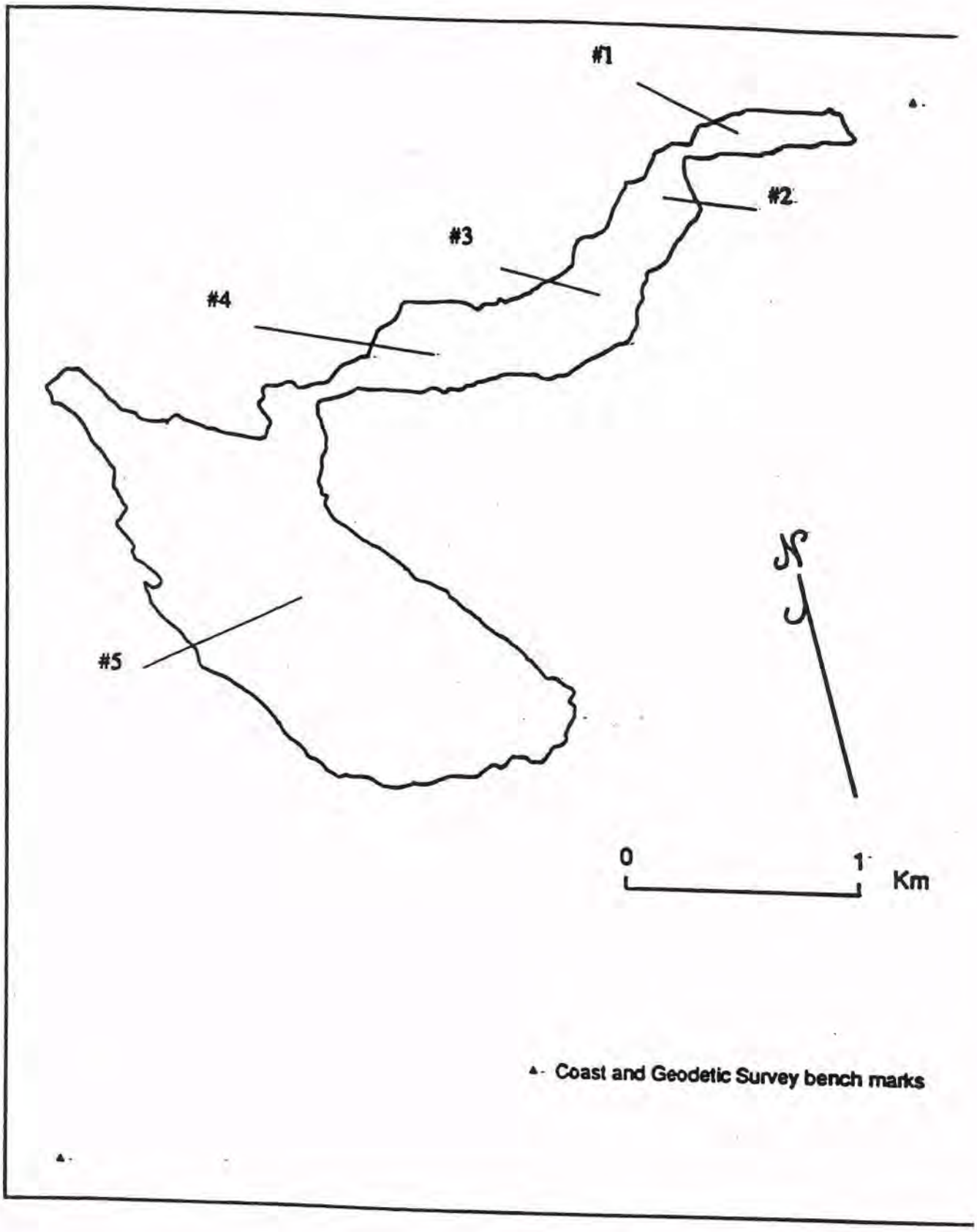

Figure 12. Map of sample locations used for salinity measurements in Abbotts Lagoon

Table 5. Salinity and Conductivity Measurements Taken in Abbotts Lagoon

Salinity, Conductivity, and temperature measurements carried out on June 24, 1987. All measurements were made in the field using a Beckman Electrodeless induction salinometer that measures salinity in $^{o}/_{ooo}$, temperature in ^{o}C, and conductivity in mill-ohms/cm. Locations of sampling stations on fig.

Station	Salinity	Conductivity
AL62487-1	6.317	.20973
2	6.315	.20969
3	6.316	.20971
4	6.311	.20956
5	6.309	.20949

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Table 6. Salinity and Conductivity Measurements Abbotts Lagoon

Sample site	Water temp (°C)	salinity	conductivity	H
Site 1	16.1	.40	.20	
	15.8	.25	.26	
Site 2	16.4	.25	.48	
Site 3	16.3	.27	.46	
	16.0	.44	.58	
Site 4	16.2	.36	.50	
	15.3	.38	.75	
Site 5	15.2	3.46	4.83	
	15.8	3.41	4.80	

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were analyzed by rapid sediment analyzer, and hydrophotometer using standard laboratory techniques, (Thiede, 1976), and the results were plotted using statistical measures of Folk and Ward (1957) (Table 7).

The sediment distribution within each of the five bays and central portion of the Drakes Estero and Abbotts Lagoon have been characterized based on grain size analysis and diving observations.

a. Drakes Estero

Sediment in Drakes Estero ranges between medium grained sand to medium-fine silt, and varies slightly within each branching bay and the central estero area (fig. 13, Table 8). Medium- to fine-grained sand is found in the main tidal channels of Drakes Estero where the winnowing effects of the tidal currents transport out the fine-grained material leaving the coarser material. The entrance of the estero contains medium- to fine-grained well sorted sand. The sediment becomes siltier on the intertidal flats and in the upper ends of each bay. In the mid to upper parts of the branching bays, where silt becomes predominant, the tidal channels become less distinct to a point where mud makes up the tidal flats and the channels take on a meandering dendritic pattern and become very narrow and shallow. This is most obvious in Creamery Bay, Home Bay, and Estero de Limantour. In Schooner Bay the channel is somewhat artificial in that it has been

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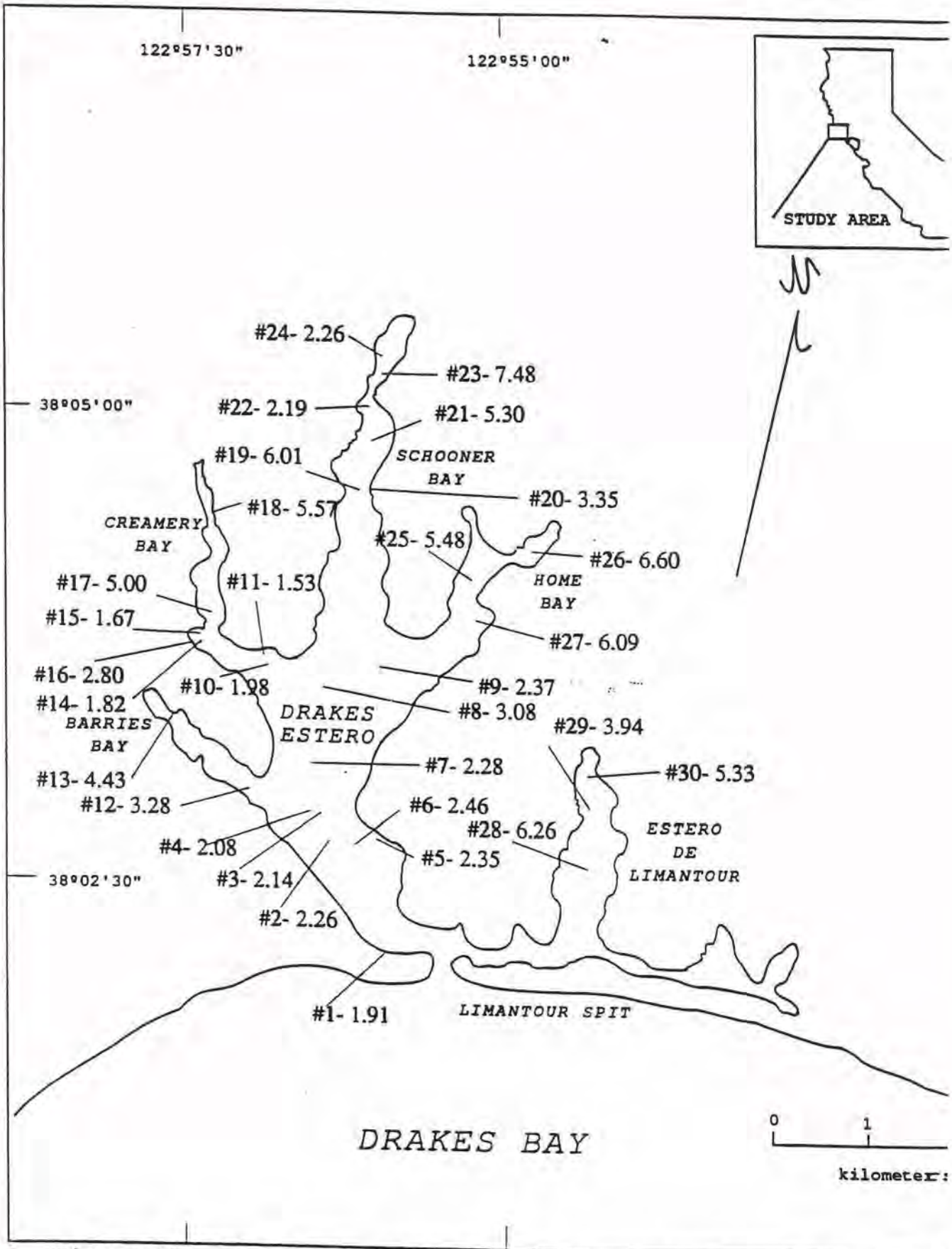

Figure 13. Map showing location of sample sites used for grair analysis in Drakes Estero. Numbers match mapped number on Tak number following represents the mean grain size, in phi (ø).

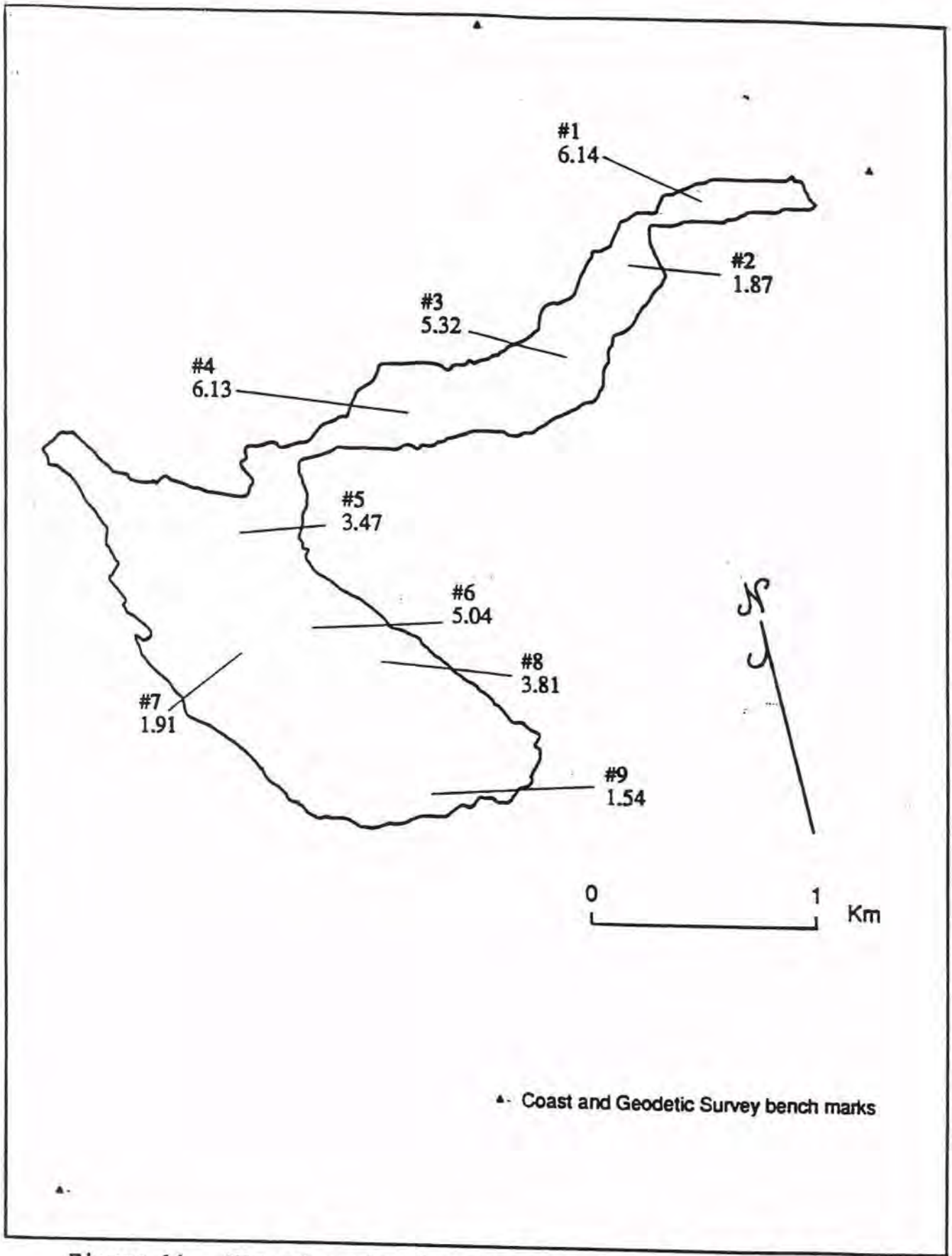

Figure 14. Map of grain size distribution in Abbotts Lagoon. First number corresponds to numbers on Table 9, second number is grain sizes in phi (ø).

Table 7.
Terminology and Phi size equivalents in milimeters

Milimeters	Phi (ø) units	Size class
4096	-12.00	
1024	-10.00	Boulder
256	-8.00	
64	-6.00	Cobble
16	-4.00	Pebble
4	-2.00	
3.36	-1.75	
2.83	-1.50	Granule
2.38	-1.25	
2.00	-1.00	
1.68	-0.75	
1.41	-0.50	Very coarse sand
1.19	-0.25	
1.00	0.0	
0.84	0.25	
0.71	0.50	Coarse sand
0.59	0.75	
0.50	1.0	
0.42	1.25	
0.35	1.50	Medium sand
0.30	1.75	
0.25	2.0	
0.210	2.25	
0.177	2.50	Fine sand
0.149	2.75	
0.125	3.0	
0.105	3.25	
0.088	3.50	Very fine sand
0.074	3.75	
0.0625	4.0	
0.053	4.25	
0.044	4.50	Coarse silt
0.037	4.75	
0.031	5.0	
0.0156	6.0	Medium silt
0.0078	7.0	Fine silt
0.0039	8.0	Very fine silt
0.0020	9.0	
0.00098	10.0	
0.00049	11.0	Clay
0.00024	12.0	
0.00012	13.0	
0.00006	14.0	

Table 8. Grain size analysis for samples collected in Drakes Estero

Sample Number	Median	Mean	Sorting	Skew.	Kurt.	Ratios sand/silt	silt/clay	sand/clay	sand/mud	Dist. fm Enterance	Mapped Number
DE070485-6	1.9	1.91	0.36	0.14	0.91	389.83	0.31	119.82	91.65	0.05	1
DE070485-4	2.4	2.26	0.41	0.43	0.98	249.24	2.33	580.74	174.39	1.7	2
DE070485-3	2.16	2.14	0.41	0.06	0.95	257.5	1.02	261.85	129.82	1.95	3
DE070485-1	2.11	2.08	0.55	0.05	1.1	51.58	2.16	114.00	35.98	1.96	4
DE070185-7	2.3	2.35	0.49	0.17	1.74	28.38	3.77	107.08	22.43	1.4	5
DE070185-6	2.49	2.46	0.37	0.03	1.4	193.86	1.05	204.5	99.5	1.5	6
DE082085-1	2.24	2.28	0.69	-0.35	12.42	670.8	0.67	447.18	268.31	2.4	7
DE063086-2	3.00	3.08	0.67	0.26	1.59	9.76	12.77	124.67	9.05	3.1	8
DE063086-3	2.71	2.37	1.04	-0.52	2.79	49.86	0.67	33.24	1.6	3.15	9
DE081885-4	1.94	1.98	1.07	0.36	2.59	19.51	1.88	36.71	12.74	3.55	10
DE081885-1b	1.54	1.53	0.58	0.18	1.65	40.63	2.83	115.15	30.03	3.55	11
DE081287-3	3.04	3.28	0.94	0.41	0.99	2.89	26.69	77.21	2.79	2.6	12
DE080887-1	4.31	4.43	1.51	0.16	1.33	0.92	10.7	9.86	0.84	3.75	13
DE081887-7	1.84	1.82	0.89	0.16	1.51	22.35	4.41	98.52	18.22	4.15	14
DE081885-5	1.67	1.67	0.49	0.05	0.99	151.07	1.46	220.86	89.71	4.16	15
DE071786-1	2.39	2.8	1.5	0.45	1.07	3.74	10.93	40.9	3.43	4.16	16
DE081187-1	4.64	5	1.74	0.34	1.04	0.79	6.54	5.16	0.68	4.3	17
DE071786-2	5.15	5.57	1.46	0.43	1	0.13	8.51	1.08	0.11	5.2	18

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Table 8.(con't) Grain size analysis for samples collected in Drakes Estero

Sample Number	Median	Mean	Sorting	Skew.	Kurt.	Ratios sand/silt	silt/clay	sand/clay	sand/mud	Dist. fm Entrance	Mapped Number
DE72386-2	5.66	6.01	1.7	0.29	1.28	0.14	5.06	0.72	0.12	5.0	19
DE070385-5	3.34	3.35	0.5	0.01	2.21	24.39	2.75	67.084	17.89	5	20
DE072386-1	4.96	5.3	1.66	0.37	0.78	0.87	5.19	4.52	0.73	5.5	21
DE073185-9	2.1	2.19	1.07	0.41	2.52	16.27	2.31	38.32	11.59	5.85	22
DE073185-1	6.9	7.48	2.42	0.36	1.26	0.1	2.13	0.16	0.05	6.25	23
DE073185-5	2.11	2.26	1.88	0.37	1.76	11.28	1.35	15.26	6.48	6.4	24
DE080787-5	5.23	5.48	1.66	0.32	1.02	0.25	5.25	1.31	0.21	4.5	25
DE080787-4	6.22	6.6	2.14	0.19	1.67	0.17	3.17	0.55	0.13	4.45	26
DE081287-1	5.79	6.09	1.53	0.29	1.19	0.08	6.5	0.54	0.07	3.6	27
DE081287-2	5.95	6.26	1.75	0.26	1.42	0.13	4.88	0.65	0.11	1.9	28
DE080787-3	3.7	3.94	1.14	0.47	1.76	1.8	9.7	17.4	1.63	2.3	29
DE080687-1	5.29	5.33	2.09	0.13	0.86	0.78	3.4	2.63	0.6	2.55	30

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scoured out by the constant boat traffic from the oyster operation.

Silt on intertidal flats along the margins of the estero is derived from the local bedrock, the Purisima Formation, which weathers into large blocks that further disintegrate under the influences of wind-driven waves and tidal currents. The finer suspended sediment is deposited on the intertidal areas where tidal current velocities are minimal . Finer sediment is also found adjacent to areas of dense vegetation where the vegetation baffles the effects of currents and allows for the deposition of the suspended sediment.

Sediment sorting decreases from well sorted in the tidal channels to poorly sorted toward the surrounding cliffs. Sediment is very well sorted along the channels and channel margins and becomes increasingly poorly sorted at the base of the cliffs where silt, sand, and pebbles to boulder size material is mixed. Sediment becomes more poorly sorted and grain size increases toward the small streams that flow into the estero, where coarser grained sediment is deposited on the proximal portion of the deltas that form at the mouths of the streams. At the mouth of Schooner Bay, Home Bay and Estero de Limantour, the source of the deposited material is a combination of underlying Monterey Formation and the granitic rocks found along Inverness Ridge. In the upper reaches of Barries Bay and Creamery Bay the sediment does not show the same pattern because the source material is a

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combination of fine grained aeolian sand, and the more friable silt portions of the Purisima Formation.

b. Abbotts Lagoon

Abbotts Lagoon has medium- to fine-grained sand along the west side of the lagoon adjacent to the open ocean. Along the north side of the lagoon, active sand dunes are migrating into the lagoon and depositing fine-grained sand (Table 9, fig.14). While diving we observed that this aeolian sand interfingers with fine silt and organic matter at the bottom of the lagoon. Along the seaward side of the lagoon, medium-grained sand was deposited as megaripples during the time the lagoon was open to sea. The megaripple structures are visible in the bathymetric profiles (Appendix A2), and were probably formed on sills (Clifton, et al., 1973) that formed inside the lagoon as it began to close after the 1982 break in the barrier. Bathymetry profiles show the steep face at the base of the barrier, then a more gentle rise with ridges toward the west . The steep topography of the west side of the lagoon diminishes toward the south where berm overwash processes are not the major depositional process but aeolian deposition is more pronounced (Appendix A2). The south end of the main arm of the lagoon is also composed of medium to fine sand deposited by aeolian and older berm overwash deposition. The stream that flows into the southern end of the Abbotts Lagoon carries silt and organic material into a small marsh along the southeast side of the lagoon. Both arms of Abbotts

Table 9. Grain size analysis for samples collected in Abbotts Lagoon

Sample Number	Median	Mean	Sorting	Skew.	Kurt.	Ratios sand / silt	silt	clay	sand / clay	sand / mud	Mapped Number
AL041789-1	5.8755	6.1387	2.0114	0.3001	0.8612	0.089		3.953	0.354	0.071	1
AL041789-2	1.8155	1.8722	0.7015	0.2629	1.3034	69.165		0.667	46.110	27.666	2
AL041789-3	4.4735	5.3205	1.4939	0.8265	0.9069	0.032		8.424	0.269	0.029	3
AL041789-4	5.7315	6.1273	1.9447	0.3935	0.9059	0.046		4.092	0.190	0.037	4
AL072487-1	2.1409	3.4750	2.2364	0.8496	1.1112	3.960		2.416	9.568	2.801	5
AL041789-5	5.4806	5.0388	2.7012	-0.1357	0.7894	0.731		3.560	2.603	0.571	6
AL041789-6	1.7028	1.9107	1.3788	0.5560	4.8682	9.659		3.021	29.178	7.257	7
AL073087-3	3.6040	3.8108	1.0947	0.4811	2.9796	3.588		4.967	17.819	2.987	8
AL081387-1	1.5046	1.5359	0.4267	0.0661	1.8261	607.591		0.667	405.086	243.046	9

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Lagoon are located in well consolidated, resistant Monterey Formation, which, unlike the Purisima Formation does not contribute large amounts of fine grained sediment. Along the east shore of the main arm of the lagoon the shore line is composed of large blocks of Monterey Formation with very little silt and clay as a matrix. While diving, we noted that the east shore is composed of cobbles and some boulders in a pebble matrix. A green colored algae covers the surface of the sediment-water interface and changes with depth to a brown colored algae. Diving and coring was not conducted in the upper arm. Sediment sampling, water sampling, and bathymetric profiling were conducted.

Abbotts Lagoon contains fine-grained silt and clay material in the upper arm and at the bottom of the main arm. This fine grained material is deposited from the small streams that flow into the upper two lagoons and from organic material along the shore of these lagoons. The streams, aeolian processes and overwash probably provide the bulk of the sediment in Abbotts Lagoon.

Bar graphs and point plots illustrate the composition of sediment at various points within both Abbotts Lagoon and Drakes Estero. The plots illustrate how the sediment tends to decrease in size away from the entrance in the case of Drakes Estero (Appendix D). In Abbotts Lagoon the sediment changes from medium-grained silt in the upper arm to medium sand in the narrow connection between the two arms. The sudden increase in grain size within the lagoon can probably

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be attributed to erosion of bedrock exposed at the connections between the arms during periods of high stream flow when precipitation is highest. The main arm of the lagoon shows an increase in grain size adjacent to the west and south shores of the lagoon.

2. Herbicide Analysis

The method used in the determination of chlorophenoxy acid herbicides, and their esters and salts, in bottom material are detailed in Wershaw, R.L., et al. 1987. Chlorophenoxy acid herbicides and their esters are extracted with either diethyl or methyl t-butyl ether from an acidified slurry of bottom material. The extracted herbicides are hydrolyzed to the free acids, which are converted to their methyl esters with boron trifluoride-methanol and purified using adsorption chromatography. The methyl esters are determined by gas chromatography using electron-capture detectors.

The minimum detectable concentration of chlorophenoxy acid herbicide in these bottom materials was 0.10 µg/kg. Values of <1.0 µg/kg are reported (Table 10) and reflect the quality of the samples submitted having background material that inhibited the lower detection levels. The reported levels is still considered as being negligible in the samples analyzed, (Ralph White, U.S.Geological Survey Water Resources, personnel communication, 1990).

Results of the herbicide analysis indicate that the amounts of herbicides found in the cores collected in both

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Drakes Estero and Abbotts Lagoon range between <0.1 to <1.0 µg/kg and are reported only at or slightly above the level of detection for 2,4-DP, 2,4,D, 2,4,-T, and Silvex. Table 10 show the results of the analysis and the location of the coring sites. Herbicide (2,4,D) residues have been found to persist for months in bottom muds of cold lakes or environments with a low oxygen content (U.S. Environmental Protection Agency, 1974); such environments, however, are dissimilar to that in Drakes Estero. A study conducted on eleven streams in the western United States were monitored for 2,4-D, 2,4,5-T, and Silvex, the study resulted in no herbicide residues found (Brown and Nishioka, 1967). The analyses indicate that the amount of herbicide introduced is not appreciable and that any herbicide introduced into Drakes Estero is not preserved because the estero is shallow and is constantly being flushed by tides and because the estero does not attain the low O^2 levels nor the low temperatures that would be conducive to the preservation of herbicides. The low levels found in the estero could also be due to relatively small amounts of herbicides introduced into the system. In Abbotts Lagoon, the bottom water conditions could serve to preserve herbicides because there is no tidal flushing like that in Drakes Estero. However, the amounts found in the analyses suggest that there is very little input by streams or runoff.

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3. Pesticide Analysis

The method used for determination of organochloride and organophosphorous insecticides, PCB's, and PCN's are extracted from bottom material with acetone and hexane (Wershaw, R.L., et al. 1987). The organophosphorous insecticides are determined by gas chromatography using flamephotometric detectors. The extracts are then purified using adsorption chromatography on an alumina column. If PCB's, PCN's, and toxaphenes are present, the extracts are further purified using a silica gel column. The organochlorine compounds are determined by gas chromatography using electron-capture detectors.

The reporting of concentrations of organochlorine compounds and organophosphorous insecticides in bottom material with the exception of, chlordane, perthane, toxaphene, PCB's, PCN's and organophosphorous insecticides are limited to a detection limit of 0.1 µg/kg, and are reported as, less than 0.1 µg/kg. Values of 0.1 to 1.0 µg/kg, are reported to one significant figure (table 11).

Concentrations of chlordane, perthane, PCB's, and PCN's in bottom materials are limited to a detection limit of 1.0 µg/kg, and are reported as less than 1.0 µg/kg. Values of 1.0 µg/kg and above, are reported to two significant figures.

Concentrations of toxaphene in bottom materials are limited in detection to 10 µg/kg, and are reported as less than 10 µg/kg (Wershaw, R.L., et al., 1972) (table 11).

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Results of the pesticide analysis indicate that all tested pesticide compounds were low or below the analytical cutoff points for the compounds tested, except for DDE which in Schooner, Estero de Limantour, Abbotts Lagoon, Barries Bay, and Creamery Bay, did show concentrations between 0.1 to 2.1 µg/kg (Table 11). Although the amounts of traceable DDE fluctuated somewhat in those sample localities, the amount reported are low. The results can be compared to the National Academy of Sciences National Academy of Engineering (1973) recommended safe level of 1,000 µg/kg ΣDDT (the sum of DDD, DDE, and DDT) wet weight for the protection of fish-eating wildlife. Also the U.S. Environmental Protection Agency (1980) based ambient water-quality criteria for protection of aquatic life at an

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Table 10. Results of Herbicide Analysis µg/kg

Station ID	2, 4-DP µg/kg	2,4,D µg/kg	2,4,-T µg/kg	Silvex µg/kg
AL071787-2	<1.0	<1.0	<1.0	<1.0
AL072487-1	<1.0	<1.0	<1.0	<1.0
AL073087-2	<0.1	<0.1	<0.1	<0.1
DE080687-1	<0.1	<0.1	<0.1	<0.1
DE080787-4	<1.0	<1.0	<1.0	<1.0
DE081087-1	<1.0	<1.0	<1.0	<1.0
DE081087-3	<1.0	<1.0	<1.0	<1.0

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Table 11a. Pesticide Analysis

Location: Barries Bay

Station ID: DE080887-1	**Results** µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<1.0
DDE	0.1
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
Gross PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

Location: Creameary Bay

Station ID: DE081187-1	**Results** µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<0.1
DDE	0.2
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
GROSS PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

@ - Polychlorinated biphenyls
# - Polychlorinated naphthalenes

Table 11b. Pesticide Analysis

Location: Schooner Bay, north

Station ID: DE081087-3	Results µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<0.1
DDE	0.2
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
Gross PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

Location: Home Bay

Station ID: DE080787-4	Results µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<0.1
DDE	<0.1
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
Gross PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

@ - Polychlorinated biphenyls
# - Polychlorinated naphthalenes

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Table 11c. Pesticide Analysis

Location: Estero de Limantour

Station ID: DE080687-1	Results µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<0.1
DDE	0.2
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
Gross PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

Location: Abbotts Lagoon, Mid lagoon

Station ID: AL073087-2	Results µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<0.1
DDE	0.9
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
Gross PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

@ - Polychlorinated biphenyls
# - Polychlorinated naphthalenes

Table 11d. Pesticide Analysis

Location: Abbotts Lagoon, North

Station ID: AL072487-1	Results µg/kg
Gross PCN #	<1.
ALDRIN, BTM. MAT.	<0.1
LINDANE,	<0.1
CHLORDANE,	<1.
DDD	<0.1
DDE	2.1
DDT	<0.1
DIELDRIN	<0.1
ENDOSULFAN	<0.1
ENDRIN	<0.1
TOXAPHENE	<10.
HEPTACHLOR	<0.1
HEPT EPOX	<0.1
METHOXYCHLOR	<0.1
Gross PCB @	<1.
MIREX	<0.1
PERTHANE	<1.

@ - Polychlorinated biphenyls
# - Polychlorinated naphthalenes

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estimated safe tissue concentration of 150 µg/kg ΣDDT wet weight in fish. The results of the pesticide analysis show that the levels of traceable DDE in the sediment analyzed are below the limits set by the National Academy of Sciences and the U.S. Environmental Protection Agency for organisms. Another study conducted by Gilliom and Clifton (1989) using 66 samples from various sites along the San Joaquin River report concentrations for the majority of their samples at many orders of magnitude above what is reported in this study. In their study they used sediment as the analytical medium, and submitted their samples to the same analytical laboratory that ran the analysis for this report.

4. Sedimentation Rates

Sedimentation rates can be determined using various dating techniques. By using information about the depth of the sample below the sediment surface coupled with an age using one of the accepted dating techniques, or comparing differences in water depth over repeated bathymetric surveys, workers have calculated sedimentation rates for various coastal settings. Rowntree, (1973) discusses the variations and errors between the techniques that must be considered in using sedimentation rates, and points out problems in the numbers presented by various workers.

Table 12 shows some consistency in the majority of rates given for long term deposition that range from 3 to 70 cm/100 yrs. The dating method used for the long term deposition rates are the same with the exception of the work of Gorsline

and Stewart, 1962, and Schwartz, 1983, but the sedimentation rates arrived at by these workers are similar to the other studies. The inconsistencies in the dates could be attributed to the location of the sample in the study area or to the difference in sediment input into each of the study areas. Table 13 gives short-term sedimentation rates calculated using various methods in other estuaries and lagoons along the west coast of North America and in other parts of the world. As the table indicates, the different methods used adds variation to the overall trend of the combined sedimentation rates. There are extremely high sedimentation rates reported by Warme (1971), Shepard (1953), and Schwartz (1983), but as pointed out by Rowntree (1973), the sampling methods used, the variables used in the calculations, and the depositional environments sampled varied for the three studies.

A recent study conducted by Mudie (1984) used palynology from two samples collected 0.50 meters below the sediment surface in a salt marsh area adjacent to Estero de Limantour. Based on radiocarbon dating from the base of the core, an average sedimentation rate of the whole section was suggested at 10.0 cm/100 years. The study then looked at the first appearance of two pollen types, *Rumex acetosella* (first introduced into California in the period 1825-1848) at 35 cm, and *Plantago lanceolata* (first introduced into California around the 1850's) at 15 cm, and calculated an average rate of accumulation of 50 cm/100 years from the time of first

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appearance of the two pollen types to 1974. The paper attributes the interval of rapid sedimentation to the establishment of cattle ranches in the area which reflects the accelerated erosion following overgrazing (Mudie, 1984). During the time since 1860 sedimentation has probably dropped to about 15 cm/100 years (Mudie, 1984)

Sedimentation rates presented here for Drakes Estero and Abbotts Lagoon were calculated by dividing the depth within the core sample from which sediment was dated, by the age the dated sediment. The sedimentation rates determined for Drakes Estero and Abbotts Lagoon are based on nine cores sub-sampled for C^{14} dating, and 18 cores sub-sampled for Pb^{210} analysis. The results suggest average sedimentation rates higher than the rates reported by Mudie (1984), with the number of samples and the more depositional settings sampled by this study accounting for the wider range of sedimentation rates. This study did, however, calculate sedimentation rates similar to Mudie's for C^{14} analysis, and higher for the more recent ages using Pb^{210}.

Another method used in Drakes Estero, that will be discussed later, measured the depth of sediment cover over the pre-transgressive valley floor as determined by the interpretation of the geophysical records. The depth of sediment cover was divided by the estimated inception of the marine transgression, which gave a longer range sedimentation rate than determined by C^{14} and Pb^{210} analyses.

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Table 12. Long term deposition rates in estuaries

Worker	Location	Method	Sedimentation Rate cm/100 yrs
Redfield, 1967	Barnstable Marsh, MA.	C^{14}	19.2
Rusnak, 1960	Laguna Madre, TX.		10.1
Gorsline & Stewart, 1962	Bahia de San Quintin, Baja California, Mexico	Geomorphic analysis	33.5
Anima, (this study)	Drakes Estero, CA	C^{14}	1.3 - 43.7
Anima, (this study)	Abbotts Lagoon, CA	C^{14}	3.8
Darienzo, 1987	Netarts Bay, OR	C^{14}	10.8
Mudie, 1980	Drakes Estero, CA	radiocarbon	8.8 - 10.1
	Elkhorn Slough, CA	radiocarbon	5.1 - 8.1
	Del Mar Lagoon, CA	radiocarbon	3.8 - 4.2
	Mission Bay, CA	radiocarbon	12.1 - 12.8
	Tiajuana Lagoon	radiocarbon	9.0 - 10.1
	Los Penasquitos, CA	radiocarbon	9.4 - 9.5
Schwartz, 1983	Elkhorn Slough, CA	Amino acid and C^{14}	11-28
Peterson, 1983	Netarts Bay, OR	C^{14}	21.0 33.5 40-70

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Table 13. Short term deposition rates in e:

Worker	Location	Method	Sedimer Rate cm
Schou, 1967, p. 137-138 using data from Nielsen, 1935	Danish Marshes (Skallingen)	accretion above layers of colored sand	
Shepard, 1953	Bays of central Texas Coast	comparison of hydrographic surveys 1875-1935	
Stevenson, & Emery, (1958)	Newport Bay, CA	Depth of estuarine sediments--recent change in depositional environment	
Schwartz, 1983	Elkhorn Slough, CA	Amino acid and C^{14}	
Warme (1971)	Mugu Lagoon, CA	extrapolation from depth of undated shells in sediments	
Thompson, (1971)	Humboldt Bay, CA	2.75 years of monitoring of vertical accretion; interpretation of historical surveys, dredging data	
Mudie, 1980	Drakes Estero, CA Mission Bay, CA Los Penasquitos, CA	pollen pollen pollen	
Anima, (this study)	Drakes Estero, CA	PB^{210}	
Anima, (this study)	Abbotts Lagoon, CA	PB^{210}	

a. Carbon^{14} Dating;

Carbon^{14} provides a determination of the age of organic matter in the sediment. The practical range of radiocarbon dating is from 200 to 35,000 years Before Present (BP). Hogg (1982), and Terasmae (1985), present excellent discussions of the theory and basic principles of the C^{14} method. Carbon^{14} analysis was done on wood fragments collected from five vibracores collected in Drakes Estero, and one core from Abbotts Lagoon. The cores were carefully examined after being split in the laboratory and any wood fragments were noted and the distance from the top of the core measured before removal from the core. The data reflect the possibility that the wood fragments extracted could be detrital wood and therefore older than sediment they were removed from. The lack of large wood fragments suggests that most of the material found, although detrital, would reflect the age of the sediment layer they were extracted from. Small fragments of wood disintegrate faster than larger fragments, thus if all the fragments are small the C^{14} dates probably reflect the sediment age. Larger fragments, in contrast, decay slower and would be older than the sediment. Table 14, list the samples used and the dates calculated.

The C^{14} data presented on Table 14 can be used to estimate average sedimentation rates over the length of single cores collected from various parts of the study area. Normally 50 grams of sample are required to run C^{14} analysis, but because the amount of organic matter found in some of the

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cores was so low, an accelerator facility was used which can attain dates from smaller samples. Samples from a core collected in upper Barries Bay, DE080887-1, at .35 m, and .70 m below the top of the core do not coincide with the depth age pattern seen in the other cores; the same is true in a core collected in Creamery Bay, DE081187-1, from .65 m and 1.55 m below the the top of the core. This inconsistency could be attributed to the small sample size submitted for analysis giving unreliable dates, or simply that the dated material might have been eroded from an older stratigraphic layer and redeposited higher in the stratigraphic column. The results suggest an average sedimentation rate for Drakes Estero of 12 cm/100 years. If the samples with the inconsistent dates collected in Creamery and Barries Bay are excluded and considered anomalous, the average sedimentation drops to 9.1 cm/100 years. In either case the average sedimentation rates are low compared to the results of the Pb^{210} analysis.

The absence of wood or plant fragments in the cores collected from the central portions of Drakes Estero precluded age dating for this part of the system.

The sedimentation rate for the upper 112 cm in Abbotts Lagoon was calculated to be 3.8 cm/100 yrs, based on a sample size of 1.51 mg for the C^{14} dates.

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b. Pb^{210} Analysis

The Pb^{210} method of determining sedimentation rates is based on the occurrence of excess radioactive lead, Pb^{210}, a member of the Uranium^{238} decay series. Radon^{222} which has a half life of 3.8 days (Lederer and others, 1968), diffuses from the soil into the atmosphere and remains chemically inert until it decays through four short-lived nuclides, (Po^{218}, Pb^{214}, Bi^{214},Po^{214}) to Pb^{210}. This isotope is rapidly removed from the atmosphere into the hydrosphere by rain, snow, and dry fallout and provides a measurable flux to the land and waters of approximately 0.5 to 1.0 dpm (disintegrations per minute) $Pb^{210}/cm^2/yr$ depending on the latitude and distance from continental land masses (Benninger, 1976, Carpenter and others, 1982). Pb^{210} is also supplied to the hydrosphere by stream runoff and decay of Ra^{226} in the water column, but these sources are insignificant when compared with the atmospheric source (Benninger, 1976). There seems to be no significant formation of Pb^{210} as a result of nuclear detonations (Beasley, 1969). From the water column, it is rapidly removed to the bottom sediments. Several mechanisms have been proposed for the removal of Pb^{210} from the hydrosphere, including adsorption on particulate clays or organic matter and coprecipitation with Fe and Mn oxides. The chemical behavior of lead makes it immobile in the sediments. Pb^{210}, which has a half life of 22.26 years (Höhndorf, 1969), undergoes beta decay to Bi^{210} in the sediment column. This

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Table 14. Carbon ^{14} Analysis of Core material

Sample Number	Location	Smpl. Wt. (mg)	Core Depth (m)	Age Determination ± yrs.		Sedimentation Rate cm/ 100 yrs
AL081387-1	Abbotts Lagoon	1.51	1.12	2,920	±45	3.8
DE072386-1	Schooner Bay	1.26	1.00	1,760	±45	5.7
DE072386-1	Schooner Bay	1.93	1.60	2,490	±45	6.4
DE080787-2	Estero de Limantour	1.45	1.51	1,290	±45	11.7
DE080887-1	Berries Bay	1.89	1.32	1,440	±40	9.2
DE080887-1	Berries Bay	0.52	.35	2,780	±70.	1.3
DE080887-1	Berries Bay	2.33	.70	560	±40	12.5
DE081187-1	Creamery Bay	0.31	.65	1,110	±60	5.9
DE081187-1	Creamery Bay	.56	1.55	355	±50	43.7
DE080588-2	Home Bay Mouth	1.73	5.5 H_2O*	95	±40	--

Average sediment accumulation rate for Drakes Estero is 12.05 cm/100 yrs.
Sediment accumulation rate for Abbotts Lagoon is 3.8 cm/100 yrs.

* This sample was collected at a water depth of 5.5 m in an submarine outcrop that is 3 m thick underlying a silty/sand with eel grass (*Zostra marina)* bed. The exposure is located along the erosional bank of the NE margin of the main tidal channel. This sample is probably younger than the outcrop and should be considered erroneous until more dates can be aquired from the same area.

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daughter product undergoes another decay to Po^{210}, which has a half life of 138.4 days (Leder and others, 1968), and alpha decays to stable Pb^{206} ((Martin and Rice, 1981). Three general assumptions must be met when using the dating method: 1.) the Pb^{210} flux to the sediments has been constant during the time interval of the dating range. This is called the inheritance assumption. 2.) There has been negligible migration of Pb^{210} in the sedimentary column after deposition. This is called the closed-system assumption. 3.) The sedimentation rate has been constant during the period of time to be determined (Martin and Rice, 1981).

The method used in this study to measure Pb^{210} activity was alpha counting. The method involves measurement of Po^{210} activity (Robbins and Edgington, 1975; Flynn, 1968; Millard, 1963; Nozaki and Tsunogai, 1973). If Pb^{210} and Po^{210} are in secular equilibrium, which has been shown to exist in some sediments (Benninger, 1976; Nittrouer and others, 1979), the alpha decay of Po^{210} can be used to measure the Pb^{210} activity of both the Pb^{210} produced by the decay of Ra^{226} in the sediment column (supported Pb^{210}) and the Pb^{210} added from external sources (excess Pb^{210}). In recently deposited sediments that contain large amounts of organic matter, the Po^{210}/Pb^{210} activity may be >1.0. This disequilibrium can be verified by analyzing the ingrowth of Pb^{210} 6 months after the original analysis and comparing the second activity with the initial activity. A calibrated Po^{208} spike is used to

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calculate the activity of the Pb^{210} activities (Martin, and Rice, 1981).

The 22.3 yr half-life of Pb^{210} allows the analytical technique to examine sedimentary events back 100-150 yr. Pb^{210} has been used in obtaining sedimentation rates in a number of depositional settings. Nittrouer et al., (1979) used Pb^{210} on the Washington continental shelf to work out the geochronology of the sediments. Koide et al. (1972) similarly obtained geochronologies from shelf sediments off the Santa Barbara coast, and Van der Wijk and Mook (1987) used Pb^{210} to obtain chronologies used in lake acidification studies. Paez-Osuna, and Mandelli (1985) measured seasonal depositional processes from a core taken in Laguna Mitla, a Mexican coastal lagoon. Armentano and Woodwell (1975) utilized the process in the study of sedimentation rates from a Long Island salt marsh. El-Daoushy (1986) dated Scandinavian aquatic and peat deposits using Pb^{210}. Benninger et al. (1975) used Pb^{210} as a tracer in a river-estuarine system. Martin and Rice (1981) give an excellent overview of laboratory analysis procedures.

Sedimentation rates were calculated from Pb^{210} analysis of sediment sub-samples collected from vibracores. The method requires fine grained sediment with little to no sand content to obtain optimum results. This requirement did not allow for dating of sediment in the central portion, the mouth or in the main channels of the estero. Sub-sampling of the vibracores was carried out using a scheme suggested by

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Dr. C. Nittrouer of the State University of New York, Stoney Brook, who conducted the analysis. The core was measured and all the material between prescribed intervals was sub-sampled. Sampling intervals were at: 0-1 cm, 3-4 cm, 6-7 cm, 9-10 cm, 13-14 cm, 17-18 cm, 21-22 cm, 26-27 cm, 31-32 cm, 36-37 cm, 41-42 cm, 46-47 cm, then every 10 cm there after to 1 meter. The sampling scheme is based on the theory that Pb^{210} is only traceable within the upper 1 meter of the core, and that the first 50 cm is the most important portion of the sedimentary column (Nittrouer, 1989 personal communication). Unless the area is undergoing very rapid sedimentation, the upper meter should contain the last 150 to 200 yrs, which is the useful limit of Pb^{210} dating. Sub-sample size was between 20-50 gms of sediment. The sub-samples were refrigerated after collection.

The average sedimentation rate based on Pb^{210} for the 18 cores is 30.5 cm/100 years, which is slightly more than half that reported by Mudie (50 cm/100 years)(1984). The results of the Pb^{210} analysis (Table 15) show that there is some uncertainty in the sedimentation rates calculated. The uncertainty comes from the high amount of bioturbation throughout the estero. The sedimentation rates presented on Table 15, although higher than the sedimentation presented by Mudie 1984, are similar to results of other workers using the same dating method (Table 16). Careful study of Pb^{210} data suggest that systematic variations in sedimentation rate occur within the estero. Overall the sedimentation rates in

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each of the bays where multiple cores were analyzed show a decrease in sedimentation rate down the bay. Based on Pb^{210} dates, sediment is being deposited at a higher rate in the upper part of the bays near the source of sediment supply. Cores from similar environmental settings that have comparable biological activity give good agreement, i.e., DE080687-1, DE080787-2 & 5, DE080887-1 & 3. Although the high bioturbation rate in most of Drakes Estero does add some degree of uncertainty,

Table 15. Results of Pb^{210} Analysis
Drakes Estero & Abbotts Lagoon

Sample Number	Sample site	Sediment Accumulation Rate (cm/100 yrs
DE080887-1	Upper Berries Bay	23
DE080887-3 *	Lower-mid Berries Bay	9.0
DE081287-3	Lower Berries Bay	<10
DE081187-1*	Creamery Bay	29
DE081087-1#	Across from Oyster Co.	very rapid sed rate or active mixing
DE081887-2#	First bend from Oyster Co.	rapid deposition or active mixing
DE081087-3	Upper Schooner Bay	46
DE080787-4#	Home Bay NE of bridge	rapid deposition or active mixing
DE080787-5	Upper Home Bay	27 (excellent profile)
DE081287-1	Lower Home Bay	32
DE080687-1	Upper Estero de Limantour	53
DE080787-2	Upper Estero de Limantour East	25
DE080787-3*	Upper Estero de Limantour West	20
DE081287-2	Lower-mid Estero de Limantour	60
AL072487-1*	North Abbotts Lagoon	8.0
AL072887-1		more samples needed
AL073087-2	Mid Abbotts Lagoon	19
AL073087-3		deeper samples needed

Average sediment accumulation rate for Drakes Estero is 30.5 cm/100 yrs.
Average sediment accumulation rate for Abbotts Lagoon is 13.5 cm/100yrs.
- either rapid deposition of the upper 50 cm of the core or active mixing by benthic organisms causing erratic profiles, resulting in unclear interpretations.
* - very high uncertainty resulting from biological mixing

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Table 16. Comparison of Pb^{210} studies in North Am (modified from Grootes, 1983)

Worker	Location	Sedimentat: cm/100
Koide et al., 1972	Santa Barbara, CA	39.0
Koide et al., 1973	Baja California	27.0
Bruland et al., 1974	Coast Southern California	7.0 -
Armentano and Woodwell, 1975	Salt marsh, Long Island	47.0 -
Smith and Walton, 1980	Saguenay Fjord	10.0 -
Anima, (this study)	Drakes Estero, CA	9.0 -
Anima, (this study)	Abbotts Lagoon, CA	8.0 -

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the consistency of the sedimentation rates calculated throughout the estero system should be considered as a good approximation of true ages. The oldest date calculated was 122 yrs. before present (B.P.) from a core collected in upper Home Bay; the sedimentation rate calculated (27 cm/100 yrs.) reflects the proximity of the core to a source of sediment. Analyses conducted on cores collected at the uppermost reaches of the bays show higher sedimentation rates than cores from the middle areas of the bays. Estero de Limantour reflects this most graphically; at the upper reaches of the estero the sedimentation rate reached 53 cm/100 yrs. in an area downstream from the creek that flows into it. The sedimentation rate decreases down the estero (25 cm/100 yrs., 20 cm/100 yrs.) to the point where open ocean processes increase the sedimentation rate (60 cm/100 yrs.) by berm overwash and tidal input of sediment. Table 15 shows that upper bay samples indicate slightly higher sedimentation rates than do the lower to mid bay samples; this is due to proximity of the sample sites to one of the streams that flow into the bay.

Samples analyzed from Abbotts Lagoon show a sedimentation pattern similar to that of Drakes Estero. A core collected from the north part of the main arm of Abbotts Lagoon shows a sedimentation rate of 8.0 cm/100 yrs., similar to the rate attained from a sample collected in mid-Barries Bay, 9.0 cm/100 yrs. neither area is undergoing rapid sedimentation. Samples collected in mid Abbotts Lagoon,

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however, indicate a higher sedimentation rate, 19 cm/100 yrs., which resemble that of a sample collected in upper Barries Bay, 23 cm/100 yrs. this again is probably a reflection of the proximity of the sample sites to a stream mouth.

5. Geophysical Profiles

The geophysical records collected give a subbottom profile of depth of sediment filling the pre-marine transgression valley. The record was used to determine the long-term rate of sediment filling and the depth of sediment cover over the underlying bedrock, in this case Purisima Formation. Interpretation of the geophysical records collected support the findings of McCulloch (1984) that the buried subbottom channels he found in Drakes Bay extend onshore and align with topographic features of Drakes Estero, Estero de Limantour, Horseshoe Pond (which lies to the west of the mouth of Drakes Estero), and the valley where the Drakes Beach Visitor Information Center is located (fig. 15).

The records collected in Drakes Estero are somewhat discontinuous because of numerous groundings due to the shallow depths. Nonetheless subbottom features inside the estero suggest a large buried valley with smaller buried channels that aligns with one of the buried channels suggested by McCulloch in the offshore area adjacent to Drakes Estero. Many of the subbottom features found in Drakes Estero align with small valleys and the branching bays

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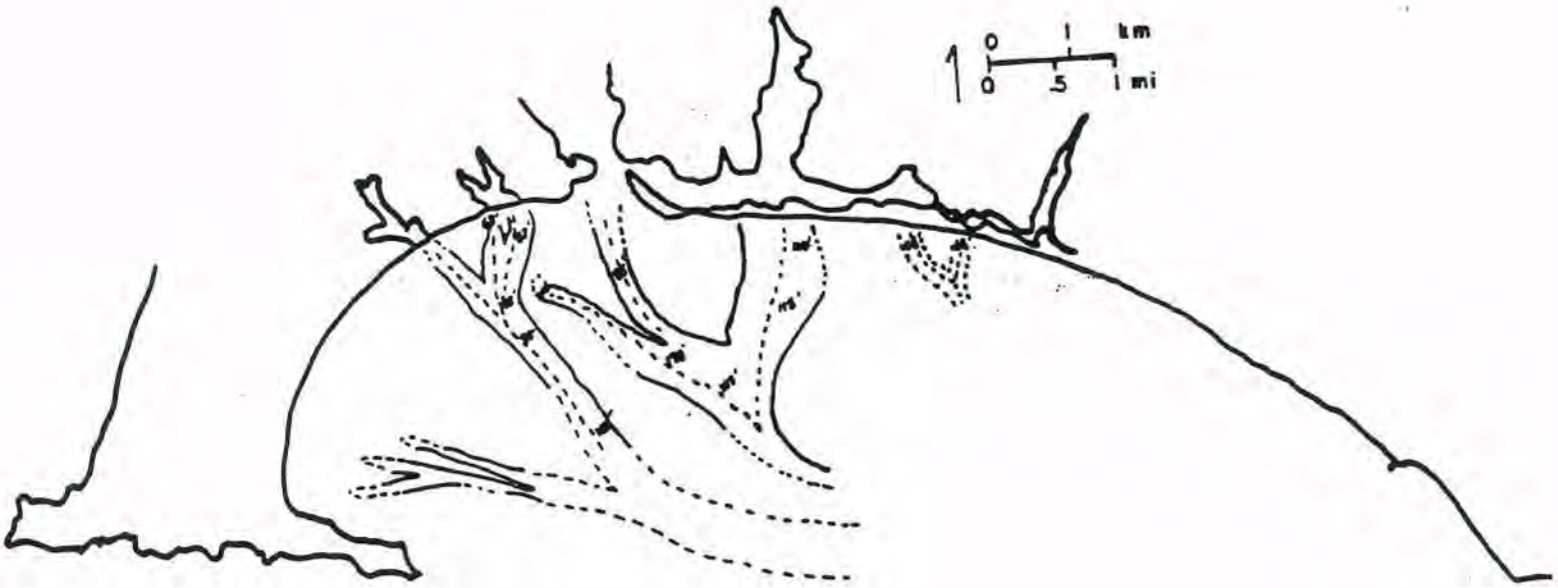

Figure 15. Paleodrainage channels cut into bedrock in Drakes bay, adjacent to Drakes Estero (from McCulloch, 1984)

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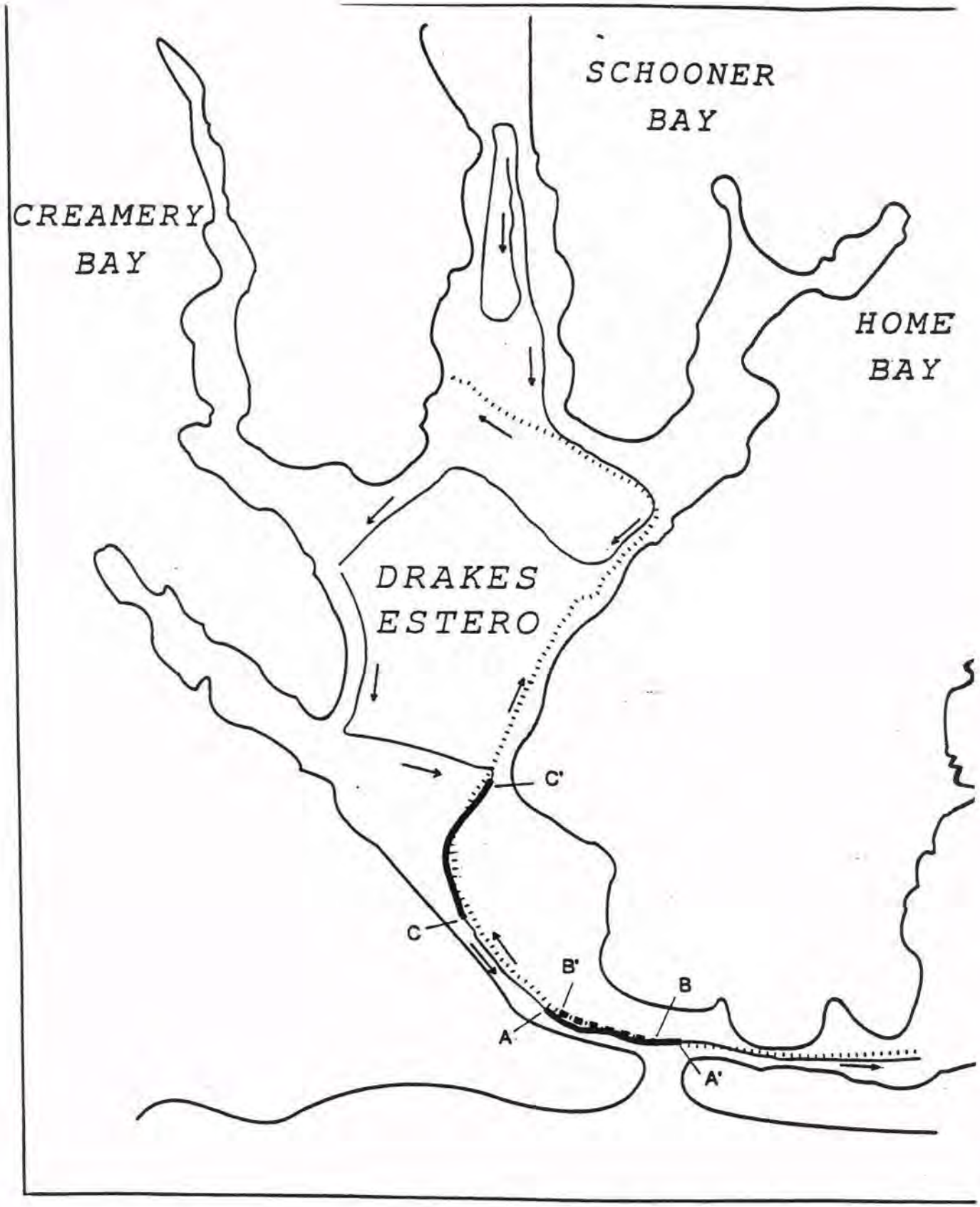

Figure 16. Geophysical trackline map showing location of sections of lines interpreted on figures 17, 18, and 19.

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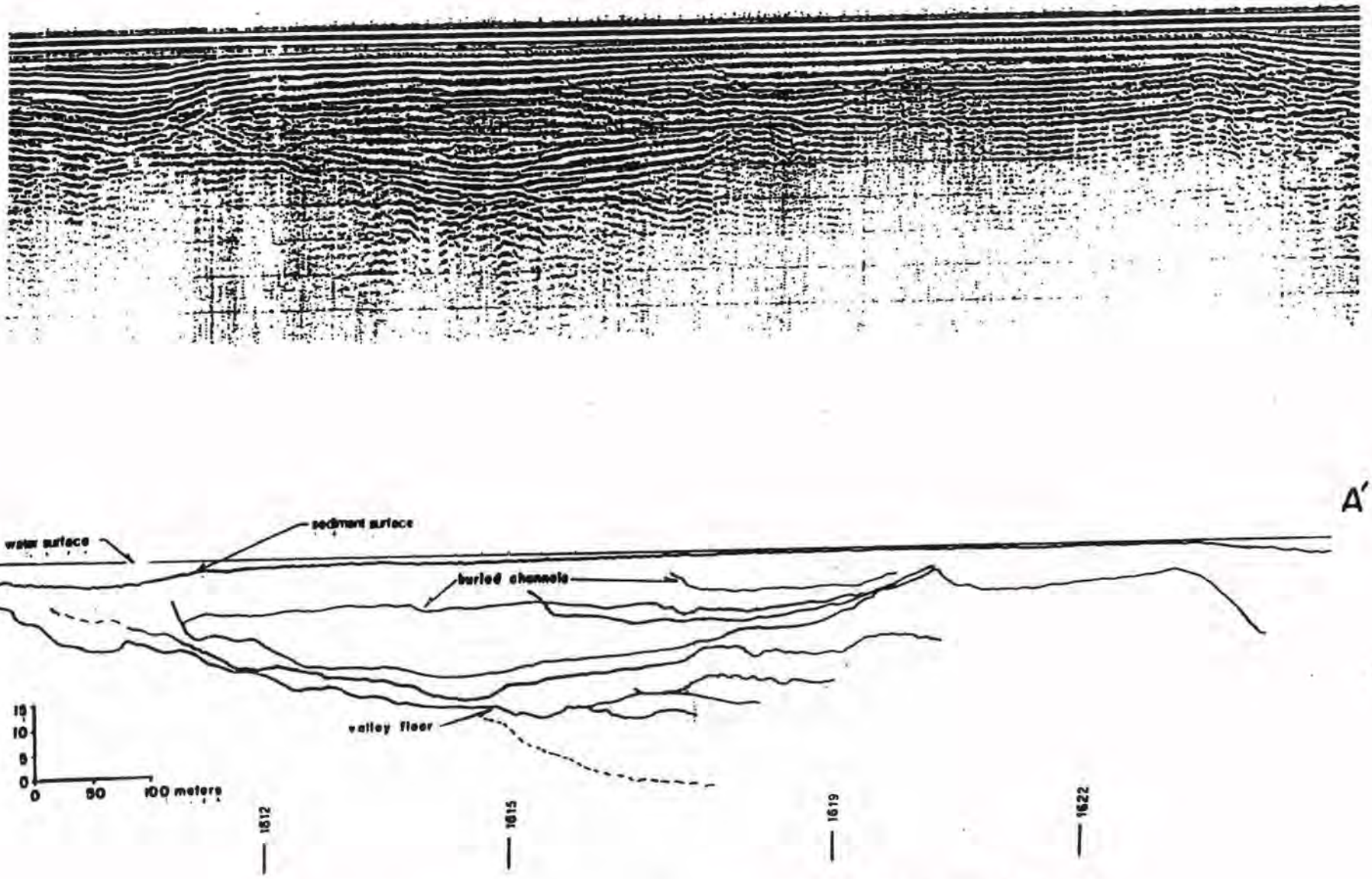

Figure 17. Geophysical record and interpretation of line A-A'.

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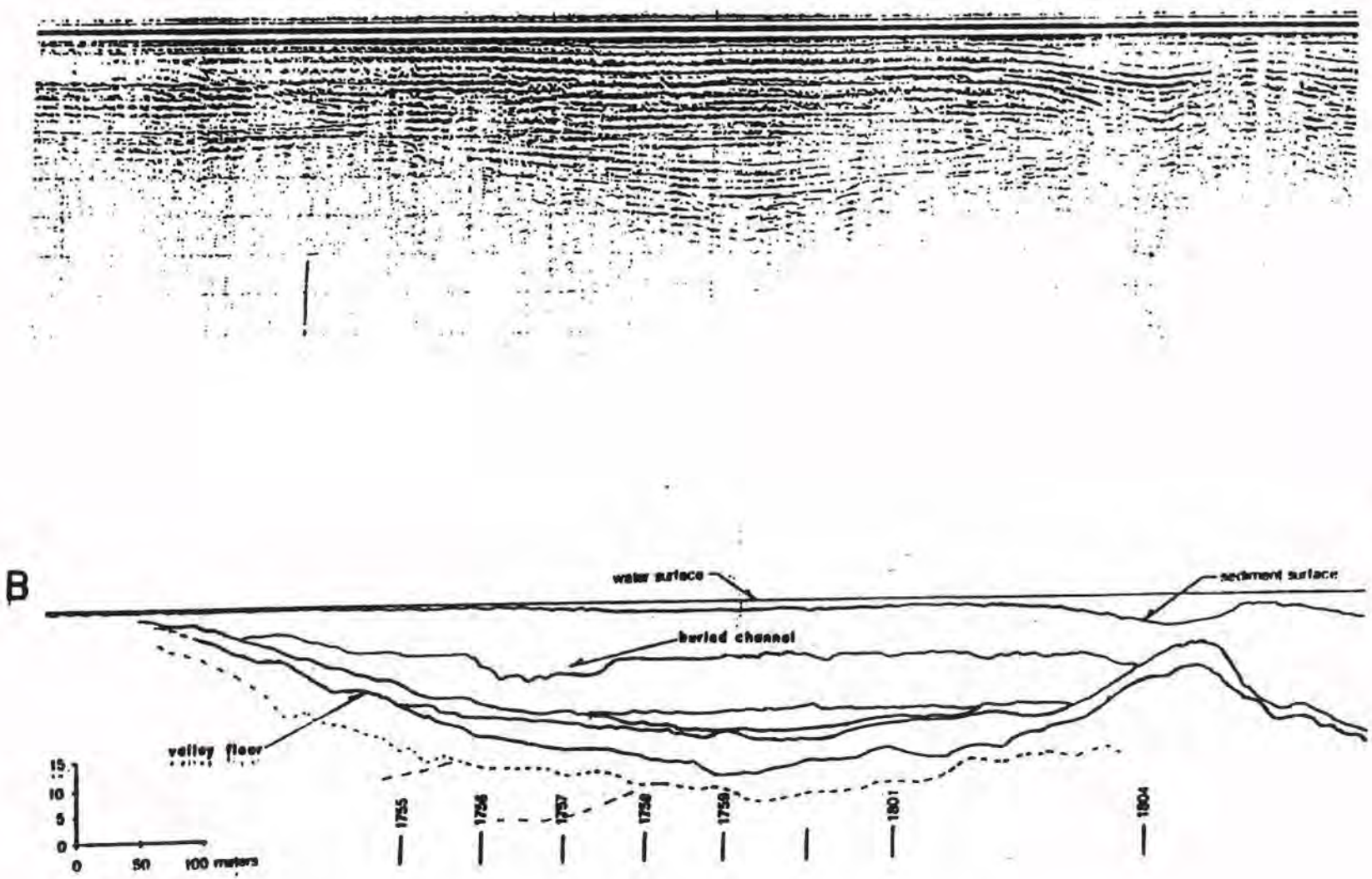

Figure 18. Geophysical record and interpretation of line B-

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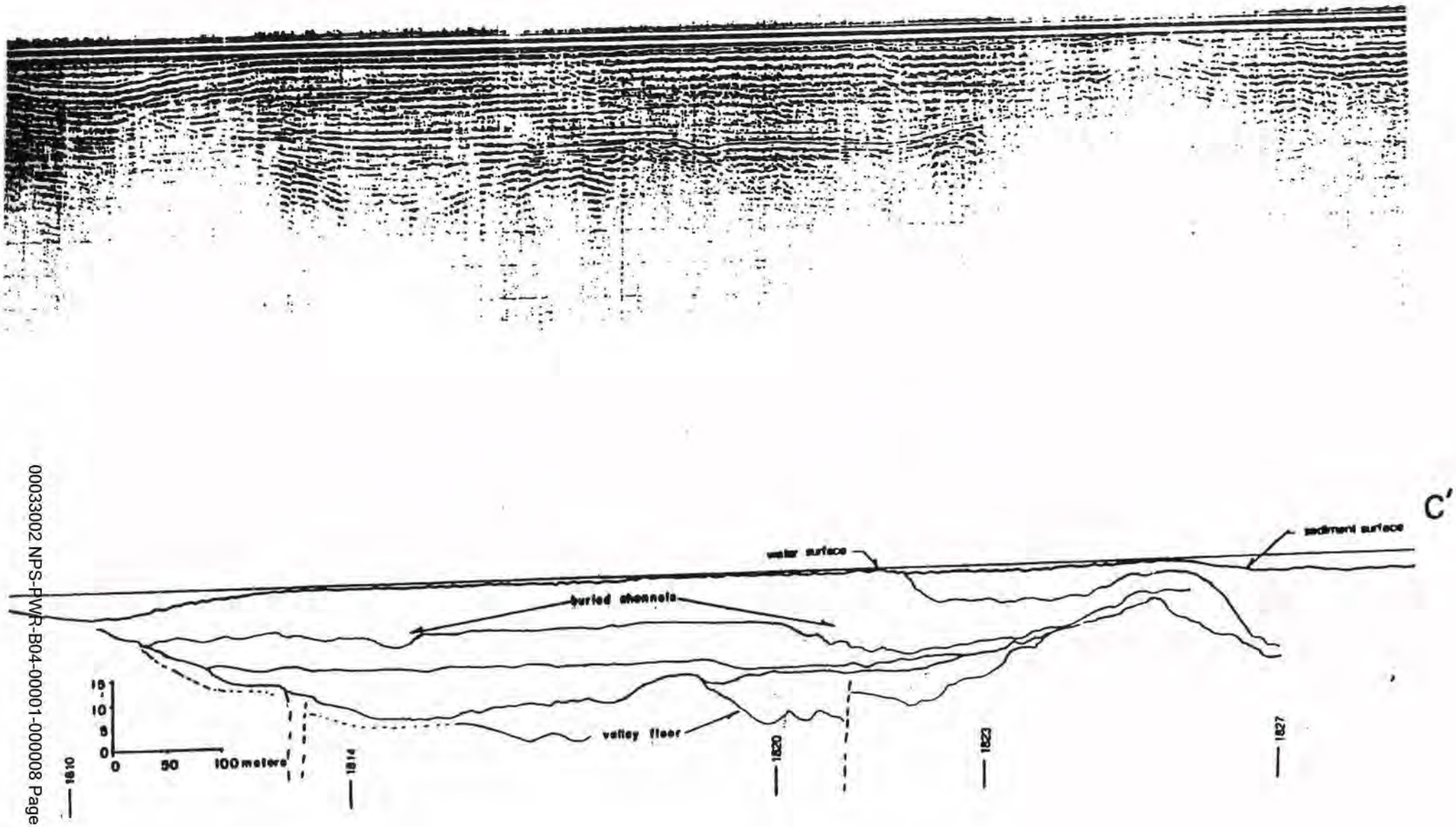

Figure 19. Geophysical Record and interpretation of line C-C'.

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themselves. The records could not be run within the bays themselves, except Schooner Bay, because of the shallow depths, but the profiles were run across the mouths of the bays where possible. Figure 16 shows selected tracklines and figures 17, 18, 19, show the bottoms of the buried valleys with the thickness of sediment fill. Visible in the figures are buried tidal channels that are analogous to the modern tidal channel system of the estero. These features were probably deposited in an earlier upper intertidal flat or supratidal marsh environment which developed as the sea level began to fill the old stream valley to its present height. The interpretation of the depth of sediment infilling is consistent with that proposed by McCulloch in his work.

The geophysical records suggest that approximately 30 meters of sediment has filled the valley occupied by Drakes Estero near the entrance. The sea level curve suggested by Milliman and Emery (1968) (fig. 20) was used as a measure of the last marine transgression, which began at 15-18,000 yrs. B.P. The sea-level curve suggest that the time of the onset of valley filling at a depth of 30 m was 8,000 yrs B.P. Dividing the depth of valley fill by the time of onset of filling suggest a long-term sedimentation rate of 37.5 cm/100 yrs. Table 17 shows the results of similar calculations using acoustic and Sonoprobe surveys for Tomales Bay and Bolinas Lagoon. Drakes Estero sedimentation rates are well

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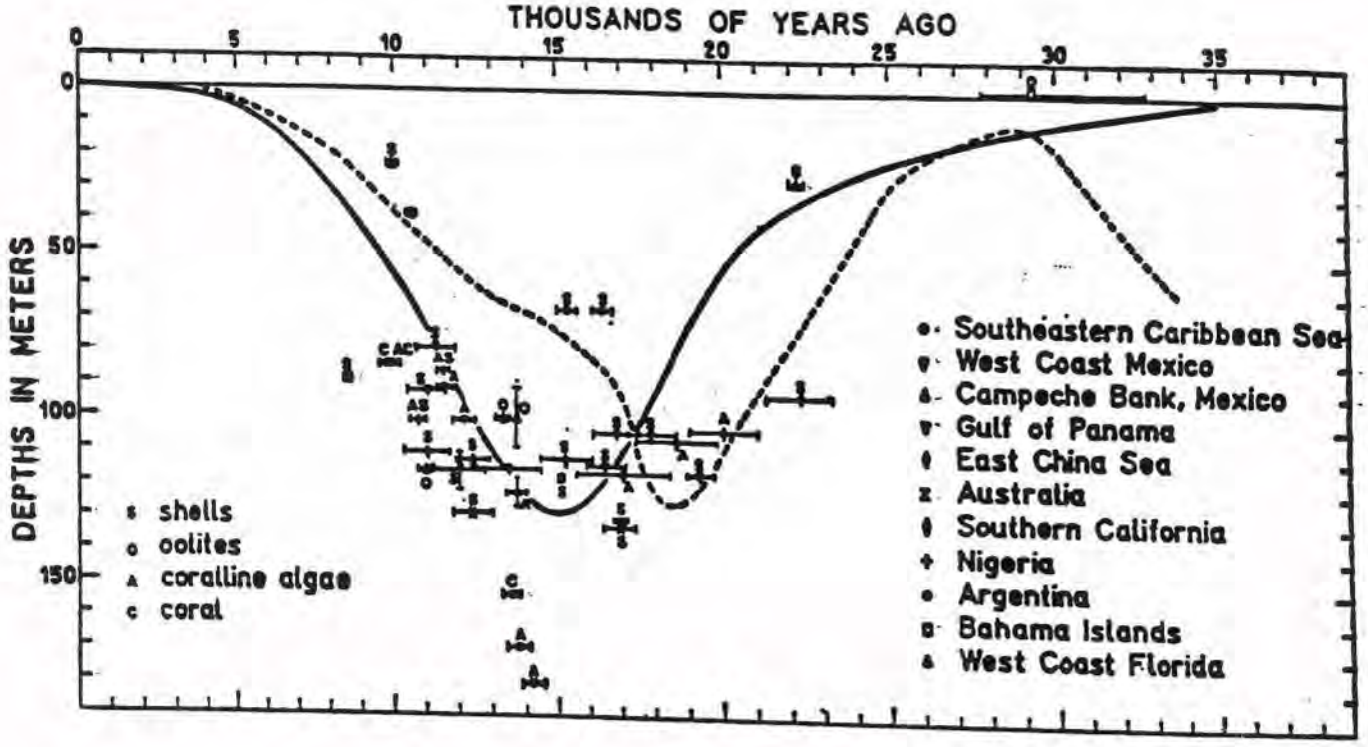

Figure 20. Sea level fluctuation over the last 35,000 years B.P. Depths and ages of sea-level indicators throughout the world. The solid line is the sea-level curve for the Atlantic continental shelf. The dotted line is the sea-level curve for the Texas shelf, from Milliman and Emery (1968).

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Table 17. Deposition Rates in Central California based on acoustic survey interpretations, sediment se correlation, and bathymetric surveys.

Worker	Location	Method	Sediment Rate cm/1
Daetwyler, (1965	Tomales Bay, CA	Sonoprobe surveys	2
Rowntree, 1973	Bolinas Lagoon, CA	Acoustic surveys	3
Anima (this study)	Drakes Estero, CA	Uniboom surveys	3
Stevenson, and Emery, 1958	Newport Bay, CA	correlate old tidal flat sediments with change in hydraulics of the estuary.	4
Wahrhaftig, 1970	Bolinas Lagoon, CA	pre transgressive beach deposits	30.5
Ritter, 1973	Bolinas Lagoon, CA	1939-1968 surveys	4

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within the same range of rates. Comparison with bathymetric surveys and sediment correlations by other workers show similar results.

6. Nutrient Study (Hagar, 1990, written communication)

The purpose of the nutrient study was to ascertain the influence of land use on the nutrient inputs to Drakes Estero and Abbotts Lagoon. The study gathered data on the chemical composition of the water of creeks flowing into Drakes Estero and Abbotts Lagoon from October, 1987 to September, 1988 (fig. 21). The study began with a reconnaissance of ten creeks, and subsequently focussed on five creeks chosen to represent a range of land uses. Water samples were collected primarily during storm events. The properties measured were temperature, electrical conductivity, dissolved nitrate, nitrite, reactive phosphate, silica and ammonium, total dissolved nitrogen and phosphorus, particulate nitrogen and carbon, total phosphorus, and suspended particulate material. At most sampling times, flow rates were estimated and evidence of previous water levels noted (Hagar, 1990).

Descriptions of sampling sites, with estimated watershed areas, the methods used to sample the study streams and the laboratory analysis procedures used are described in Hagar, 1990.

The original strategy of this study was to test two hypotheses: First, that the ratio of dissolved inorganic nitrogen or phosphorus to total dissolved inorganic

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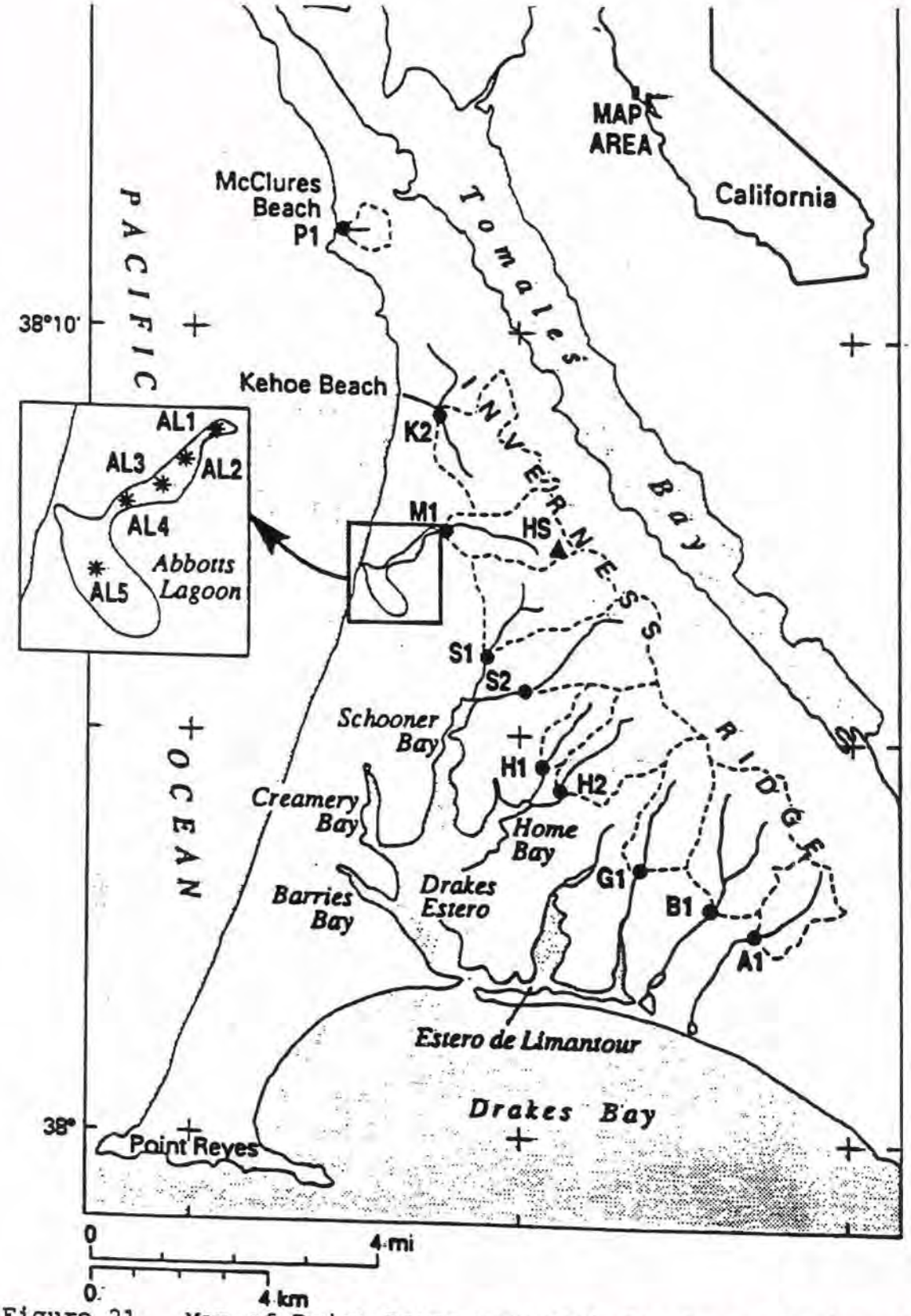

Figure 21. Map of Point Reyes National Seashore showing the sites used for nutrient analysis sampling (from Hagar, 1990)

concentration, aliased by the electrical conductivity, would be significantly higher in the creeks draining agriculturally utilized watersheds, and would be highest in the most intensely utilized watersheds. Second, that the ratio of particulate nitrogen or phosphorus to (total) suspended particulate material would also be higher. By showing consistent enrichment of the dissolved and particulate loads of these creeks, it was anticipated that the difficult and costly task of establishing yearly nutrient budgets would be circumvented. However, the highest nitrate plus nitrite (water year median 312 uM) and total dissolved nitrogen concentrations (340 uM) were seen in a "control" creek, one supposedly outside of the area of agricultural influence. Consistently high nitrate plus nitrite levels (164-165 uM) were also seen in an incidentally sampled spring in the upper part of a watershed with relatively intense agricultural use in the lower parts. Although no firm conclusions can be reached as to the quantitative impact of agricultural land use, it seems unlikely that surface nutrient inputs to Drakes Estero are of concern. Inputs to Abbotts Lagoon should be further studied, since the lagoon is not regularly flushed, and there are significant above-ground and presumably groundwater supplies of nutrients to the lagoon. Because of the limited rainfall during this winter, it was impossible to establish the degree to which the washout of nutrients occurred, and thus the applicability of these results to other, wetter years (Hagar, 1990).

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Section IV. Conclusions

1. Drakes Estero

The results of this study indicate that Drakes Estero is a slowly filling system that is being supplied with sediment from the open marine environment, streams, aeolian deposition, biological reworking, and erosion of the surrounding bedrock. Tidal action is playing the dominant role in sediment distribution, erosion of surrounding bedrock, and overall flushing of the system. The rate of sedimentary filling has varied since the onset of the last marine transgression which began 8,000 yrs. B.P. based on the depth of sediment fill at the entrance of the lagoon, Pb^{210}, and C^{14} analyses. The depth of fill suggests the sedimentation rate was approximately 37.5 cm/100 yrs from 8,000 yrs. B.P. until approximately 3,000 yrs. B.P., when according to the results of the C^{14} analysis it decreased to between 3.8 to 6.4 cm/100 yrs. and increased again to between 5.7 to 11.7 cm/100 yr over 1,200 to 1,700 yrs B.P. The early high sedimentation rate may reflect the rapid rise of the sea during the early stages of the marine transgression. The Pb^{210} analyses suggest a continued increase in sedimentation rates to the levels similar to the post transgressive sea level rise. Comparing the results of this study to that of other workers suggests that both the long-term and short-term sedimentation rates follow a similar pattern and that discrepancies that may exist may be due to sampling errors or

the resolution of the dating medium in the different studies. Comparison of Pb^{210} age dates and those of C^{14} (Appendix E) suggest that sedimentation has increased in the last 150 yrs. The increase in sedimentation could be attributed to increased land use as the population of the area increased, i.e., trail and road use, road building, increase in the paved areas that would increase the amount of surface runoff of rain water as opposed to ground absorption. But to relate the increase in sediment input to increased cattle grazing alone is very difficult to substantiate based on the change in population and overall land use of the area over the last 150 years. Based on geophysical record interpretations the lagoon has undergone 10-35 m of infilling in the past 8,000 years. Based on rates of sediment filling calculated using the three methods mentioned and comparing these rates of filling to other areas along the west coast, Drakes Estero and Abbotts appear to be filling at a rate like other west coast lagoons.

The results of both herbicides and pesticides analyses indicate that input into the two study areas are near or below the detection limits of the analytical methods used. Comparing the results of this study to studies conducted in the San Joaquin River and San Francisco Bay show that the amounts detected in the this study are very low.

The effects of range land use are not discernable from the nutrient monitoring program of the streams that flow into Drakes Estero and Abbotts Lagoon. A complete and detailed

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report on the methods and results of the nutrient analysis is available in Hagar, 1990.

In Drakes Estero, open-coast processes have a direct influence on the morphology of the lagoon entrance and subsequently on the distribution of sediment inside the lagoon. When the entrance is to the extreme west as it was in 1953 and again in 1974, oceanic wave and tidal approach is nearly aligned with the main arm of the tidal channel that trends north-south so that sediment being carried in suspension is carried further into the lagoon. Compared to the configuration with the entrance to the east, where wave and tidal currents dissipate their energy on the adjacent cliffs, the sediment would not be transported the same distance into the lagoon, but instead be deposited along the shore of the adjacent margins or as small ebb tidal features near the channels. The tidal flats just north of the main channel (fig. 5) are a relic flood tidal delta feature of when the mouth is in a west side configuration. When the entrance is located to the east , incoming waves and tides attack the adjacent cliffs of Purisima Formation, probably accounting for periods of increased erosion in this area.

The fluvial input of sediment into the system is important to the overall sediment supply and is mainly impacting lagoonal filling in upper parts of the branching bays, most notably in Schooner Bay and in the upper part of Estero de Limantour where sedimentation rates were the highest in the lagoon system. Streams that flow into the

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lagoon are eroding the underlying bedrock from higher in the watershed and introducing the sediment to the estero, where it is deposited mostly in marshes and deltas adjacent to the stream mouths. Where the drainage basins are not large, as in the case of Barries and Creamery Bays, the deltas are comparatively small and the marsh areas not as extensive.

Because they are filter feeders, the oysters being grown and harvested in the estero play an important role in the deposition of fine grained sediment. Haven and Morales-Alamo, (1966) in their study on the quantities of suspended matter removed by oysters(*Crassostrea virginica*) and deposited as feces and pseudofeces (material taken in by an organism but not digested, and expelled as pellets resembling feces), concluded that the amount of feces and pseudofeces (biodeposition) always greatly exceeded the deposition of solids by gravity or settling from suspension. Ito and Imai (1955) calculated that in Japanese waters a raft of oysters 60 m square would annually produce 0.6 to 1.0 metric tons (dry weight) of fecal material. In laboratory experiments (Haven, D. S., and Morales-Alamo, R., 1966), oysters were found to filter seston from the water and deposit it as feces or pseudofeces about seven times faster than it would settle by gravity. It was also determined that the amount of biodeposition differed between warm water and cold water conditions and that oyster ranked second in the amount of feces and pseudofeces produced only to the tunicate *Mogula manhattensis*, based on weight per unit of tissue weight. The

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Haven Morales-Alamo report points out that the biodeposition rate of other common species of invertebrates equals or exceeds that of the oyster. The combination of abundant native filter feeders and the introduced oyster raises questions of the impact the industry is having to the sedimentation rate of the lagoon.

Other work carried out by Haven and Morales-Alamo (1972) reported on the settling velocities of feces and pseudofeces, compared with velocities of naturally settling suspended sediment, support the idea that fine grained sediment in suspension tends to be deposited on the substrate surface more rapidly after having passed through the body of a filter feeder than by natural means. The quiet water environment of the upper middle part of the estero, where most of the oyster racks are found, could allow for the deposition of silt-sized material in the form of feces and pseudofeces produced by the oysters. Once deposited, the material is resistant to erosion. Because the areas of greatest abundance of oysters are well into the lagoon, where tidal flushing is limited, the feces are not being transported out of the system with the tides. Areas adjacent to staked oyster beds have been observed to have higher accumulations of silt and clay sized material on the leeward and/or a down current direction from the beds. Studies mentioned on the production of silt-sized material by Atlantic oysters indicate that the amounts produced are significant. More research is needed to

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ascertain what amount of silt-sized material is being produced by oysters in the lagoon.

2. Abbotts Lagoon

Abbotts Lagoon is also a filling system, but the rate of filling (between 8.0 to 19.0 cm/100 yrs.) is slower than that of Drakes Estero. Sediment supply is mostly from aeolian dune encroachment, open coast processes (berm overwash, and wave erosion), and stream input. Abbotts Lagoon has the Monterey Formation as its basement rock, which is more resistant to erosion than the Purisima Formation found underlying Drakes Estero, so that the input of sediment from cliff erosion is minimal. However, as mentioned earlier, there is some erosion of bedrock between the two arms of the lagoon and along the east side of the main arm. Scuba diving observations made in the lower or ocean side of the Abbotts Lagoon system found that there are very few organisms living in the lagoon other than arthropods and microorganisms. The system lacks significant numbers of bivalves or other filter feeders that would fix fine-grained sediment and redeposit it as silt-sized material. The system is not tidally influenced, so that constant sediment input or flushing is not a factor.

Both the herbicide and pesticide analysis indicate that the amounts of the two compounds is the same as that found in Drakes Estero, albeit the lack of good circulation by tides would be conducive to preservation of the compounds.

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Section V Recommendations

Although there is very little input of herbicide and pesticides into the Drakes Estero and Abbotts Lagoon systems, the use of either of these two agents should not be increased without a detailed re-sampling of the sediments and streams to evaluate the effects of their increased use. This is to insure that the levels of pesticides and herbicides be kept at or below the existing levels.

The methods used by the oyster industry in Drakes Estero appear to be serving as a baffle to tidal currents in those locations where rack density is highest i.e., mouth of Creamery Bay, Schooner Bay, and Home Bay. What the results of this current baffling might be needs further study. It has been observed that silt-sized material accumulates on the leeward and/or down-current side of the staked oyster beds. Further study isneeded to ascertain what effects the methods and the large numbers of oysters, oyster racks, and staked oyster beds are having on the sedimentological makeup of the estero. The oyster industry has left much debris in the estero over the years related to their operation. A cleanup effort to remove debris from the intertidal flats, subtidal channels, surrounding shoreline, and marsh areas would be beneficial to the esthetics of the estero. Also, consideration should be given to removing abandoned structures and devices not used by the operation.

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Recommended Future Work

1. Conduct experimental studies on the production of fine-grained material from the various filter feeders that live in the lagoon to determine the effects the fine grained material on the deposition rate into the lagoon. Does this production of fines have an impact on the filling of the lagoon?

2. Continue to monitor the rate of migration of the inlet and what its position has to do with the deposition of sand in the central part of the estero. What is the effect of the inlet position to the sedimentation pattern inside the estero? Periodically monitor the bar across Abbotts Lagoon, especially during periods of high tides and storms, to study the erosion of and rebuilding of the barrier.

3. Run more geophysical profiles in the lagoon to determine the amount of sediment that has already infilled the lagoon. This could aid in a better understanding of the infilling characteristics of the lagoon.

4. What has been the effect of damming of the streams in the overall sedimentation picture of the lagoon. By vibracoring the ponds developed behind the dams and attaining Pb^{210} dates, the amount of sedimentation into these ponds can be determined. What is the rate of filling? Will they eventually fill and begin depositing sediment into the lagoons? How long before this occurs?

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5. Conduct a detailed identification of the fossil mammal remains found along the margins of Drakes Estero and collect samples large enough to display at the Visitor Information at Bear Valley, (fig. 22).

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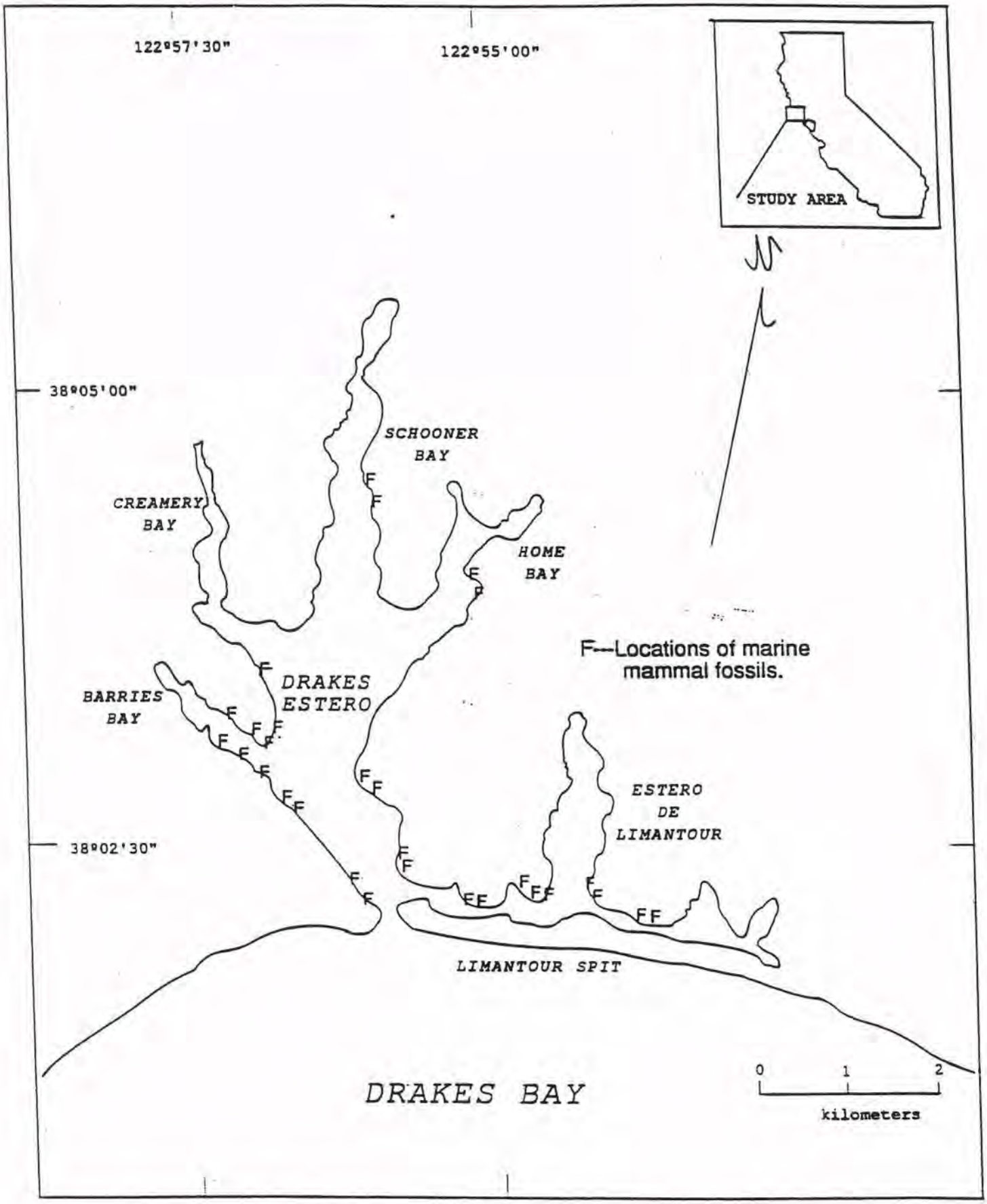

Figure 22. Map showing the location of fossils exposures surrounding Drakes Estero.

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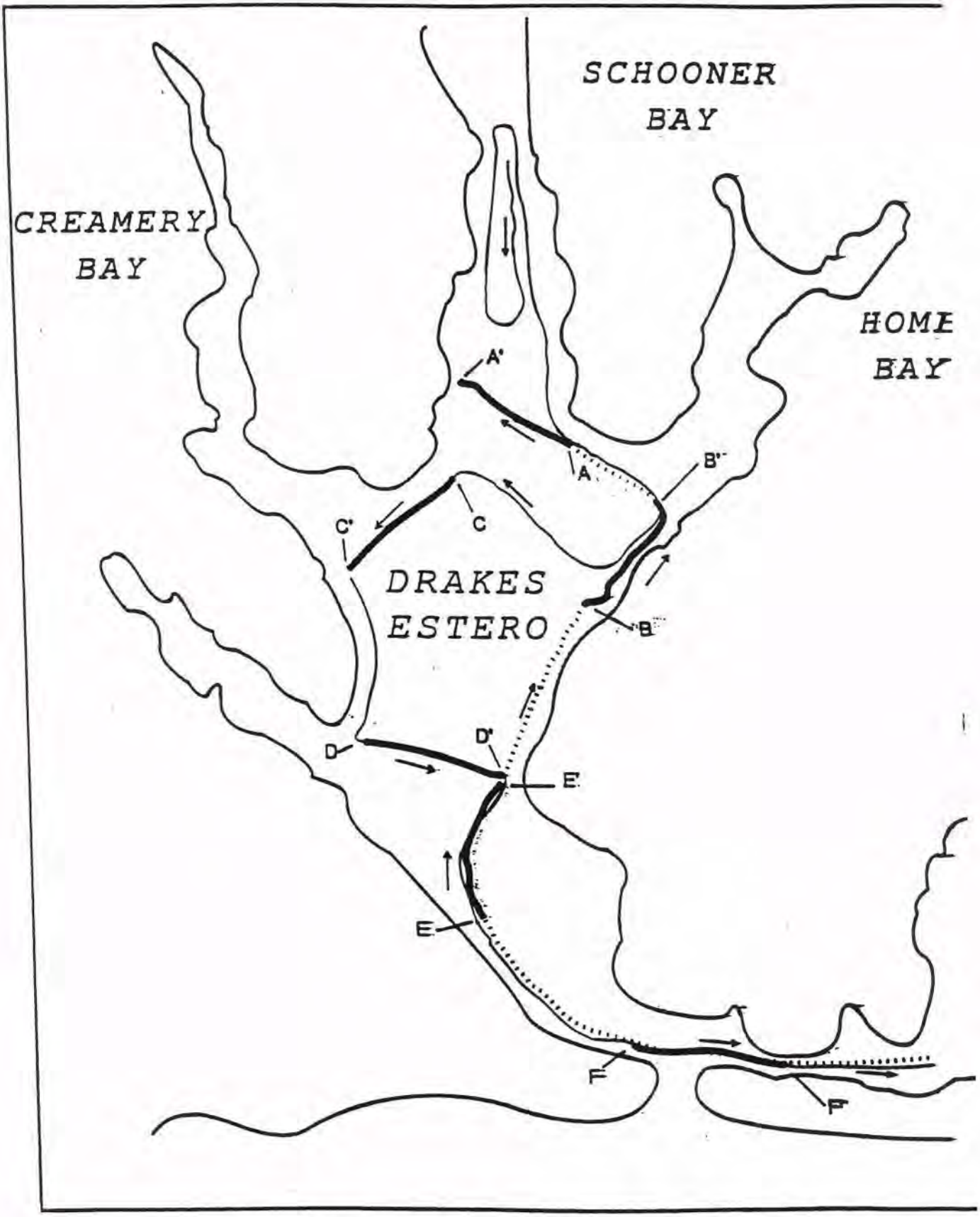
Appendix A1



Map showing bathymetric tracklines run in Drakes Estero. Letters correspond to profile lines (dark lines). Arrows indicate boat direction.

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A1b. Bathymetry records taken in Drakes Estero along tracklines A-A', B-B', and C-C'.

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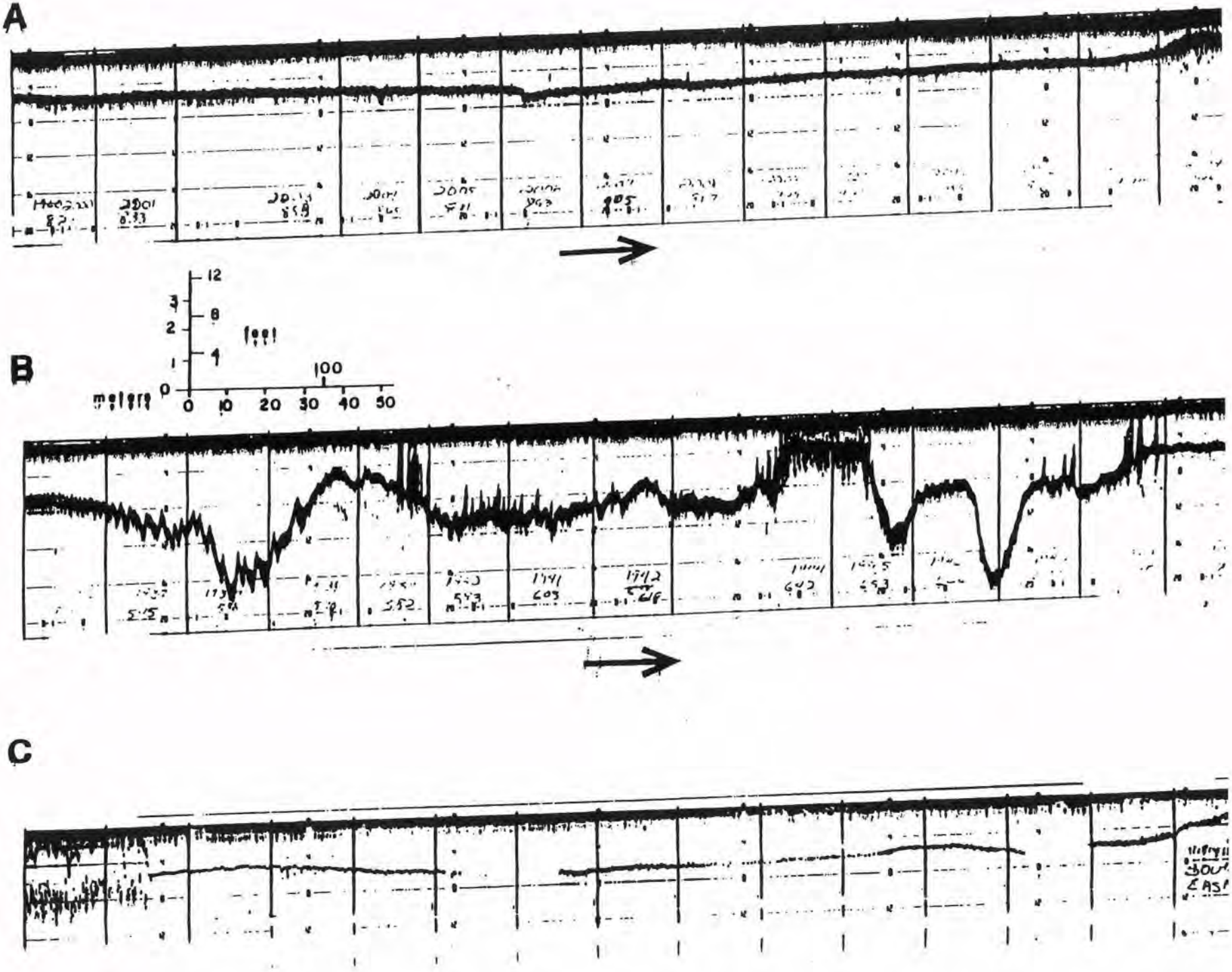

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A1c. Bathymetric records taken in Drakes Estero along tracklines D-D', E-E', and F-F'.

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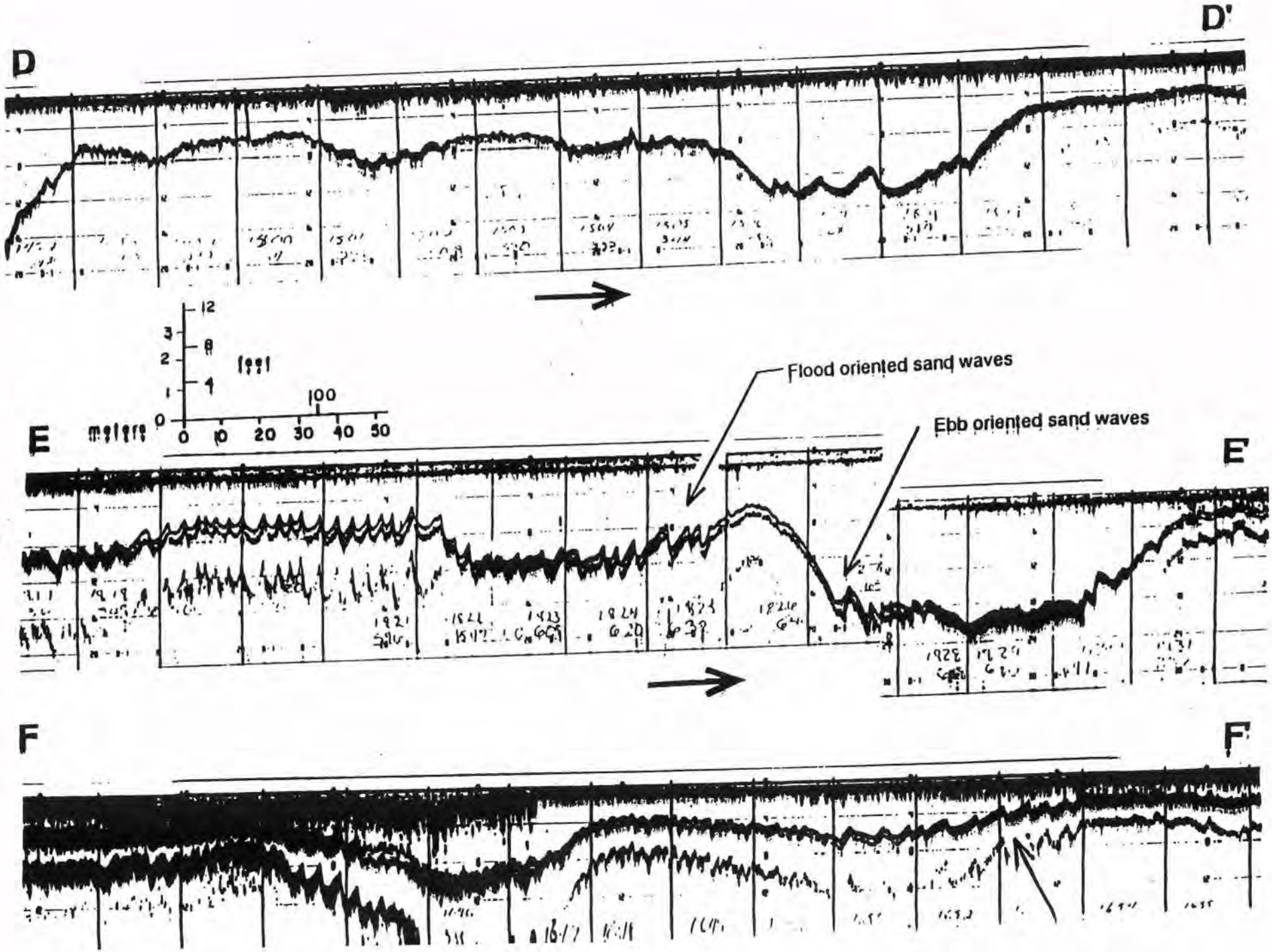

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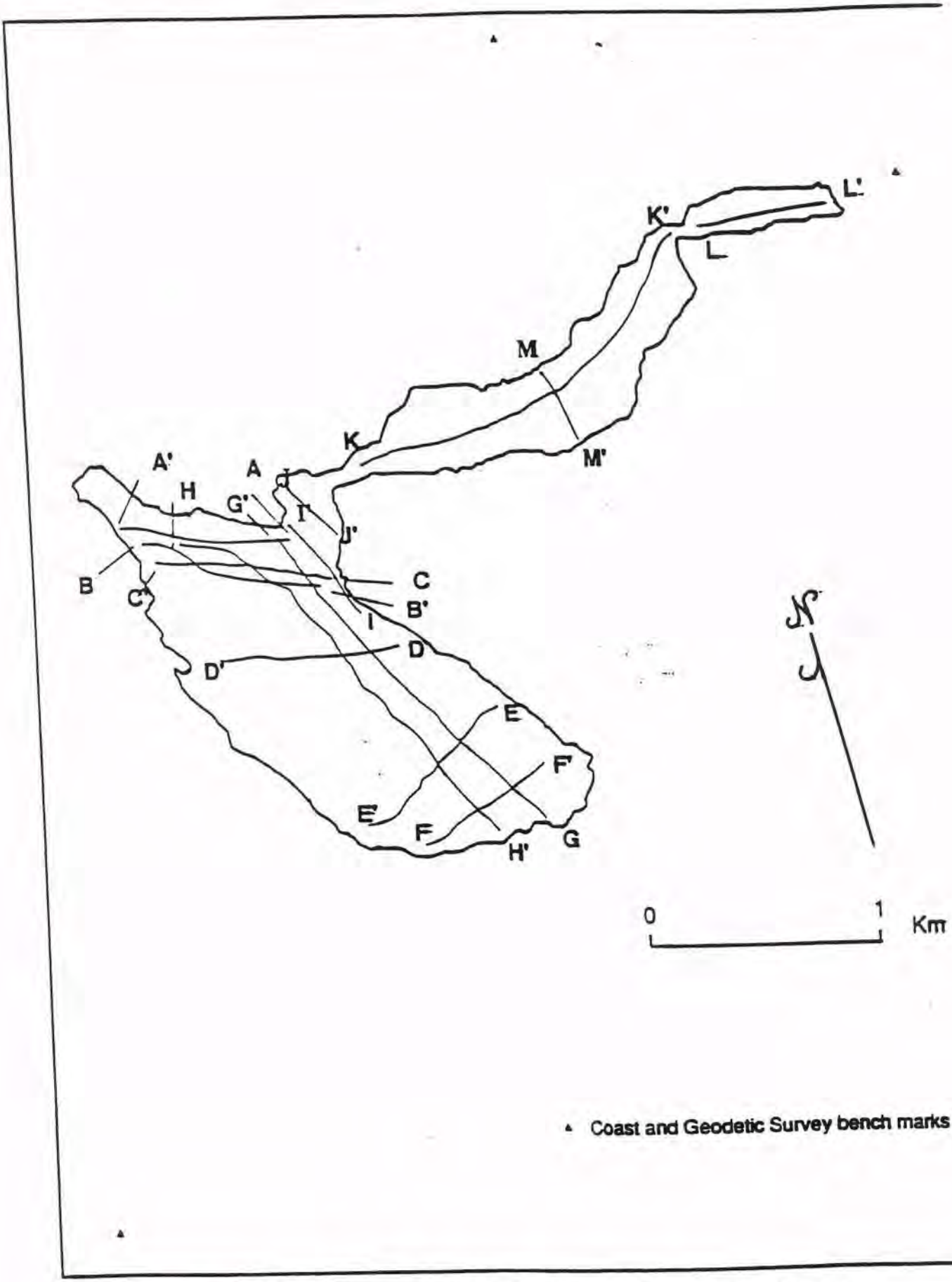
Appendix A2



A2a. Map showing bathymetric tracklines in Abbotts Lagoon.

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A2b. Bathymetric records collected along track line A-A' in Abbotts Lagoon. Note ridges that formed during closure of the lagoon.

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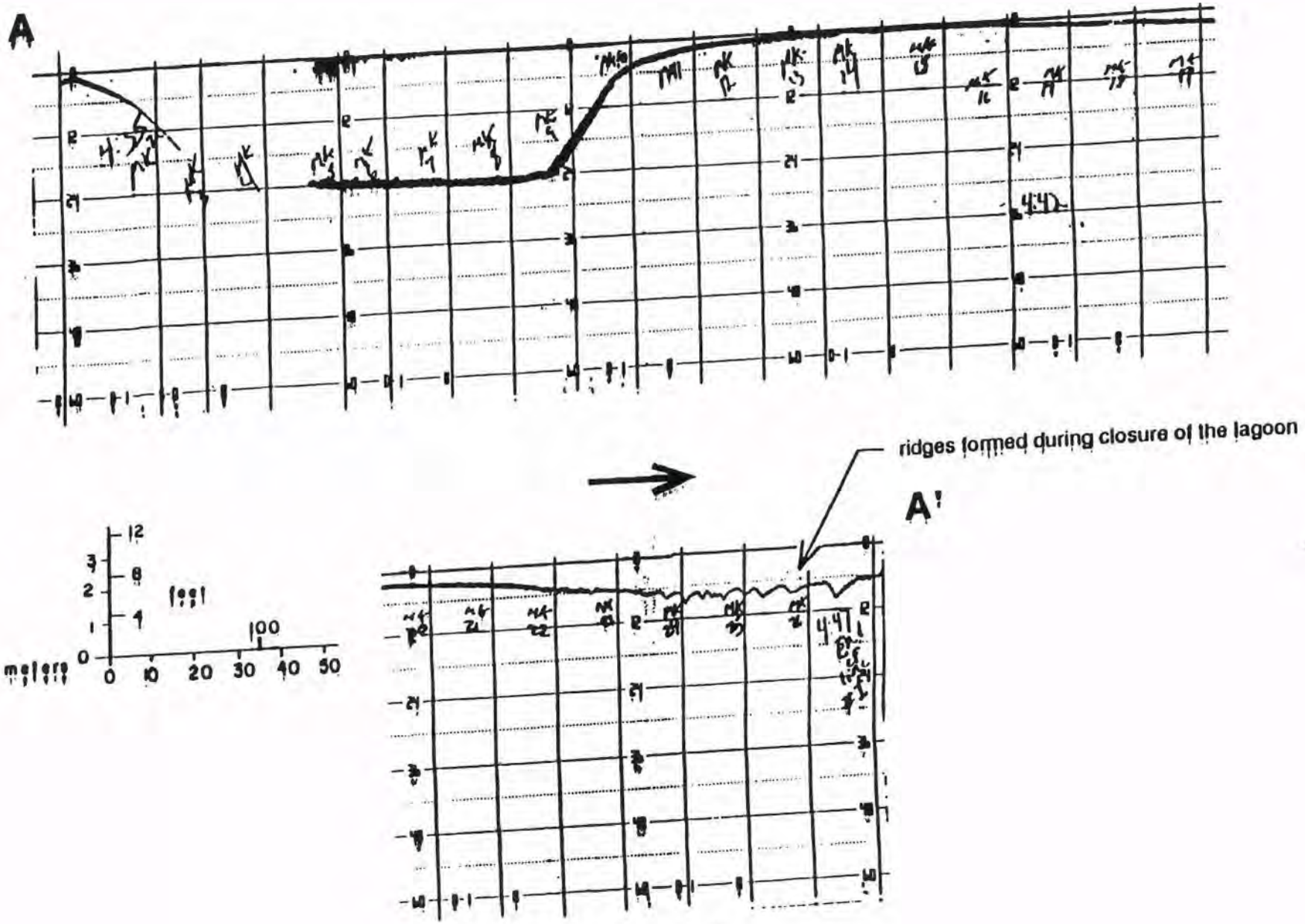

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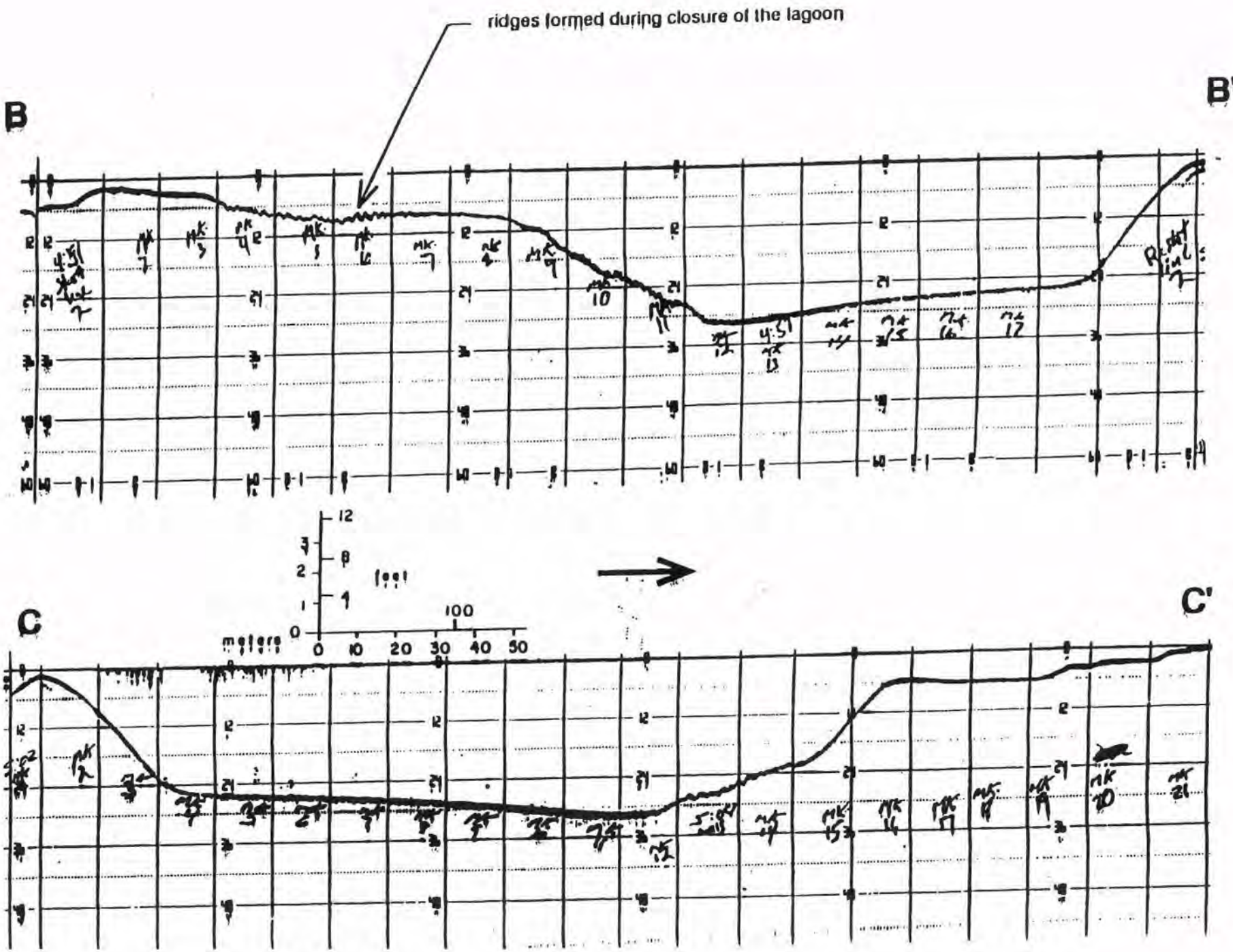
A2c. Bathymetric records collected along tracklines B-B', and C-C', in Abbotts Lagoon. Note ridges along both tracklines that formed during closure of the lagoon



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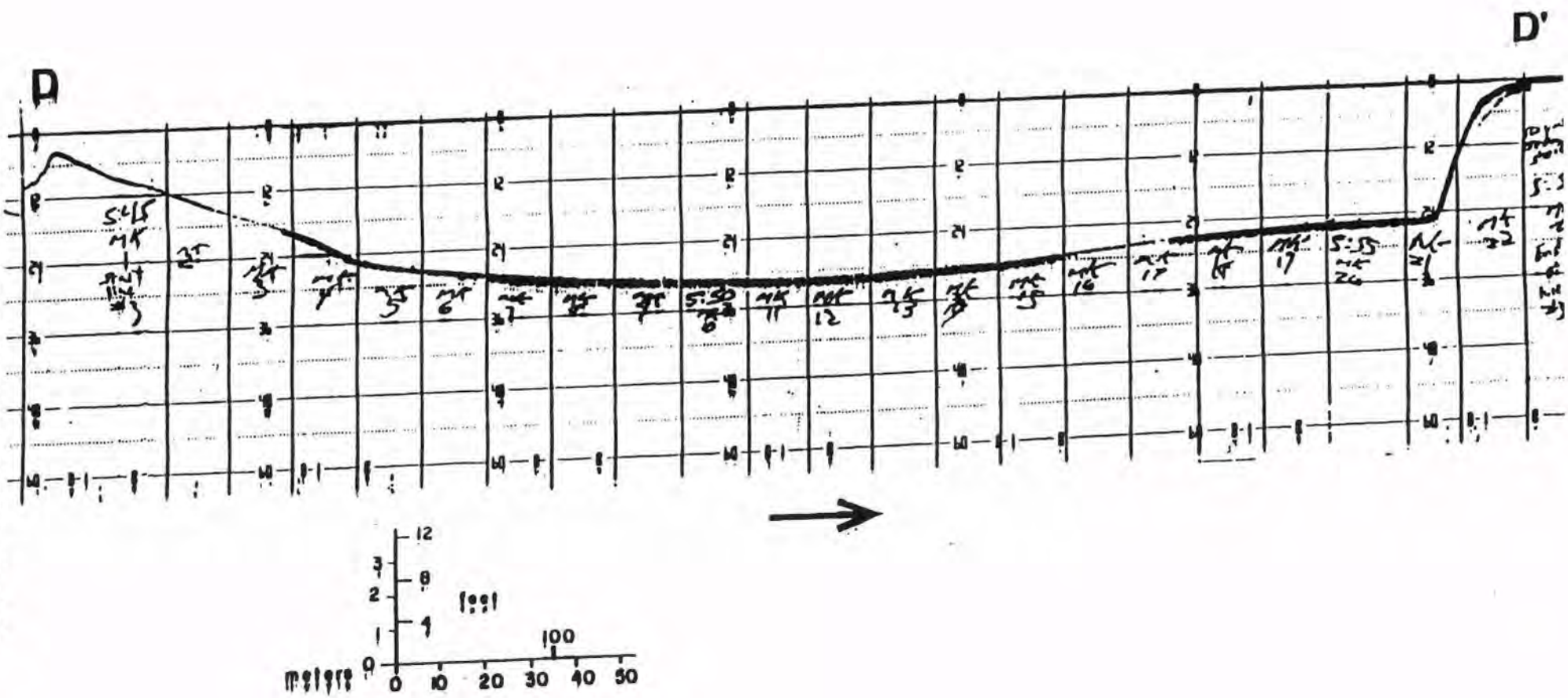
A2d. Bathymetric records collected along trackline D-D' in Abbotts Lagoon. Note steep west bank of the lagoon.



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A2e. Bathymetric records collected along tracklines E-E', and F-F' in Abbotts Lagoon.

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A2f. Bathymetric records collected along trackline G-G' in Abbotts Lagoon. This trackline was run from south to north along the center of the lagoon.

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A2g. Bathymetric records collected along trackline H-H' in Abbotts Lagoon. This trackline was run from the north to the south west of trackline G-G'.

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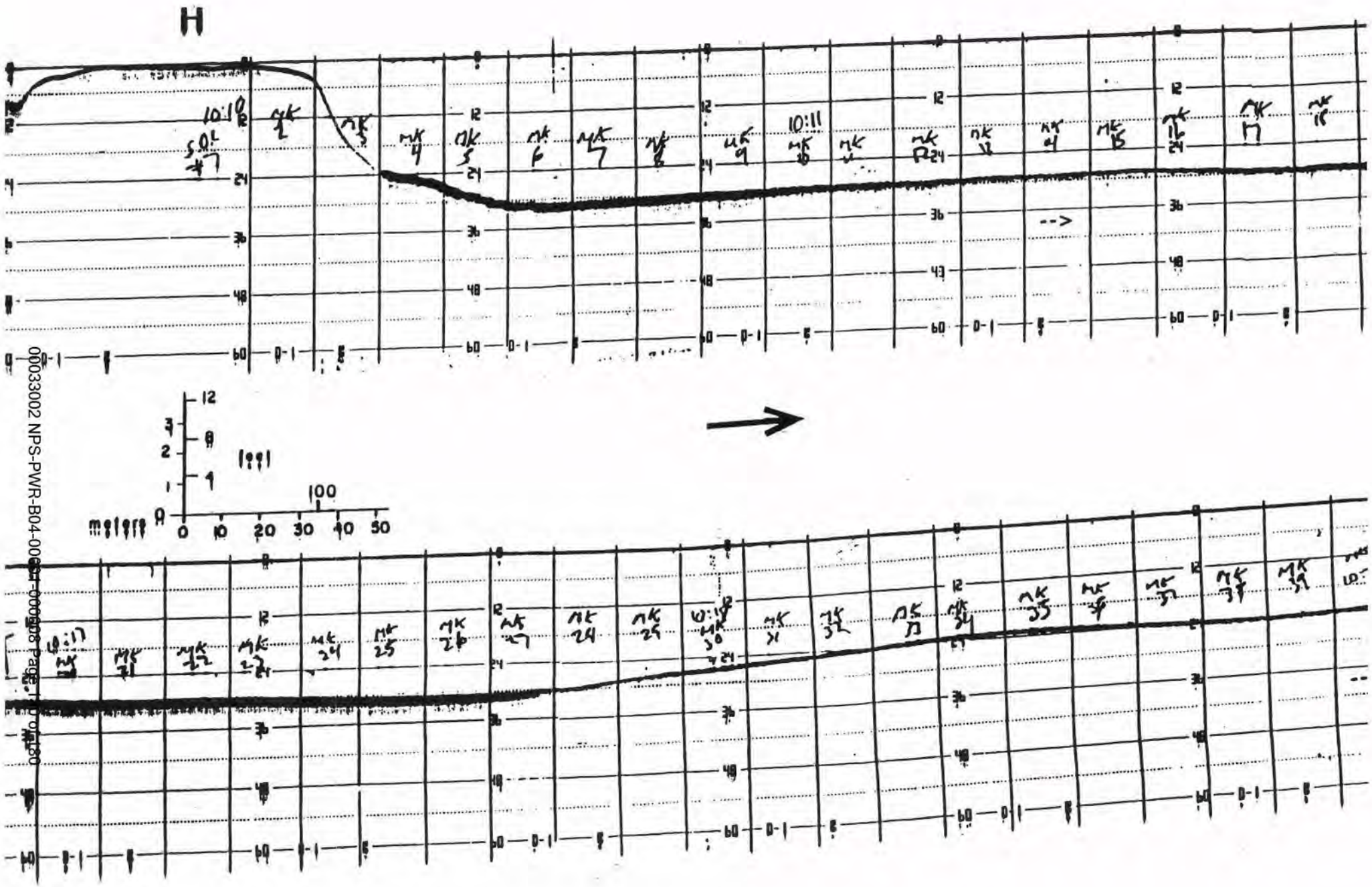

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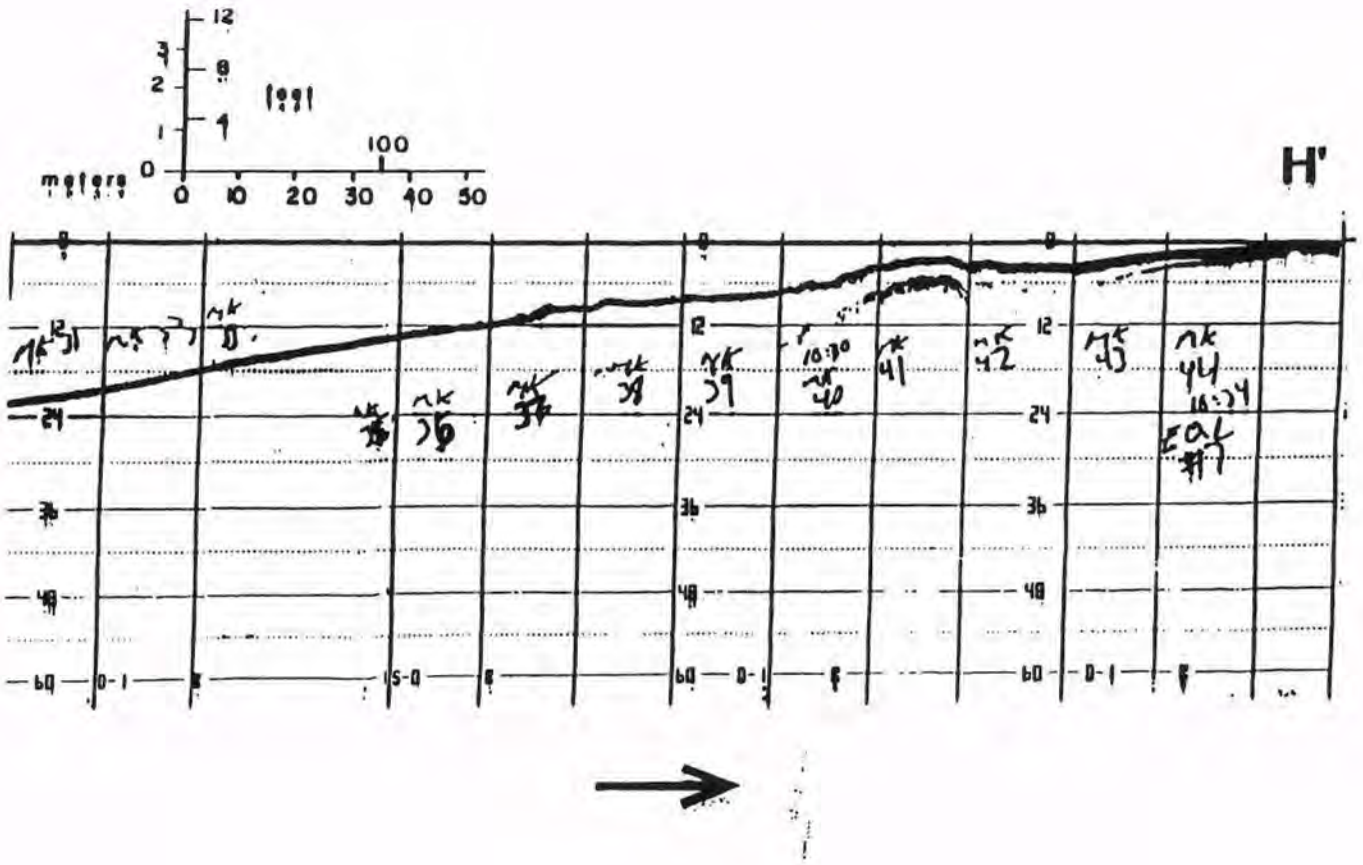

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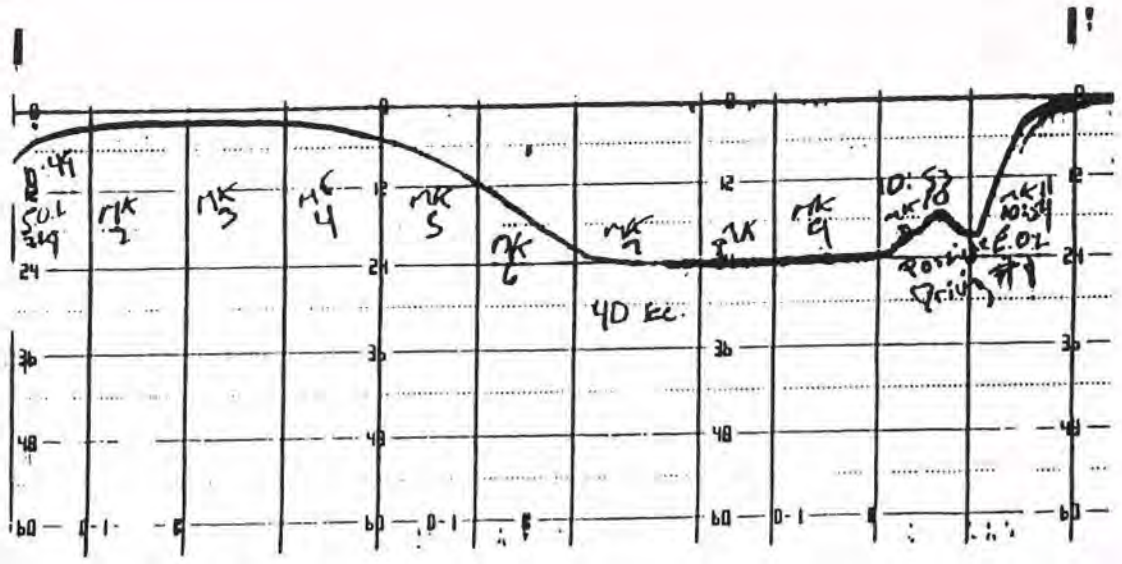
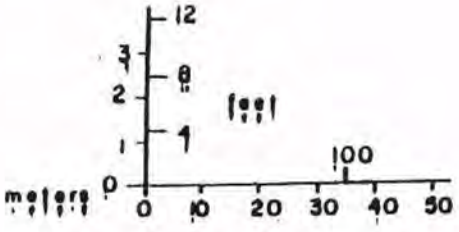
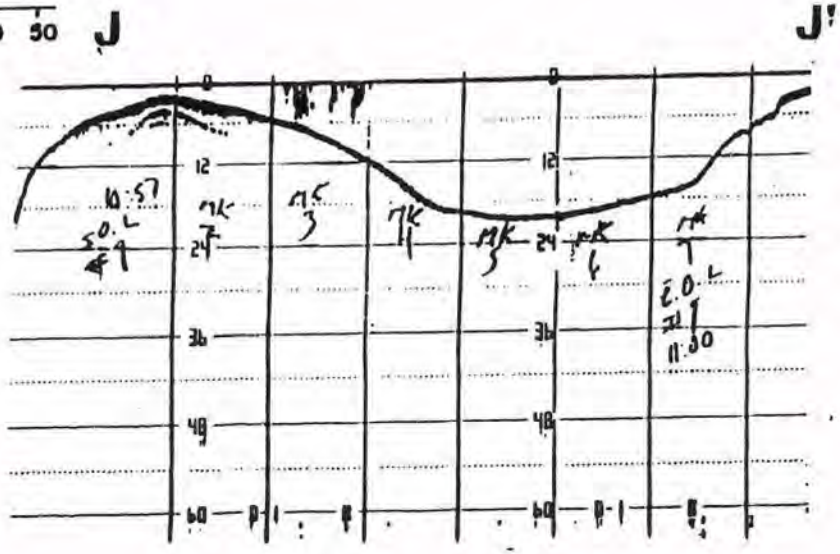
A2h. Bathymetric records collected along tracklines I-I', and J-J' at the northern part of Abbotts Lagoon.







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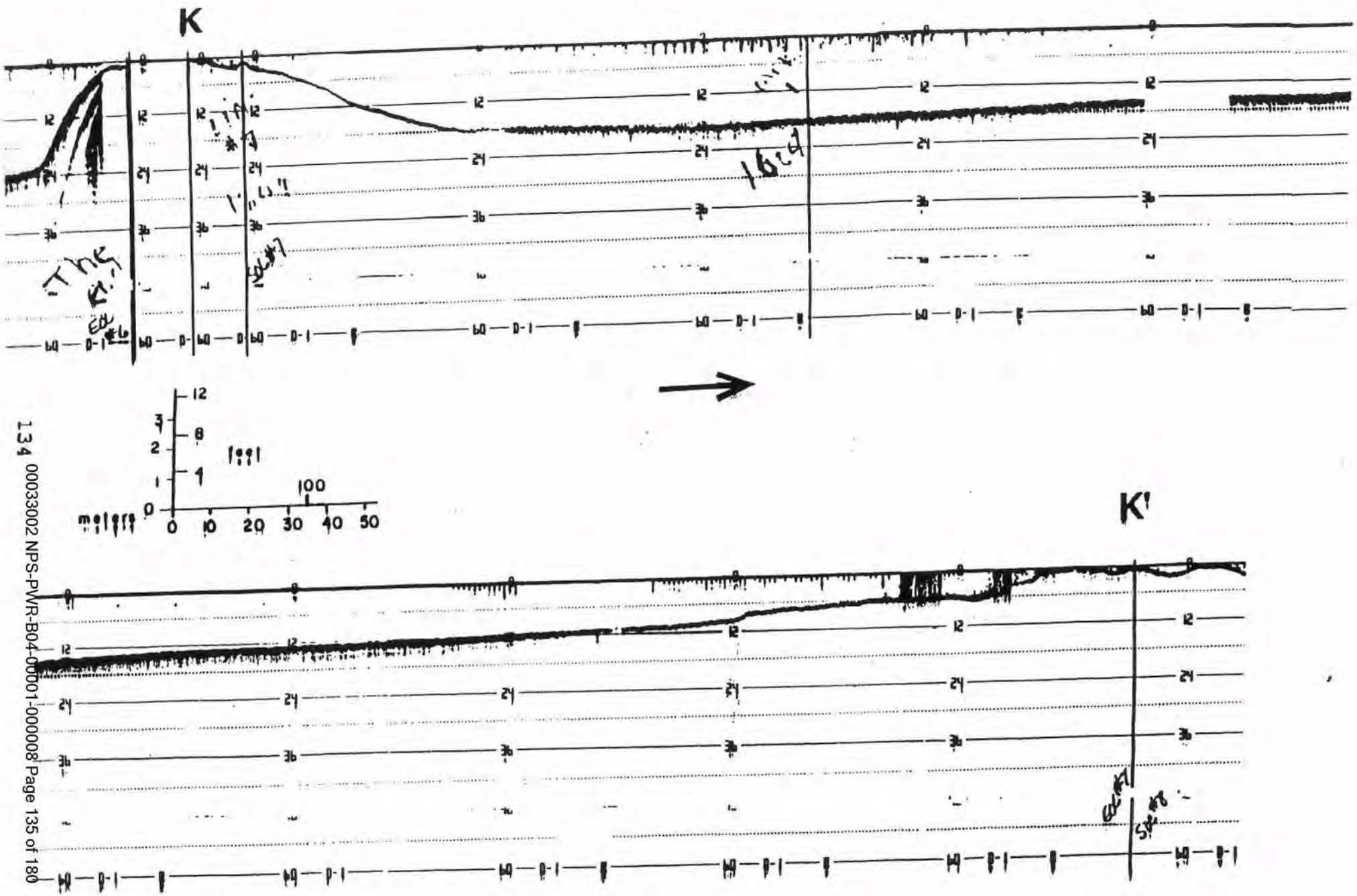
A2i. Bathymetric records collected along trackline K-K' in the eastern arm of Abbotts Lagoon


K
K'
0 10 20 30 40 50
100

A2j. Bathymetric records collected along tracklines L–L', and M–M' in the eastern arm of Abbotts Lagoon

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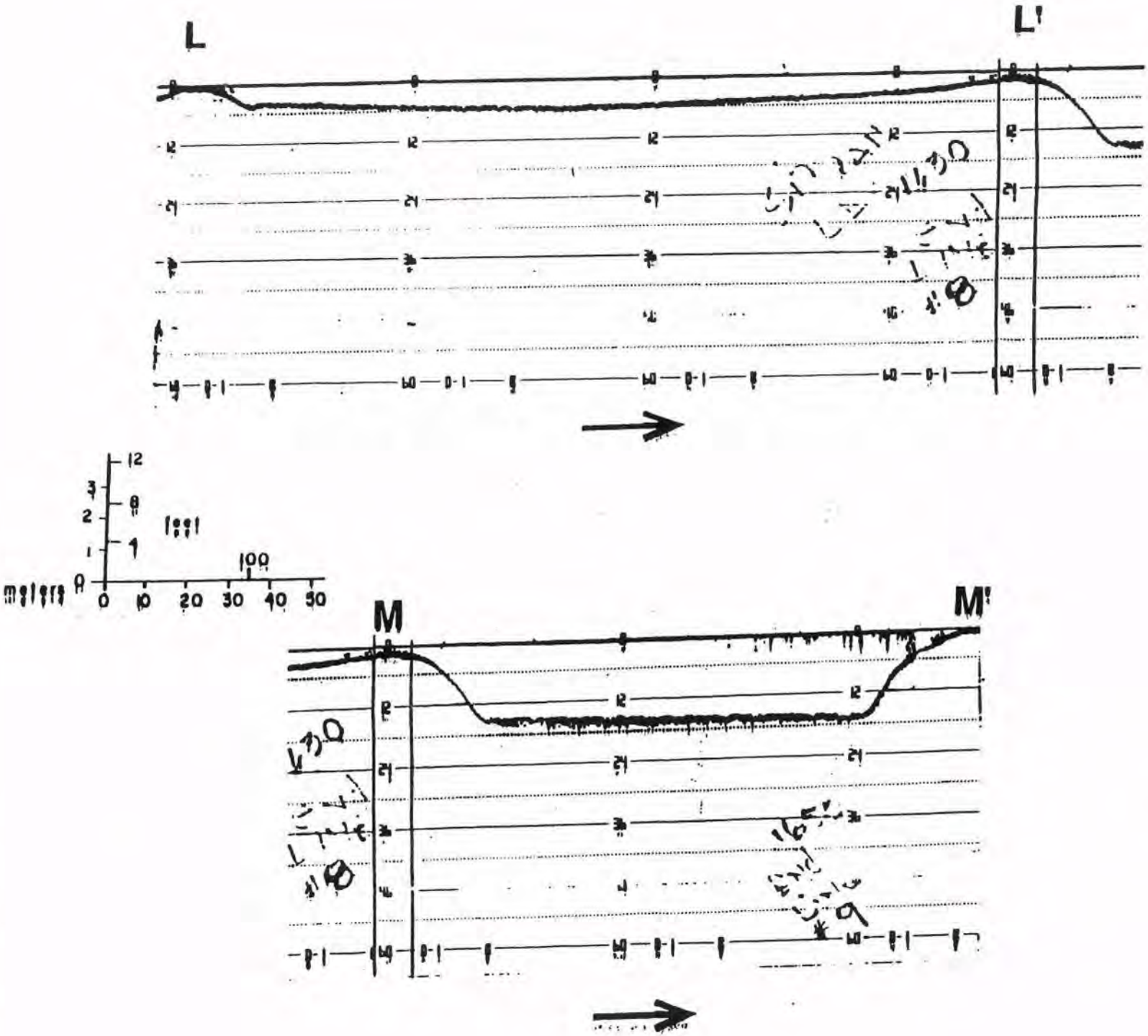

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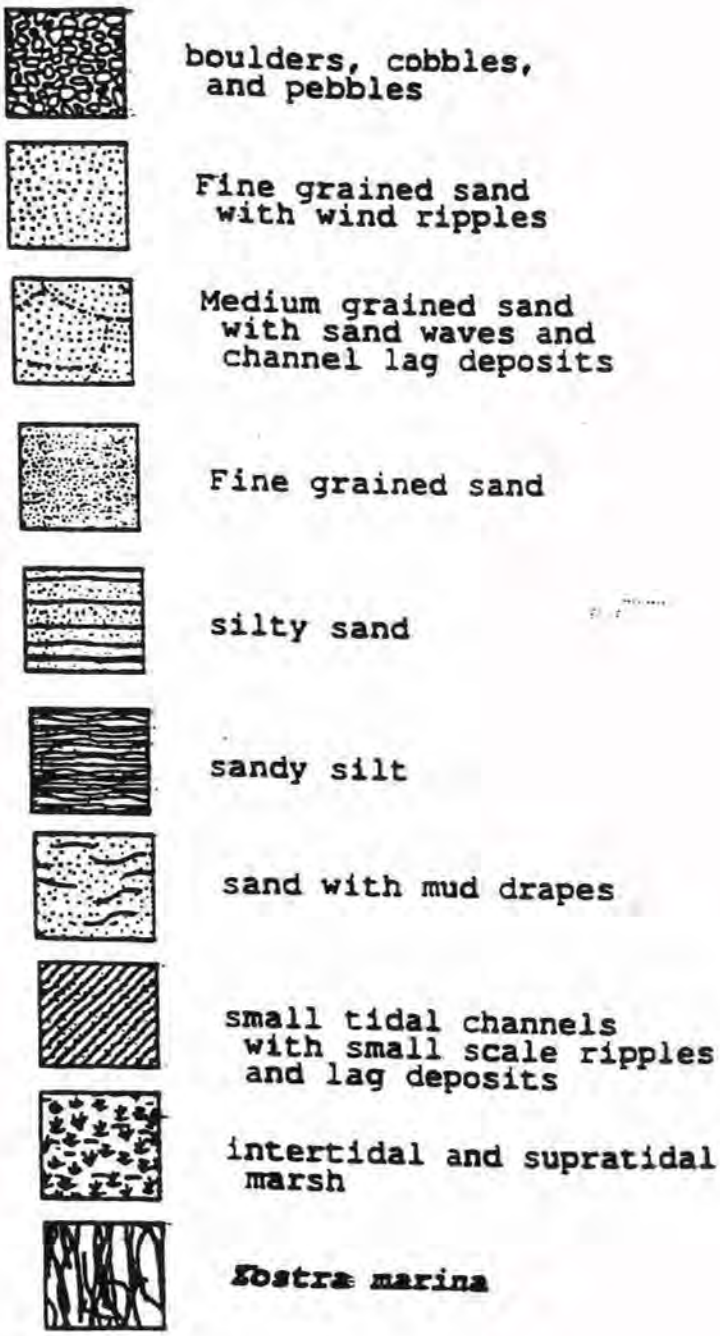
Appendix B Sediment Characteristics

Key to Patterns and Texture



B1a. Key to patterns and textures used in figures B1b to B1g

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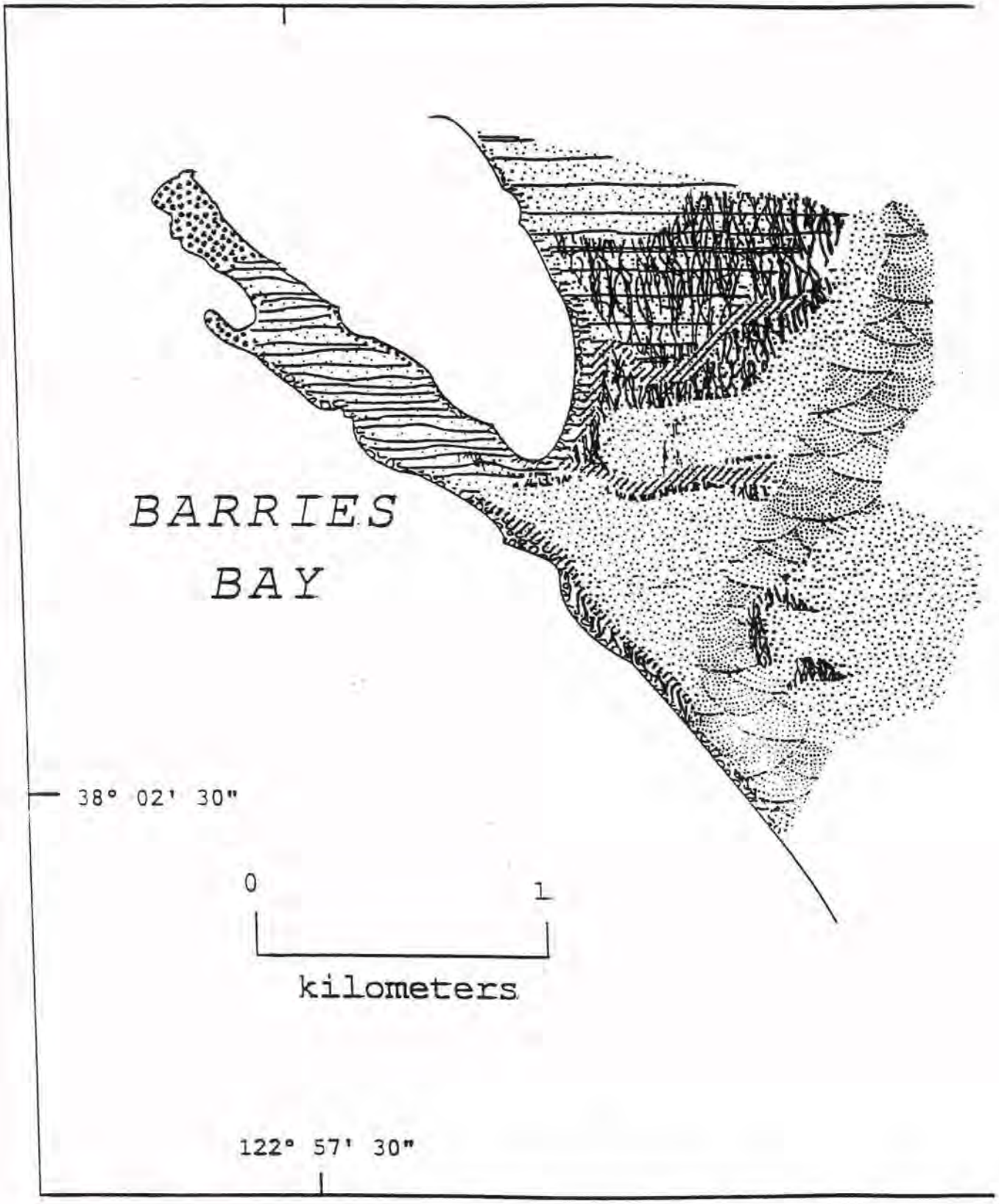
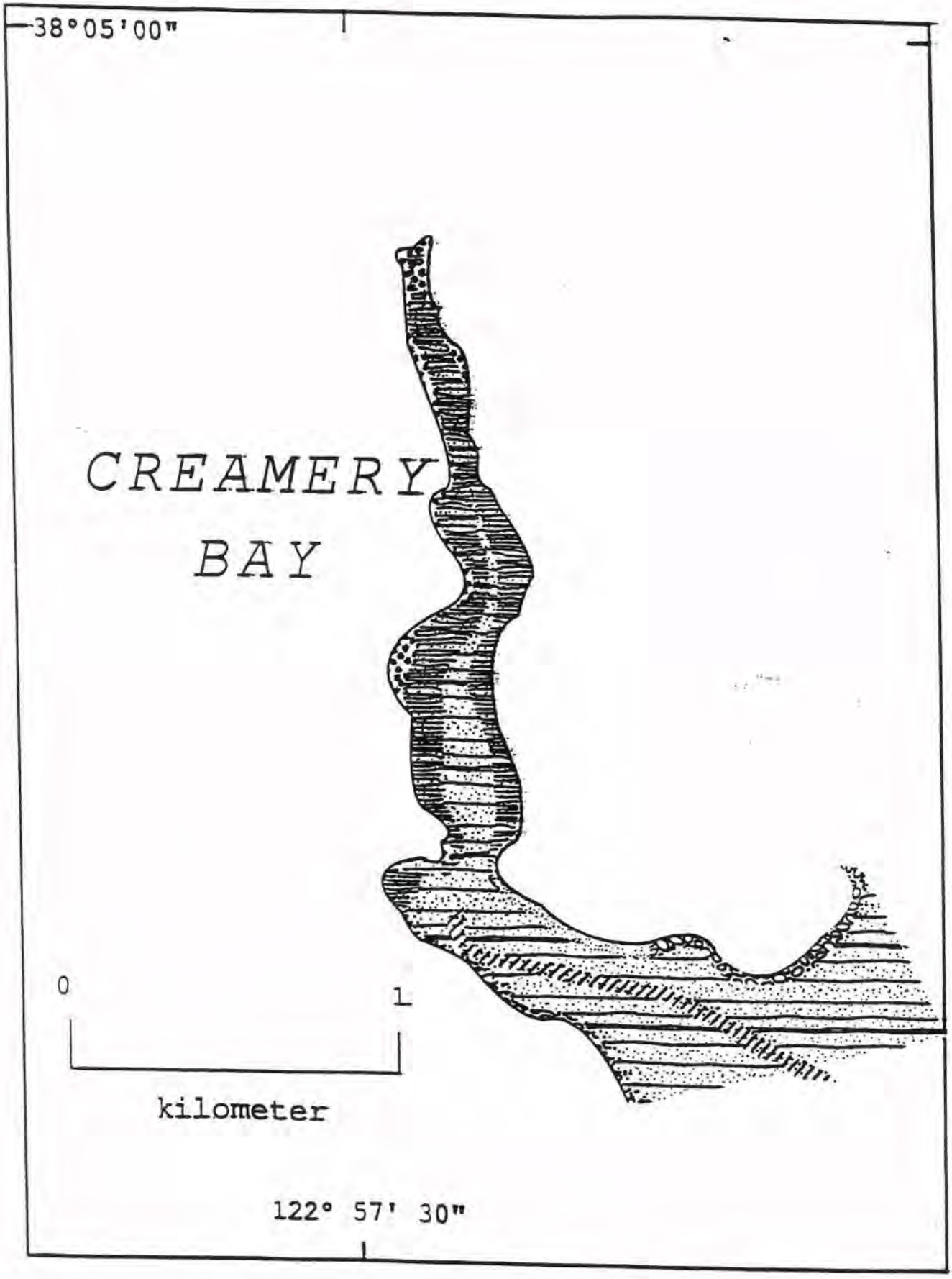


B1b. Sediment textures found in Barries Bay and portions of the central estero.



B1c. Sediment textures found in Creamery Bay

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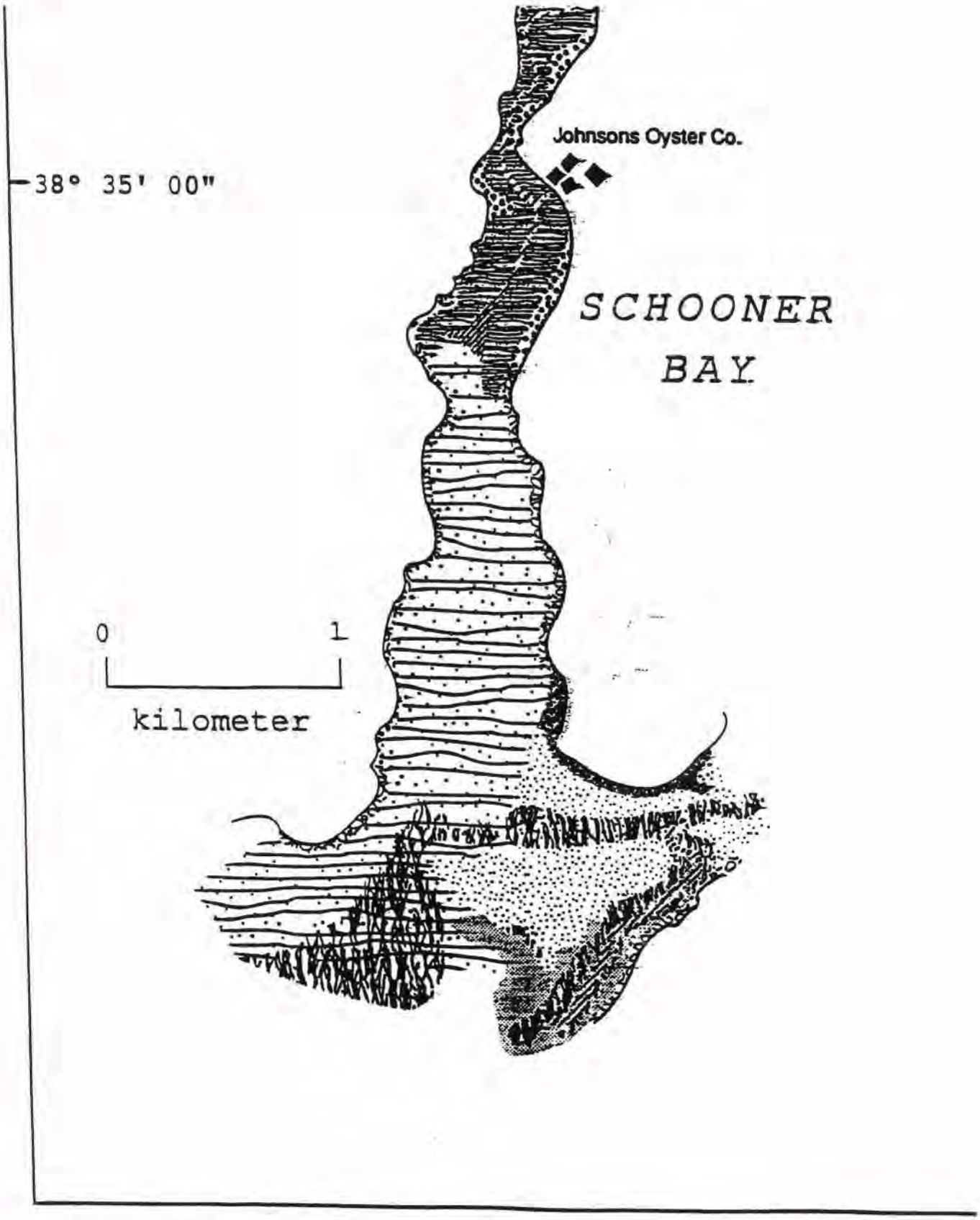

Bld. Sediment textures found in Schooner Bay, and northern portions of the central estero

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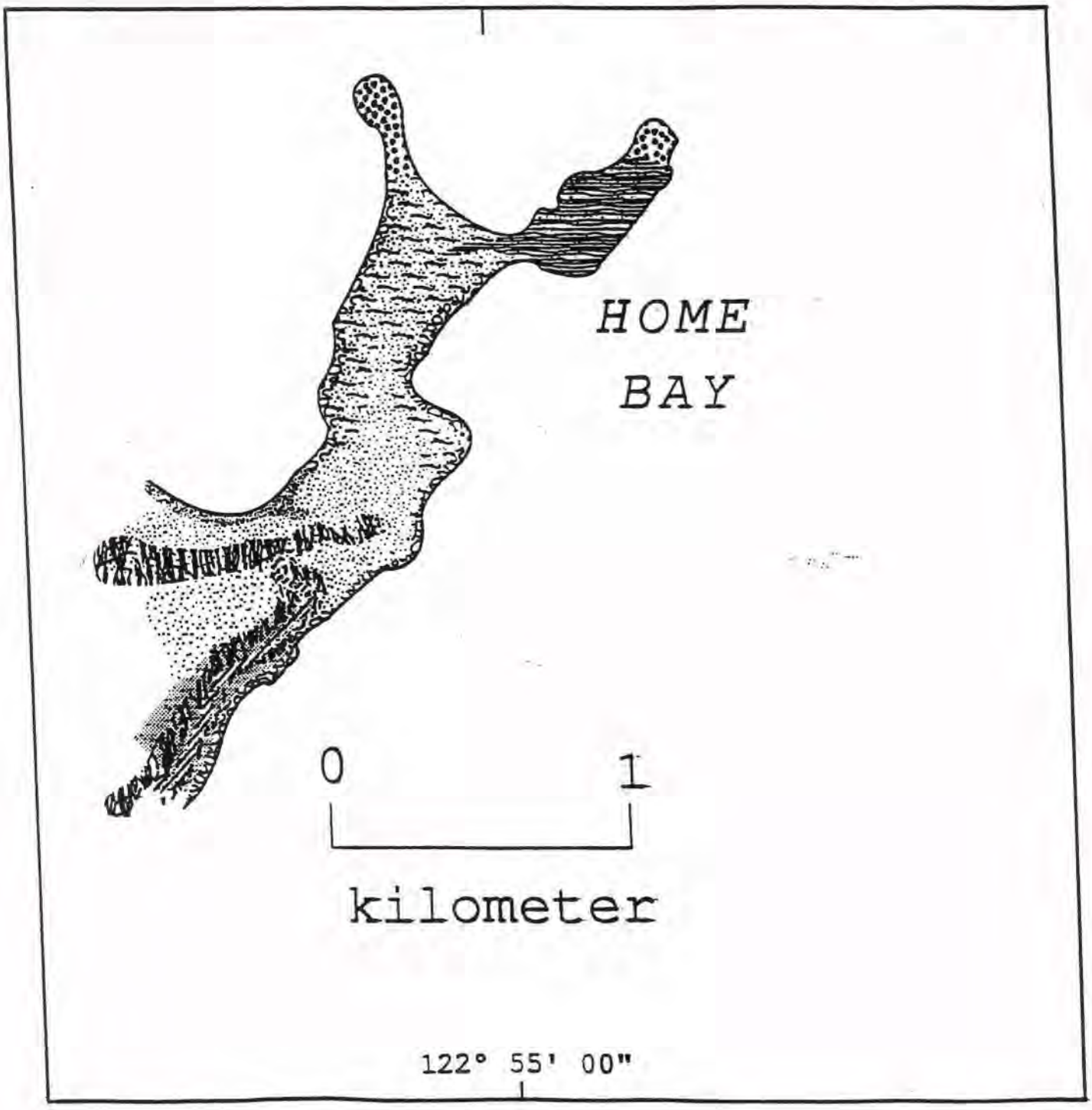
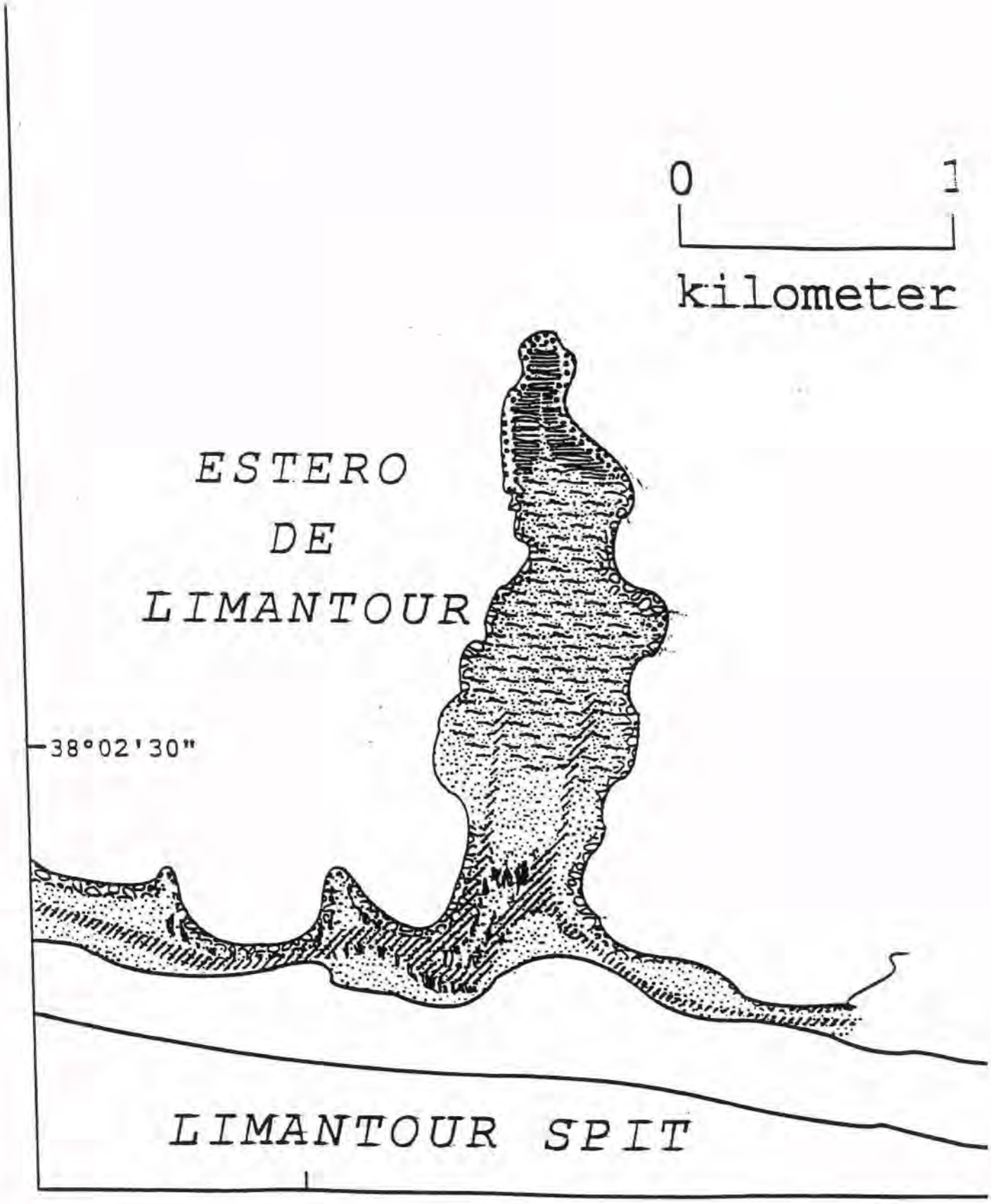


Ble. Sediment textures found in Home Bay.



Bl f. Sediment textures found in Estero de Limantour

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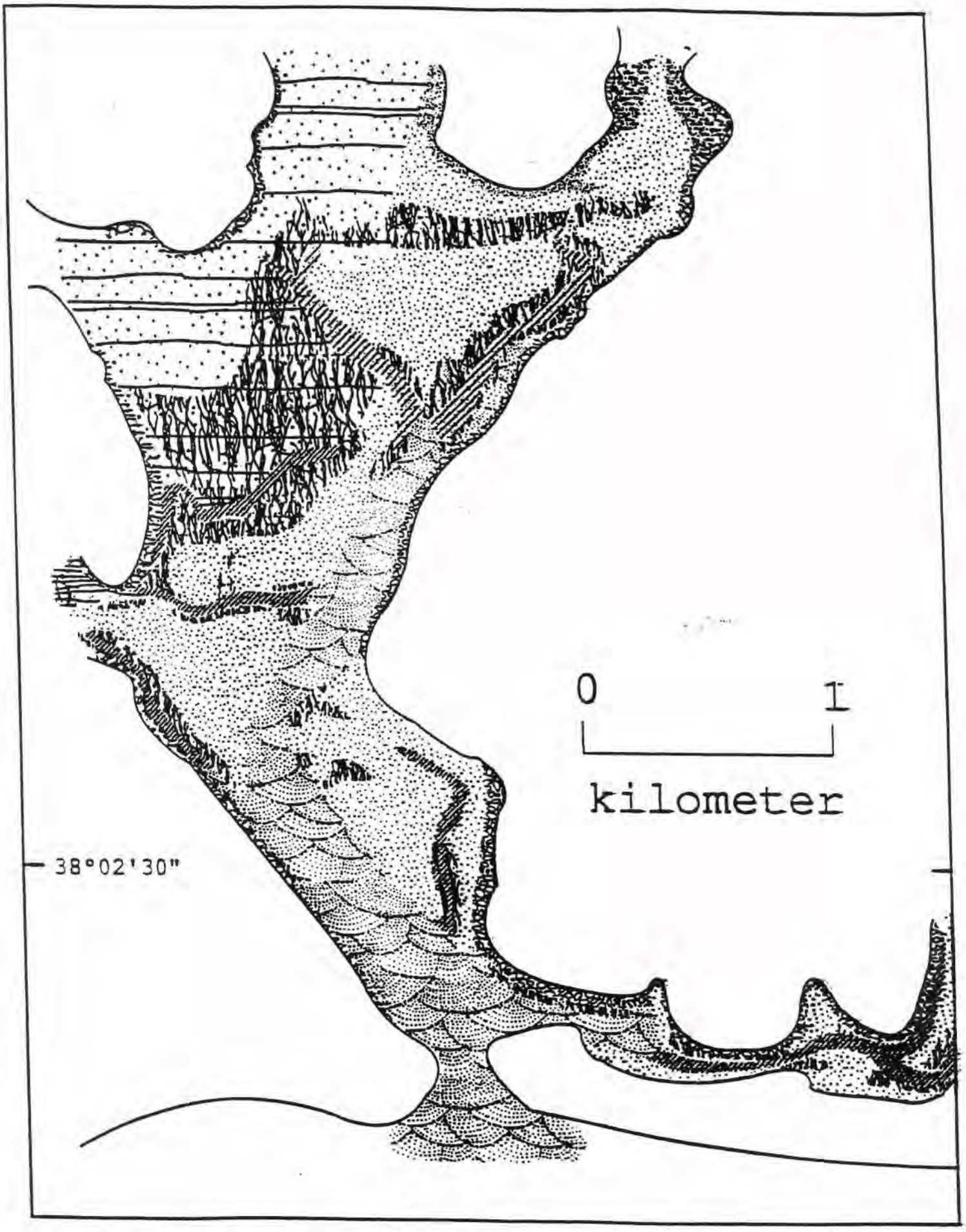

Blg. Sediment textures found in the central part of Drakes Estero.

Appendix C

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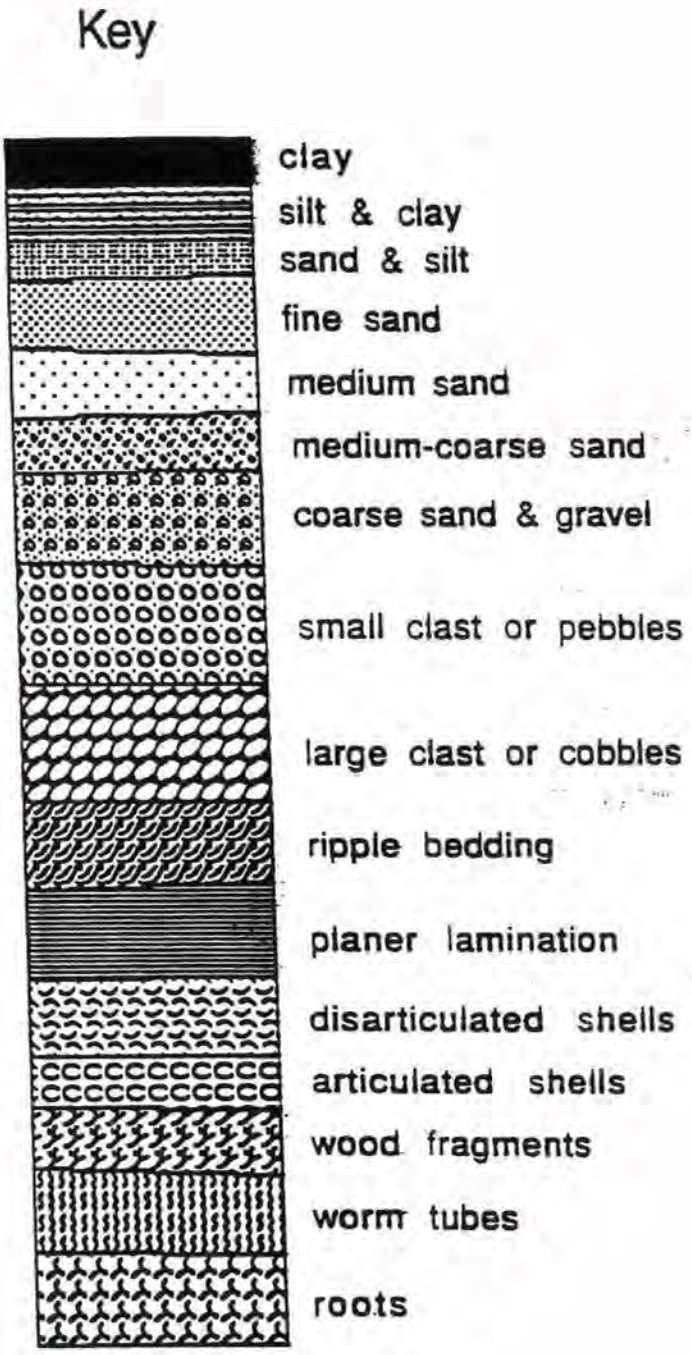

Cla. Key to textures and general features found in cores taken in Drakes Estero and Abbotts Lagoon.

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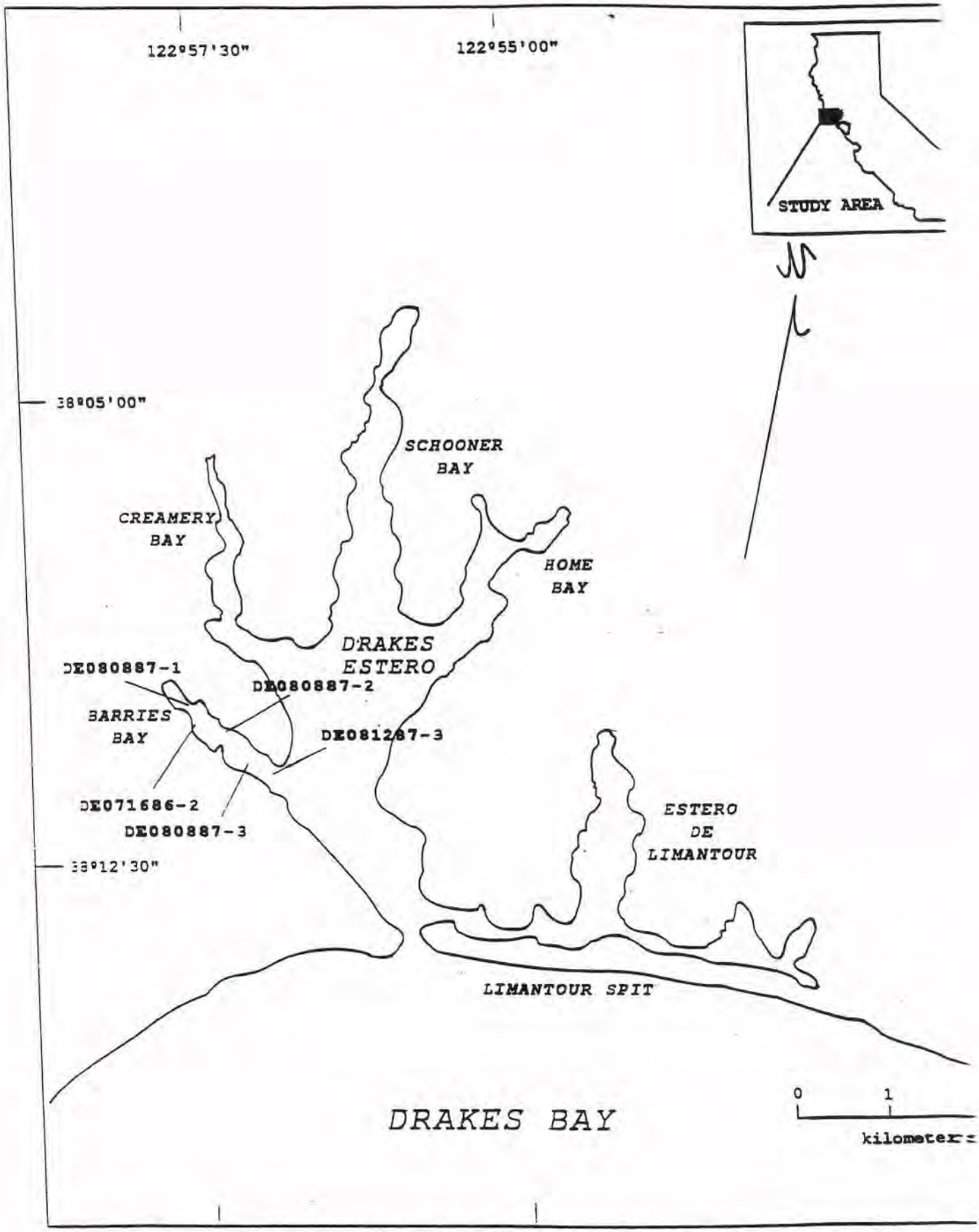
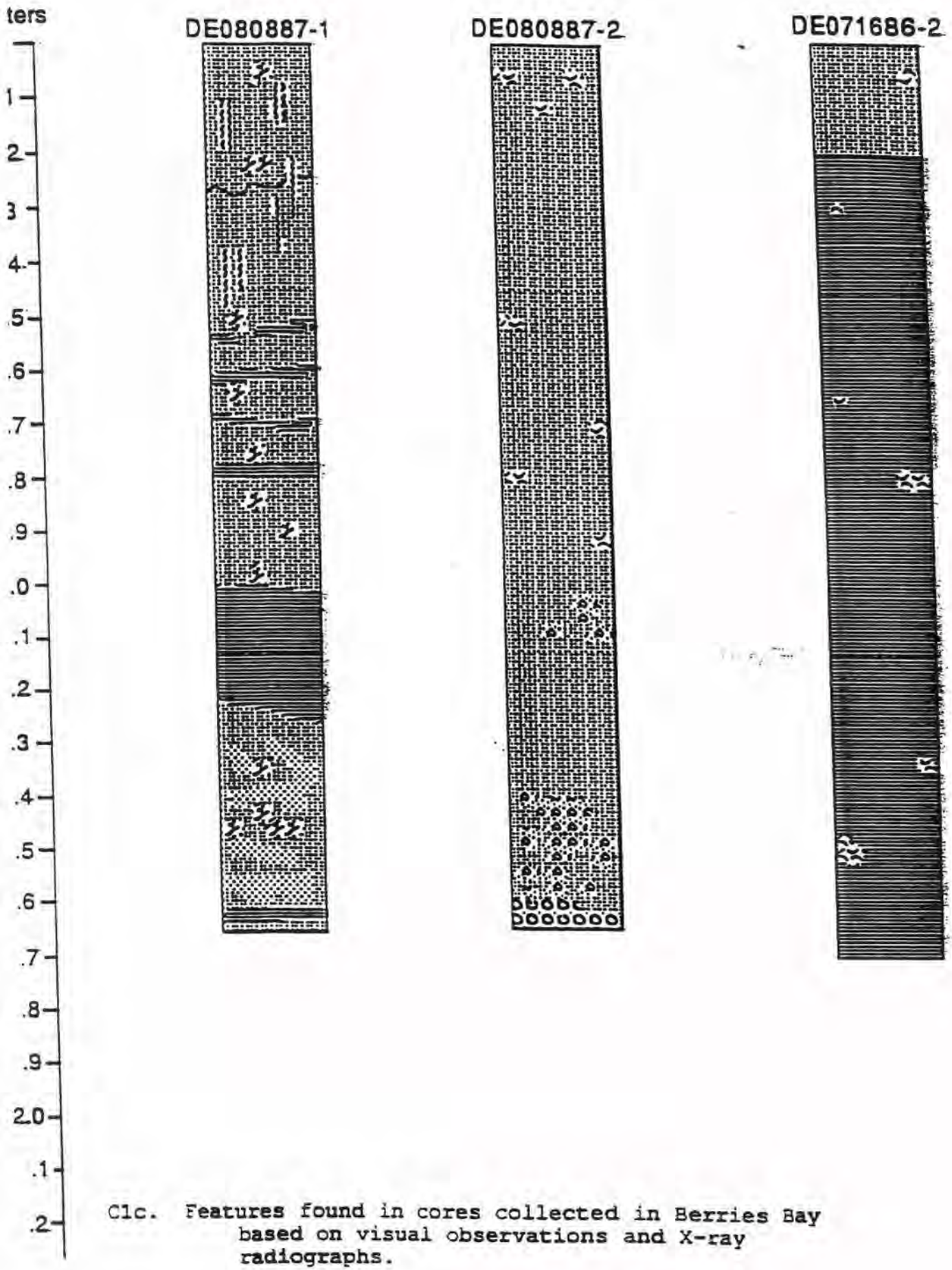
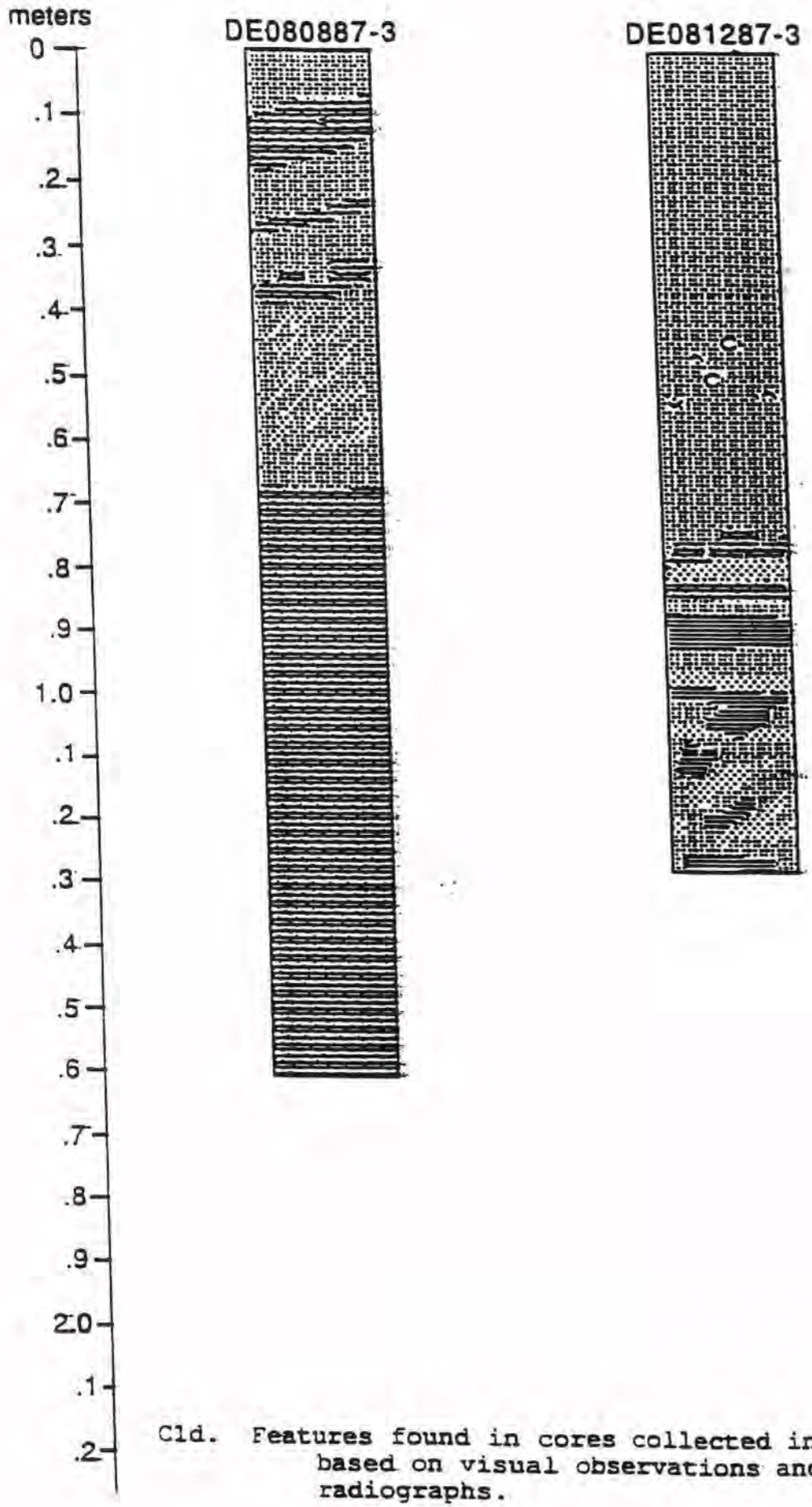


C1b. Map showing locations of cores collected in Barries Bay.



C1c. Features found in cores collected in Berries Bay based on visual observations and X-ray radiographs.



C1d. Features found in cores collected in Berries Bay based on visual observations and X-ray radiographs.

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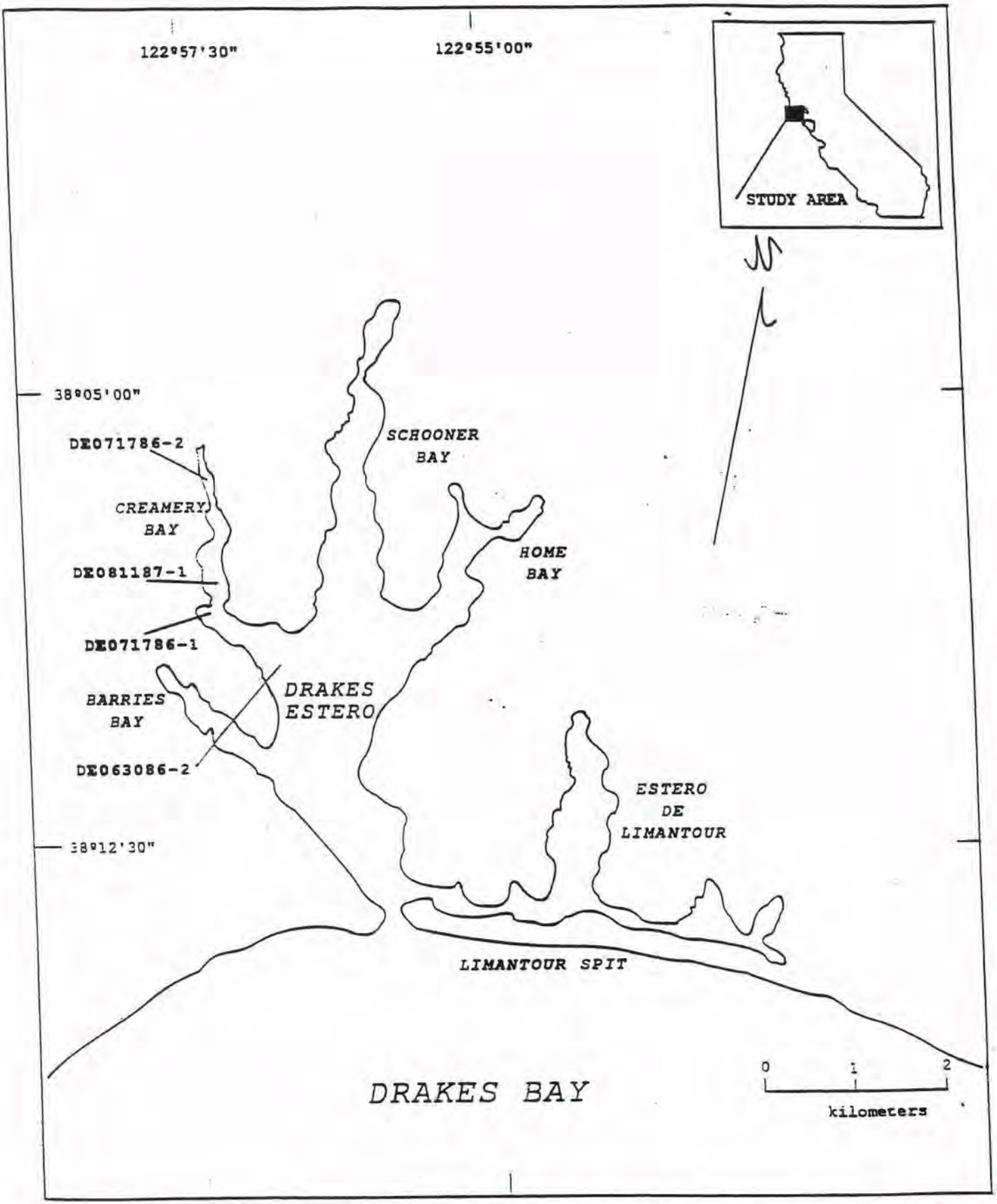

C1e. Map showing locations of cores collected in Creamery Bay.

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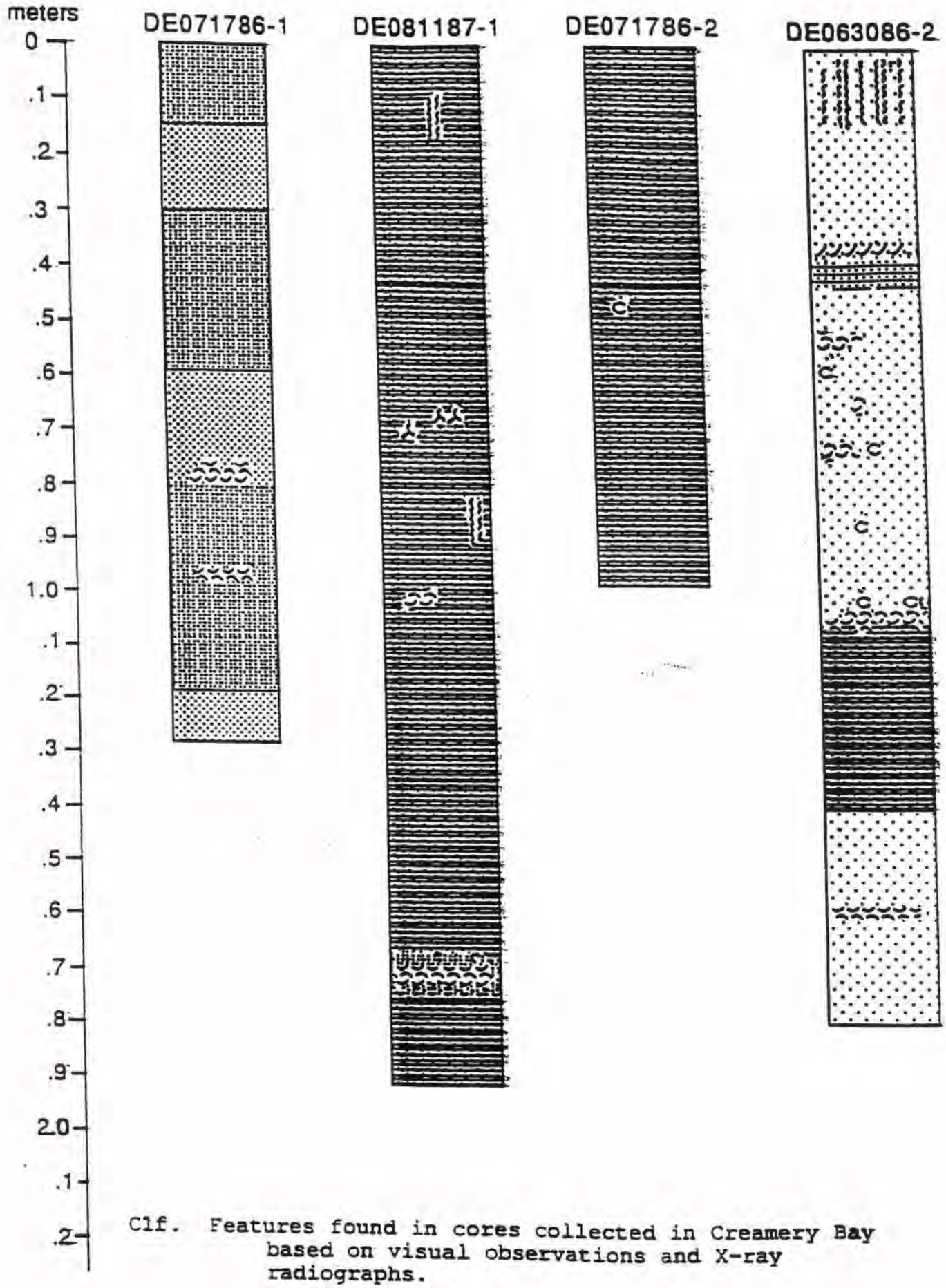

Clf. Features found in cores collected in Creamery Bay based on visual observations and X-ray radiographs.

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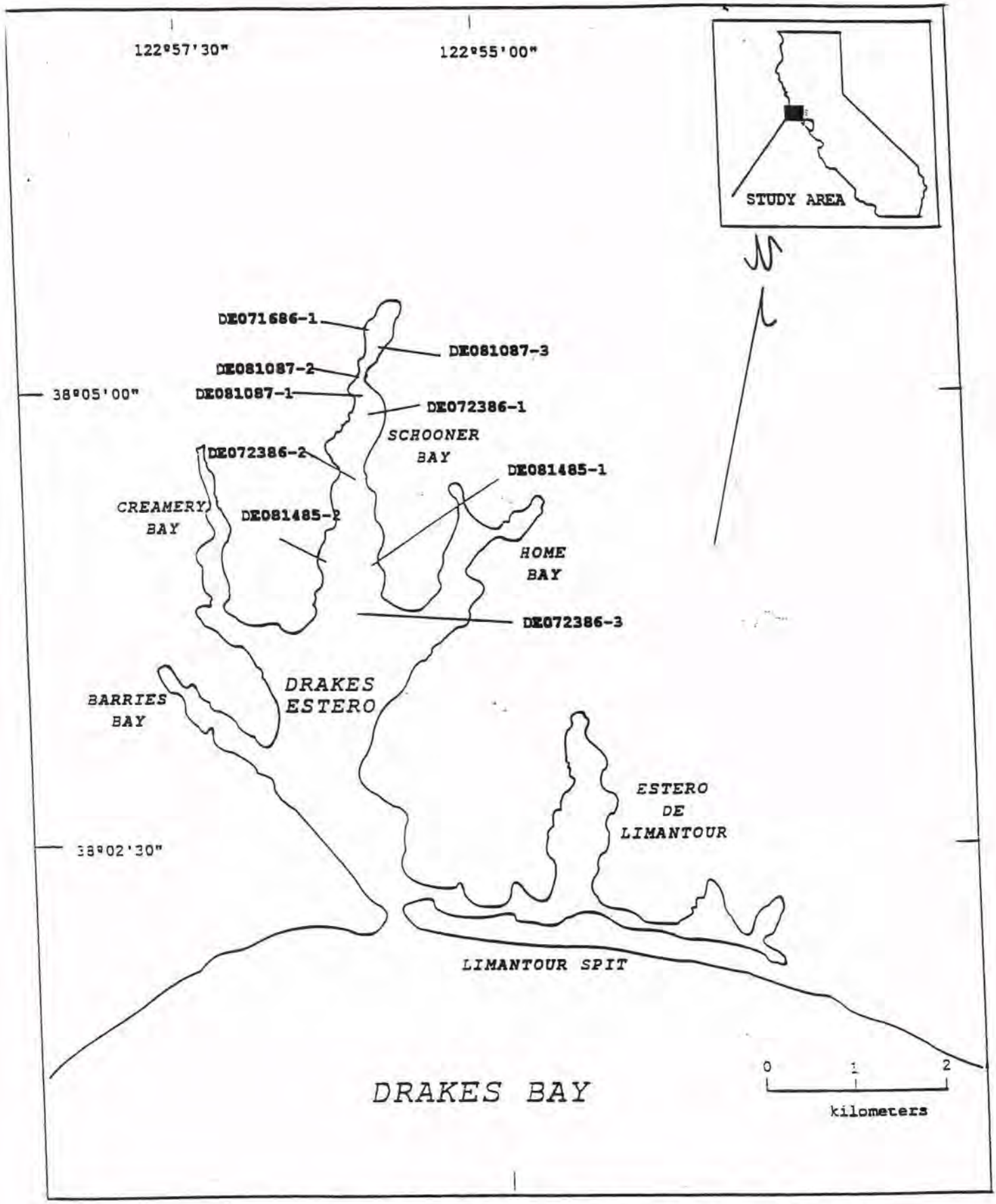

Clg. Map showing locations of cores collected in Schooner Bay.

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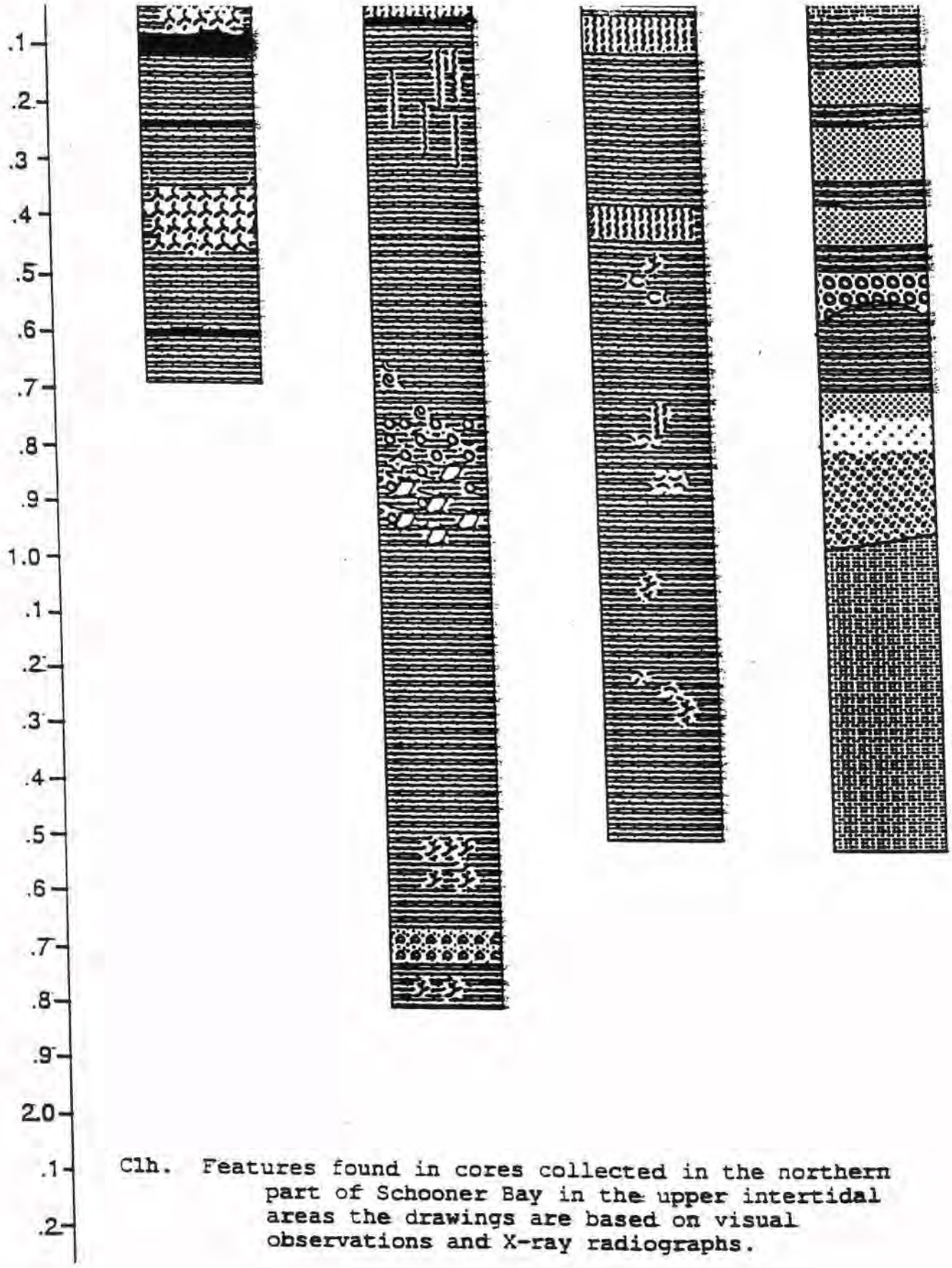

C1h. Features found in cores collected in the northern part of Schooner Bay in the upper intertidal areas the drawings are based on visual observations and X-ray radiographs.

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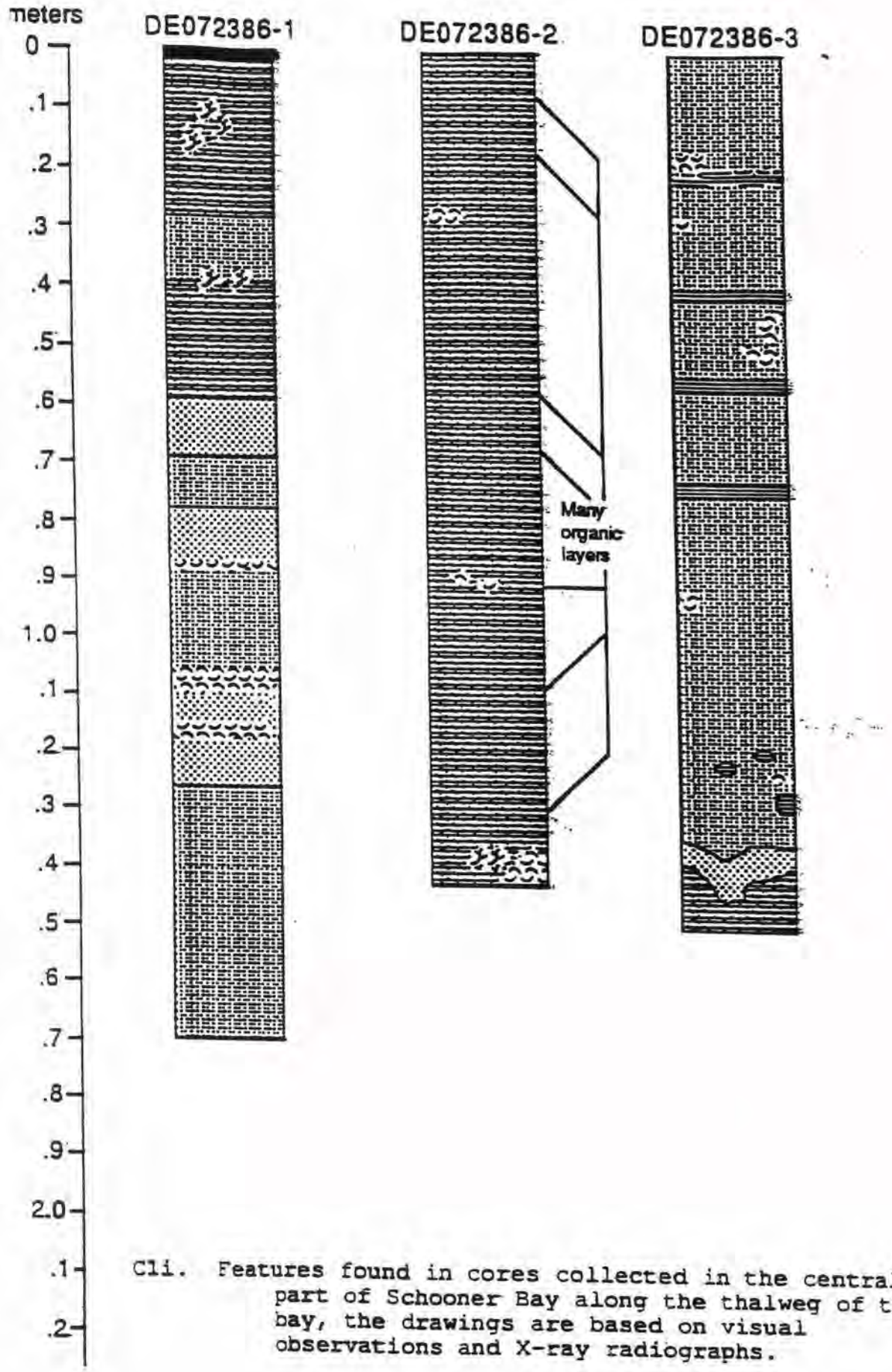
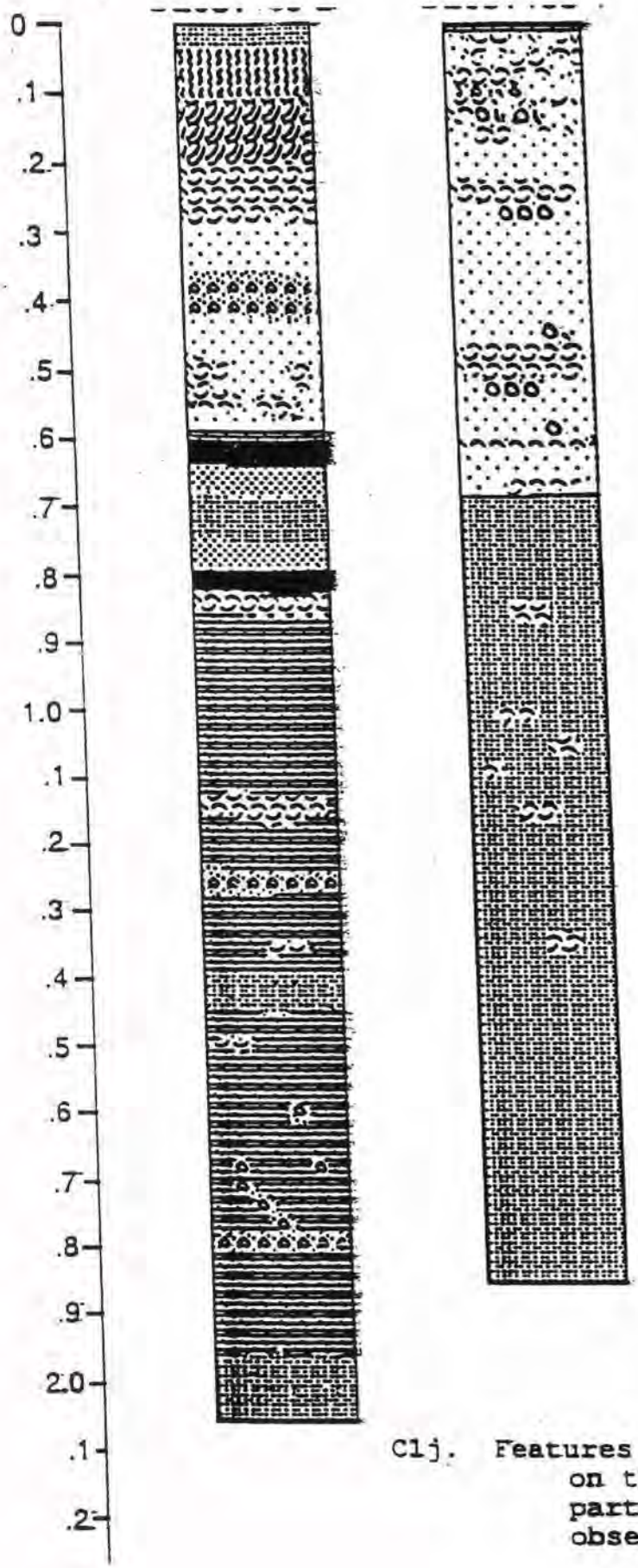


C1i. Features found in cores collected in the central part of Schooner Bay along the thalweg of the bay, the drawings are based on visual observations and X-ray radiographs.



Clj. Features found in cores collected in Schoon
on the east and west sides of the south
part of bay, drawings are based on visu
observations and X-ray radiographs.

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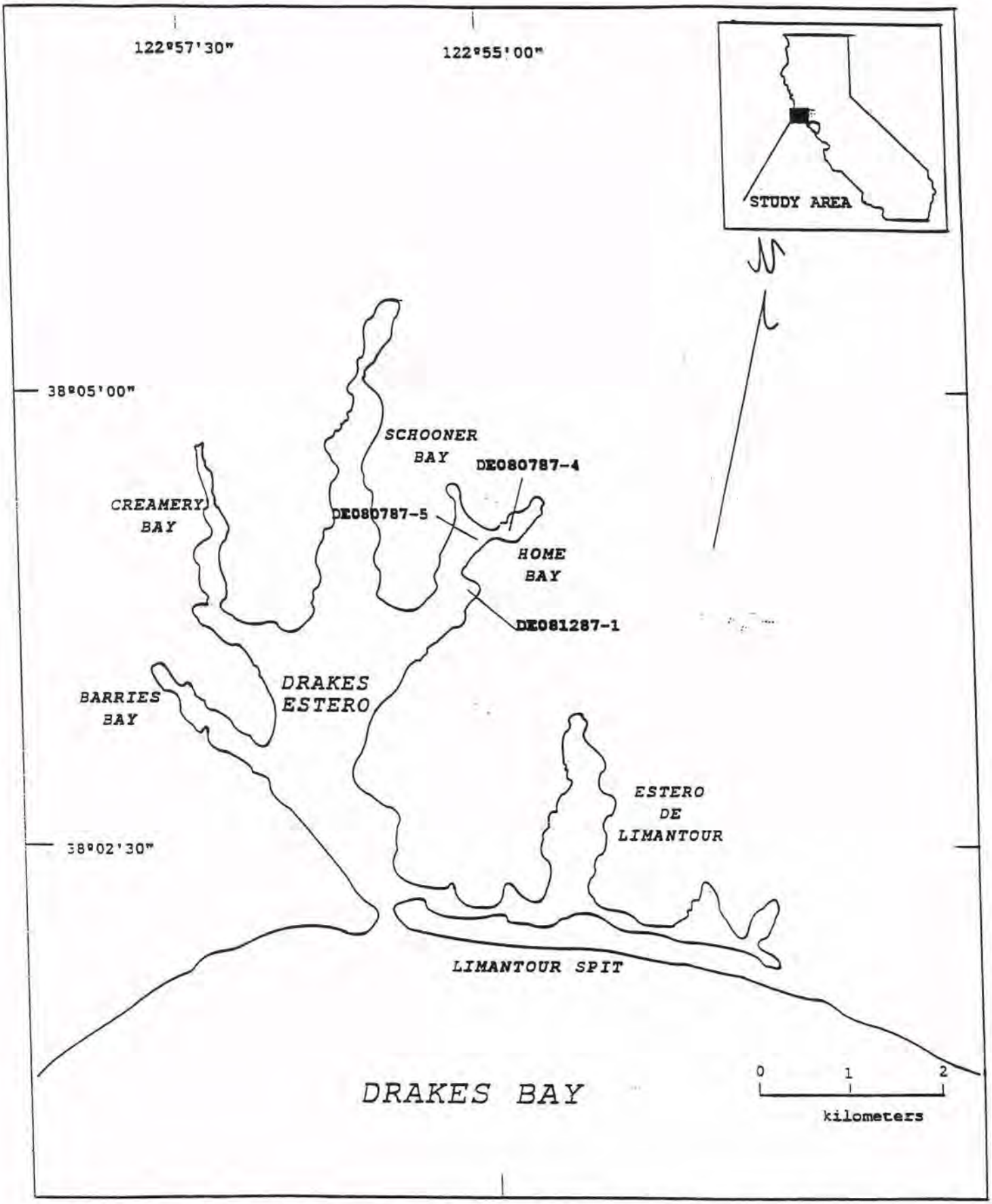

Clm. Map showing locations of cores collected in Home Bay.

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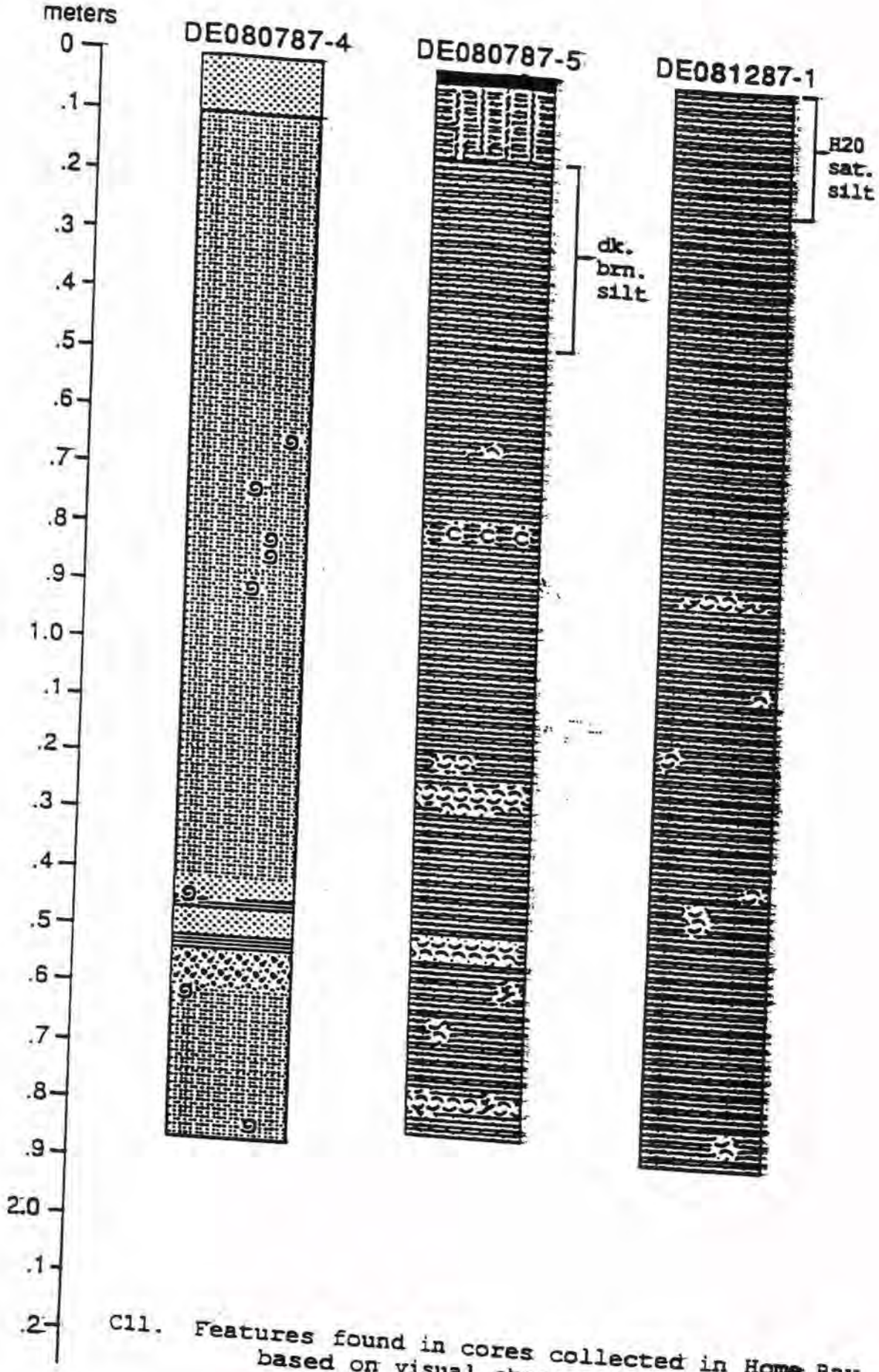
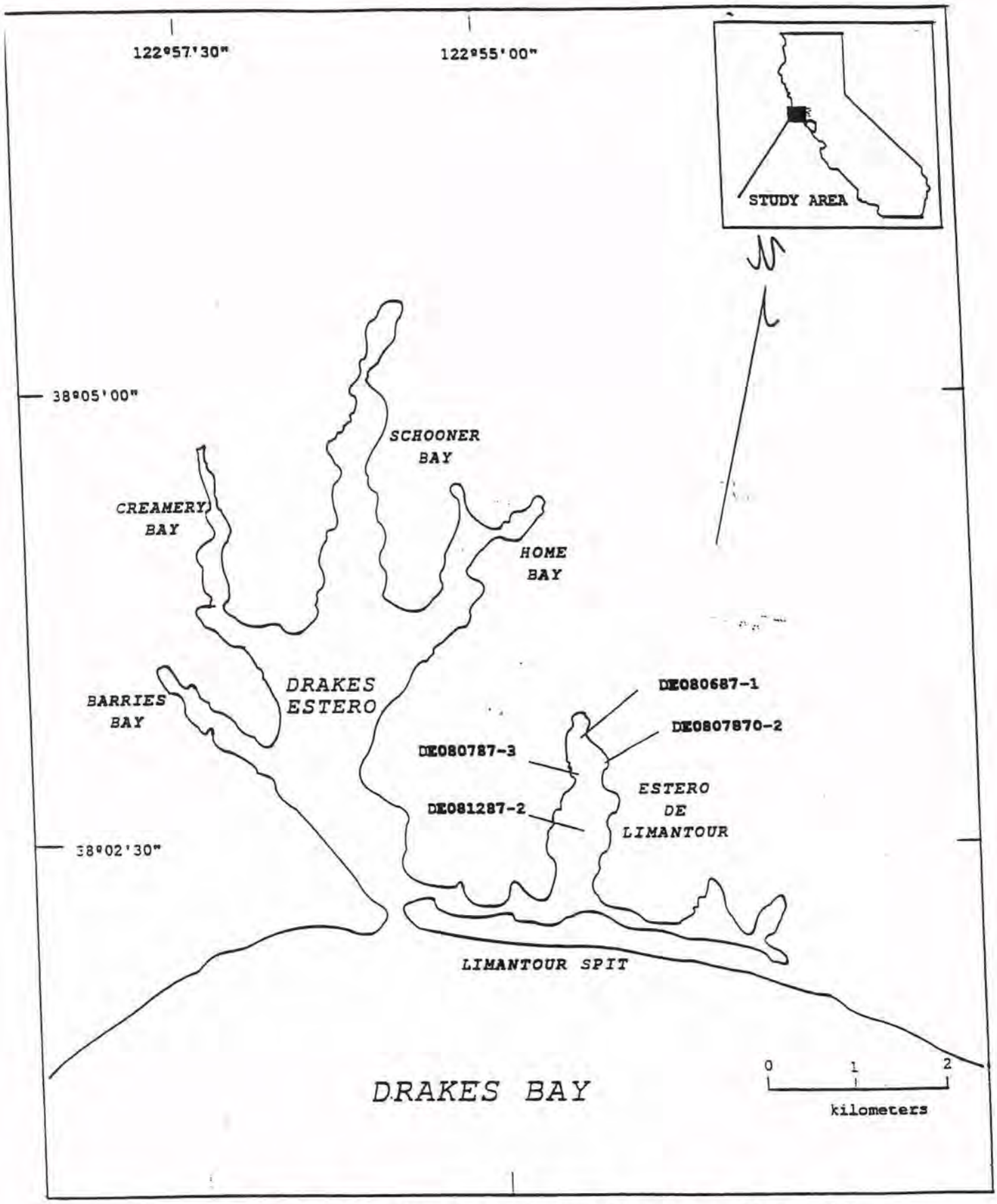


C11. Features found in cores collected in Home Bay based on visual observations and X-ray radiographs.



Clm. Map showing locations of cores collected in Estero de Limantour.

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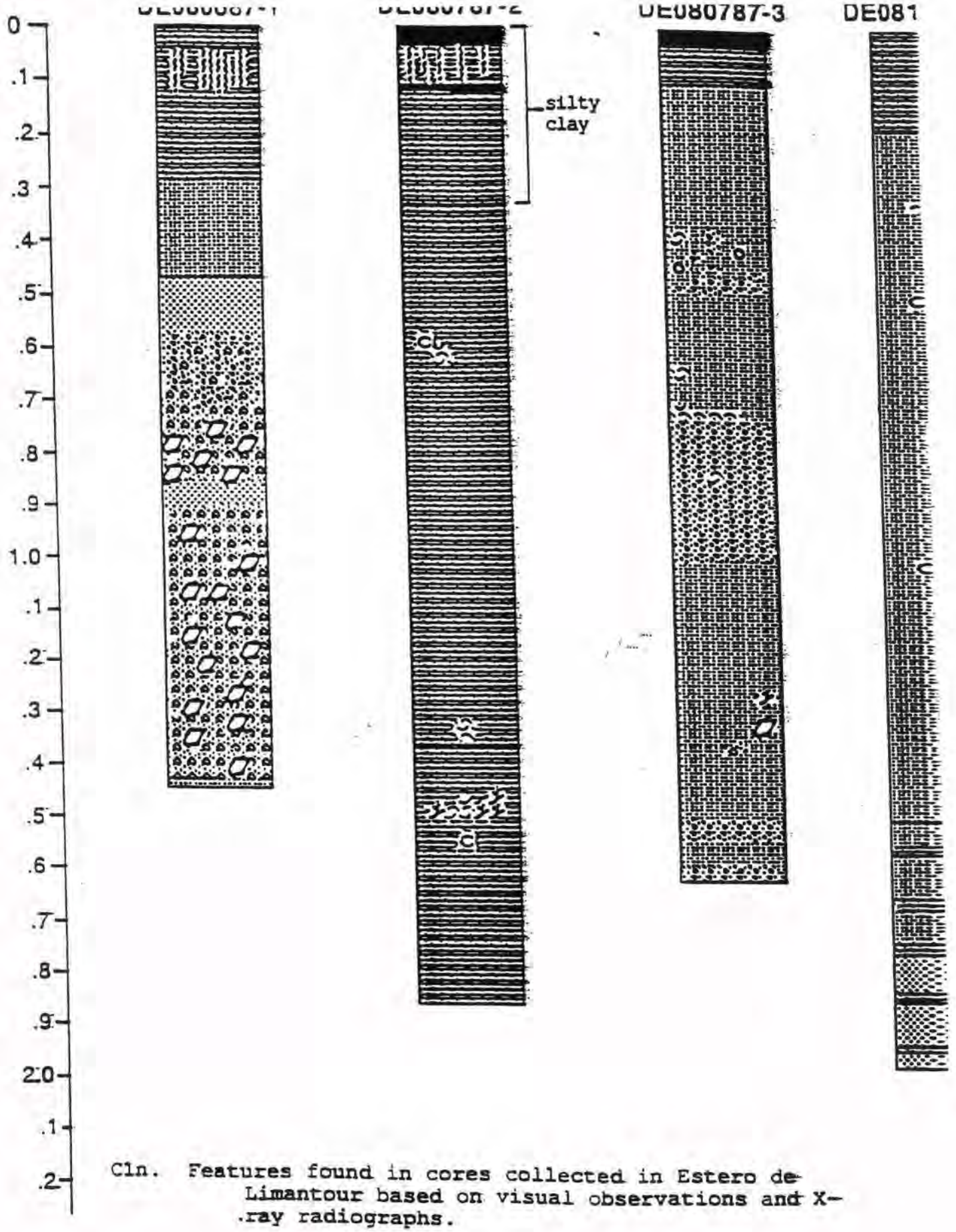

Cln. Features found in cores collected in Estero de Limantour based on visual observations and X-ray radiographs.

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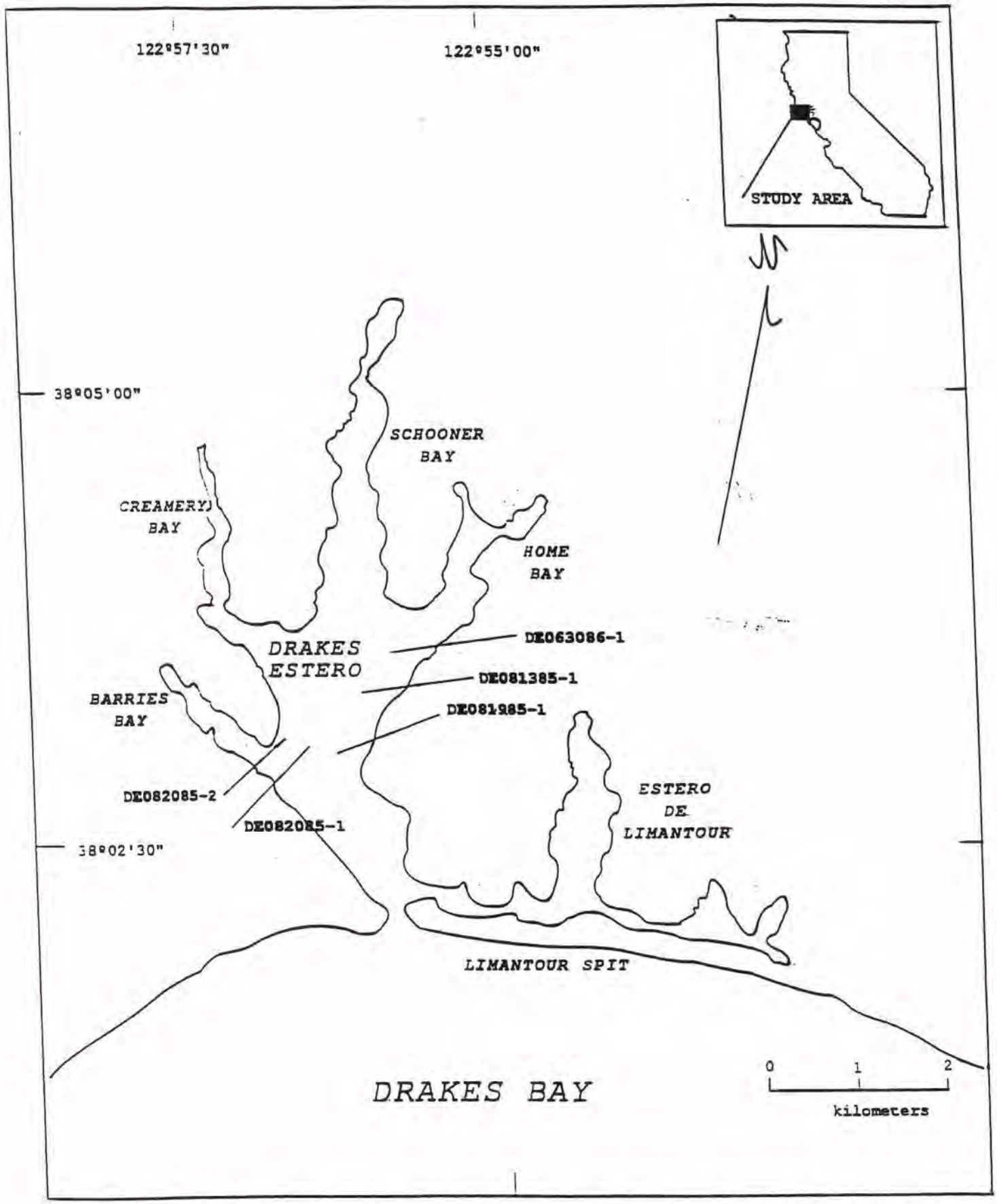

C1o. Map showing the locations of cores collected in the mid-portion of central Drakes Estero.

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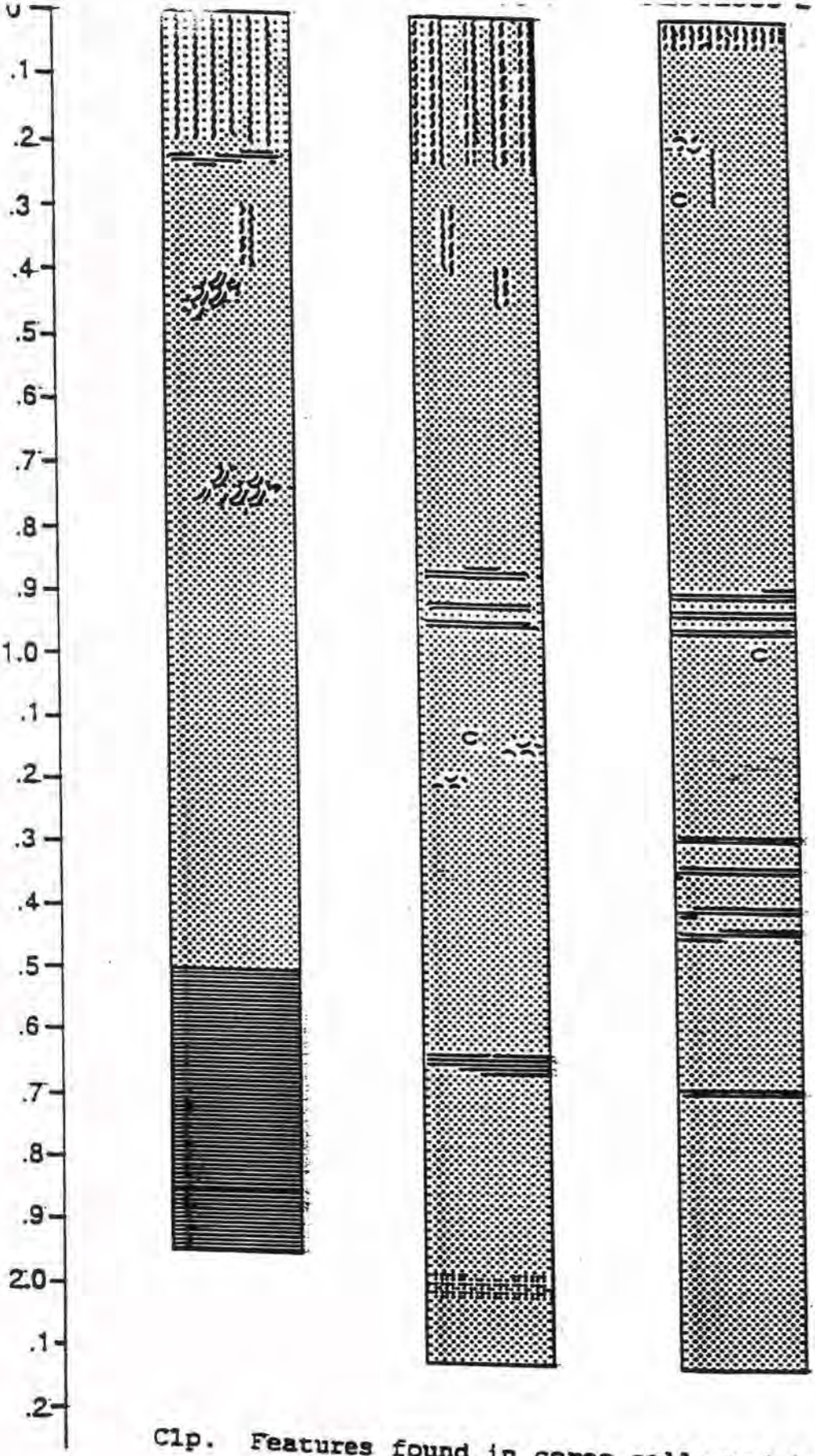

C1p. Features found in cores collected in the mid-portions of central Drakes Estero drawings are based on visual observations and X-ray radiographs.

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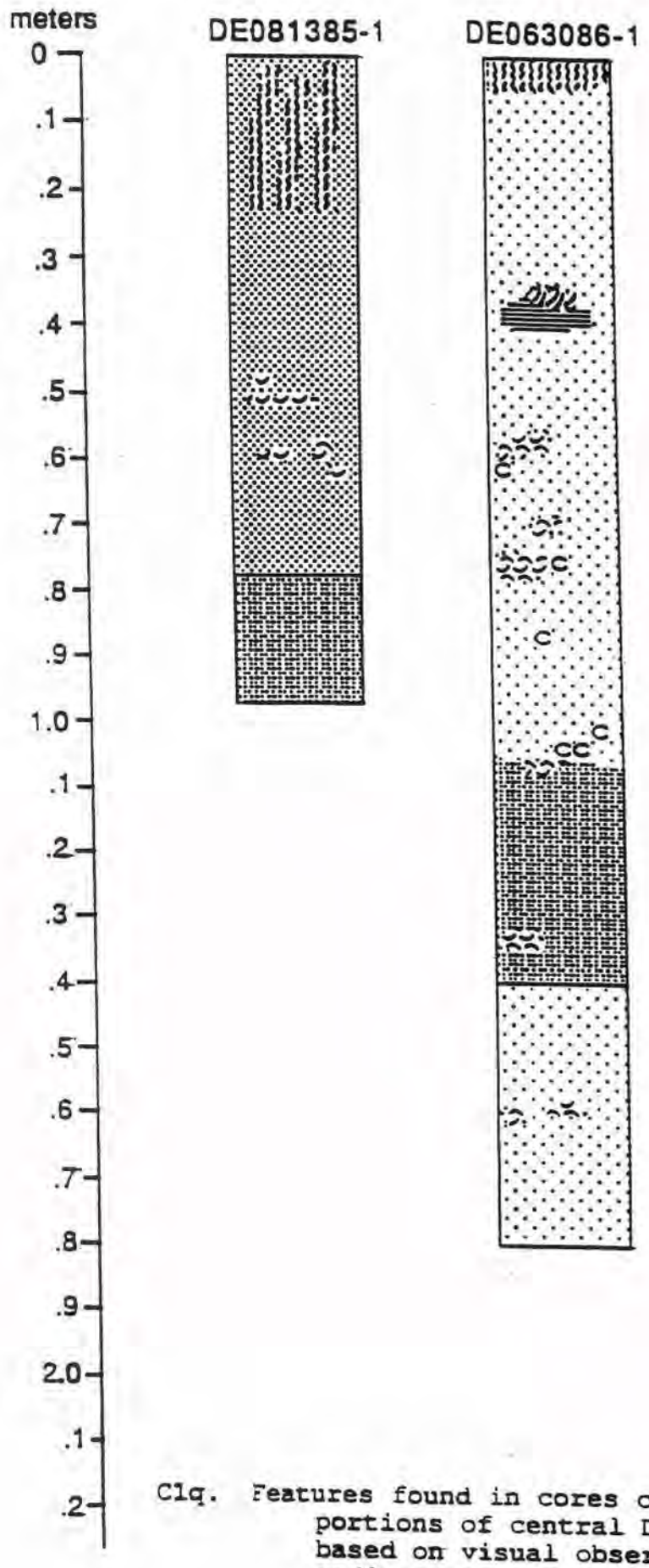
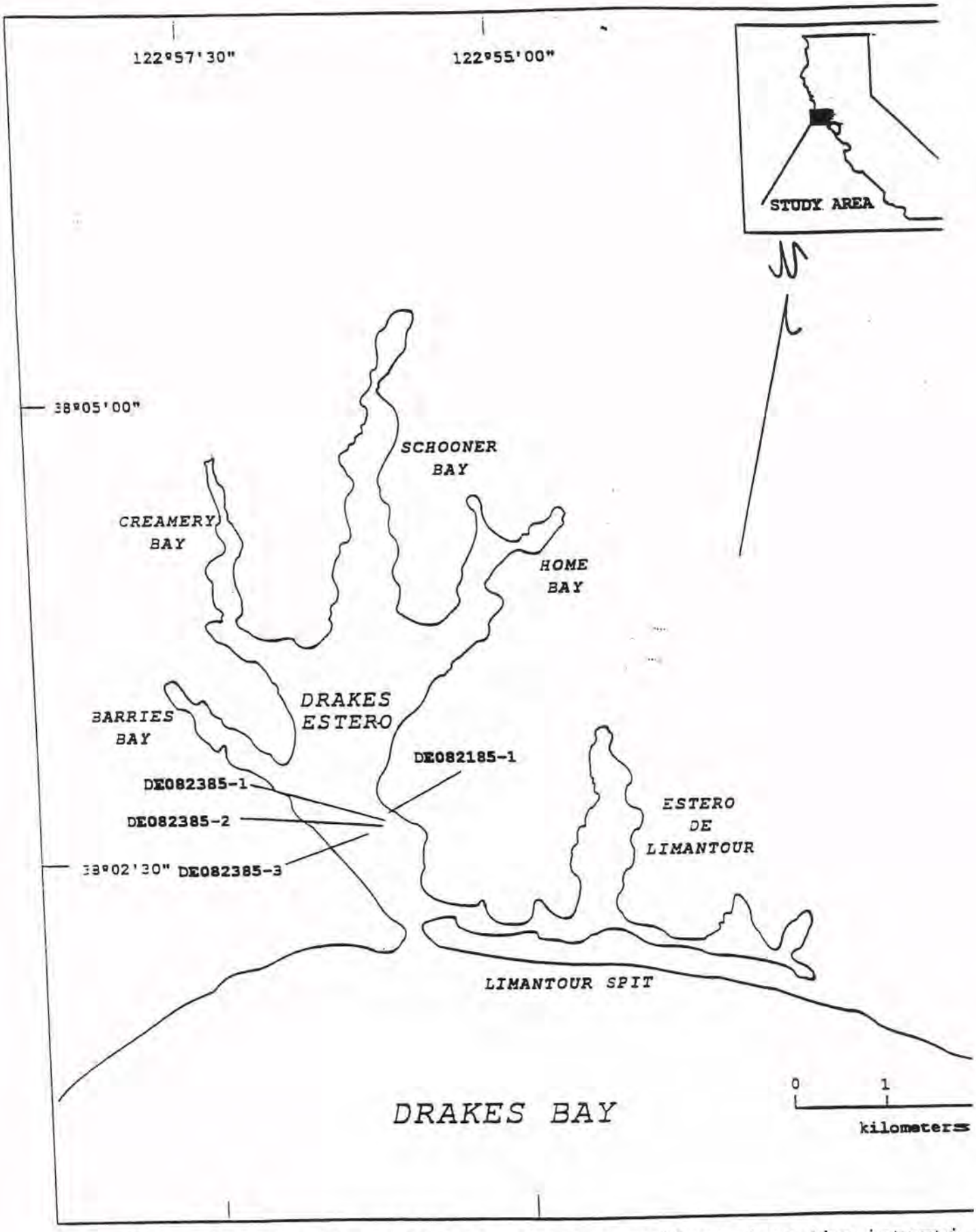
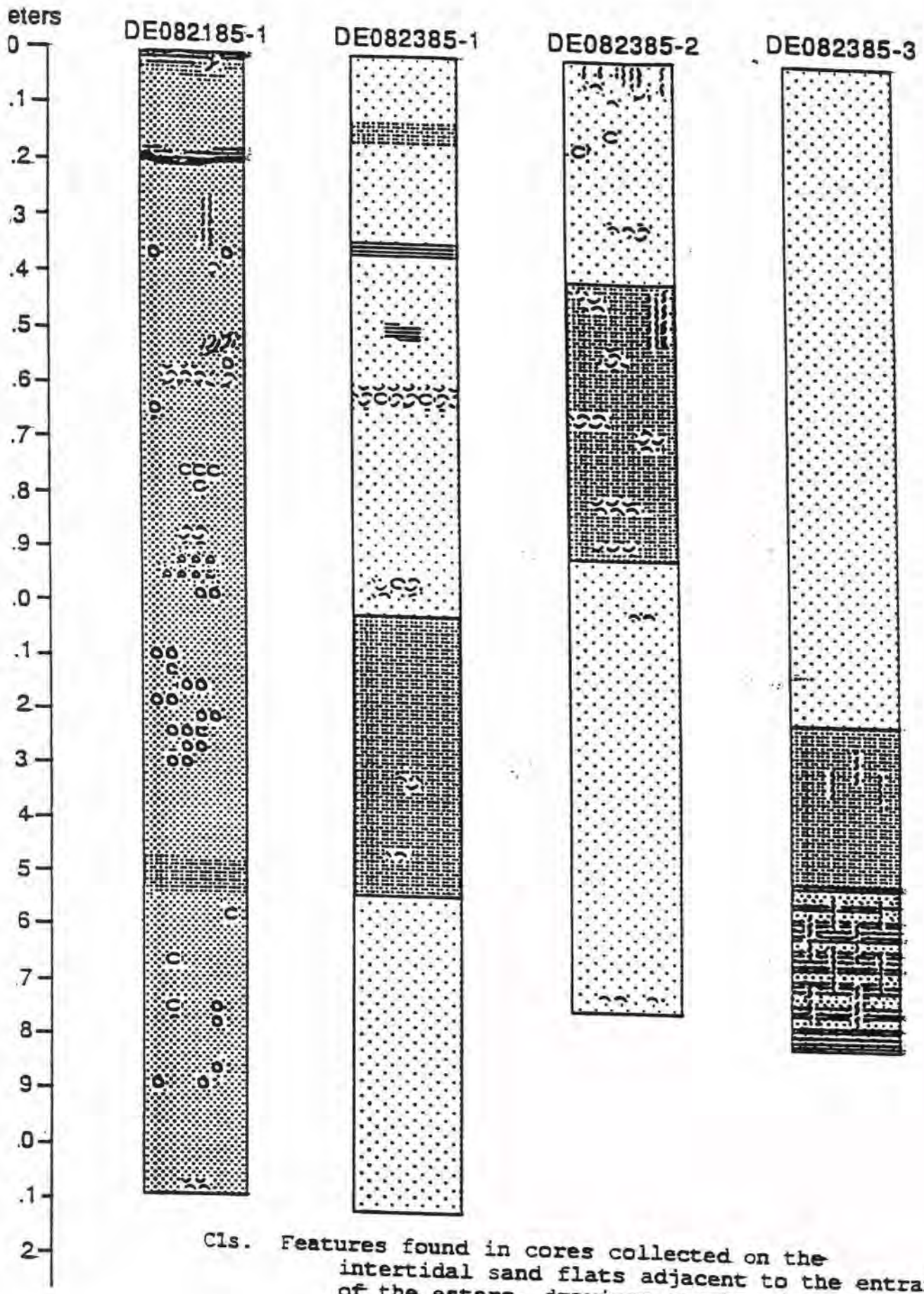


Clq. Features found in cores collected in the mid-portions of central Drakes Estero drawings are based on visual observations and X-ray radiographs.



Clr. Map showing locations of cores collected on the intertidal sand flats adjacent to the entrance of the estero.



Cls. Features found in cores collected on the intertidal sand flats adjacent to the entrance of the estero, drawings are based on visual observations and X-ray radiographs.

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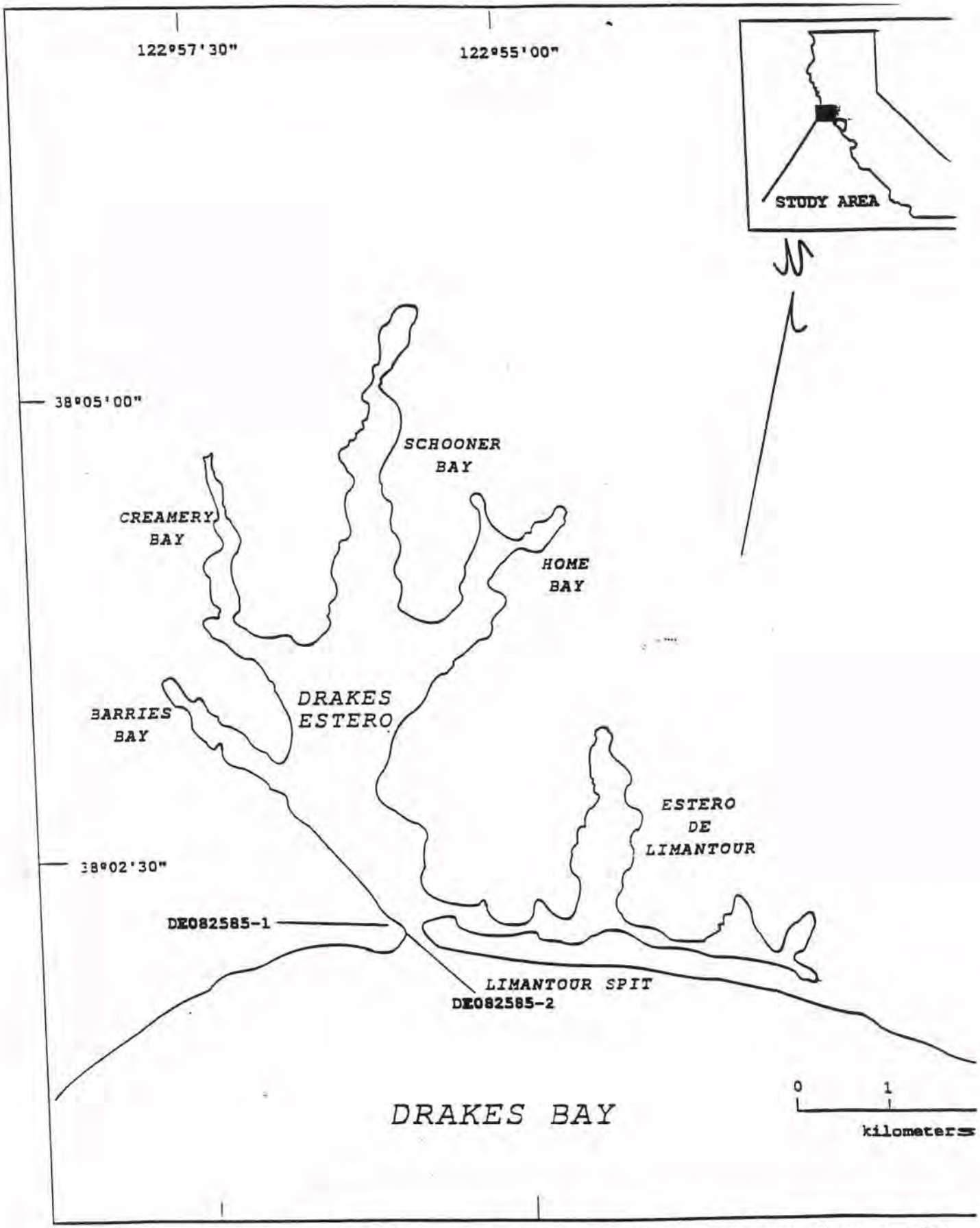

C1t. Map showing locations of cores collected near the entrance of Drakes Estero.

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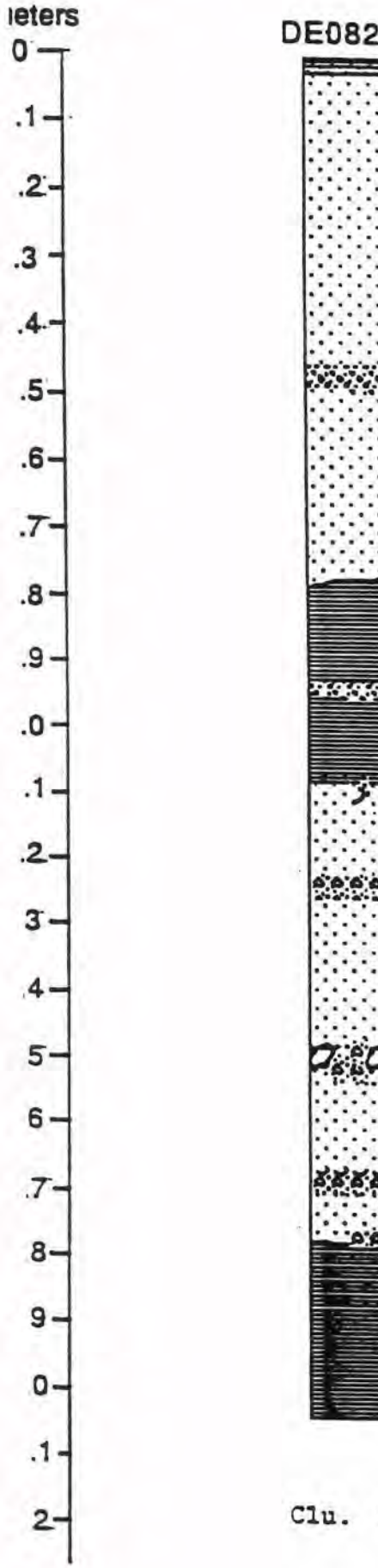

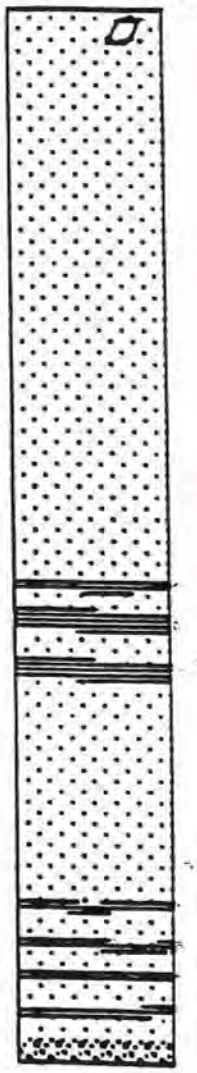

Clu. Features found in cores collected near the entrance to Drakes Estero drawings are based on visual observations and X-ray radiographs.

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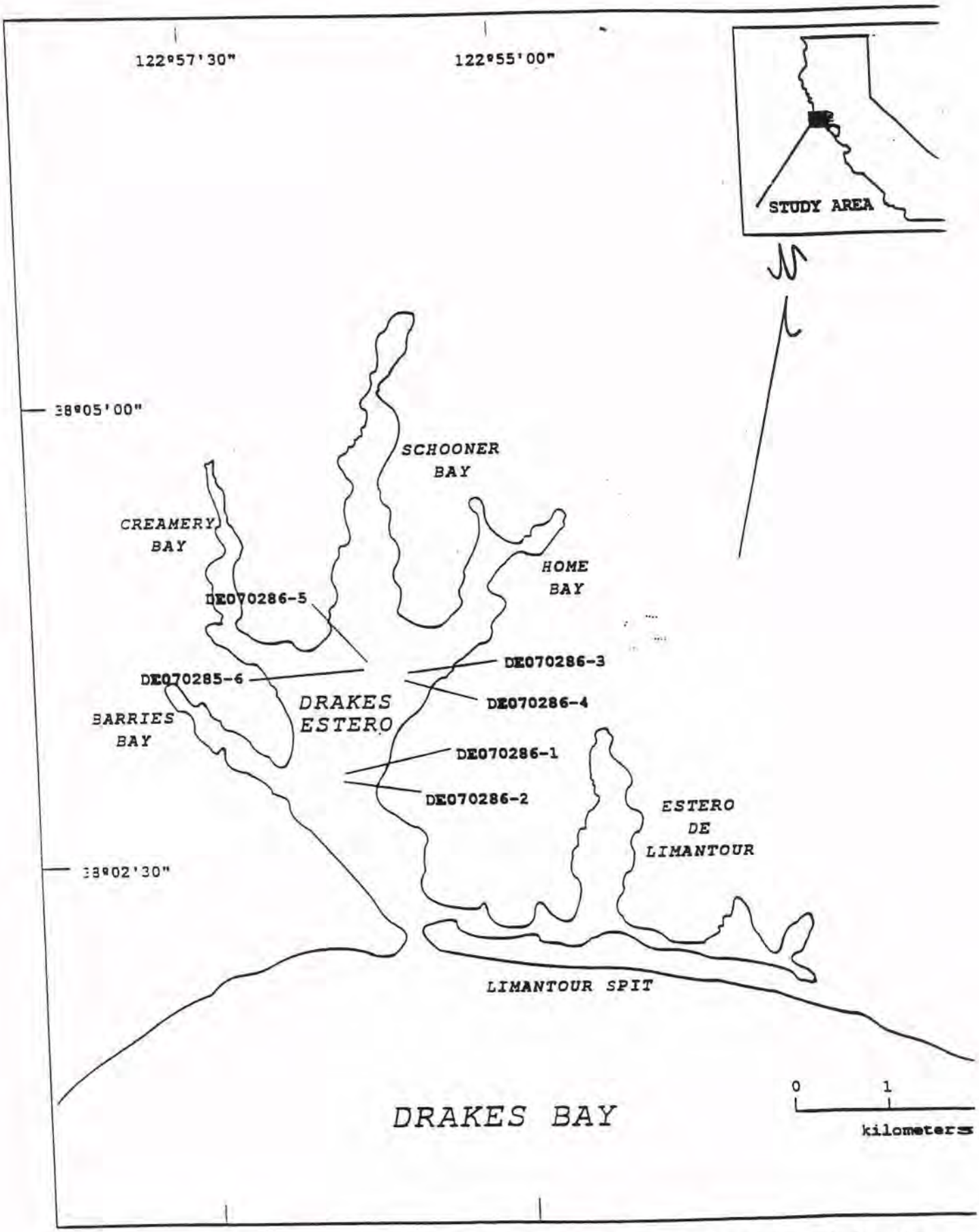
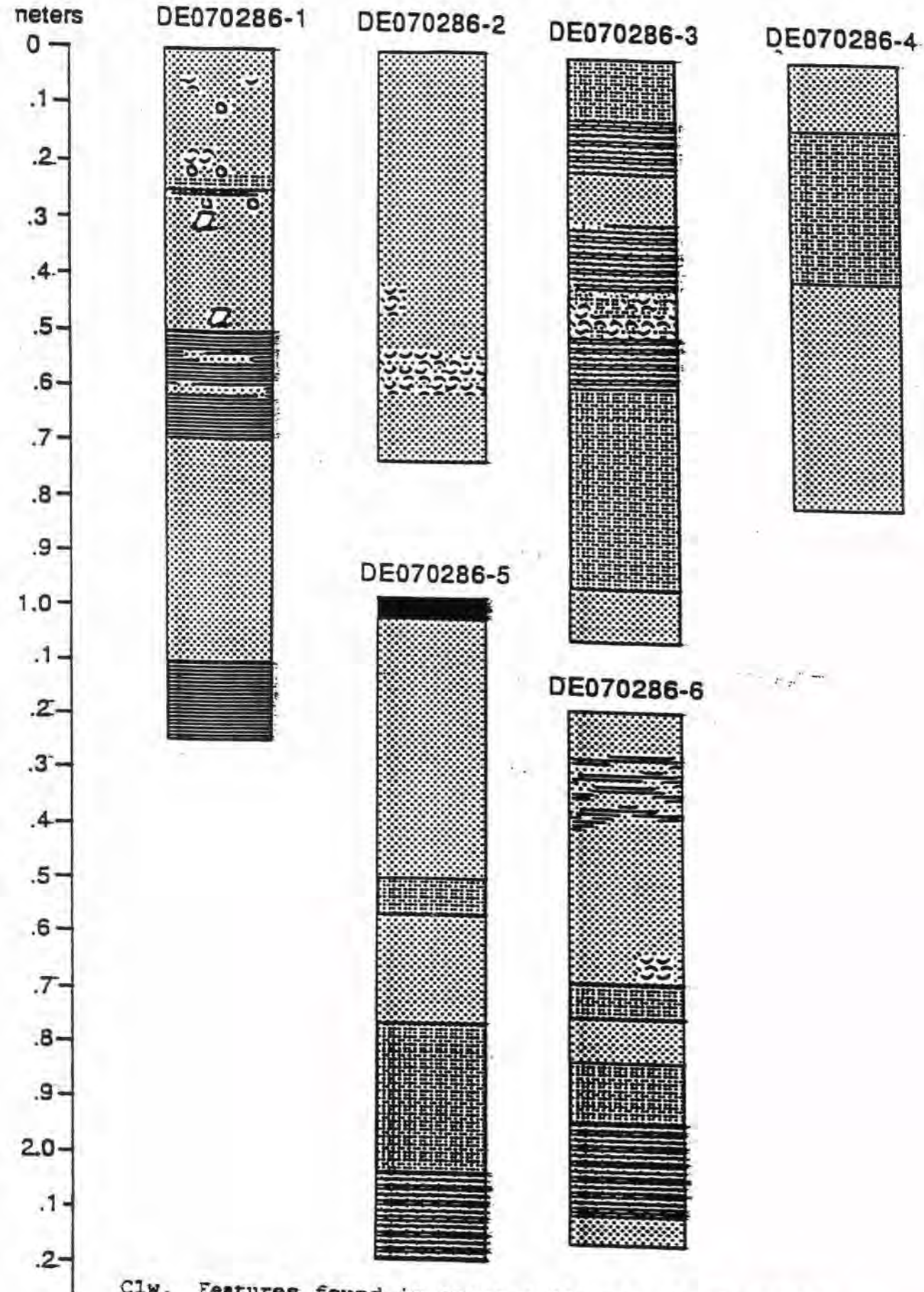


C1v. Map showing locations of cores collected in the tidal channels of the estero.



C1w. Features found in cores collected in the tidal channels of the estero, drawings are based on visual observations and X-ray radiographs.

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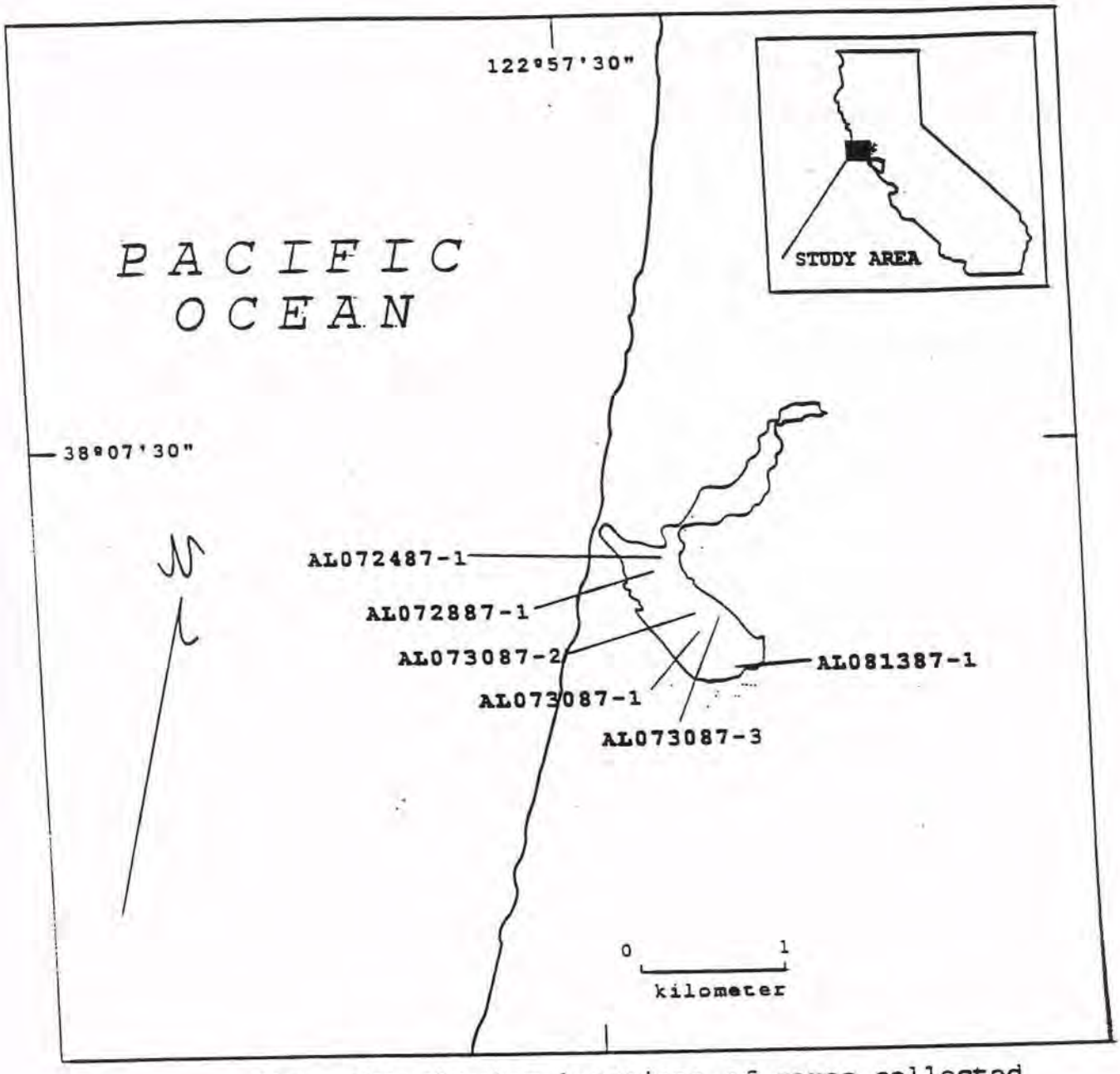
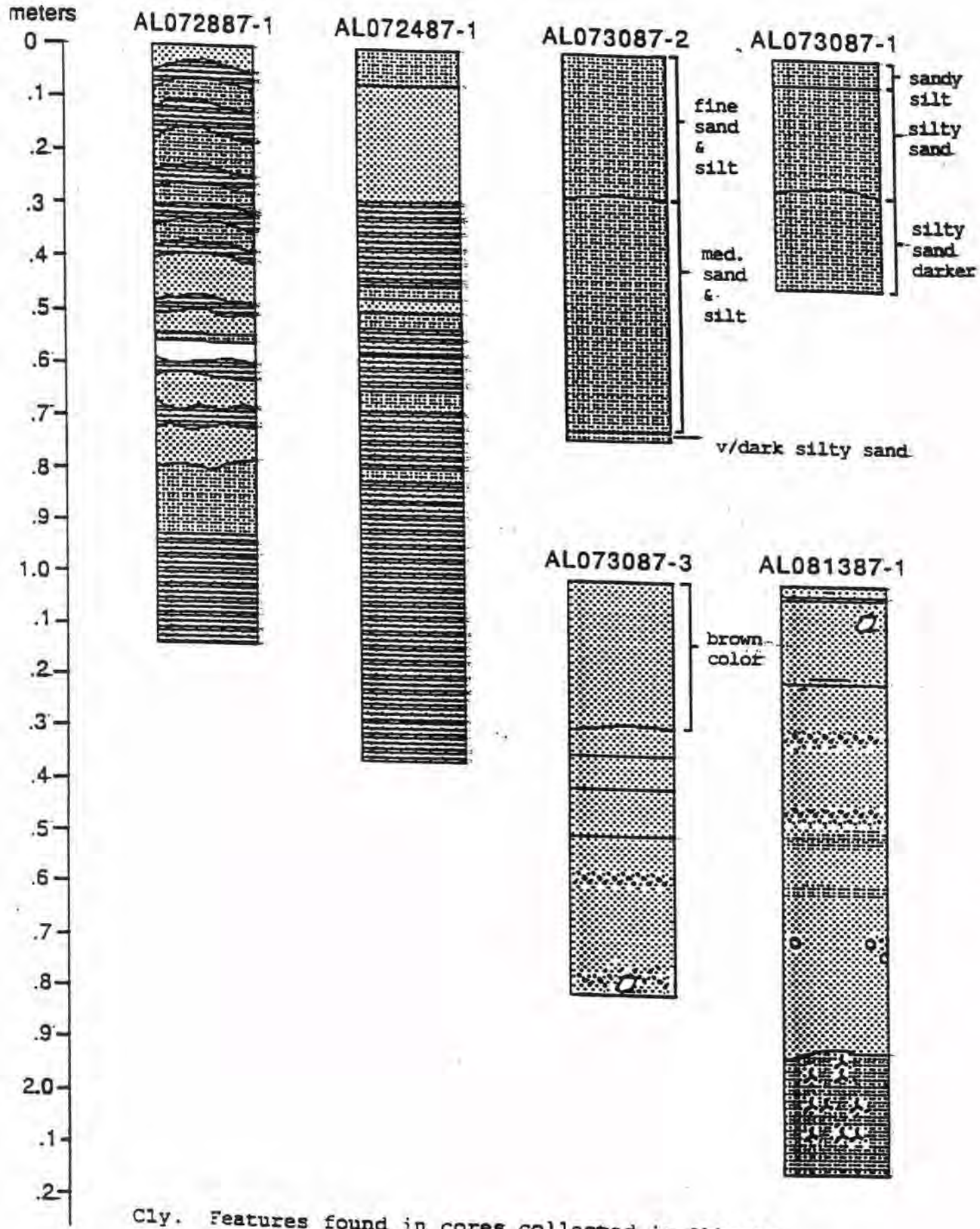


C1x. Map showing locations of cores collected in Abbotts Lagoon.



Cly. Features found in cores collected in Abbotts Lagoon based on visual observations and X-ray radiographs.

Appendix D Variability in Grain Sizes

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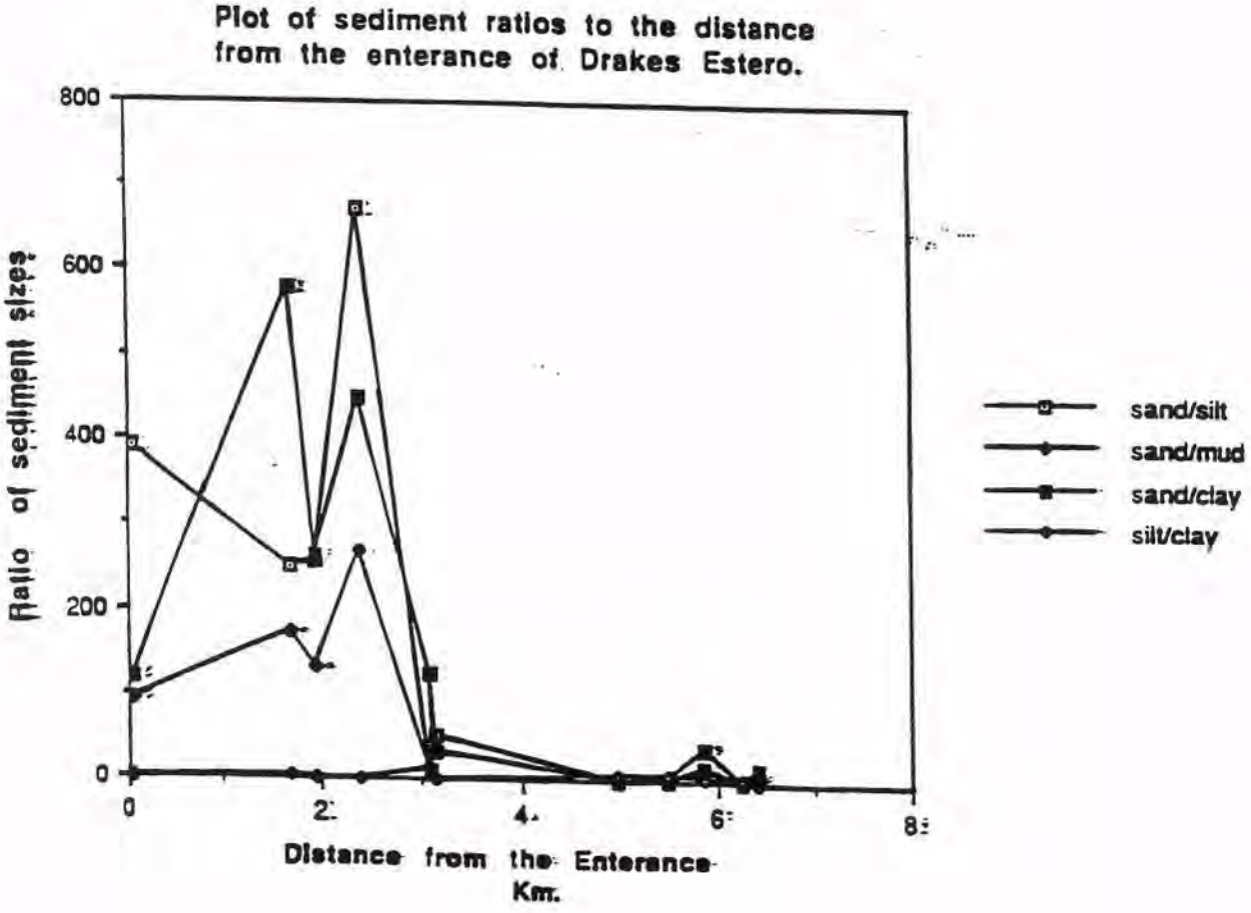

D1a. Graph showing the change in grain size from the entrance of the Drakes Estero to the upper portions of the estero.

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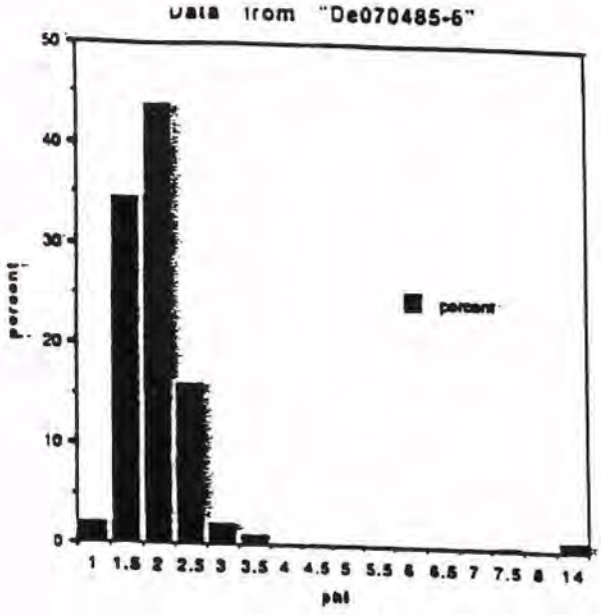
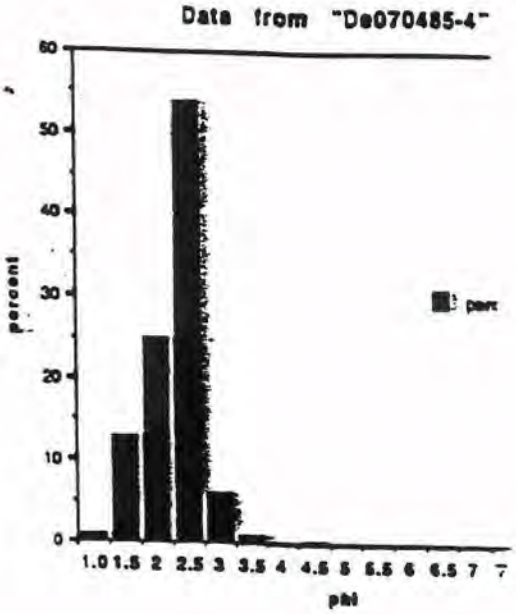
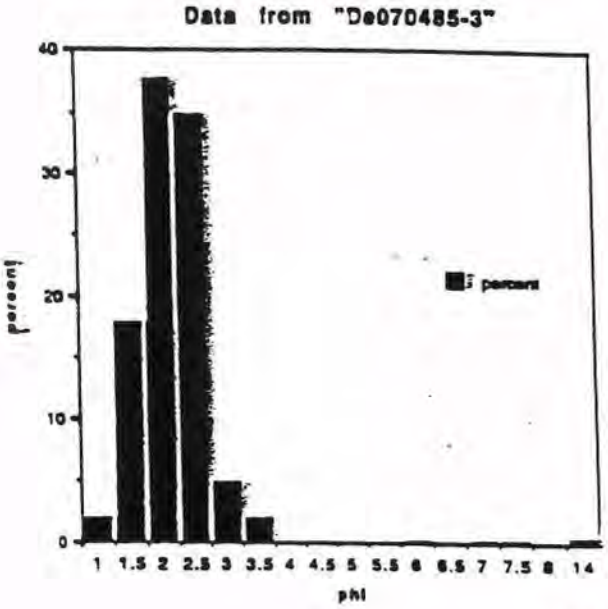
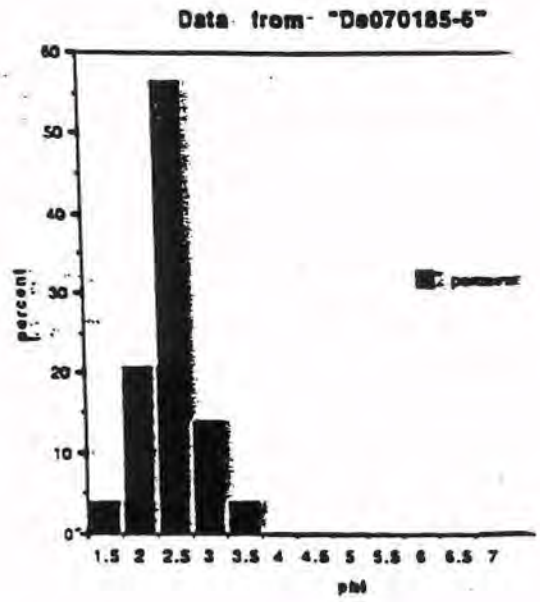
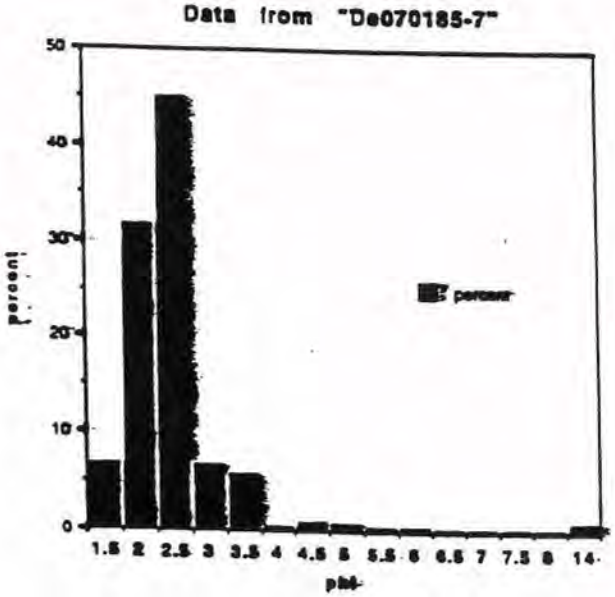


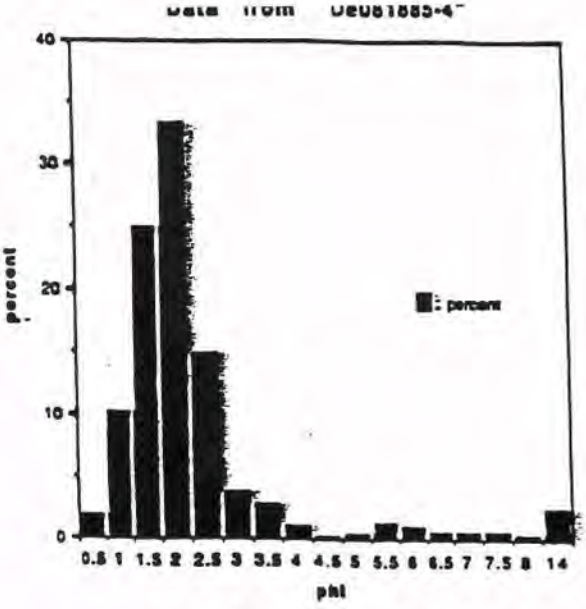


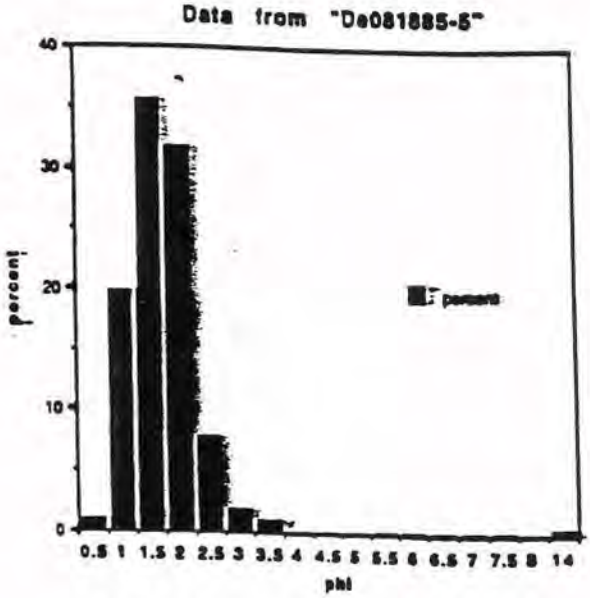


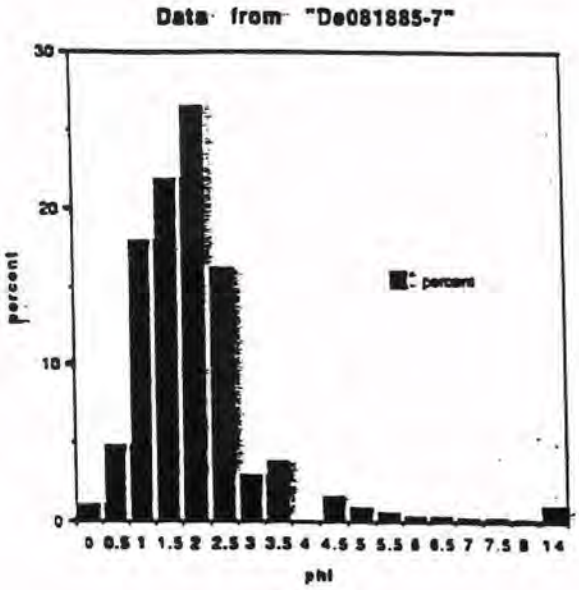


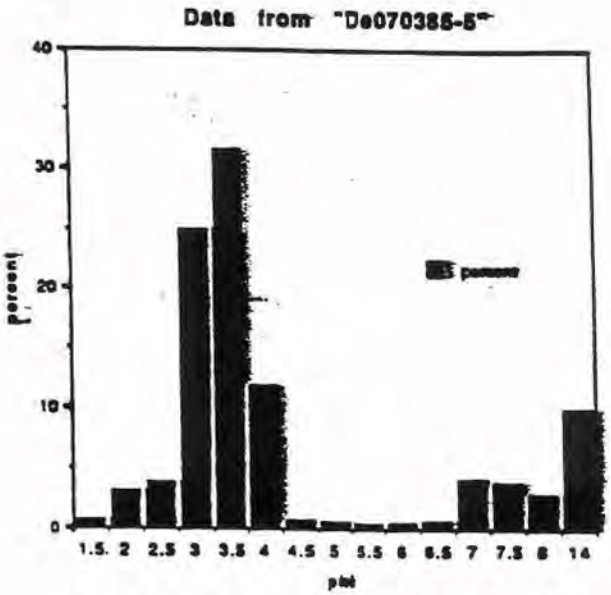


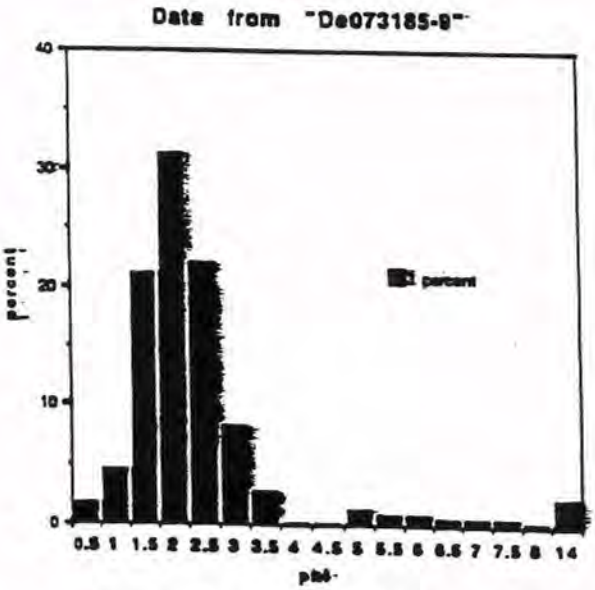
D1b. Bar graphs of core samples collected in Drakes Estero samples for grain size analysis.



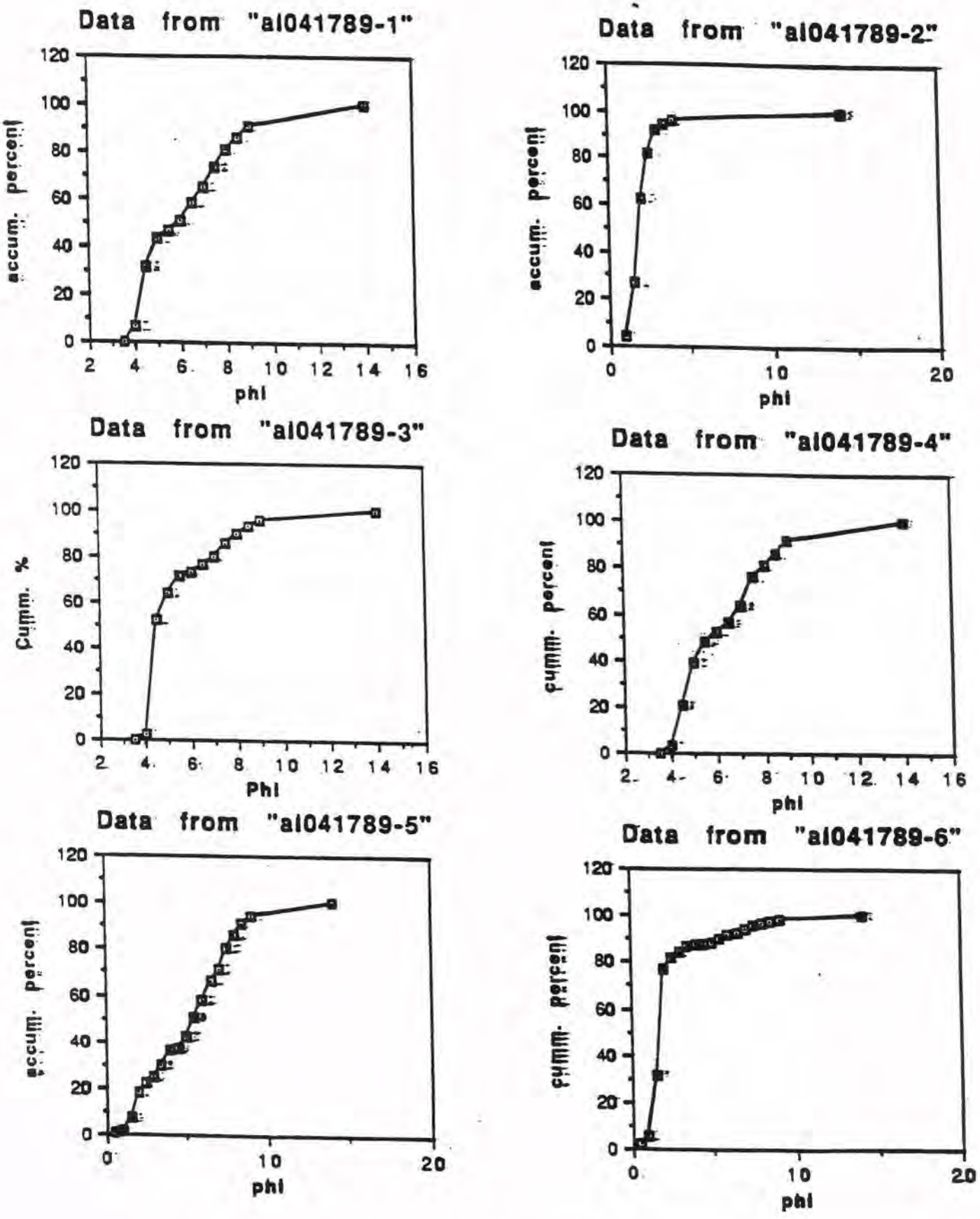








D1c. Bar graphs of core samples collected in Drakes Estero samples for grain size analysis.



D1d. Cumulative frequency plots of sediment samples collected in Abbotts Lagoon.

Appendix E C^{14}, PB^{210} Comparisons

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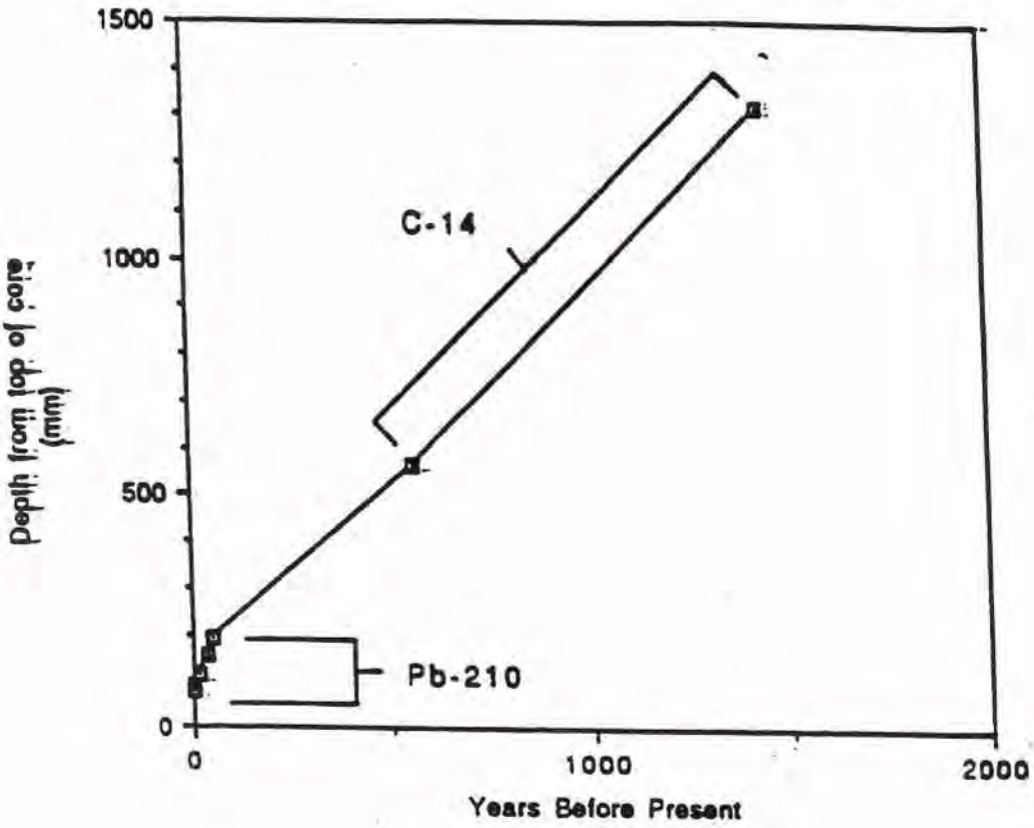
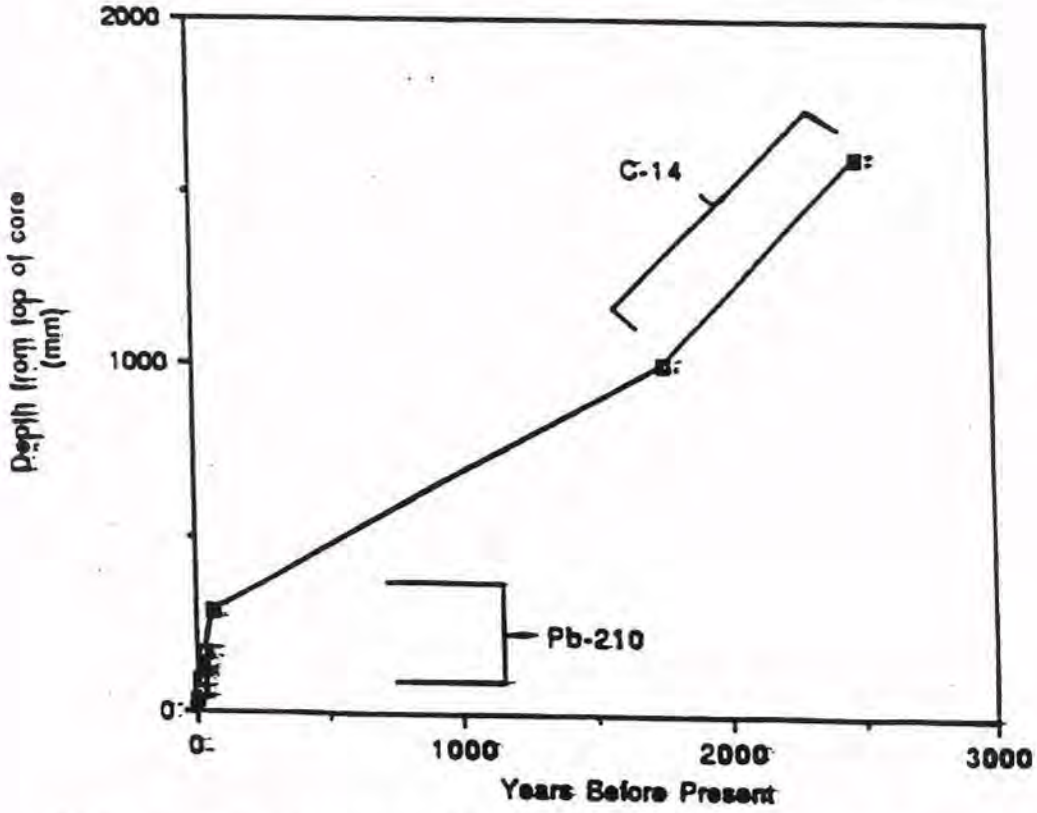
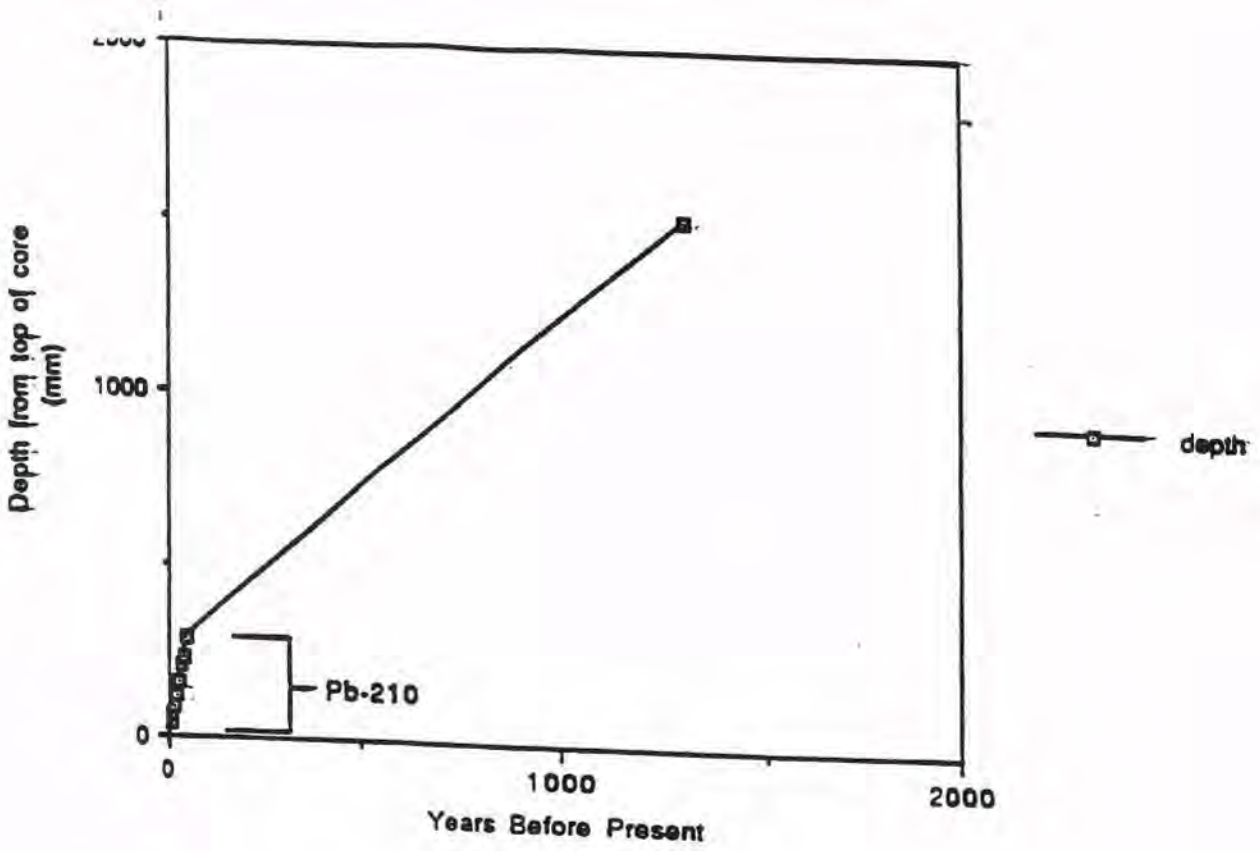


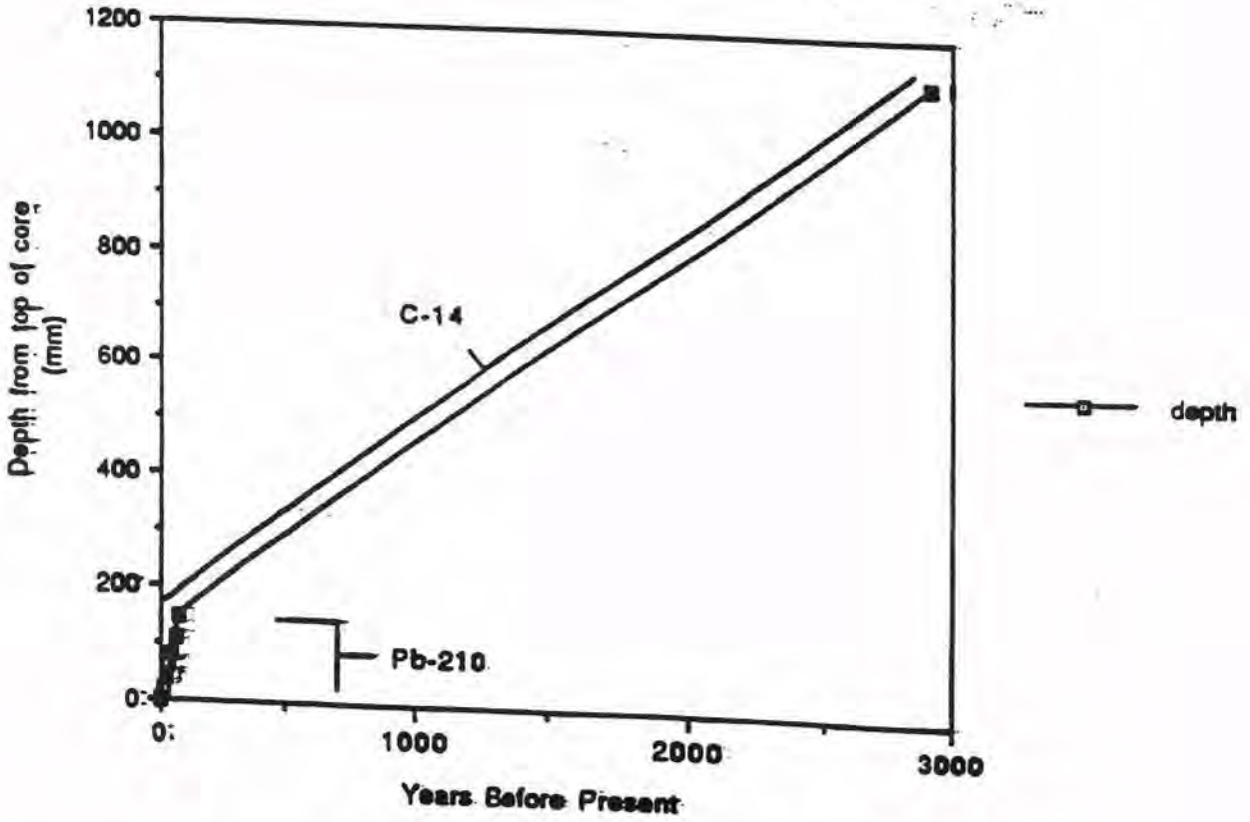
Combined Age Dates from Schooner Bay



E1a. Graph showing the average combined C14, and Pb210, age dates for Berries and Schooner Bays.



Combined age dates from Abbotts Lagoon



E1b. Graph showing the average combined C14, and Pb210, age dates for Estero de Limantour and Abbotts Lagoon.

Trip Report
Drakes Estero
4/13/07
3:45-5:00 PM

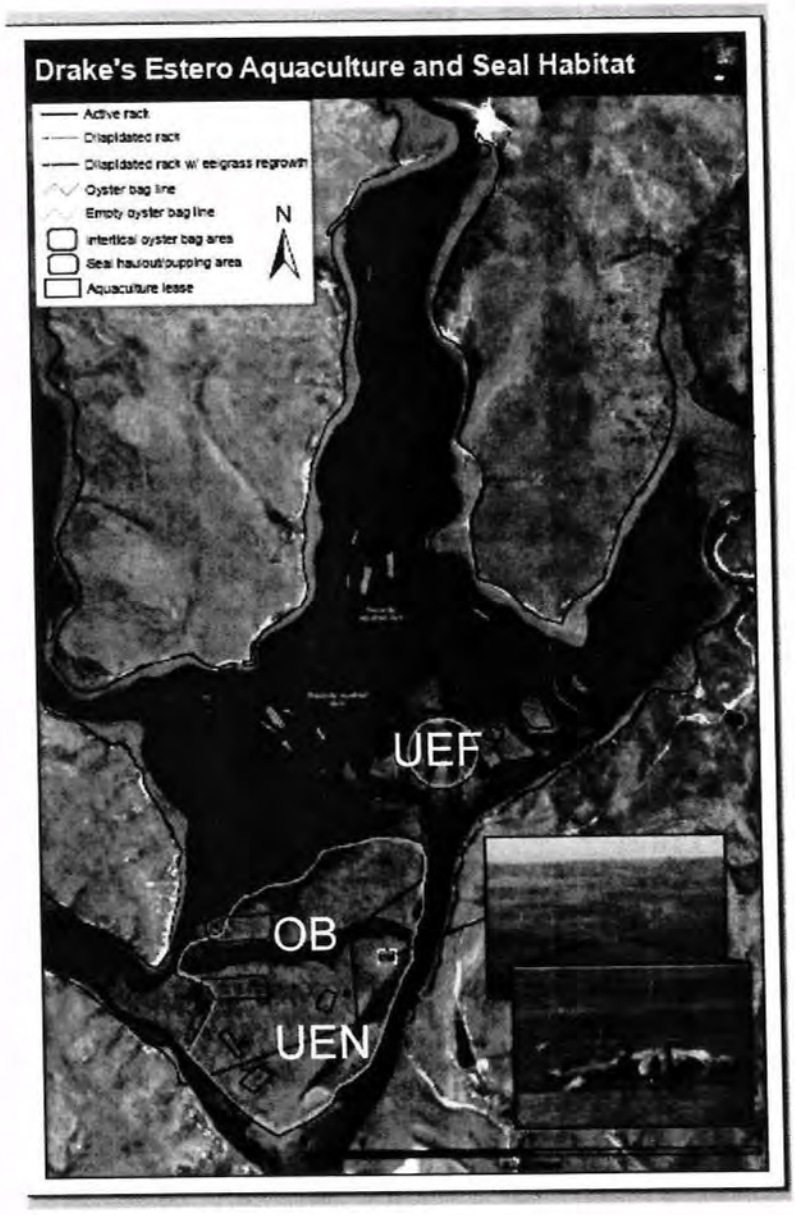
Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Friday during the afternoon low tide to count harbor seals and to determine the distribution and number of oyster bags on the seal haul out sites.

I arrived at 3:40 PM and met a volunteer who surveys harbor seals who had been present since 1:45 PM. She stated that she had observed 2 people in a boat tending oyster bags at the OB sand bar (see map) at around 2:30 PM. There were no seals present on the OB sand bar and the number at UEN was 133 with 21 pups, and the total count for the estero was 525, including 46 pups when she counted the seals at 2:20-30 PM.

When I conducted the survey at 4 PM, there were 10 seals present and 2 pups at the OB sandbar and 117 seals and 54 pups on UEN sand bar, a 157% increase in seals on the UEN sandbar. These two sites have historically had the higher numbers of females with pups likely because the pups are more protected from strong currents and the water is warmer in the middle of the estero. The total count for the estero was 618 including 88 pups, a 120% increase in pups after the boat left, even though it was late in the day. Seal numbers are highest mid day to mid-afternoon, depending on the tide level. The tide was low enough for the seals to haul out at 1:00 PM. For comparison of numbers on OB, in 2005 on April 12, there were 105 seals and 62 pups, and in 2004 on April 11, there were 169 seals and 36 pups.

I observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because of distance, I could not get an accurate count of bags, but the number of rows was around 20. The bags were adjacent to and directly on the haul out sites where the seals historically have hauled out in the past at OB and UEN (see map).


Drake's Estero Aquaculture and Seal Habitat
Active rack
Dilapidated rack
Dilapidated rack w/ eelgrass regrowth
Oyster bag line
Empty oyster bag line
Intertidal oyster bag area
Seal haulout/pupping area
Aquaculture lease
N
UEF
OB
UEN

Trip Report
Drakes Estero
4/26/07
3:45-5:00 PM

Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Thursday during the afternoon low tide to count harbor seals for the peak pupping season count.

I arrived at 3:45 PM and began counting the seals at A and A1 sandbars. At 3:50 PM I noted a white boat (@20 ft long) with outboard motor and two people aboard in the east end of the OB seal haul out site. The boat was fowled in eelgrass and the operators were poling through the eelgrass bed. Once half way along the channel going west, they used the engine again. I did not see the number of seals present before the boat was there; however there were only 5 (2 pups) when I began surveying and I saw seal heads in the water. There were seal drag marks on the sand bar indicating other seals may have been present and several fresh wet seals were hauling out on UEN, an adjacent sand bar. Also on previous day 4/25, a volunteer counted 21 (8 pups) on the OB haul out. When the boat went by the seals at 3:55 PM, all flushed into the water except one lone seal. Seals on UEN raised their heads but I did not see any enter the water. The boat continued west along the channel and flushed around 120 Black Brant that were in the eelgrass beds in the channel.

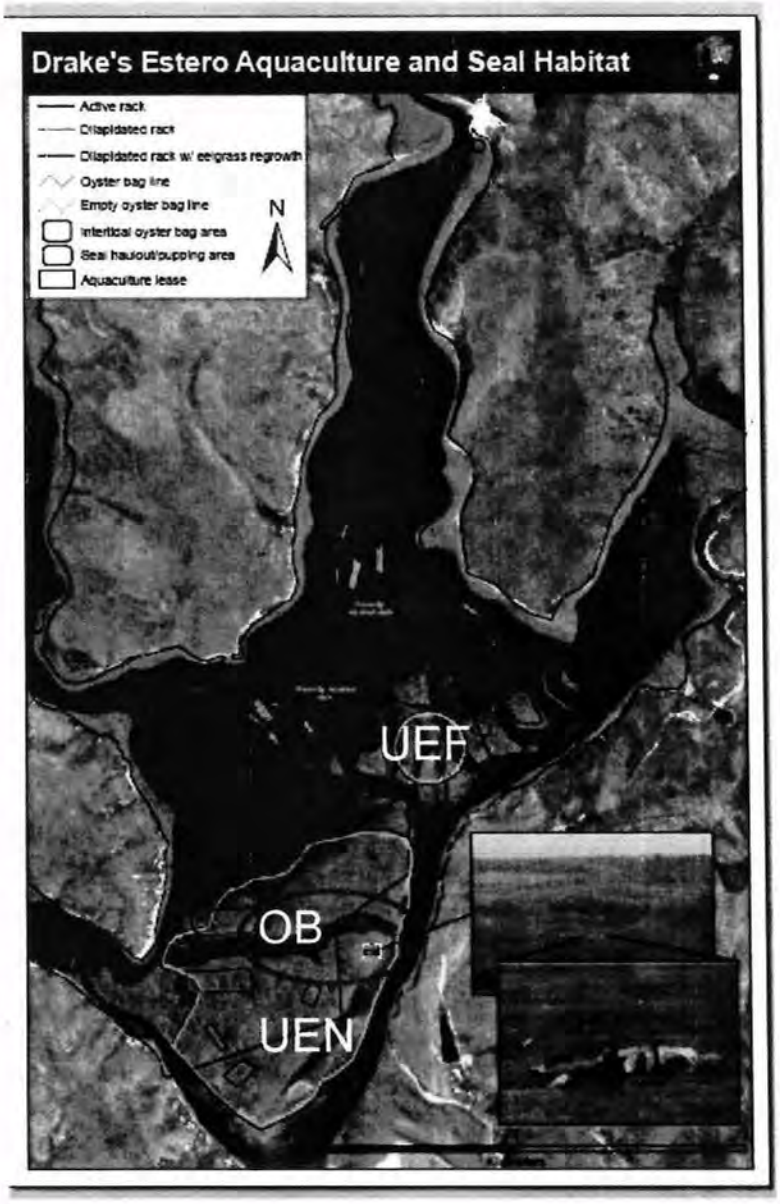
The boat then landed at around 4:10 PM about 2/3 of the way along the channel going west on the OB channel on the north west side where many oyster bags are located. Two men got off the boat, one taller in a green slicker and another in yellow slicker pants. They remained on the site until around 4:38 OM. During this time, they checked bags and added around 30 more bags onto the sandbar on the north west side of the sand bar and closer to the seals. During the interim time, 6 (2) seals hauled out at OB. When the boat proceeded back down the channel going east towards the seals at 4:55 PM, 5 seals flushed into the water included 2 mother-pup pairs at OB, another 3 mother pup pairs flushed at UEN sand bar, and around 75 seals alerted at UEN but did not enter the water. Additionally, around 200 black brant were flushed that were in the eelgrass beds in the channel after previously being flushed by the boat. At 4:58 PM, the boat then proceeded up into Home Bay. I terminated the survey at 5:00 PM.

A total of around 90 seals including around 50 pups were disturbed by the boat, and of these, I observed 14 seals including 7 pups directly flushed into the water. From previous research, we know that females with pups are more disturbed than adult males or immature seals. Additionally, around 320 black brant were flushed while in eelgrass beds.

During surveys of the estero, I again observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because this is the peak pupping season, mothers with pups are hauling out all over UEN, including near where the oyster bags are

located. There also appeared to be more bags on UEN, in addition to the bags added to OB today. Again, the bags were adjacent to and directly on the haul out sites where the seals historically hauled out in the past three decades of surveys that I have conducted.

Map of Drakes Estero – red circle indicates where seals and Black Brant were disturbed.



Harbor Seal Monitoring at

Point Reyes National Seashore
and
Golden Gate National Recreation Area

Annual Report 2005

Prepared by:

Melanie Vanderhoof and Sarah Allen

Introduction

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped at Point Reyes, California. The Point Reyes seal population represents the largest concentration of harbor seals in the State of California, other than the Channel Islands, accounting for 20% of the mainland breeding population (Lowry and Carretta 2003). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt feed and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999, Allen et al. 2004). The objectives of monitoring are to 1) detect changes in population numbers, 2) detect changes in reproductive success and 3) identify anthropogenic or environmental factors that might affect population status and trends. The monitoring objectives and protocol are described in detail in Hester et al. (draft report). The information presented here is a summary of the data collected during the 2005 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort including adjacent areas (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in 2005 in conjunction with other agencies and organizations are also presented.

Methods

Study Area

The Point Reyes peninsula extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N) and are referred collectively as the Point Reyes sites. Point Bonita in the Marin Headlands is the southern most seal haul out site within the study area, and along with Alcatraz collectively form the Golden Gate NRA sites. Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PORE), Golden Gate National Recreation Area (GOGA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline.

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). Coastal locations regularly surveyed included Tomales Point, Point Reyes Headland, Duxbury Reef, Double Point and Point Bonita; estuarine locations surveyed included Tomales Bay, Drakes and Limantour Esteros complex, and Bolinas Lagoon (Figure 1).

Regional survey sites included colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark's Slough), in Sonoma County (Sea Ranch, South Sonoma sites and Jenner) and in San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons which run from the March 1 to May 30 and June 1 to July 31, respectively.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during two in-class sessions and four field sessions. Many of the volunteers were trained and seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each Point Reyes site a minimum of twice per week, weather and logistics permitting. Point Bonita was also surveyed twice per week. The Point Reyes Headland and the regional survey sites were surveyed once every two weeks on concurrent weekends. Surveys occurred primarily during low to medium tides, the time when the maximum number of seals haul out in the San Francisco Bay region (Fancher 1979, Allen et al. 1982).

Survey periods were designed to last approximately two hours, with counts occurring every half-hour to one hour, depending on location. Each sub-site was surveyed separately, and then summed to give a total for each site. All sub-sites were visible from one location with the exception of Tomales Point, Tomales Bay and Bolinas Lagoon. For each of these sites, each sub-site was counted from two to four times per survey.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two age classes were lumped together. Pups were the young of the year and after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only between March and June 1. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

All actual and potential disturbances to harbor seals were recorded during a period from March 1 through July 20. The analysis of disturbance data was truncated and does not account for disturbance data collected during the entire molt season. The total number of disturbance survey days was 226 (Table 1). Observers recorded the time and the source of the disturbance. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water or unknown. In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time and location of where the seals rehauled were also recorded. In some cases, an unknown disturbance and unknown response was recorded if the disturbance occurred before the survey was started, and so the nature and extent of the disturbance was not directly

observed. The rate of disturbances was calculated based on the number of disturbances per survey period (survey period was usually 2 hours but may have varied by ½ hour). In future reports, disturbance rate will be calculated based on the number of disturbances per survey hour, in order to compare to other disturbance studies.

Regional surveys occurred every two weeks March – July on weekends, Friday – Sunday that had low tides during the morning or mid-day. All of the Point Reyes and Golden gate sites, as well as the San Francisco Bay and Sonoma sites, were surveyed during these weekends. Participants in the region-wide surveys included the GFNMS and FMSA, San Francisco State University, and Stewards of Slavianka, a non-profit conservation group based in Sonoma County.

Results and Discussion

Overall

In 2005, volunteers completed 244 surveys at sites in Marin County at PORE and GOGA between March 1 and July 30. The combined maximum pup counts for all sites during the breeding season was 1,115 pups. This is 13% lower than 2004, but comparable to previous years (Figure 2). Pup numbers, combining all sites, appear to have stabilized since approximately 2000. Drakes Estero and Double Point together produced 56% of the pups (Figure 3). Pup numbers at Double Point have continued to rebound from 2003, when the presence of a northern elephant seal (*Mirounga angustirostris*) reduced the number of seals at Double Point. Numbers were similar at most sites in the past several years, except at Drakes Estero, which has seen a decrease in pup numbers since the 2003 season, as pup numbers rebound at Double Point and when a coyote was seen preying on newborn pups in 2004 at Drakes Estero (Figure 4).

Date of first pup was observed in 2005 was March 6 compared to March 20 in 2004. There was no apparent trend in the date of first pup observed between 2000 and 2005 (Table 4).

The maximum molt count for all of the Point Reyes sites was 4,380 seals. This count is 23% lower than in 2004, but comparable to counts from 2001-2003 (Table 2; Figure 5). Seals from Drakes Estero and Double Point made up 55% of the maximum molt count (Table 1; Figure 6). The maximum molt counts recorded for Tomales Bay and Tomales Point in the 2005 season were low compared to previous years. The constant presence of fog during the peak molt period at Tomales Point reduced the number of surveys completed during this time.

Surveyors recorded 120 disturbances between March 1 and July 20. 107 of these were actual disturbances, while 13 were potential disturbances. The potential disturbances represented 11% of all disturbances. Of these, 39% (5) were motor boats, and 31% (4) were humans. The disturbance data was analyzed using only the disturbances where a reaction by the seals was recorded (107). The average rate of disturbances per survey in 2005 was 0.54. This can be compared to 0.58 disturbances per survey in 2003 and 0.48

disturbances per survey in 2004. Drakes Estero, while having the highest pup and molt numbers, also had the highest rate of disturbance, 1.03 disturbances per survey (Figure 7). Fifty-two percent of the disturbances resulted in seals flushing into the water.

Twenty-four percent of the disturbances were of unknown cause (Figure 9). The largest identifiable causes were humans on foot (22.7%), non-motor boats (16.4%), and aircraft, (14.6%). These major causes are similar to disturbance data collected from 2002-2004 (Table 3). Both motor and non-motor boat disturbances have decreased slightly. Aircraft increased from an average of 5.6% in 2003 and 2004, to 14.6% (Table 3). This increase may be linked to a rising popularity of "ultralights" which have been observed flying low, especially over Tomales Point. Also notable is the reduction in disturbance from dogs. This may be the result of current enforcement of restrictions regarding where dogs are allowed in the park.

There were no major mortality events this year. The Marine Mammal Center reported that harbor seal rescues, primarily of weaned pups, were within the range of normal variability (Marine Mammal Center, pers. comm.). In 2004, surveyors observed coyotes preying on harbor seals in Drakes Estero; however, coyote predation of pups was not directly observed in 2005. On one survey at Drakes Estero, a bobcat was reported on the tidal sandbars where seals haul out but no predation was observed.

During the 2005 season, National Oceanic and Atmospheric Administration (NOAA) reported reduced upwelling and warmer than usual water temperatures for northern California, Oregon and Washington (2005 www.noaa.gov general website). Unusual, warm water species observed at Point Reyes during 2005 included: the Humboldt squid (*Dosidicus gigas),* a Brown Booby (*Sula leucogaster*) and the California grunion (*Leuresthes tenuis*). The reduced upwelling resulted in reduced algal and krill populations, which may have impacted food availability for harbor seals. During the 1998 El Nino event, when upwelling did not occur, there was a dramatic reduction in the number of seals pupping and hauling out in the Point Reyes area (Sydeman and Allen 1999). Such a dramatic reduction was not observed during the 2005 season.

Summary by site

Bolinas Lagoon

46 surveys were completed at Bolinas Lagoon between March 1 and July 31. Bolinas Lagoon had a high pup count of 143 the week of April 18, and a peak molt count of 449 the week of July 4 (Table 1). It had the second highest rate of disturbance, 0.82 disturbances per hour (Figure 7). Humans were the main cause of disturbance, making up 47.1% of the recorded disturbances. Bolinas Lagoon was one of the top sites for disturbances in 2003 and 2004, as well (Figure 8).

Double Point

32 surveys were completed at Double Point between March 1 and July 31. Double Point had a high pup count of 291 the week of April 25, and a peak molt count of 1,126 the week of July 4. Double Point had a disturbance rate of 0.48 disturbances per survey.

78.6% of the disturbances were of unknown cause. The remoteness of this site coupled with being surrounded by high cliffs reduces the exposure to human disturbances and may prevent surveyors from identifying the natural sources for disturbance.

Drakes Estero

37 surveys were completed at Drakes Estero between March 1 and July 31 2005. Drakes Estero had a high pup count of 332 the week of May 2, and a peak molt count of 1,261 the week of July 4. Besides having the largest pup and molt numbers, Drakes Estero had the greatest rate of disturbances observed, with a disturbance rate of 1.03 disturbances per survey. Causes for disturbance at Drakes Estero were variable. Birds (22.2%) were the most frequent cause, followed by non-motor boats (19.4%), humans (16.7%), and aircraft (16.7%).

Duxbury Reef

38 surveys were completed at Duxbury Reef between March 1 and July 31. Duxbury Reef had a high pup count of 10 the week of May 9, and a high adult count of 93 the week of May 9. Disturbance was low at Duxbury Reef. The rate of disturbance was 0.03 disturbances per survey this year.

Point Bonita

28 surveys were conducted at Point Bonita. Point Bonita was added to the annual survey locations initially in 2004; however, logistics were not finalized until the 2005 season. Few pups were counted at this site (6); however, the maximum count of seals during the breeding and molt seasons was around 100-130 seals (Tables 1 and 2).
Humans on foot were the major source of disturbance (Table 1).

Point Reyes Headland

Eight surveys were completed at Point Reyes Headland (PRH) between March 1 and July 30 2005. PRH had a high pup count of 44 the week of April 25 and a peak molt count of 456 the week of July 4. Disturbances are low at PRH and no disturbances were recorded in 2005. This haul out site is a primary haul out site for northern elephant seals. The peak count for northern elephant seals between March 15 and July 15 was 1,436 seals on April 29, which coincides with the molt period for elephant seals. Fog limited the number of surveys at PRH.

Tomales Bay

28 surveys were completed at Tomales Bay between March 1 and July 30. Tomales Bay had a high pup count of 188 the week of May 9, and a peak molt count of 549 the week of June 20. The disturbance rate more than doubled in the past year from 0.27 disturbances per hour in 2004 to 0.6 disturbances per hour in 2005. The largest source of disturbances was motor boats, 42.8%. The motor boats were usually clam diggers traveling from the mainland to the sandbars (Mary Ellen King, pers. comm.). Clammers, once on the sandbars and on foot, did not appear to be a source of disturbance. There were no recorded instances of clammers on foot disturbing the seals during the 2005 season.

Tomales Point

26 surveys were completed at Tomales Point between March 1 and July 30. Tomales Point had a high pup count of 101 the week of April 25, and a peak molt count of 378 the week of June 27. The disturbance rate was 0.42 disturbances per survey and the primary source of disturbances was aircraft, which made up 36.4% of the disturbances. Abalone divers are also assumed to be a primary disturbance source at Tomales Point. Often they were present upon arrival of surveyors, and so we were unable to determine the extent of their impact. Abalone collecting season begins in April and overlaps with part of the harbor seal breeding season.

Regional Sites

11 regional surveys were completed, starting on March 4, and ending July 29, at 20 locations. The seasonal peak for pups was during the week of April 30th and the peak for molting seals was during the week of July 10. The maximum number of seals during the breeding season was 3,306 and the average was 2689. The maximum number of seals during the molt was 4,691, with an average of 4,106 (Table 5). Point Reyes had the highest concentration of seals with Double Point and Drakes Estero accounting for 45% of adults during the breeding season, 49% of pups produced, and 50% of molting seals. The maximum count of pups was 1,272 and the first pups were identified at Castro Rocks and Fitzgerald Marine Reserve on March 6th. Of the 20 areas surveyed, only six produced >100 pups (Tomales Bay, Tomales Point, Drakes Estero, Double Point, Bolinas Lagoon, and Mowry Slough). Within San Francisco Bay, Mowry Slough accounted for the majority of seals, followed by Castro Rocks. Sonoma County coast haul out sites were composed of a number of small sites with larger concentrations at Sea Ranch and Jenner. San Mateo County coast sites were also composed of a number of small sites adding up to larger concentrations at Pebble Beach and Fitzgerald Marine Reserve. Only four seals were counted during one survey at Bean Hollow during the entire season. Cowell Ranch Beach and Fitzgerald Marine Reserve accounted for most of the seals counted in the county, but few pups were recorded there.

Disturbances during surveys ranged from northern elephant seal attacking harbor seals at Jenner to people on foot, tide pooling at Point Bonita. The primary sources for disturbance at San Francisco Bay were vehicles at Castro Rocks, aircraft and motor boats at Yerba Buena Island and no disturbances were noted at Mowry Slough.

Collaboration

Point Reyes National Seashore and Golden Gate National Recreation Area collaborated with multiple government agencies and non-profits on projects related to the harbor seal population. The parks collaborated with NOAA on a Tomales Bay stewardship program called SEALS. Park rangers ferried docents on boats out onto the mud flats in Tomales Bay to educate visitors and clam diggers about seals on week ends during low tides. The National Marine Fisheries Service (NMFS) conducted an aerial survey of harbor seal haul out sites along the California Coast, on the 24th and 25th of June 2005. NMFS counted 3,826 harbor seals from Point Reyes to Point Bonita, and 621 harbor seals were counted in San Francisco Bay (Lowry et al., draft report). Regional surveys were conducted in

collaboration with Stewards of Slavianka, Bodega Bay Marine Lab, GFNMS, San Francisco State University, the California Department of Transportation, Joe Mortenson and Mary Ellen King. The Marine Mammal Center released rehabilitated pinnipeds at Chimney Rock at PRNS. We also collaborated with the San Francisco State University study on sightings of satellite and radio tagged seals observed at PRNS. One satellite tagged adult female successfully raised a pup at Double Point in 2005.

Summary

Counts of pups and molting seals at the PORE and GOGA sites were lower in 2005 than the 2004 season. They are comparable to previous years and within the normal range of variation, but the maximum pup count for 2005 was the lowest recorded since 1999, and the peak molt count was the lowest since 2001. The number of disturbances recorded by surveyors remains similar to previous years and no trends are detected. Disturbances were site specific; however, hikers and boaters remain the two most frequent sources of disturbance across all sites.

Harbor seal haul out at Point Reyes Headland.

Acknowledgements

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Volunteer training at Drakes Estero.

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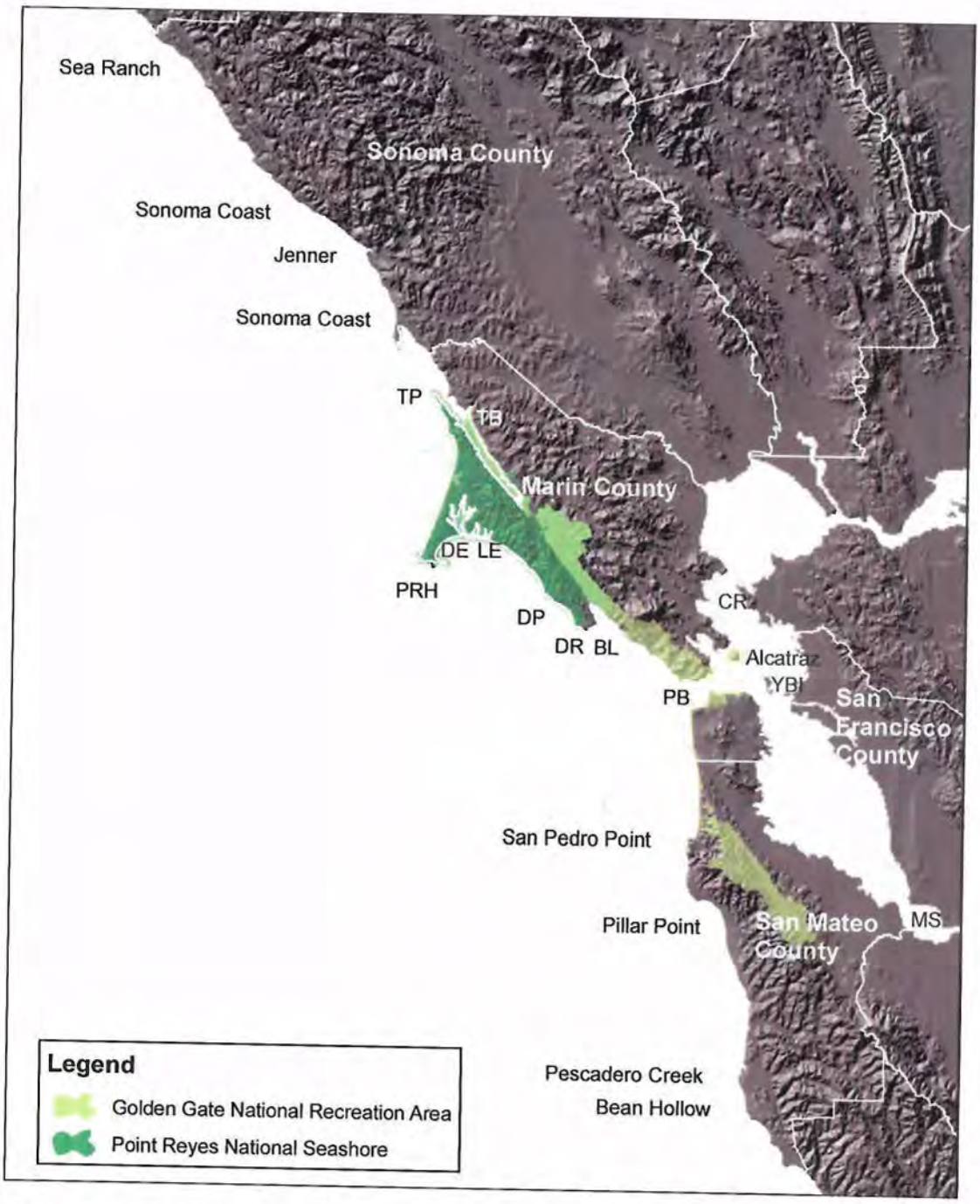

Figure 1. Harbor seal haul out sites in Marin County and San Francisco Bay, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Table 1. Summary data of harbor seal colonies for the 2005 season. All reported numbers reflect the maximum number seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 1 to May 31. Max # Molt =all age classes during the molting season, June 1 to July 30. The percent of red seals is a percentage of the maximum total number of seals during the molt season of each site. The number of surveys and disturbances are from March 15 to July 30.

Site	Max # Breed	Max # Pups	Max #Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Bolinas Lagoon	318	143	449	Weekday: 29 Weekend: 9	Weekday: 29 Weekend: 2	10	2.5%	2	1
Double Point	639	291	1126	Weekday: 20 Weekend: 9	Weekday: 13 Weekend: 1	8	1.1%	2	5
Drakes Estero	754	332	1261	Weekday: 23 Weekend: 12	Weekday: 22 Weekend: 14	15	1.4%	2	2
Duxbury Reef	93	10	64	Weekday: 29 Weekend: 8	Weekday: 1 Weekend: 0	1	1.1%	0	0
Point Reyes Headlands	84	44	456	Weekday: 8 Weekend: 0	Weekday: 0 Weekend: 0	2	1.6%	0	0
Tomales Bay	532	188	549	Weekday: 13 Weekend: 12	Weekday: 9 Weekend: 5	13	1.9%	0	0
Tomales Point	313	101	378	Weekday: 16 Weekend: 10	Weekday: 5 Weekend: 6	14	3.7%	0	1
Point Bonita	133	6	97	28	---	3	3.1%	0	1
2005 Total:	**2,866**	**1,115**	**4,380**	**226**	**107**				

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Table 2. Summary of survey data for 1997-2005, combining all sites at Point Reyes (excluding Point Bonita for comparison between years). Maximum # of Breed and Molt, and Average # Breed include all age classes. Number of surveys and disturbances are the number completed or recorded in the entire year.

YEAR	Max # Breed	Average # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Disturbances Per Survey
1997	3,268	1,830.50	983	NA	Weekday: 44	Weekday: 9	0.2
		SE = 379			Weekend: 29	Weekend: 37	1.3
		N =4			Total: 73	Total: 46	
1998	2,481	1,744.60	528	3,070	Weekday: 79	Weekday: 24	0.3
		SE = 122.5			Weekend: 64	Weekend: 46	0.7
		N = 8			Total: 143	Total: 70	
1999	3,325	1,779.90	1,068	2,863	Weekday: 139	Weekday: 71	0.5
		SE = 173.5			Weekend: 69	Weekend: 54	0.8
		N = 10			Total: 208	Total: 125	
2000	3,506	2,511.10	1,342	3,108	Weekday: 106	Weekday: 78	0.7
		SE = 224.4			Weekend: 91	Weekend: 116	1.3
		N = 7			Total: 197	Total: 194	
2001	3,485	2,218.80	1,247	3,769	Weekday: 112	Weekday: 57	0.5
		SE = 244.8			Weekend: 119	Weekend: 107	0.9
		N = 4			Total: 231	Total: 164	
2002	4,180	2651.3	1193	4297	Weekday: 123	Weekday: 67	0.5
		SE = 119.7			Weekend: 144	Weekend: 102	0.7
		N = 8			Total: 267	Total: 169	
2003	3820	2280	1117	4534	Weekday: 172	Weekday: 86	0.5
		SE = 303.9			Weekend: 115	Weekend: 83	0.7
		N = 9			Total: 287	Total: 169	
2004	4534	2518.3	1267	5633	Weekday: 161	Weekday: 52	0.3
		SE = 348.6			Weekend: 97	Weekend: 53	0.5
		N = 10			Total: 258	Total: 105	
2005	2,733	2182.3	1,109	4,283	Weekday: 166	Weekday: 80	0.5
		SE = 195.1			Weekend: 78	Weekend: 29	0.4
		N= 11			Total: 244	Total: 109	

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Table 3. Causes for disturbance during 2002-2005 for Point Reyes sites; percent is of total disturbances for a given year.

Year	Type of Disturbance								
	Motor boat	Non-motor boat	Vehicle	Dog	Aircrafts	Human pedestrian	Bird	Unknown	Other
2002	13%	16%	6%	0.5%	11%	24%	6%	21%	2%
2003	13%	20%	2%	0%	9%	21%	7%	23%	6%
2004	5%	10%	8%	2%	3%	39%	7%	25%	2%
2005	8%	13%	1%	0%	15%	25%	9%	23%	6%

Table 4. Date of first pup by year at Point Reyes, including all sites.

Year	Date
2000	14 March
2001	16 March
2002	03 March
2003	27 March
2004	20 March
2005	06 March

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Table 5. Regional surveys of harbor seals in central California, March through July 2005. Eleven surveys were conducted, 7 during the breeding season and 4 during the molt.

Location	Breeding Season				Molt Season		
	Average	SE	Total* Max	Pup* Max	Average	SE	Total Max
Sonoma County							
Sonoma Coast	160.9	62.2	230	56	194.5	37.4	237
Jenner	78.4	73.3	152	7	268.5	--	285
Marin County							
Tomales Bay	331.0	24.3	532	188	358.5	53.9	549
Tomales Point	161.8	18.1	313	101	255.5	40.9	378
Point Reyes Headland	63.4	8.2	84	44	367	45.6	456
Drakes Estero/Limantour	516.8	26.9	754	332	796.8	81.3	1261
Double Point	370.1	27.2	639	291	663.1	80.2	1126
Duxbury Reef	42.4	4.6	93	10	26.5	4.7	64
Bolinas Lagoon	170.7	14.0	318	143	287.5	27.7	449
Point Bonita	60.7	50.4	133	6	76.8	13.2	89
San Francisco Bay							
Castro Rocks	212.8	68.4	339	43	191.25	16.1	213
YBI	91.9	33.0	151	9	158.3	47.6	194
Newark Slough	7.1	4.6	13	5	2.0	2.0	4
Mowry Slough	86.3	34.6	139	108	123.3	60.3	210
San Mateo County							
San Pedro Point	7.6	13.1	37	0	43.5	--	75
Bean Hollow	--	--	0	0	--	--	4
Cowell Ranch Beach	70.7	23.8	114	22	130.5	--	135
Pescadero	18.3	9.3	26	5	34.0	--	48
Pebble Beach	77.0	36.9	149	20	162.5	--	170
Fitzgerald Marine Reserve	152.3	17.6	188	19	147.3	17.2	163
GRAND TOTALS	2,668.7	507.7	3,102	1,272	4,105.8	726.9	4,778

*Based on the total for a single day.

Figure 2. Maximum pup counts at PRNS from 1997-2005. See text for methods.

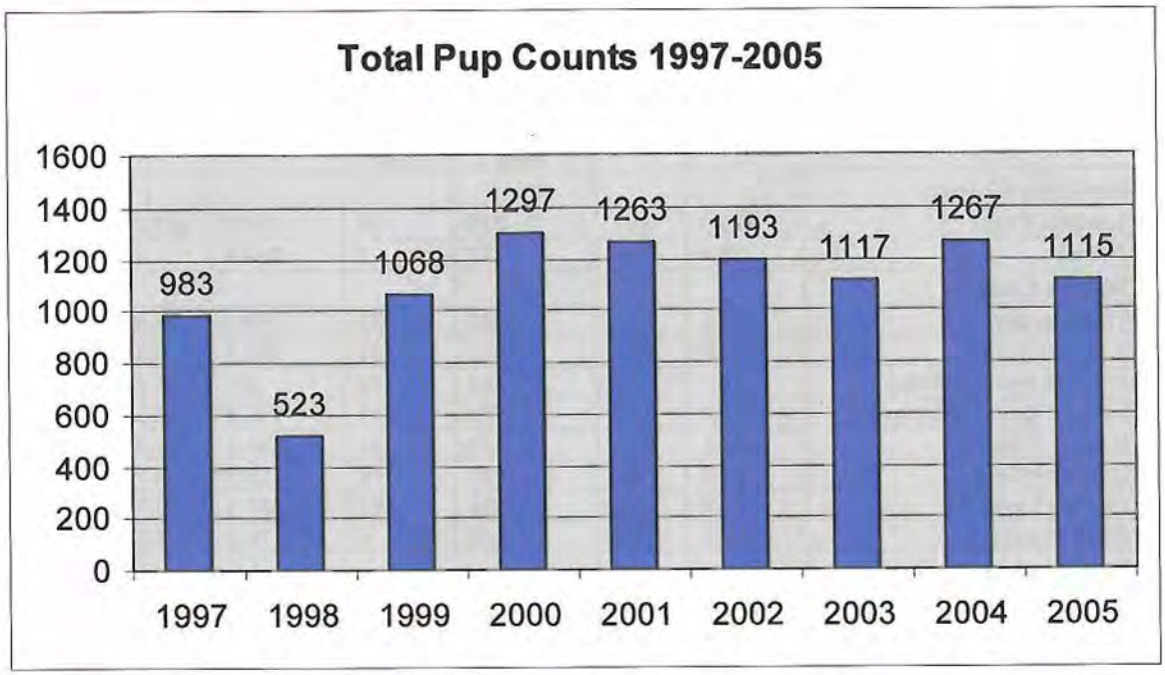


Figure 3. Maximum pup counts by site at PRNS during the 2005 season. See text for methods.

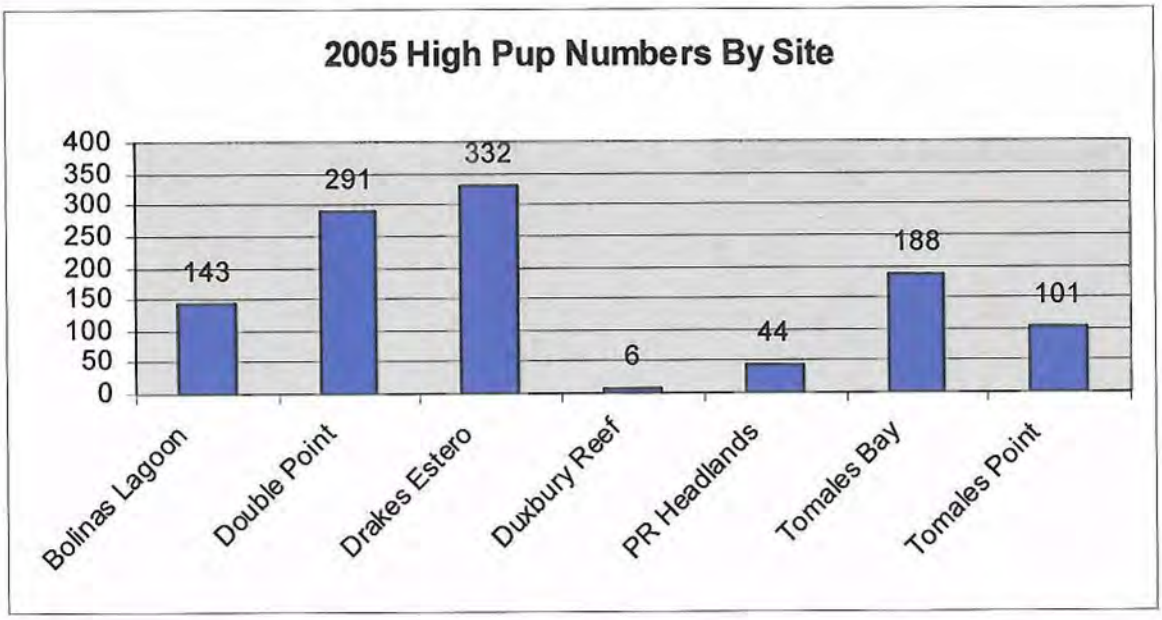


Figure 4. Maximum pup counts by site at Point Reyes, 2002-2005. See text for methods.

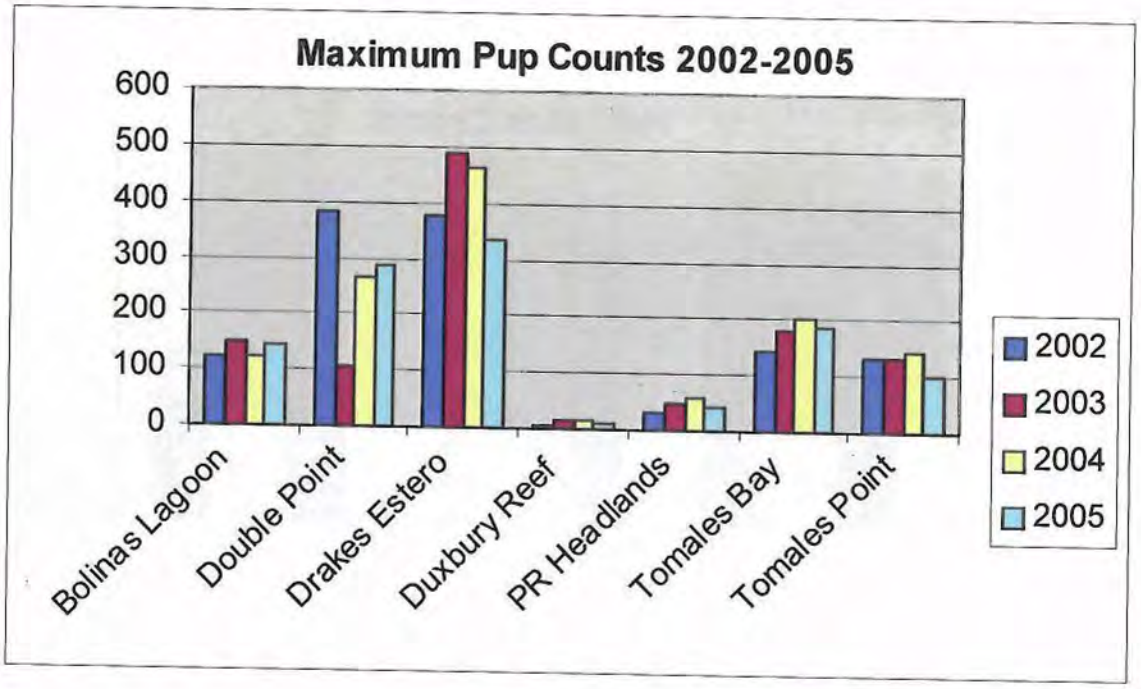


Figure 5. Maximum molt counts for Point Reyes, 1998-2005. See text for methods.

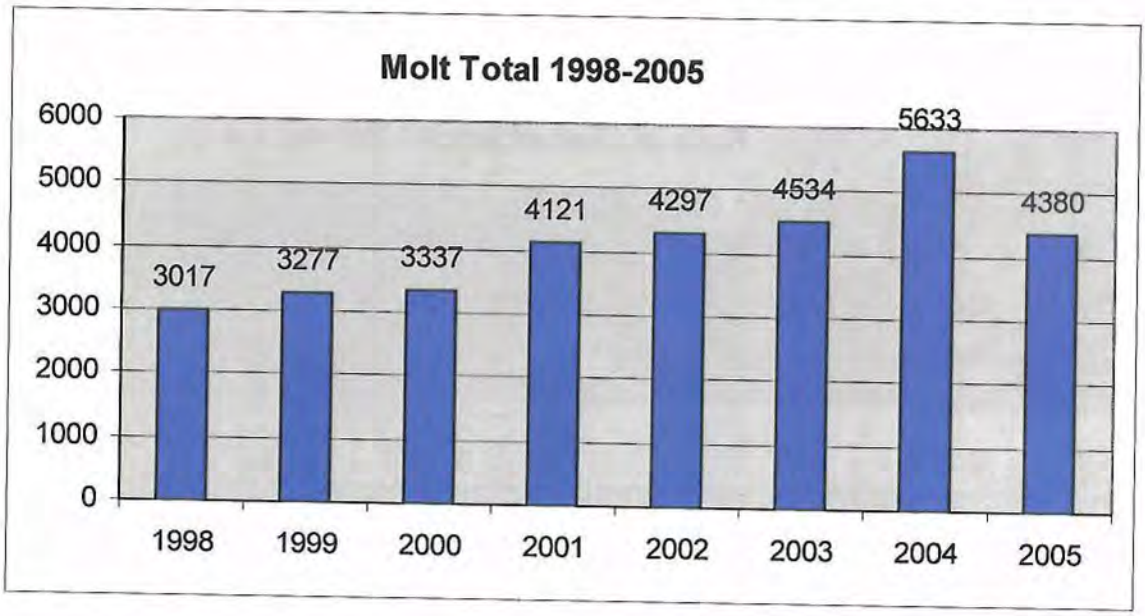


Figure 6. Maximum molt counts for the sites at Point Reyes during the 2005 season. See text for methods.

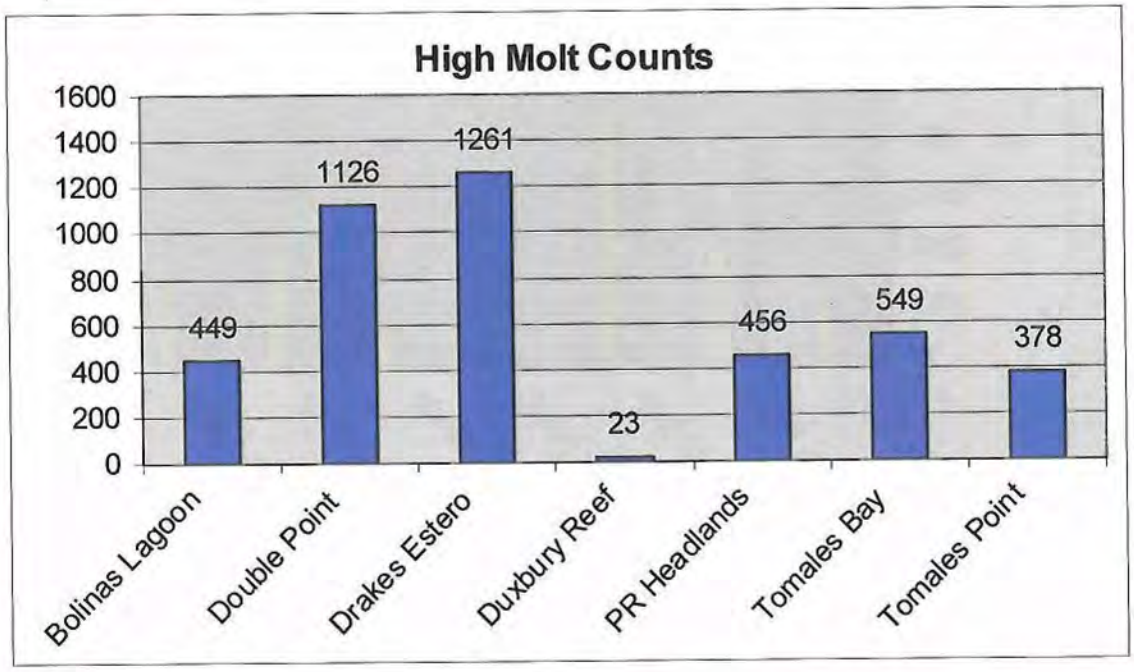


Figure 7. Average number of disturbances per survey, by site at Point Reyes, 2005. See text for methods.

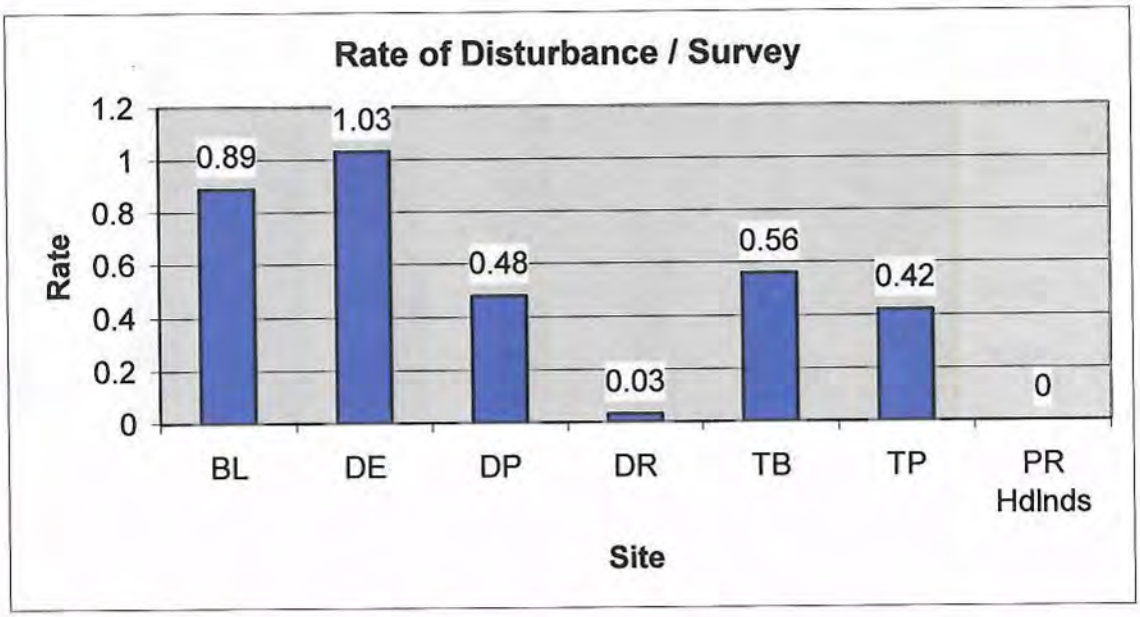


Figure 8. Average number of disturbances per survey, by site at Point Reyes for 2003-2005. See text for methods.

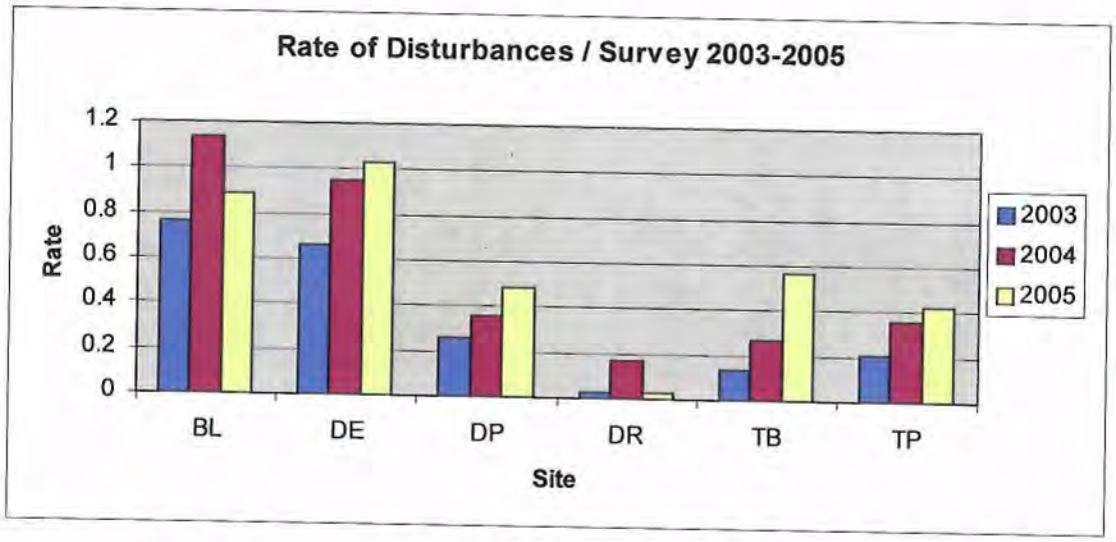
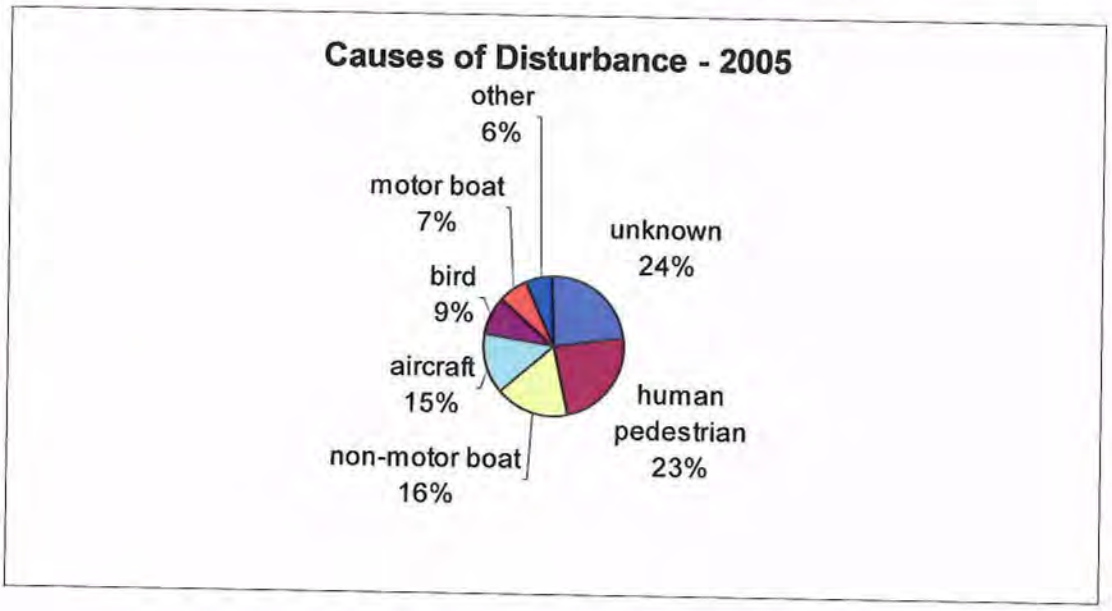


Figure 9. Causes for disturbance by percent for all of Point Reyes sites in 2005.



Harbor Seal Monitoring

San Francisco Bay Area

Annual Report
National Park Service
2006

Prepared by:

Jeannine Manna, Dale Roberts, Dave Press, and Sarah Allen

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Volunteer training at Double Point.

Introduction

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped in the San Francisco Bay Area, California. Within the San Francisco Bay Area, the population at Point Reyes represents the largest concentration of harbor seals in the State of California, other than the Channel Islands, accounting for 20% of the mainland breeding population (Lowry and Carretta 2003). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999, Allen et al. 2004, Vanderhoof and Allen 2005). The objectives of monitoring are to 1) detect changes in population numbers, 2) detect changes in reproductive success, and 3) identify anthropogenic or environmental factors that might affect population status and trends. The monitoring objectives and protocol are described in detail in Hester et al. (draft protocol). The information presented here is a summary of the data collected in Point Reyes National Seashore and Golden Gate National Recreation Area during the 2006 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort including adjacent areas, (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in conjunction with other agencies and organizations for 2006, are also presented.

Methods

Study Area

The study area extends from Tomales Point south to San Francisco Bay. The Point Reyes peninsula extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N) and is referred collectively as the Point Reyes sites. Point Bonita, in the Marin Headlands, is the southern most seal haul out site within the study area and is located at the mouth of San Francisco Bay in Golden Gate National Recreation Area. Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, Bolinas Lagoon, and San Francisco Bay. The Point Reyes National Seashore (PORE), Golden Gate National Recreation Area (GOGA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline.

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). Coastal locations regularly surveyed included Tomales Point, Point Reyes Headland, Duxbury Reef, Double Point, and Point Bonita; estuarine locations surveyed included Tomales Bay, Drakes and Limantour Esteros, and Bolinas Lagoon (Figure 1).

Regional survey sites included colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark's Slough), Sonoma County (Sea Ranch, South Sonoma sites, Fort Ross, and Jenner) and San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach (Figure 1).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons, which run from March 1st to May 30th and June 1st to July 31st, respectively.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during two in-class sessions and four field sessions. Many of the volunteers were previously trained and seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each Point Reyes site a minimum of once per week, twice during the peak of the breeding and molting seasons, weather and logistics permitting. Point Bonita was also surveyed according to the same schedule. The Point Reyes Headland and the regional survey sites were surveyed once every two weeks on concurrent weekends. Surveys occurred primarily during low to medium tides, the time when the maximum numbers of seals haul out in the San Francisco Bay region (Fancher 1979, Allen et al. 1982).

Harbor seals at Tomales Bay.

Survey periods were designed to last approximately two hours, with counts occurring at half-hour intervals, depending on location. Each sub-site was surveyed separately, and then summed to give a total for the site at each time interval. All sub-sites were visible from one location with the exception of Tomales Point and Bolinas Lagoon. For each of these sites, each sub-site was counted from two to four times per survey, due to driving or hiking distance between the sub-sites.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two age classes were lumped together. Pups were the young of the year and after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only between March and June 1. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

All actual and potential disturbances to harbor seals were recorded during surveys from the period of March 1st to July 31st. The total number of surveys where disturbances were recorded was 221 (Table 1). Observers recorded the time and the source of the disturbance. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water, or unknown. In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time when the seals rehauled was also recorded. In some cases, an unknown disturbance and unknown response was recorded if the disturbance occurred before the survey had started, and so the nature and extent of the disturbance was not directly observed. The rate of disturbances was calculated based on the number of disturbances per survey period (survey period was usually 2 hours but may have varied by ½ hour). In future reports, disturbance rate will be calculated based on the number of disturbances per survey hour, in order to compare to other disturbance studies.

Regional surveys occurred every two weeks March through July on weekends, Friday – Sunday that had low tides around mid-day. All of the PORE and GOGA sites, as well as the San Francisco Bay and Sonoma sites, were surveyed during these weekends. Participants in the region-wide surveys included the GFNMS and FMSA, San Francisco State University, US Fish and Wildlife Service, Stewards of Slavianka, a non-profit conservation group based in Sonoma County, the Marine Mammal Center and Fitzgerald Marine Reserve.

Results and Discussion

Overall

In 2006, volunteers completed 221 surveys at sites in Marin County at PORE and GOGA between March 1st and July 31st. The combined maximum pup count total for all sites during the breeding season was 1,056 pups (Table 1). The maximum pup count total for just PORE sites, excluding Point Bonita pup numbers in order to compare to previous years, was 1,042 (Table 2). The 2006 pup count is only 6% lower than 2005. Pup numbers appeared to decrease since 2004, and 2006 was the lowest pup count recorded since 1998; however, we did not test for statistical significance (Figure 2). Drakes Estero and Double Point continue to show the highest numbers of pups, together producing 56% of the pups seen for 2006 at PORE and GOGA (Table 1; Figure 3).

The first pup observed in 2006 was on March 9 compared to March 6 in 2005. There is no apparent trend in the date of first pup observed between 2000 and 2006 or in location (Table 4).

The decline in the overall number of pups produced in 2006 compared to the previous five years may be related to changes in marine conditions. Upwelling was much reduced in 2006 and similar to 2005, resulting in reduced krill, which in turn may have affected food availability for harbor seals.

Many, but not all, haul out sites experienced a decline in pup numbers. Pup numbers at Tomales Bay decreased 43% compared to 2005 and were much lower when compared to the mean over the past 4 years. The maximum pup count for Tomales Bay in 2006 fell well below the range of one standard deviation from the five-year mean (Figure 5). Bolinas Lagoon and Drakes Estero, though, both had an increase in pup numbers in 2006, most likely resulting from the decrease in pups at Double Point. Similar fluctuations between these sites have been seen in previous years, such as in 2003 when a northern elephant seal (*Mirounga angustirostris*) disrupted the colony at Double Point resulting in an increase in the number of pups at Drakes Estero and Bolinas Lagoon (Figure 4).

The maximum total count of all seals during the molt season for all sites at PORE and GOGA was 4,709 seals (Table 1). For just PORE sites, the maximum count was 4,560. This count is 6% higher than in 2005 (Table 2). The 2006 molt count total was the highest in the past nine years except for in 2004 when the count was 5,633 (Figure 6). Seals from Drakes Estero and Double Point accounted for 49% of the maximum molt count for PORE and GOGA combined (Table 1; Figure 7).

At PORE, surveyors recorded 135 disturbances between March 1st and July 31st. 120 of these were actual disturbances (disturbances that resulted in a seal response), while 15 were potential disturbances (4% of all disturbances). Of these potential disturbances, 47% (7) were human, 20% (3) were clammers, 20% (3) were motorboats, and 13%(2) were barking dogs. The average rate of actual disturbances per survey in 2006 for PORE sites was 0.76 disturbances per survey. This can be compared to 0.54 disturbances per survey in 2005. Tomales Bay and Tomales Point colonies had the most significant increase in disturbances when compared to previous years (Figure 9). Bolinas Lagoon had the highest rate of disturbance (1.3 disturbances per survey), followed by Tomales

Bay (1.2 disturbances per survey; Figure 8). In 2005, Drakes Estero had the highest rate of disturbance, 1.03 disturbances per survey (Figure 9). Forty-three percent (52) of all disturbances in 2006 resulted in seals flushing into the water.

Twenty-one percent of the actual disturbances in 2006 were caused by humans (Figure 10). Other identifiable disturbances were from non-motorboats (13%), motor boats (11%), and birds (10%). Nineteen percent of disturbances were from unknown sources. These percentages were similar to disturbance data collected from 2002-2005. There was an increase in 2006 in disturbances from motorboats and vehicles and a decrease in disturbances from aircrafts compared to 2005. This decrease is related to a decline in disturbances from "ultralights," low flying aircrafts, in 2006. No aircraft disturbances from 2006 were from "ultralights." Sources of disturbance that produced an increase in the "other" category included construction noise at a residence near Bolinas Lagoon and coyotes on the sandbars at Drakes Estero (Table 3).

There were no observed major mortality events in 2006. Pup numbers declined at Double Point after rebounding from a northern elephant seal disturbance in 2002-2003. The decline in numbers at Double Point mid-season were not explained from field surveys; however, law enforcement rangers reported that a person was rescued by helicopter adjacent to Double Point during the time that the seal numbers declined. Tomales Bay and Bolinas Lagoon pup numbers were the only sites found to have maximum counts significantly different then their average range when compared to the past 5 years.

Two harbor seals pups were picked up by park visitors at Point Reyes in 2006, mistaking the pups for being abandoned. Both pups were picked up from McClurres Beach, one on 4/13/06 and the other on 4/19/06. The pups were taken to the Marine Mammal Center for care. The Marine Mammal Center also released 3 harbor seal pups at Point Reyes at Chimney Rock, one on 7/1/06 and 2 on 6/03/06.

Pup nursing at Point Reyes.

Summary by site

Bolinas Lagoon

29 surveys were completed at Bolinas Lagoon between March 1st and July 31st. Bolinas Lagoon had a high pup count of 174 the week of May 8th, and a peak molt count of 448 the week of July 10th (Table 1). Due to Bolinas Lagoon's close proximity to a highway, the seals are very exposed to humans and traffic and had the highest rate of disturbance this year, 1.3 disturbances per survey (Figure 8). Forty-six percent (17) of disturbances were caused by humans. On more than one occasion, humans were seen walking on the mudflats where seals haul out and one time four children were seen running along the mudflats chasing seals into the water. Twenty-two percent (8) of disturbances were caused by birds. Two of these were from large flocks of Brown Pelicans (*Pelecanus occidentalis*). Bolinas Lagoon had a maximum Brown Pelican count of 1,350 in 2006 which is more than double the number seen in 2005 when the max count was 553. Sixteen percent of disturbances were from vehicles, all being motorcycles. There was construction going on at a nearby residence causing a few of the disturbances early in the season. Although this site had the highest level of disturbance, maximum pup and molt counts did not seem to be affected.

Double Point

30 surveys were completed at Double Point between March 1st and July 31st. Double Point had a high pup count of 247 the week of April 17th, and a peak molt count of 1,086 the week of July 3rd (Table 1). Double Point had one of the lowest disturbance rates, 0.33 disturbances per survey (Figure 8). The remoteness of this site coupled with being surrounded by high cliffs reduces the exposure to human disturbances and may prevent surveyors from identifying the natural sources for disturbance. 40% of the disturbances were from unknown causes and the other few were from aircrafts and motorboats far offshore. The peak pup count in 2006 is one week earlier than all previous years at Double Point, and likely the colony experienced a major disturbance related to a helicopter rescue at the fourth week of April, resulting in seals moving to Bolinas Lagoon (which was much higher in 2006) and Drakes Estero. Unfortunately, no observers were present to document the likely disturbance.

Drakes Estero

33 surveys were completed at Drakes Estero between March 1st and July 31st. Drakes Estero had a high pup count of 347 the week of May 1st, and a peak molt count of 1,228 the week of July 3rd (Table 1). Drakes Estero had the highest pup and molt numbers, and one of the highest levels of disturbance, 0.97 disturbances per survey (Figure 8). Park regulations allow kayaks and canoes back in Drakes Estero after July 1st. After that date 50% of disturbances were a result of these non-motorboats. Prior to July 1st most disturbances were of unknown cause, 47%. Surveyors documented a bobcat and a coyote disturbing seals on sandbars in Drakes Estero. Other sources included low flying large birds such as turkey vultures, hikers and clam diggers on Limantour and Drakes Beaches, and kayaks after July at the end of the seasonal closure.

Duxbury Reef

25 surveys were completed at Duxbury Reef between March 1st and July 31st. Duxbury Reef had a high pup count of 17 the week of May 15th, and a peak molt count of 75 the

week of July 24th (Table 1). Duxbury Reef had one of the lowest rates of disturbance, 0.12 disturbances per survey (Figure 8). The only recorded disturbance that resulted in seals flushing into the water was when two dogs ran out to the haul out site chasing all the seals into the water.

Point Bonita

44 surveys were conducted at Point Bonita. Point Bonita was added to the study area in 2005. The high pup count was14 which is much higher than the previous year's data and the maximum molt count was 149 (Tables 1). Disturbance data was compiled at GOGA and will be analyzed in future reports.

Point Reyes Headland

17 surveys were completed at Point Reyes Headland (PRH) between March 1st and July 31st. PRH had a high pup count of 44 the week of May 8th and a peak molt count of 462 the week of July 17th (Table 1). PRH had the lowest rate of disturbance, 0.06 with only one disturbance recorded, the source of which was a researcher (Figure 8). This haul out site is a primary colony for northern elephant seals. The peak count for northern elephant seals between March 1st and July 31st was 896 the second week of May, which coincides with the peak molt period for elephant seals (PRNS, unpubl. data). The headland is often enshrouded in fog, and consequently, surveys are limited.

Tomales Bay

22 surveys were completed at Tomales Bay (TB) between March 1st and July 31st. Tomales Bay had a high pup count of 108 during the week of May 1st, and a peak molt count of 681 the week of July 17th (Table 1). The disturbance rate doubled in the past year from 0.6 disturbances per survey in 2005 to 1.2 disturbances per survey in 2006 which is significantly greater than the average range of disturbances over the past 4 years (Figure 8; Figure 9). This site also had a significant decrease in pup numbers as well (Figure 5). 38% of disturbances were from motorboats, and represents the most motorboat incidences seen over the season. 23% of the disturbances were from non-motorboats. Other disturbance sources include clammers, aircrafts, and birds.

Tomales Point

21 surveys were completed at Tomales Point (TP) between March 1st and July 31st. Tomales Point had a high pup count of 105 the week of April 17th, and a peak molt count of 580 the week of July 5th (Table 1). The disturbance rate was 0.62 disturbances per survey (Figure 8). 54% of these disturbances were caused by humans, either hikers on the beach or abalone divers. The rate of disturbance continues to increase at Tomales Point, this year being significantly higher than the average range of previous years (Figure 9). The point is often enshrouded in fog, and consequently, surveys are limited.

Regional Sites

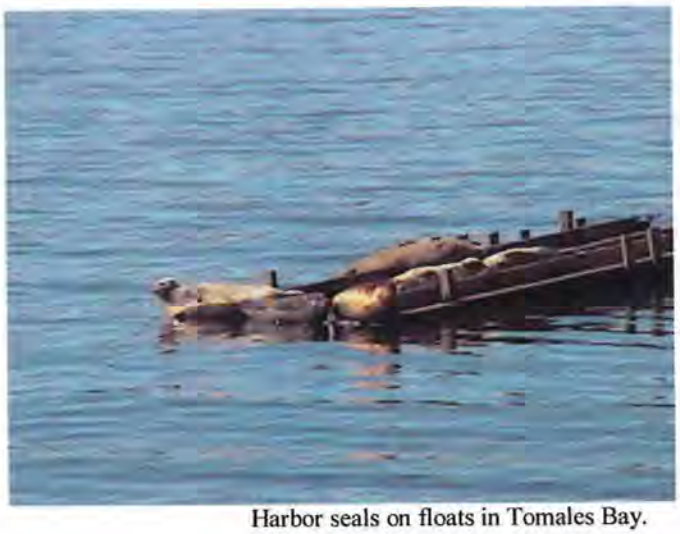
Twelve regional surveys were completed, starting on March 4, and ending July 29, at 22 locations. The seasonal peak for pups was during the week of May 6 and the peak for molting seals was during the week of July 15. The maximum number of seals during the breeding season was 5,101 and the average was 3209.2. The maximum number of seals during the molt was 5,285, with an average of 4,152.8 (Table 5). Point Reyes had the highest concentration of seals with Double Point and Drakes Estero accounting for 35%

of adults during the breeding season, 46% of pups produced, and 37% of molting seals. The maximum count of pups was 1,157 and the first pups were identified at Double Point on March 4th. Of the 22 areas surveyed simultaneously, only 3 produced >100 pups (Tomales Point, Drakes Estero, and Double Point). Within San Francisco Bay, Castro Rocks accounted for the majority of seals, followed by Mowry Slough, a reversal of last year's surveys. Sonoma County coast haul out sites were composed of a number of small sites with larger concentrations at Sea Ranch and Jenner. San Mateo County coast sites were also composed of a number of small sites adding up to larger concentrations at Pebble Beach and Fitzgerald Marine Reserve. No seals were counted during surveys at Bean Hollow during the entire season. Cowell Ranch Beach and Fitzgerald Marine Reserve accounted for most of the seals counted in the county, but few pups were recorded there (45).

Disturbances during surveys ranged from a male northern elephant seal attacking harbor seals at Jenner to people on foot, tide pooling at Point Bonita. Seals at Double Point were disturbed by a helicopter during a cliff rescue of a park visitor, resulting in reduced pupping at this site compared to the previous year. The primary sources for disturbance at San Francisco Bay were loud vehicles on the Richmond San Rafael Bridge at Castro Rocks, aircraft and motor boats at Yerba Buena Island.

Collaboration

Point Reyes National Seashore and Golden Gate National Recreation Area collaborated with multiple government agencies, non-profit organizations and individuals on projects related to the harbor seal population of central California. The parks collaborated with NOAA on a Tomales Bay stewardship program called SEALS. Park rangers ferried docents on boats out onto the mud flats in Tomales Bay to educate visitors and clam diggers about seals twice during the pupping season. The parks also collaborated with the Marine Mammal Center on a study of harbor seal health that will be initiated in 2007 at Tomales and San Francisco Bays.



Harbor seals on floats in Tomales Bay.

Summary

Compared to 2005, the total pup numbers at PORE and GOGA were lower in 2006 and the molt numbers were higher. The numbers for both seasons were comparable to previous years and within the normal range of variation, but the maximum pup count for 2006 was the lowest recorded since 1998. The pup counts at PORE sites appear to be decreasing since 2004; however, we did not test the statistical significance of this decline. The molt counts for 2006 were the highest recorded in the last nine years other than in 2004. The rate of disturbances per survey on the weekends at PORE sites have increased since 2005. Disturbances were site specific; however, humans on foot and boaters remain the two most frequent sources of human related disturbance across all sites.

Harbor seal haul out at Tomales Point

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Table 1. Summary data of harbor seal colonies for the 2006 season. All reported numbers reflect the maximum number seen during a single census over the entire season, March 1 to July 31. Max # Breed = adults, immatures and pups during the breeding season, March 1 to May 31. Max # Molt =all age classes during the molting season, June 1 to July 30. The percent of red seals is a percentage of the maximum total number of seals recorded at each site the day the red seal count was at a maximum. The number of surveys and disturbances are from March 1 to July 31, only disturbances that caused a response were used.

Site	Max # Breed	Max # Pups	Max #Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Bolinas Lagoon	361	174	448	Weekday: 18 Weekend: 11	Weekday: 9 Weekend: 28	14	6 %	4	4
Double Point	579	247	1086	Weekday: 19 Weekend: 11	Weekday: 6 Weekend: 4	5	.6 %	3	3
Drakes Estero	784	347	1228	Weekday: 18 Weekend: 15	Weekday: 22 Weekend: 10	13	1.5 %	3	3
Duxbury Reef	72	17	75	Weekday: 17 Weekend: 8	Weekday: 1 Weekend: 2	0	0 %	0	1
Point Reyes Headlands	129	44	462	Weekday: 15 Weekend: 2	Weekday: 1 Weekend: 0	1	1.4 %	0	1
Tomales Bay	503	108	681	Weekday: 8 Weekend: 14	Weekday: 10 Weekend: 16	12	2.9 %	2	1
Tomales Point	362	105	580	Weekday: 9 Weekend: 12	Weekday: 6 Weekend: 5	5	.9 %	0	1
Point Bonita	114	14	149	Weekday: 34 Weekend: 10	Weekday: 45 Weekend: 7	3	2.5 %	1	0
2006 Total:	**2,904**	**1,056**	**4,709**	**221**	**172**	**53**		**13**	**14**

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Table 2. Summary of survey data for 1997-2006, combining all sites at Point Reyes (excluding Point Bonita for comparison between years). Maximum # of Breed and Molt, and Average # Breed include all age classes. Number of surveys and disturbances are the number completed or recorded from the start of the year (Jan 01 to July 31).

YEAR	Max # Breed	Average Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Disturbances Per Survey
1997	3,268	1,830.50	983	NA	Weekday: 44	Weekday: 9	0.2
		SE = 379			Weekend: 29	Weekend: 37	1.3
		N =4			Total: 73	Total: 46	
1998	2,481	1,744.60	528	3,070	Weekday: 79	Weekday: 24	0.3
		SE = 122.5			Weekend: 64	Weekend: 46	0.7
		N = 8			Total: 143	Total: 70	
1999	3,325	1,779.90	1,068	2,863	Weekday: 139	Weekday: 71	0.5
		SE = 173.5			Weekend: 69	Weekend: 54	0.8
		N = 10			Total: 208	Total: 125	
2000	3,506	2,511.10	1,342	3,108	Weekday: 106	Weekday: 78	0.7
		SE = 224.4			Weekend: 91	Weekend: 116	1.3
		N = 7			Total: 197	Total: 194	
2001	3,485	2,218.80	1,247	3,769	Weekday: 112	Weekday: 57	0.5
		SE = 244.8			Weekend: 119	Weekend: 107	0.9
		N = 4			Total: 231	Total: 164	
2002	4,180	2651.3	1193	4297	Weekday: 123	Weekday: 67	0.5
		SE = 119.7			Weekend: 144	Weekend: 102	0.7
		N = 8			Total: 267	Total: 169	
2003	3820	2280	1117	4534	Weekday: 172	Weekday: 86	0.5
		SE = 303.9			Weekend: 115	Weekend: 83	0.7
		N = 9			Total: 287	Total: 169	
2004	4534	2518.3	1267	5633	Weekday: 161	Weekday: 52	0.3
		SE = 348.6			Weekend: 97	Weekend: 53	0.5
		N = 10			Total: 258	Total: 105	
2005	2,733	2182.3	1,109	4,283	Weekday: 166	Weekday: 80	0.5
		SE = 195.1			Weekend: 78	Weekend: 29	0.4
		N= 11			Total: 244	Total: 109	
2006	2,790	2316.8	1,042	4,560	Weekday: 130	Weekday: 56	0.5
		SE = 225			Weekend: 76	Weekend: 66	0.9
		N= 12			Total: 206	Total: 122	

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Table 3. Causes for disturbance during 2002-2006 for Point Reyes sites; percent is of total actual disturbances from March 1st to July 31st.

Year	Type of Disturbance								
	Motor boat	Non-motor boat	Vehicle	Dog	Aircrafts	Human pedestrian	Bird	Unknown	Other
2002	13%	16%	6%	0.50%	11%	24%	6%	21%	2%
2003	13%	20%	2%	0%	9%	21%	7%	23%	6%
2004	5%	10%	8%	2%	3%	39%	7%	25%	2%
2005	8%	13%	1%	0%	15%	25%	9%	23%	6%
2006	11%	13%	5%	1%	7%	21%	10%	19%	13%

Table 4. Date of first pup by year at Point Reyes, including all sites.

Year	Date
2000	14-Mar
2001	16-Mar
2002	3-Mar
2003	27-Mar
2004	20-Mar
2005	6-Mar
2006	9-Mar

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Table 5. Regional surveys of harbor seals in central California, March 1 through July 31 2006. Twelve surveys were scheduled, 7 during the breeding season and 5 during the molt, but some sites could not be surveyed all dates because of logistics or weather. ND=nod data.

Location	Breeding Season				Molt Season		
	Average	SE	Total* Max	Pup* Max	Average	SE	Total Max
Sonoma County							
Sonoma Coast	140.50	93.96	248	71	239.50	47.59	302
Fort Ross	49.00	28.93	97	14	ND		
Jenner	78.80	62.77	179	30	294.50	174.66	418
Marin County							
Tomales Bay	418.25	64.05	503	88	584.25	97.60	681
Tomales Point	264.13	123.02	462	105	399.00	153.85	540
Point Reyes Headland	85.63	64.39	219	35	363.75	134.74	462
Drakes Estero/Limantour	657.50	240.81	1002	288	850.25	132.70	975
Double Point	506.50	123.05	723	237	680.25	231.76	904
Duxbury Reef	43.25	16.88	73	17	35.75	29.08	75
Bolinas Lagoon	189.50	66.65	286	82	360.00	111.30	448
Point Bonita	46.25	35.50	106	13	77.75	32.44	119
San Francisco Bay							
Alcatraz	4.17	1.94	6	0	1.00	ND	1
Castro Rocks	202.40	94.46	339	37			
YBI	61.50	10.71	81	4	140.33	64.08	190
Newark Slough	18.20	14.70	38	11	2.25	4.50	9
Mowry Slough	112.00	74.38	229	58	124.25	30.70	161
San Mateo County							
Point San Pedro	15.00		15	0	ND		
Cowell Ranch	73.60	27.37	112	20	ND		
Pescadero	28.80	21.99	55	6	ND		
Pebble Beach	59.20	15.59	82	25	ND		
Bean Hollow	0.00	0.00	0	0	ND		
Fitzgerald Marine Reserve	155.00	81.96	246	16	ND		
ALL SITES	3209.17		5101	1157	4152.83		5285

*Based on the total for a single day.

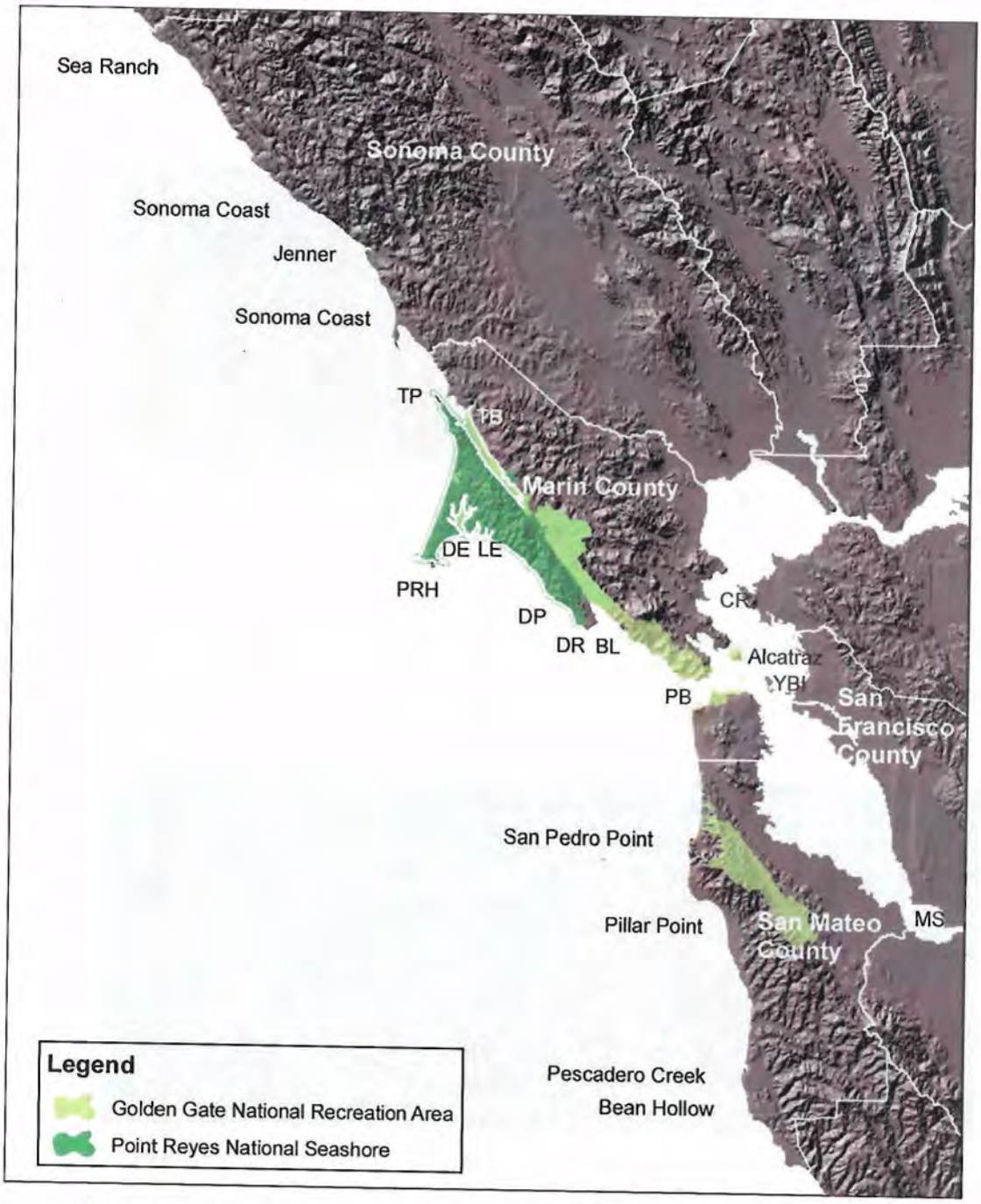


Figure 1. Harbor seal haul out sites in Marin County and San Francisco Bay, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Figure 2. Total Pup Counts at PORE (excluding Point Bonita) from 1997-2006 seasons. See text for methods.

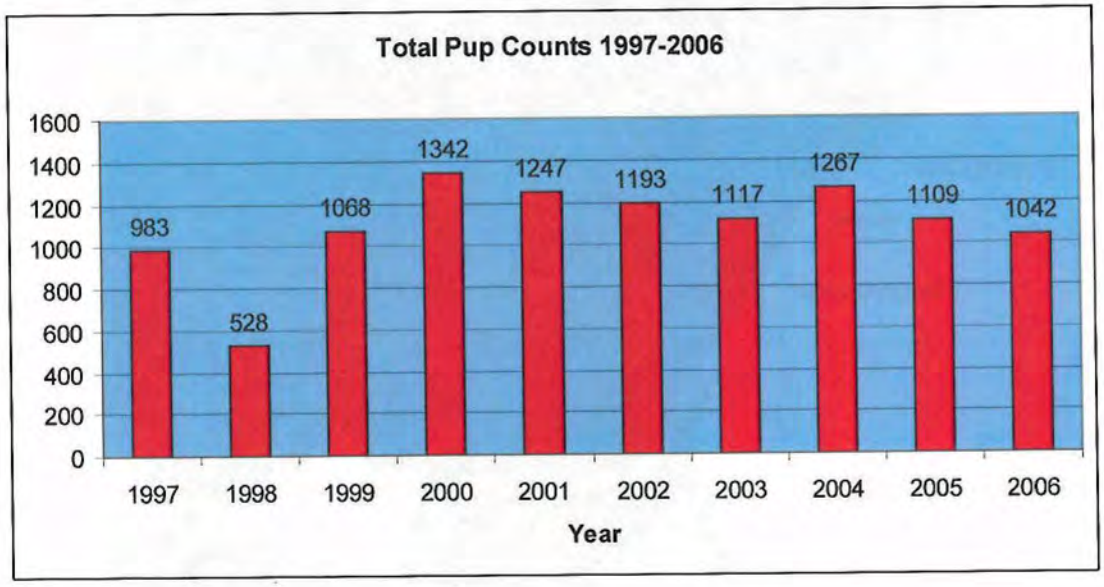


Figure 3. Maximum pup counts by site at PORE and GOGA during the 2006 season. See text for methods.

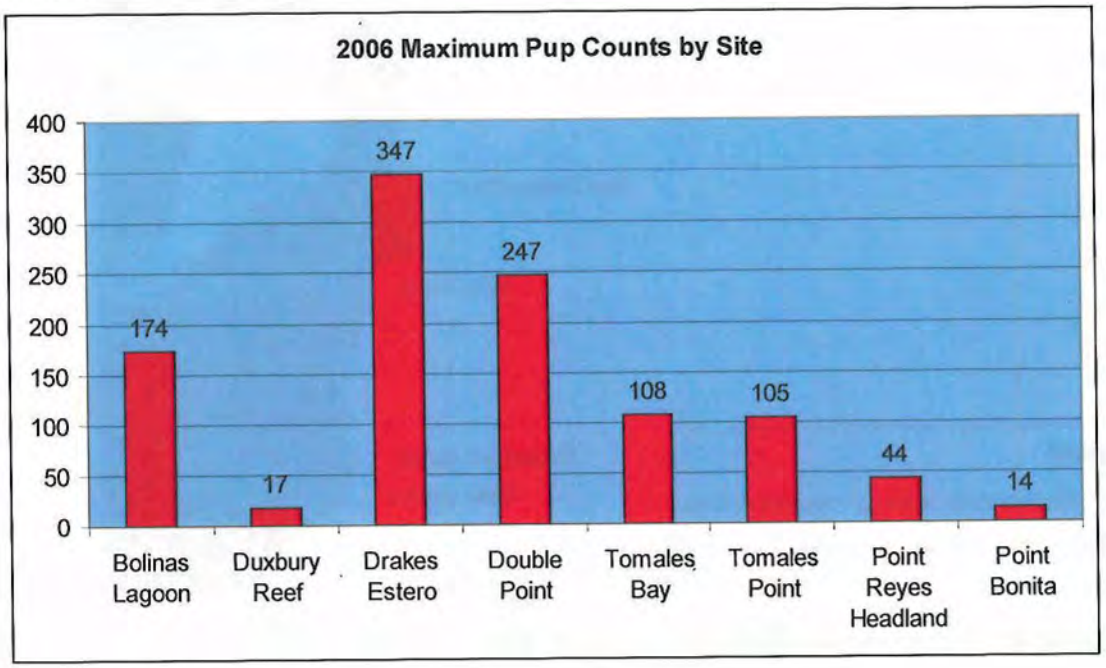


Figure 4. Maximum pup counts by site at PORE, 2002-2006 seasons. See text for methods.

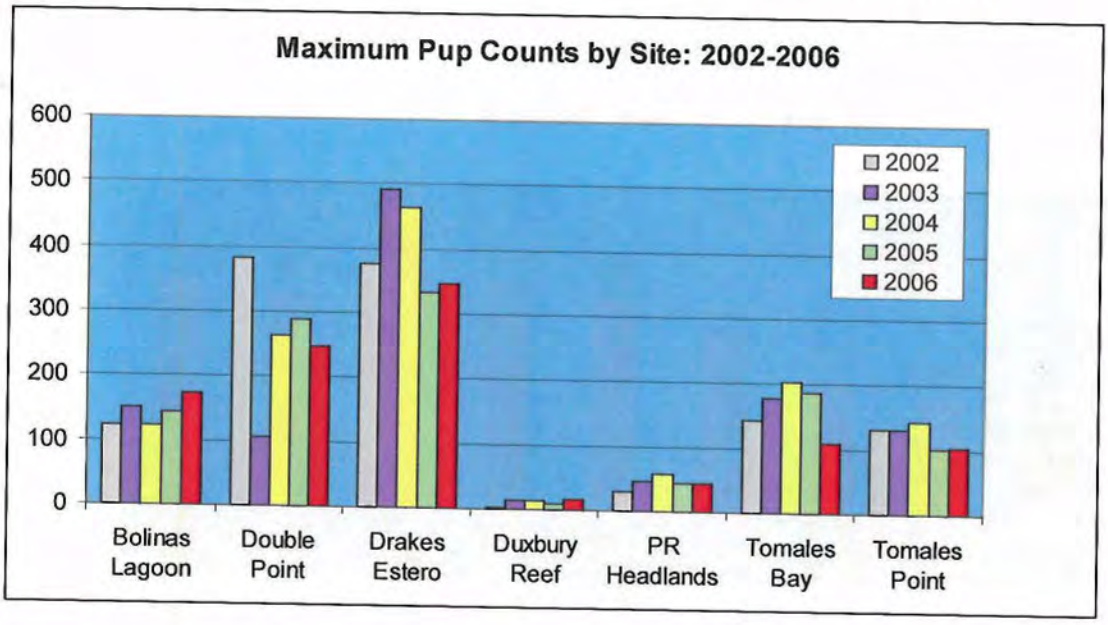


Figure 5. Maximum pup counts for Tomales Bay 2002-2006 showing a range of (mean ± one standard deviation). See text for methods.

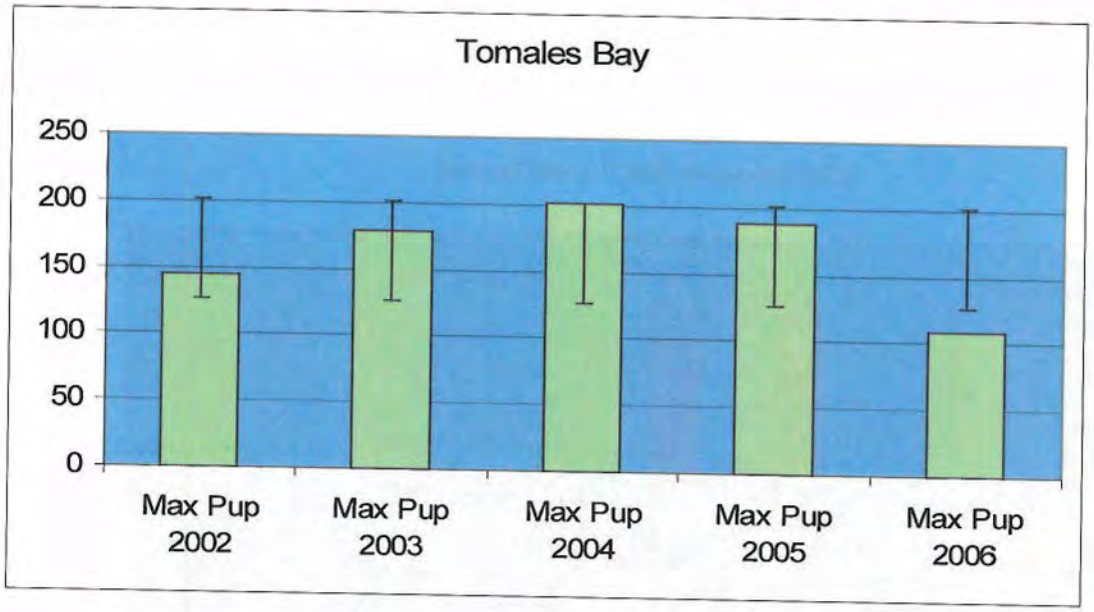


Figure 6. Total molt counts for PORE (excluding Point Bonita) from 1998-2006 seasons. See text for methods.

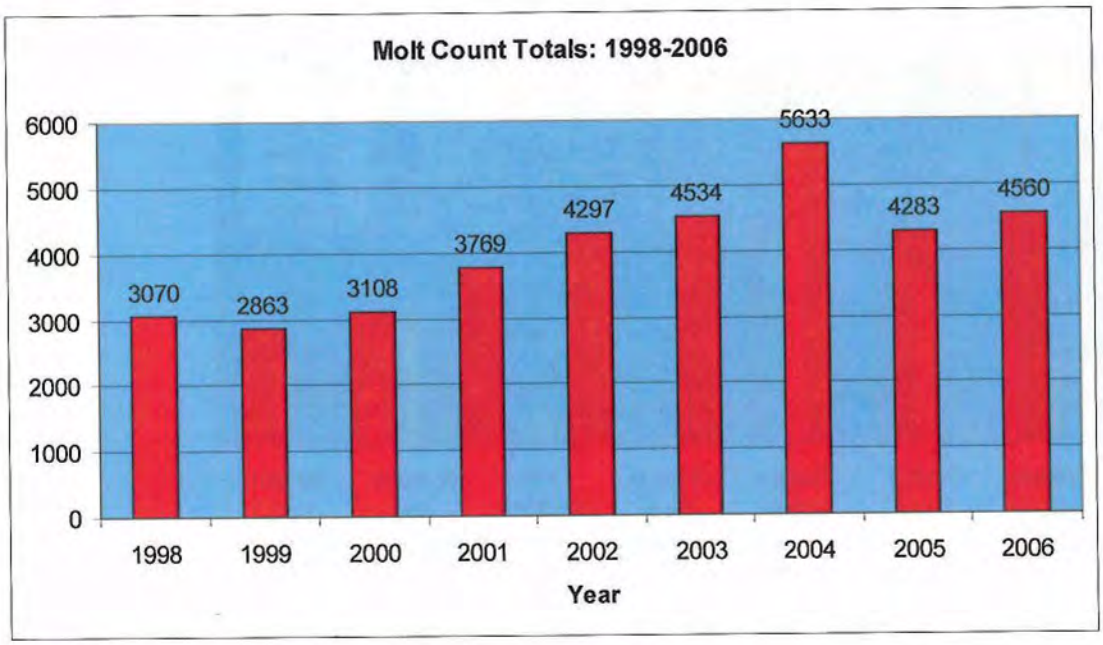


Figure 7. Maximum molt counts by site for PORE and GOGA during the 2006 season. See text for methods.

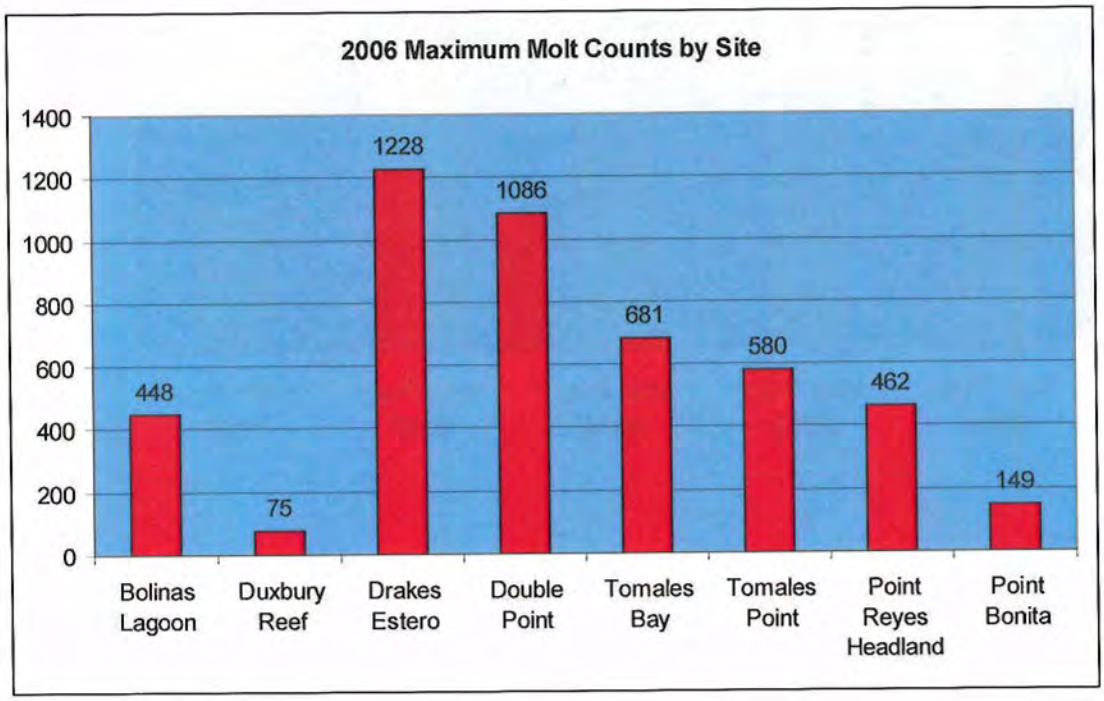


Figure 8. Average number of disturbances per survey, by site at Point Reyes, 2006. See text for methods.

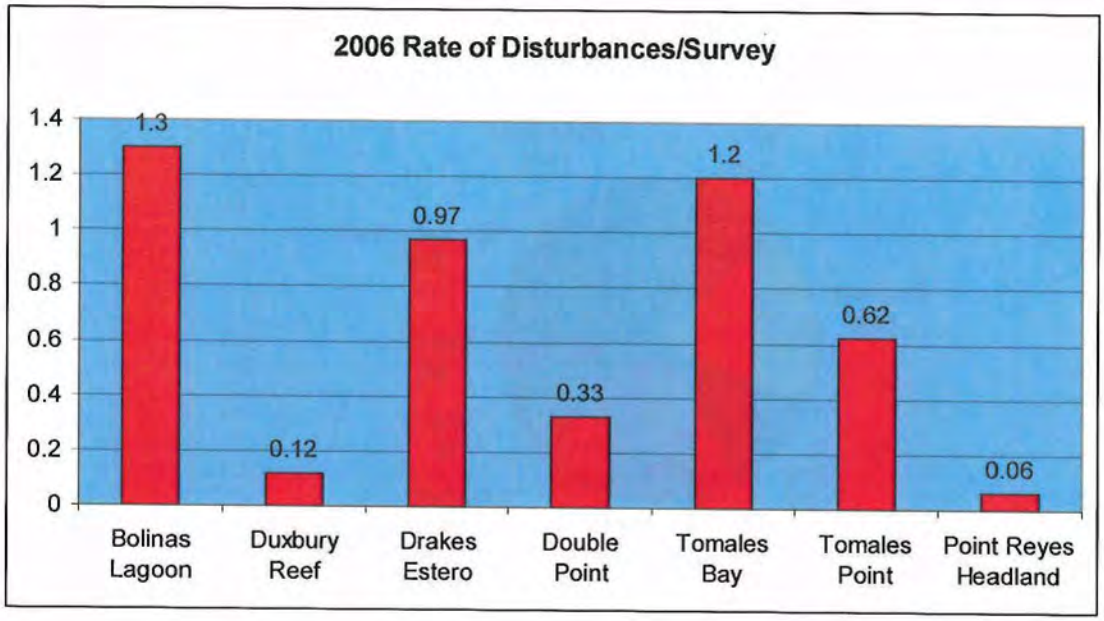


Figure 9. Average number of disturbances per survey, by site at Point Reyes for 2003-2006. See text for methods.

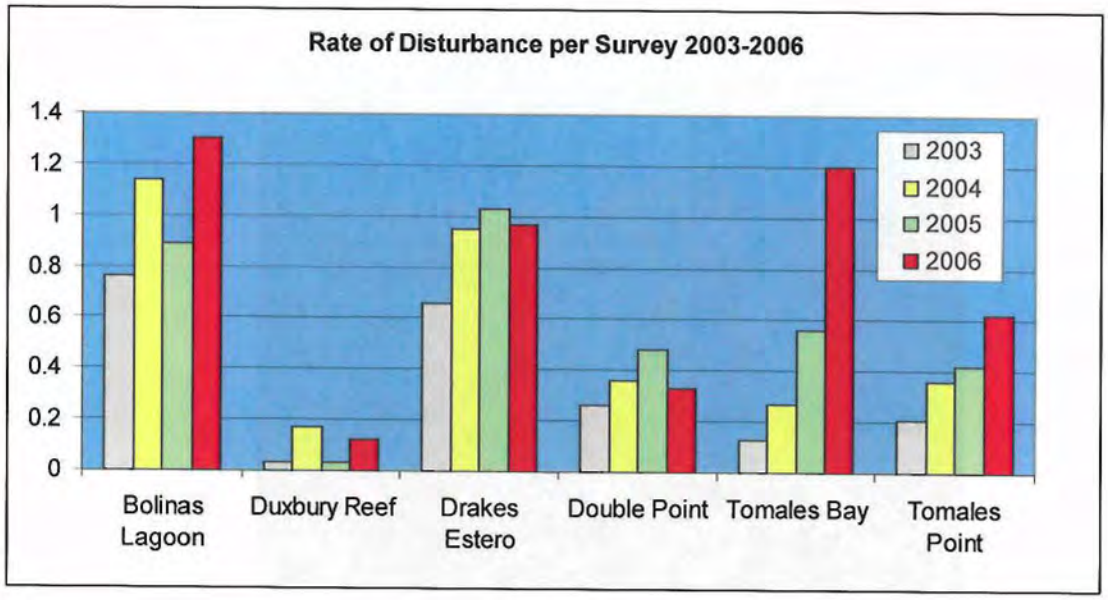
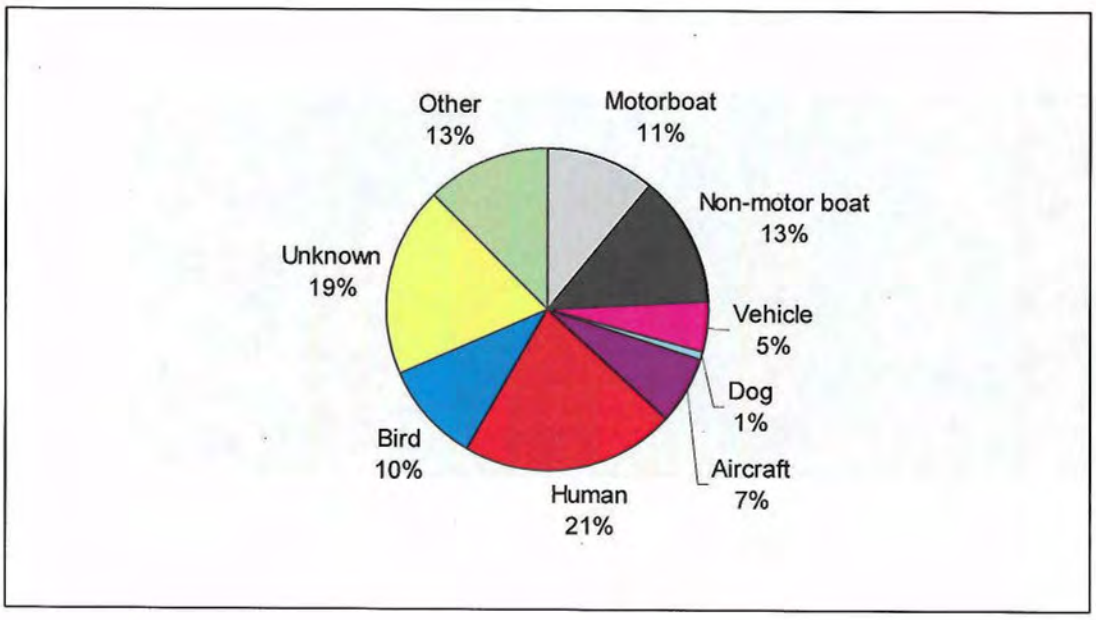
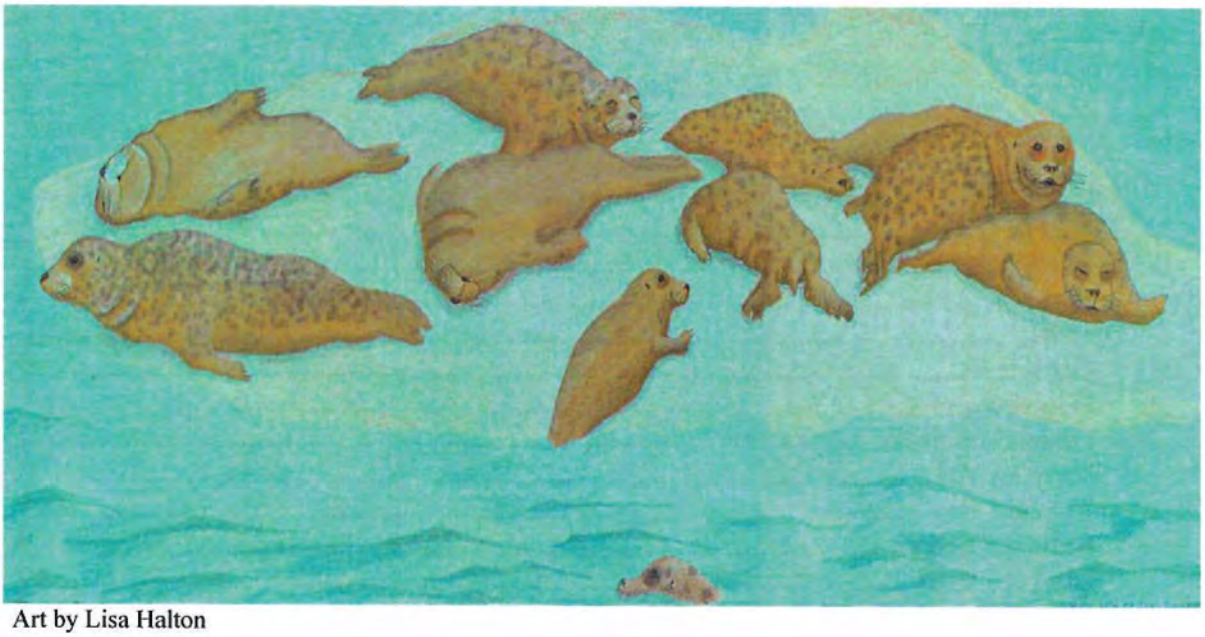


Figure 10. Causes for disturbance by percent for all of Point Reyes sites in 2006.



Volunteer training at Drakes Estero.



Art by Lisa Halton

LONG-TERM MONITORING OF HARBOR SEALS AT POINT REYES, CALIFORNIA

5-YEAR ANNUAL REPORT 1997-2001

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Point Reyes National Seashore

2004

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Introduction

Harbor seals are the dominant and only resident pinniped at Point Reyes, California. The Point Reyes population also represents the largest concentration of harbor seals in the State of California other than the Channel Islands, accounting for 20% of the mainland breeding population (Sydeman and Allen 1999). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent habitat for seals to rest, molt and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999) in order to 1) detect changes in population numbers, 2) detect changes in reproductive success and 3) identify anthropogenic or environmental factors that might affect population status. In the past, significant increases in the population of harbor seals at Point Reyes have been documented at most colonies, except at Tomales Bay where there was substantial human activity (Allen et al. 1989, Allen and King 1993) and at Point Reyes Headland where northern elephant seals are expanding (Sydeman and Allen 1999).

The information presented here is an update on the status and trend of the harbor seal population at Point Reyes. It represents a five-year summary of data collected prior to, during and three years following the 1998 El Nino Southern Oscillation (ENSO) event. We have also included two years of information from adjacent areas (San Francisco Bay and Sonoma County) where surveys were conducted in conjunction with other agencies and organizations as part of a region-wide survey effort.

Methods

Study Area

The Point Reyes coastline extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N). Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PRNS), Golden Gate National Recreation Area (GGNRA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game and the California Water Resources Control Board as Areas of Special Biological Significance because of their unique biological attributes and now reclassified as State Water Quality Protection Areas in 2003 (Chan 1979; SWQPA).

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987).

Coastal locations include Tomales Point, Point Reyes Headland, and Double Point; estuarine locations include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon (Figure 1a).

Because of its agricultural character, much of this coastline has remained largely undeveloped, even prior to inclusion in the 1960's and 70's in PRNS and GGNRA. The inaccessibility of much of the area has historically afforded protection from human disruption during the seals' terrestrial resting periods; however, prior to the Marine Mammal Protection Act (MMPA) of 1972, harbor seals at Point Reyes were commonly hunted by fishermen and ranchers (S. Allen, pers. comm.). After passage of the MMPA, the colonies at Point Reyes grew significantly (Allen et al. 1989). Currently, human disturbances may be on the rise with increased recreational use of public lands. From 1997-2000 PRNS alone recorded close to 2.4 million visitors annually (Monthly Statistical Report, PRNS, 2000).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons of 1997-2001, which respectively run from 15 March to 15 June and 15 June to 15 July. Regular survey sites included Double Point, Drakes Estero and Limantour Estero, Tomales Point (2 sites), Tomales Bay (3 sites), Point Reyes Headland, and Bolinas Lagoon. Duxbury Reef was added to the survey area in 1999.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during one in-class session and four field sessions. Many of the volunteers were seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each site a minimum of twice per week, weather and logistics permitting. Surveys occurred primarily during low to medium tides, the time when the maximum number of seals hauled out in the San Francisco Bay region (Allen 1980, Fancher 1979, Risebrough 1978).

Survey periods were designed to last at least two hours, with counts occurring every half-hour. Each sub-site was surveyed separately, and added to other sub-sites making a grand total for the site. All sub-sites were visible from one location with the exception of Tomales Point and Tomales Bay. The Tomales Point and Tomales Bay sub-sites were a considerable distance from each other, and were usually counted twice during a survey.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two groups were lumped together. Pups were the young of the year and difficult to distinguish after weaning from yearling seals. Consequently, pup numbers were reliable only between the first day of March and June. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

Data are presented as maximum for the seasons, both breeding and molt. Summary statistics, including means and standard errors, are also provided for the breeding season 1997-2001 and the molt season 2000-2001.

All actual and potential disturbances to harbor seals were recorded. Actual disturbance was defined as any activity that resulted in behavior change by the seals such as moving towards or entering the water. Potential disturbance was defined as an activity that occurred within a ¼ mile area that had the potential to alter the behavior of the seals. For example, a plane flying below 1000 feet had the potential to disturb seals. Observers recorded the time, source of the disturbance, and the distance of the source from the seals. Distance measurement was not estimated consistently between sites or observers, and consequently was dropped from analyses. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water or unknown (Allen et al. 1985). In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time and location of where the seals rehauled were also recorded. In some cases, an unknown response was recorded if the disturbance occurred before the survey was started, and so the extent of the disturbance was not directly observed. An example would be a tight group of seals seen in the water off the haul out site and many fresh seal tracks on the haul out site.

Surveys in 1998 and 1999 incorporated seal numbers from a larger scale harbor seal census for the San Francisco Bay area and adjacent waters. Other regional haul out sites were Jenner, the Sonoma coastline, Sea Ranch, the San Mateo coastline, South Bean Hollow, the Fitzgerald Marine Reserve, the Richmond Bridge, Yerba Buena Island, and Mowry Slough (Figure 1b). Participants in the region-wide survey included the Gulf of the Farallones National Marine Sanctuary Association, San Francisco State University, and Stewards of Slavianka, a non-profit conservation group based in Sonoma County. Additionally, a region-wide aerial survey was conducted in May 1999 by NPS biologists on an airplane provided by the California Department of Transportation. Photographs (8x10" color prints) were taken of each site, and biologists from San Francisco State University counted seals from photographs.

Results

Overview

The population trend in harbor seals at Point Reyes appears stable between 1997 and 2001. Annual maximum counts for the breeding season ranged between 2,481 and 3,506, and annual average counts ranged from 1,744.6 and 2,511.1 (range of SE = 122.5 to 379.0; Table 1a-g). The lower numbers for maximum totals and annual averages were associated with the 1998 ENSO. The difference in the adult/immature population of harbor seals, excluding Duxbury Reef, was minimal between 1997 and 2001 (Lambda = +0.06) but the difference between the pup numbers was notable (Lambda = +0.27; Table 1a). The maximum numbers of adult/immature seals and pups were higher in 1997 and 2001 than those observed in 1998 (1998 Lambda = -0.46 and 2001 Lambda = +1.36). Pup and adult numbers were lower at all haul out sites in 1998. Maximum counts for the

molt also were reduced during the 1998 ENSO, and also in 1999 but not noteworthy. Similarly, maximum numbers during the breeding and molt seasons were stable by location (Tables 1b-g), except for 1998. The number of surveys in 1997 was insufficient in the molting season to report a maximum count. The number of red seals at Point Reyes is very low compared to San Francisco Bay, representing less than 5% of the population. Of note, though, was the larger number of red-pelaged seals in Drakes Estero, reaching a maximum of 27 in 1999 (Table1e). In general, far fewer red seals were observed at coastal haul out sites than the estuarine ones.

Regardless of year, most disturbances occurred at Drakes and Limantour Esteros, followed by Tomales Bay, and were induced by humans (Table 2a-e). Seal response to disturbance ranged from a simple head alert to flush into the water. By year, the percent of seals flushed into the water combining all sites ranged from 43% to 74% with the highest percentage of flushes occurring in 1997 (Tables 3a-e). The average disturbance per hour, combining all sites, for 2000 was 0.39 (SD = 0.63; n = 197) and for 2001 was 0.38 (SD = 0.94; n = 231; Table 4a-b). The highest number of disturbances per hour occurred at Drakes Estero/Limantour in 2000 (0.83 disturbances/hr) and at Tomales Bay in 2001 (1.3 disturbances/hr). People on foot were the major source for disturbance at Limantour Estero, and motorboats were for Tomales Bay. Motorboats were also a source for disturbance at Double Point due to commercial fishing near the haul out site (Table 2a-e). In general for all sites, seals were more disturbed on weekends (range 0.4-1.3 disturbances per survey) than weekdays (0.1-0.8 disturbances per survey; Table 4a-b). Double Point also had elevated disturbances in 2001 related to an aggressive male northern elephant seal (Table 5b). Bolinas Lagoon seals experienced elevated disturbances in 2001 related to non-motor boats, particularly kayaks (Table 9b).

Double Point

Double Point is a pocket beach marked by two prominent points and includes several subsites. Double Point is a primary pupping site at Point Reyes and numbers of pups and adults/immatures are fairly consistent during the breeding season from year to year. Surveyors counted seals at Double Point from 19 to 52 times per year between 1997-2001 (Table 5a). The highest total number of seals occurred between the last week of April and second week of May (Figure 2), ranging from 708-960. The maximum pup counts consistently occurred during the first week of May (Figure 3) ranging between 187 during 1998 to 416 in 2000. Pup counts in 1998 were nearly half of what occurred in 1997. The maximum counts during the molting season ranged between 677 and 1145 and occurred between early June and mid July (Figure 2); however, there was inconsistent coverage of the site in 1997. Seal numbers were low during the ENSO in 1998 and also during the molt in 1999.

Seals at Double Point usually were disturbed less often than at other haul out sites at Point Reyes, averaging from 0.2-1.0 disturbances per survey between 1997 and 2001 (Table 5a-d). Weekday disturbances were similar to weekend disturbances except in 2000 when disturbances reached 1.4 per weekend survey. The hourly average number of disturbances on weekends was 0.6 (SD=0.7, n=39) in 2000 and 0.3 in 2001 (SD = 0.4, n=13; Table 5d).

Sources for disturbance varied by year at Double Point (Table 5b). Overall, people on foot were the primary known source for disturbances (19%), although unknown sources disturbed seals (29%). Commercial fishing boats have increasingly disturbed seals over the past 3 years (13%) and an aggressive male northern elephant seal was the primary source for disturbance in 2001 (10%). When seals were disturbed at Double Point they were more likely to flush into the water, flushing > 50% of the times disturbed, regardless of year (Table 5c).

Drakes and Limantour Esteros

Drakes and Limantour Esteros consist of a number of tidal sandbars. This location is one of the primary pupping sites at Point Reyes. Seals were surveyed at Drakes and Limantour Esteros from 26 to 45 times per year between 1997-2001 (Table 6a). The highest total number of seals occurred between the first and second week of May (Figure 4). The maximum pup counts consistently occurred between the third week of April and the first week of May (Figure 5). The maximum counts during the molting season ranged between 817 and 1292 and occurred between mid June and mid July (Figure 4).

Seals at Drakes and Limantour Esteros were disturbed more than at any other haul out location at Point Reyes, averaging from 1.0-1.3 disturbances per survey between 1997 and 2001 (Table 6a-d). Weekday disturbances reached as high as 1.5 disturbances per day in 2000 but usually were around 0.9 disturbances per day; this contrasts to the regional maximum of 0.7. The hourly average number of disturbances was 0.8 (SD = 0.4, n = 18) in 2000 and 0.5 in 2001 (SD = 0.7, n = 21; Table 6d).

People on foot were the primary source for disturbance (47%), although unknown sources also disturbed seals (19%), as did birds (12%; Table 6b). Kayaks and motorboats are restricted in Drakes Estero during the breeding season and likely this explains the low rate of disturbance from these sources. When seals were disturbed at Drakes and Limantour Esteros, they were more likely to flush into the water, flushing > 50% of the times disturbed, regardless of year (Table 6c).

Tomales Point

Tomales Point consists of several subsites extending along the shoreline extending to Bird Rock. Tomales Point is one of the more difficult sites to survey because of distance to travel and weather. The area is consistently foggy during the spring and summer. Seals were surveyed at Tomales Point from 9 to 34 times per year between 1997-2001 (Table 7a). There was no consistency between years when the maximum adult/immature count occurred (Figure 6). The maximum pup counts occurred between the third week of April and the third week of May, except in 1997; however, the numbers ranged widely between 74 in 1998 to 194 in 2001 (Figure 7). The wide swing in numbers is likely related to both disturbance and seals shifting between nearby Tomales Bay, which also demonstrated coincidental swings in numbers. Seasonal molt counts are unreliable and spotty due to weather.

Seals at Tomales Point were disturbed moderately compared to other haul out sites at Point Reyes, averaging from 0.2-0.9 disturbances per survey between 1997 and 2001 (Table 7a-d). Weekend and weekday disturbances were more frequent in 2000 and 2001 than earlier years. The hourly average number of disturbances on weekends was 0.3 in 2000 (SD = 0.2, n = 13) and 0.4 in 2001 (SD = 0.4, n = 18; Table 7d).

People on foot were the primary source for disturbance (52%), although sport and commercial motorboats also disturbed seals (19%; Table 7b). Tomales Point is a popular sport abalone fishing area, and the sport-fishing season coincides with the harbor seal pupping season. When seals were disturbed at Tomales Point, the percentage of seals flushing into the water varied by year (Table 7c).

Tomales Bay

Tomales Bay consists of three haul out sites (Seal Island, Clam Island and Hog Island); however, seals infrequently haul out at Hog Island. Tomales Bay was surveyed from 9 to 34 times per year between 1997-2001 (Table 8a). The highest total number of seals occurred between late April and second week of May, ranging from 290 in 1998 to 625 in 1999 (Figure 8). The maximum pup counts ranged widely from year to year, ranging from 34 in 1998 to 190 in 1999; however, coverage of the site was spotty due to logistics and weather (Figure 9). The maximum counts during the molting season were more consistent, ranging between 290 and 347 (Figure 8).

As with Drakes Estero, there were a larger number of red seals than occurred in the outer coastal areas with a maximum of 17 observed in 1999 and 2000 (Table 8a).

Recreational activities in Tomales Bay are numerous, and seal use of Hog Island has declined dramatically over the past 15 years. Nevertheless, disturbances per survey only ranged from 0-1.5 between 1997 and 2001 (Table 8a). Weekend disturbances were higher in 2000 and 2001 than during weekdays. Weekend disturbances were 0.4 disturbances per hour in 2000 (SD = 0.6, n = 13) and 1.3 in 2001 (SD = 2.5, n = 19; Table 8d).

People in motorboats were the primary source for disturbance (52%), although recreational clam diggers also disturbed seals (13%; Table 8b). Up to 1000 people were present at a time digging for clams during low tide cycles on the weekends; however, the NOAA SEALS program reduced disturbance by clam diggers with an onsite education program. The main seal haul out area is near the primary access channel for boats in the bay, and so recreationists are naturally attracted to the seals hauled out. When seals were disturbed at Tomales Bay, they were less likely to flush into the water, flushing < 55% of the times disturbed, regardless of year (Table 8c).

Bolinas Lagoon

The Bolinas Lagoon location consists of several tidal sand bars. Seals were surveyed at Bolinas Lagoon from 3 to 35 times per year between 1997-2001 (Table 9a). The maximum counts at Bolinas were distributed throughout the breeding season in contrast to other colonies, but during the molt season a distinct peak occurred during the first two weeks of July, ranging from 267 to 401 (Figure 10). The maximum pup counts consistently occurred between the first and second week of May, excluding 1997, and ranged from 51 to 123 (Figure11). This colony is the only one that appears to be growing; pup production more than doubled in three years between 1999 and 2001. As with all sites, pup production was down during 1998, and numbers of seals hauled out were also reduced.

Seals at Bolinas Lagoon were disturbed moderately in comparison to other haul out sites at Point Reyes, averaging from 0 to 1.1 disturbances per survey between 1997 and 2001 (Table 9a-d). Weekend and weekday disturbances varied from year to year. The hourly average number of disturbances on weekends was 0.3 (SD = 0.4, n = 9) in 2000 and 0.6 in 2001 (SD = 0.5, n = 18; Tables 9d). The NOAA SEALS program reduced disturbance by recreationists with an onsite education program starting in 1997.

Kayaks were the primary source for disturbance (24%), although unknown sources also disturbed seals (24%), as did birds (18%; Table 9b). When seals were disturbed at Bolinas Lagoon, they were more likely to flush into the water, flushing > 50% of the times disturbed, most years (Table 9c).

Duxbury Reef

Duxbury Reef was added as a survey site in 1999. This site is adjacent to Bolinas Lagoon and often serves as an alternate site to those in the Lagoon. Seals were surveyed from 8 to 32 times between 1999 and 2001 (Tables 10a). Annual maximum ranged from 71 to112 (Figure 12) including from 10 to 20 pups during the breeding season (Figure 13). We had insufficient data during the molt until 2001 when the maximum count was 99 (Figure 12).

Seals were rarely disturbed at Duxbury Reef, likely due to the difficulty of accessing the site except at very low tides. Humans on foot were the primary source for disturbance (88%; Table 10b). During the weekends, disturbances averaged 0.3 per hour (SD = 0.8, n = 7) in 2000 and 0.4 per hour (SD = 1.1, n = 17) in 2001 (Table 10d).

Point Reyes Headland

Point Reyes Headland location consists of a series of pocket beaches that is used also by a large northern elephant seal colony. As with Tomales Point, surveys at Point Reyes Headland were limited due to weather conditions. Annual surveys ranged between 7 and

31 (Tables 11a); several scheduled surveys were canceled on foggy days. Annual maximum counts during the breeding season ranged between 131 and 168 between 1997 and 2001 (Figure 14). Point Reyes Headland is not a significant pupping site, and the maximum pup counts ranged between 24 and 51 (Figure 15). During the molt, seal numbers were much higher, ranging between 276 and 466, because this site is used more by migrating harbor seals (Figure 14; S. Allen, pers. obs.).

Point Reyes Headland is the most remote and least disturbed site at Point Reyes, with annual disturbance days ranging between 0.0 and 0.1, regardless of day of week. The average hourly disturbance rate in 2000 on weekdays was 0.04 (SD=0.1, n=19) and in 2001 on weekends was 0.04 (SD=0.07, n=8, Table 11d).

Motorboats (40%) and planes (40%) were the only sources for disturbance (Table 11b). Nevertheless, seal spatial use of the site has changed significantly over the past 20 years as the northern elephant seal colony has grown.

San Francisco Bay Area Survey

Summary of harbor seal surveys for the San Francisco Bay Area and adjacent waters are summarized in Tables 12a-b. The maximum total harbor seal count during the 1998 breeding season was 2,595 seals on 6 May and the maximum pup count was 485. During the molting season, 3,235 seals were counted on 28 June 1998. The average maximum count for the region, combining both seasons was 2,467.0 (n=5, x=2,467, SD=507.6; Table 12a). In 1999 the highest count for all sites occurred during the aerial survey on May 10 with 3,634, including 876 pups. During the molting season, 3,011 seals were counted on 17 July 1999. The average regional count combining breeding and molt seasons in 1999 was 2,272.2 (n=9, SD=670.8; Table 12b). Three sites (Double Point, Drakes and Limantour Esteros and Tomales Point) accounted for the majority of the total number of seals (69.6%) and pups (79.2%) counted in 1998, but in 1999, Double Point, Drakes and Limantour Esteros and Tomales Bay accounted for the majority of the total count (60%) and of the pup count (62%). This change implied a shift of seals from Tomales Point to Tomales Bay in 1999.

Regional surveys for 2000 through 2001 were summarized in the NOAA annual reports (see Mortenson et al. 2000 and 2001).

Unusual Mortality Event

During the 1997 breeding and molt seasons, biologists and park visitors identified dead adult and immature harbor seals in Point Reyes. Tomales Bay was the first location where a sick adult seal was picked up by the Marine Mammal Center (TMMC, F. Gulland, pers. com.). Reports of dead and dying seals were next recorded at Double Point and Bolinas Lagoon in April and May and then at Drakes/Limantour Esteros and Point Reyes Headland from June through August. The NMFS Stranding Network (Point Reyes National Seashore, unpubl. data) documented a total of 91 dead seals. Of those seals that were identified by sex and age, the majority of seals were adults (79%; AD =

72, SA = 7, PUP = 7, UNK = 5), and of those identified to sex, the majority was males (33%; M = 30, F = 17, UNK = 44). Tissues were collected from several fresh dead or dying seals by the TMMC. A fibrinous hemorrhagic pneumonia with marked bacterial colonization was evident in all of the fresh specimens. The lesions resembled that of acute *Pasteurella* pneumonia in cattle, which is often predisposed by viral infection (L. Lowenstine, U.C. Davis, pers. com.). Nineteen live harbor seals were subsequently captured at Point Reyes Headland and blood was taken for further analyses. Preliminary findings indicate the presence of antibodies to a previously unidentified virus (F. Gulland, pers. com.).

In 2000, another unusual stranding event occurred at Point Reyes, and was investigated by the stranding network including TMMC, Museum of Vertebrate Zoology Berkeley and the National Park Service. The epicenter of this event was Tomales Point haul out sites where around 25 dead seals were found. Tissues, blood and urine were collected from five very fresh specimens. All seals tested negative for biotoxins or morbillivirus. *Pseudomonas* bacteria were found in all specimens, and an unidentified virus was found in one very fresh (<2 hrs dead) specimen. Preliminary evidence indicated that seals died acutely, since blubber layers were normal; lymph nodes were engorged with fluid (F. Gulland, Marine Mammal Center, unpubl. data).

Discussion

Harbor seals in central California represent a significant proportion of the state population. Surveys of harbor seals in the San Francisco Bay Area and adjacent waters in 1998 and 1999 reveal that large numbers of harbor seals are concentrated in north-central California, particularly at Point Reyes. Double Point and Drakes/Limantour Esteros account for more than 50% of total seals in Point Reyes counted during both the breeding and molt seasons. The pups produced at these two sites accounted for more than 55% of the total pups produced at Point Reyes annually. Substantial numbers of seals also haul out in small groups along the Sonoma and San Mateo counties' coastline and in San Francisco Bay.

Surveys conducted at Point Reyes between 1997 and 2001 showed annual differences, likely related to the 1998 El Nino event. However, trends may also reflect increased effort between years as the volunteer monitoring program was fully implemented. In addition, there was not consistent effort between weekend and weekday surveys. This is important in analyzing the disturbance data, since we would expect more disturbances on weekends when recreational use is higher.

Nonetheless, significantly fewer seals were breeding in 1998 than 1997 (-24%). Pup production was also lower, (-46%). Factors potentially influencing the breeding population at Point Reyes between 1997 and 1998 were the harbor seal die off during and after the breeding season of 1997 and the 1998 El Nino event. The 1999 number of seals breeding was substantially higher than that of 1998 but only slightly higher than the 1997 breeding season. Pup production was also elevated from 1998 by 49%, but only by 8% from the 1997 season. El Nino effects were also documented in other pinnipeds in

California in 1998 (DeLong et al. 1999); however, no other unusual stranding event was noted for harbor seals in California in 1998 (J. Cordaro, NMFS, pers. com.).

Although disturbances were recorded at all colonies, Drakes and Limantour Esteros had the highest number of disturbances recorded, regardless of year. Nevertheless, the site remained one of the largest colonies in the region, accounting for 29% of the total number of seals counted in 2001. Humans mostly caused disturbances but the type of disturbance varied by location. Boats were the primary cause for disturbance to seals in Tomales Bay but humans on foot were in Drakes/Limantour Esteros. In 1998 the Lawson Landing barge that transported more than 100 people at a time to dig for clams in Tomales Bay was terminated. The number of seals using the bay increased in 1999 from the 1997 (+18%) and 1998 (+116%) maximum numbers. The Farallones Sanctuary SEALS program had implemented a protection program for the seals to educate the public and divert clam diggers from the resting seals, and likely the combination of reduced usage and education by the SEALS program contributed to the increased presence of seals in Tomales Bay.

The occurrence of the two unusual stranding events within this five-year monitoring period is of particular interest. The only other mass stranding event of harbor seals in California was noted in 1985 at Drakes Estero and Double Point. A virus was also noted as the likely cause for that stranding event (S. Allen, pers. com.). No other stranding event for harbor seals has been documented in California over the past 20 years (J. Cordaro, NMFS, pers. com.).

The long-term monitoring program for harbor seals of Point Reyes has provided important information to guide management. Actions guided by the results of these surveys have included:

1) The initiation of a baseline study of diseases in harbor seals in conjunction with the Marine Mammal Center;
2) Continued annual restriction of kayaks and other watercraft in Drakes Estero during the breeding season March 15 - June 30;
3) A study of the dispersal of weaned pups and the feeding habits of harbor seals at Point Reyes in collaboration with Moss Landing Marine Lab;
4) Proposed delineation of marine protected areas at Point Reyes.

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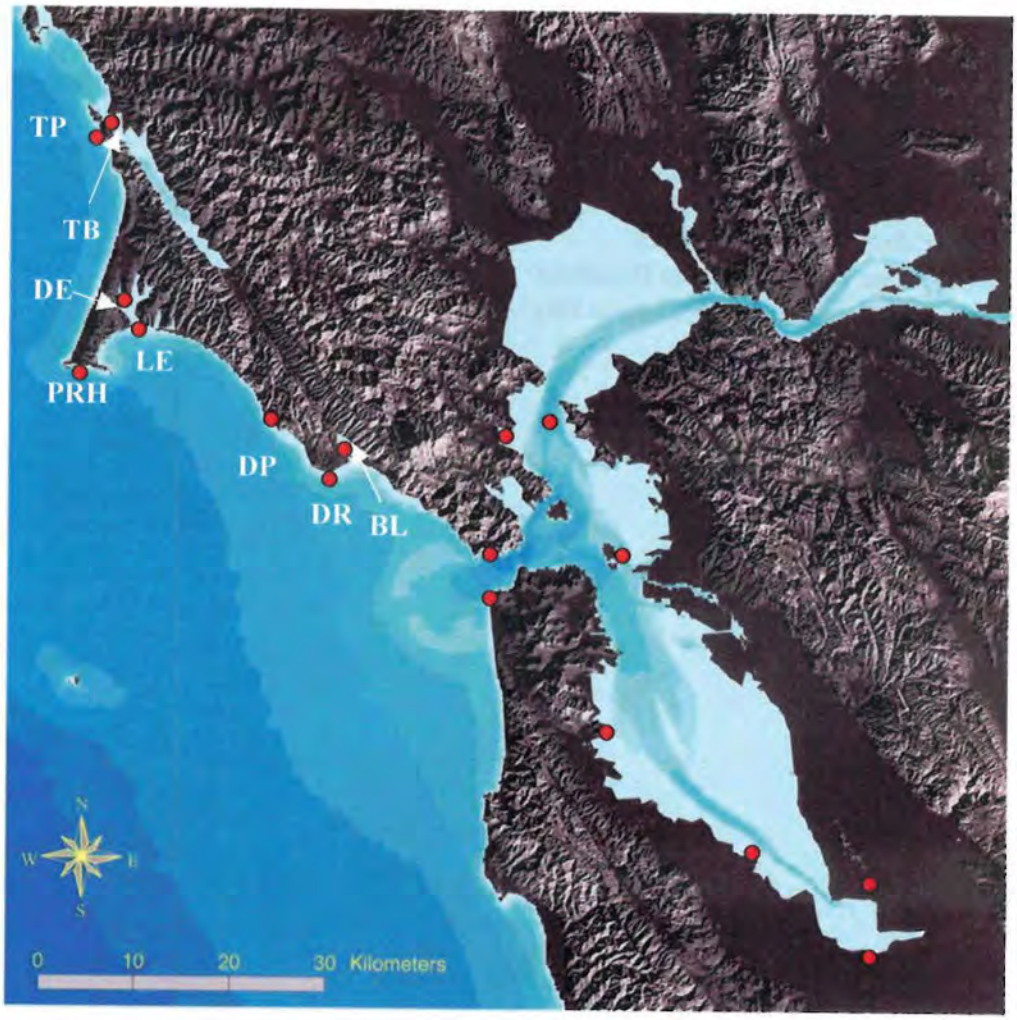

Figure 1a. Harbor seal haul out sites at Point Reyes and adjacent areas.

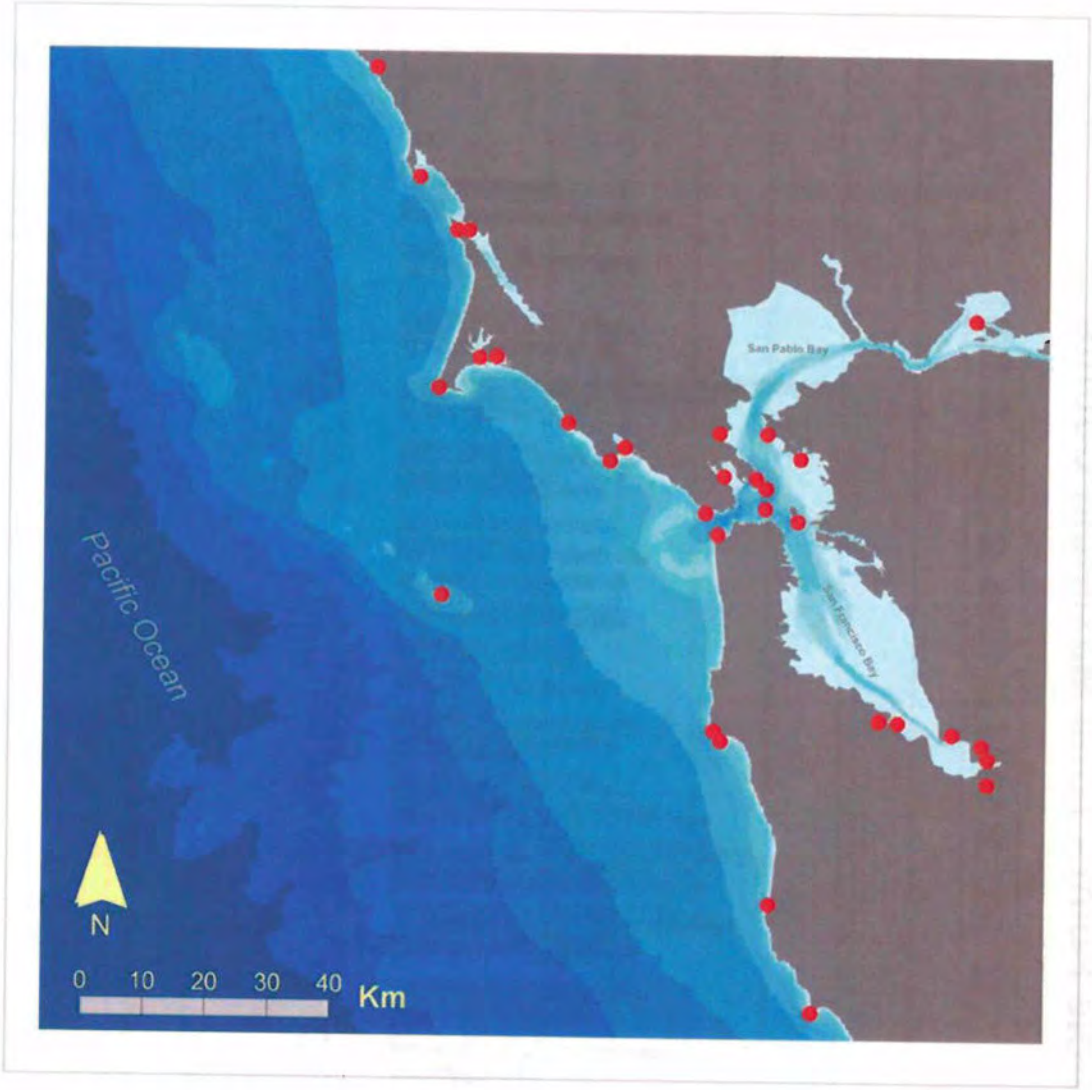

Figure 1b. Harbor seal haul out sites in central California.

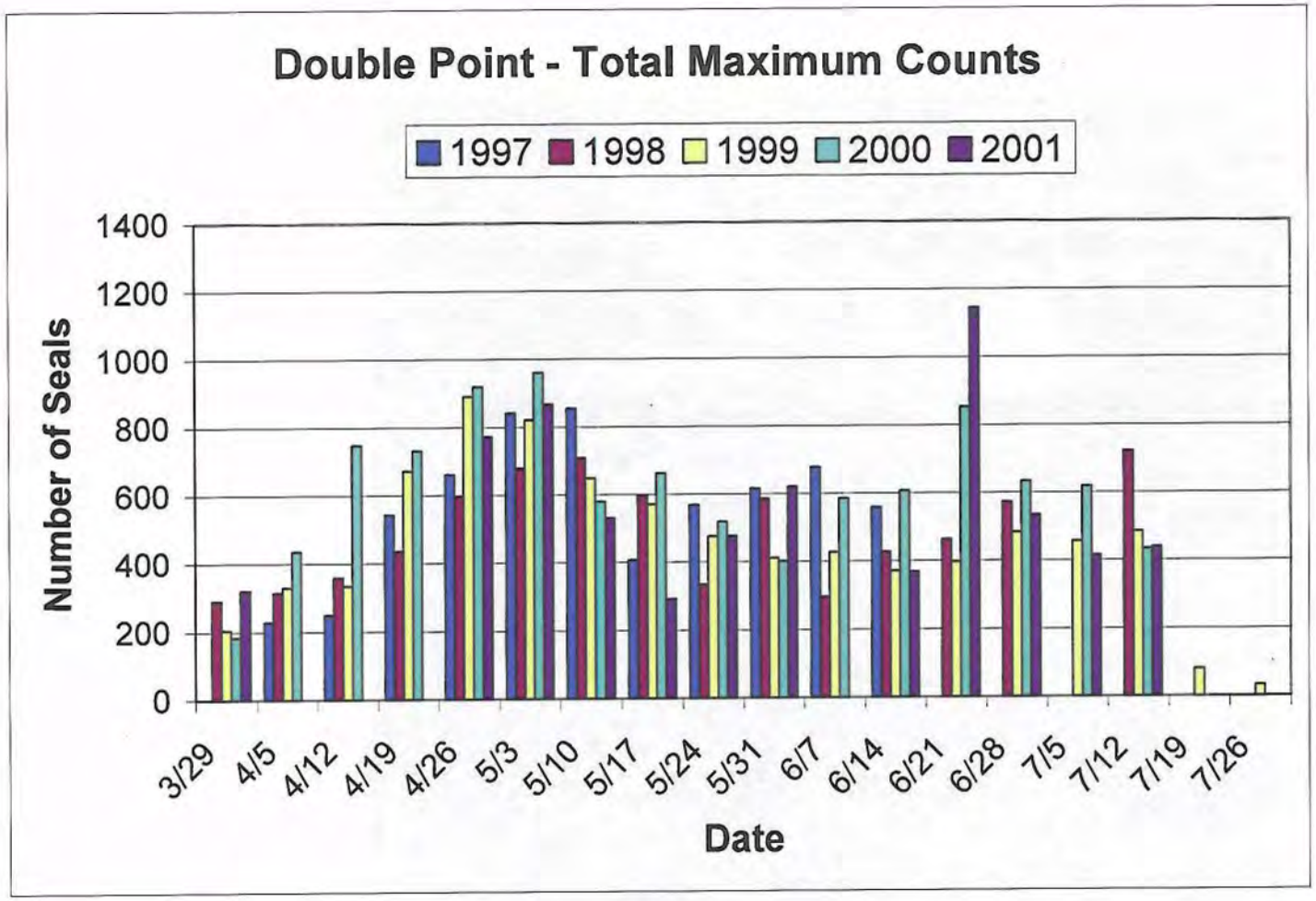

Figure 2. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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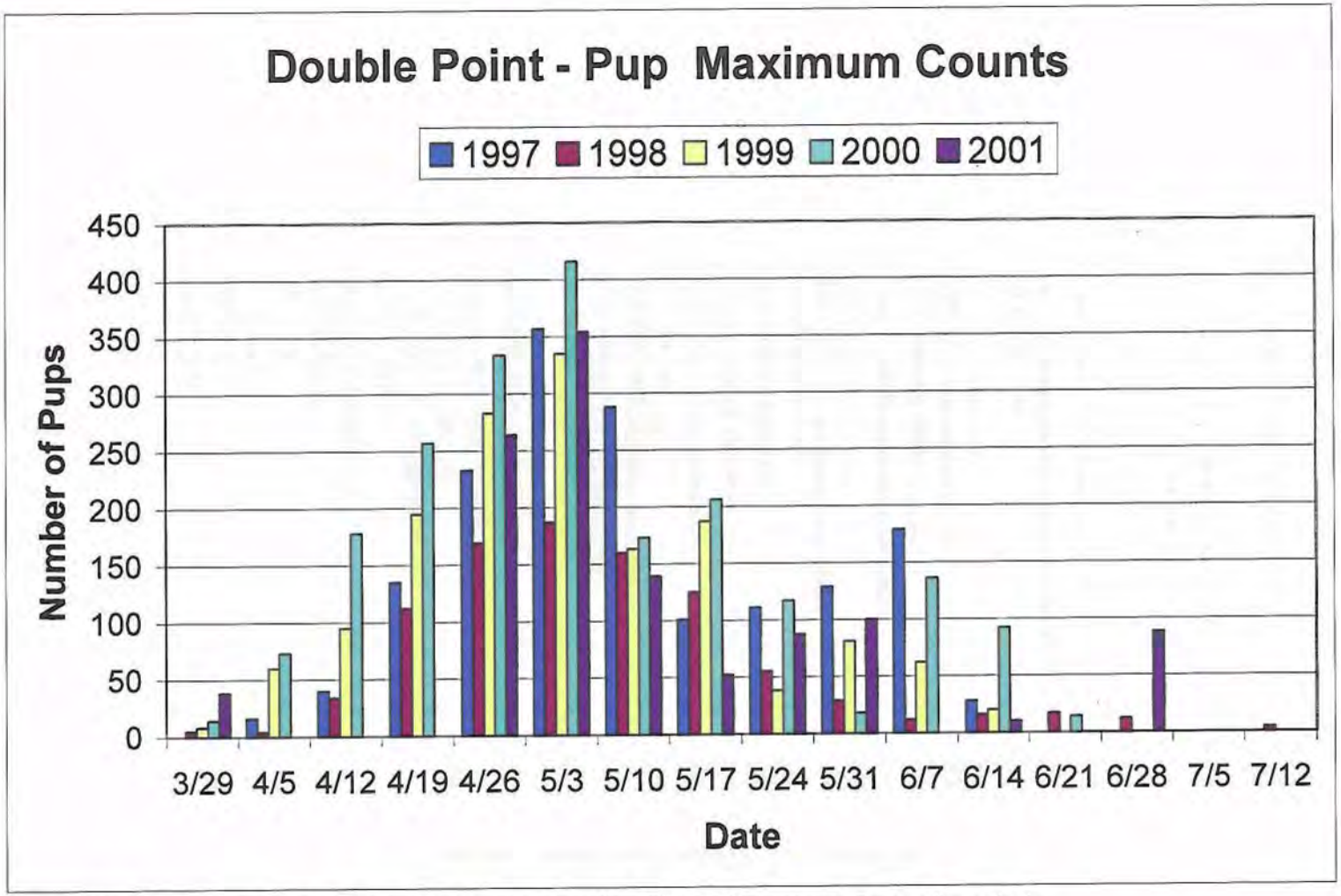

Figure 3. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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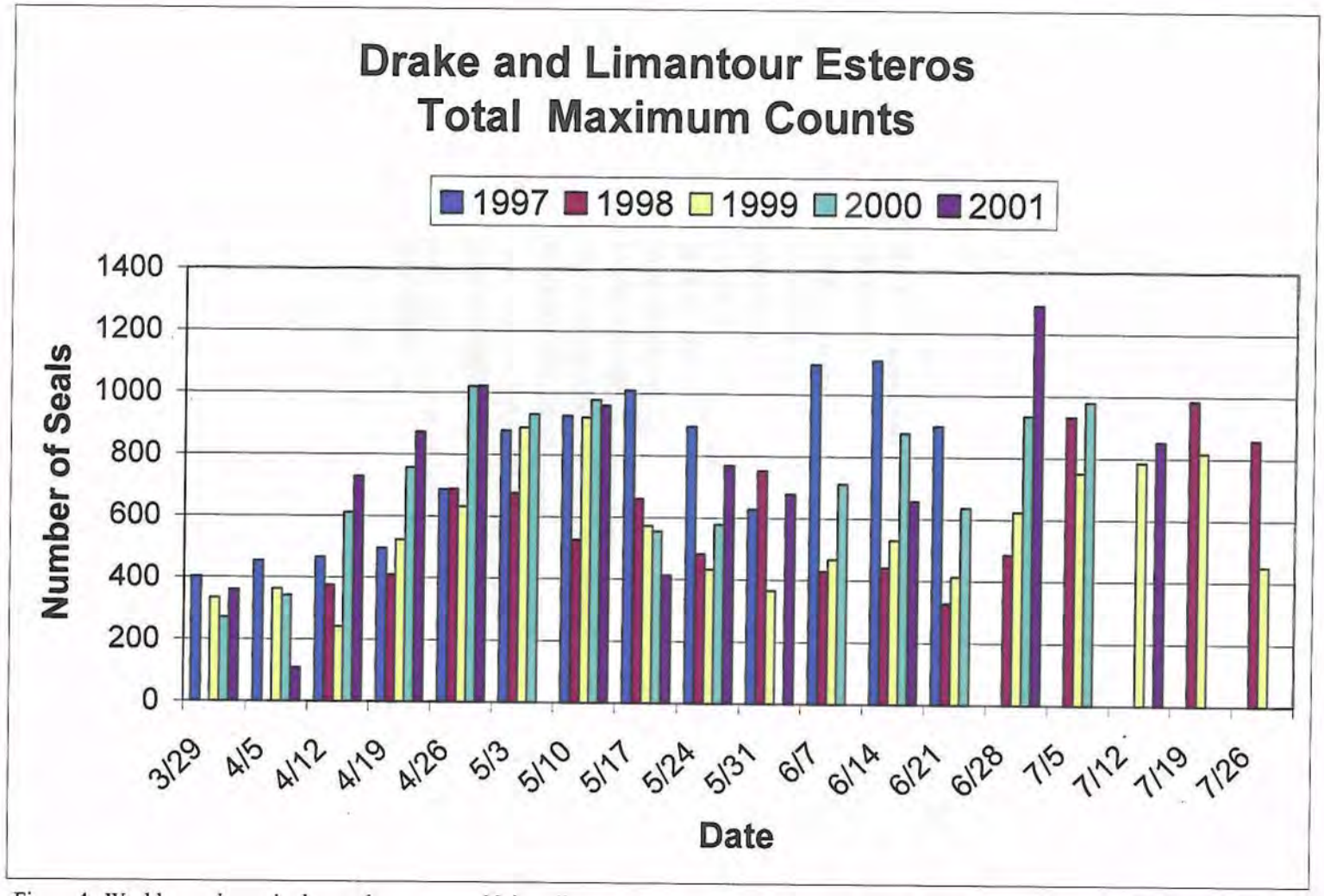

Figure 4. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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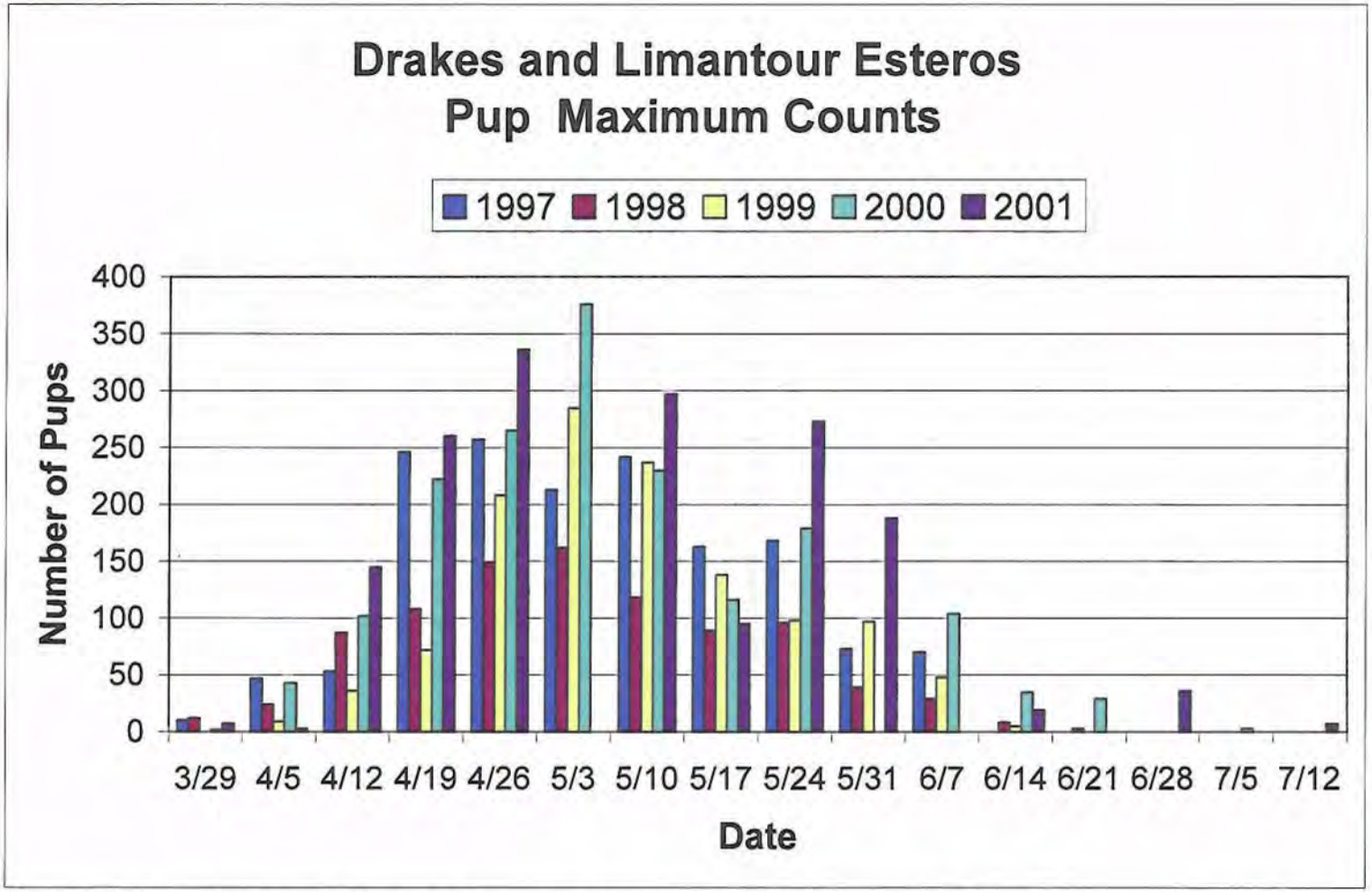

Figure 5. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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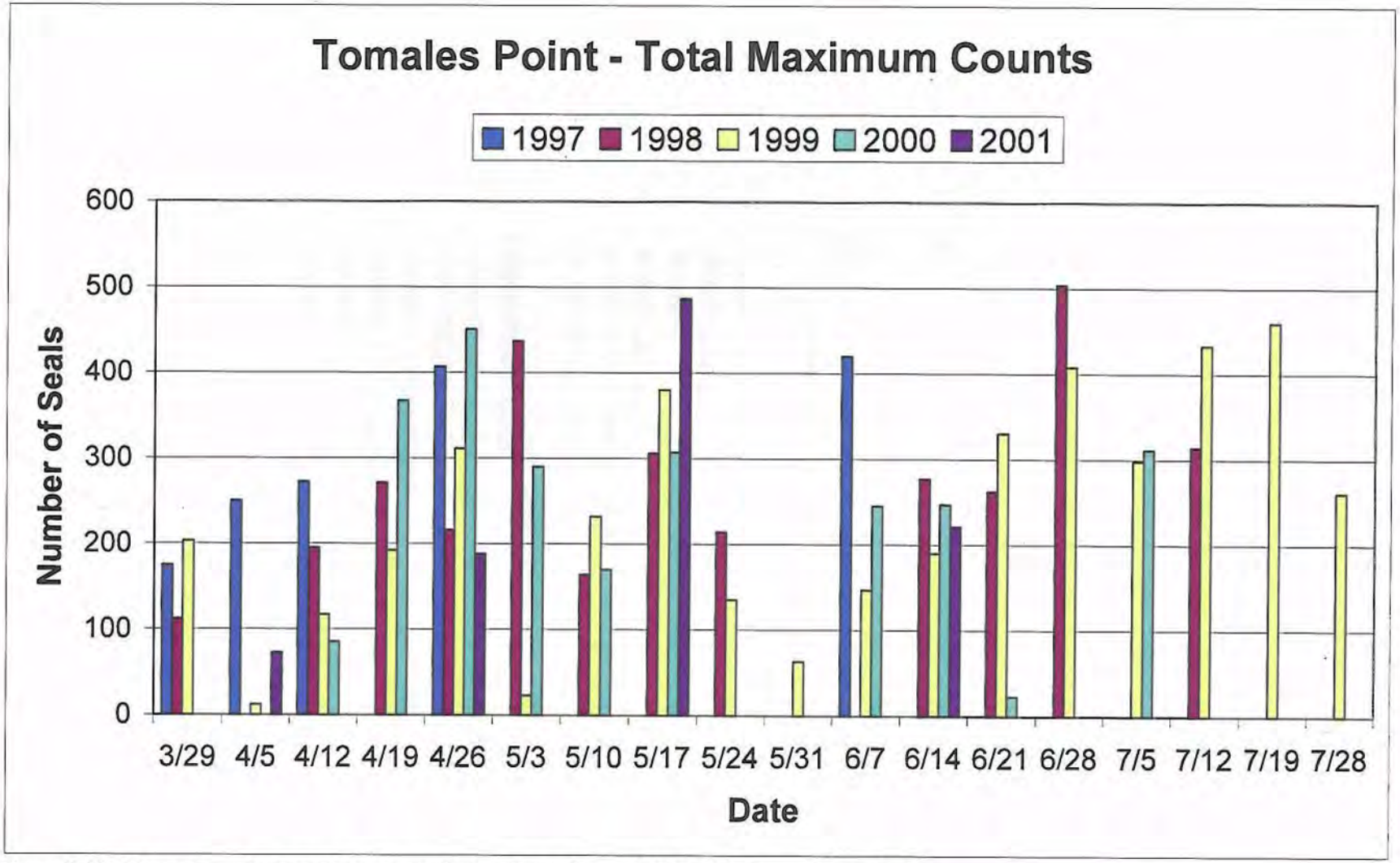

Figure 6. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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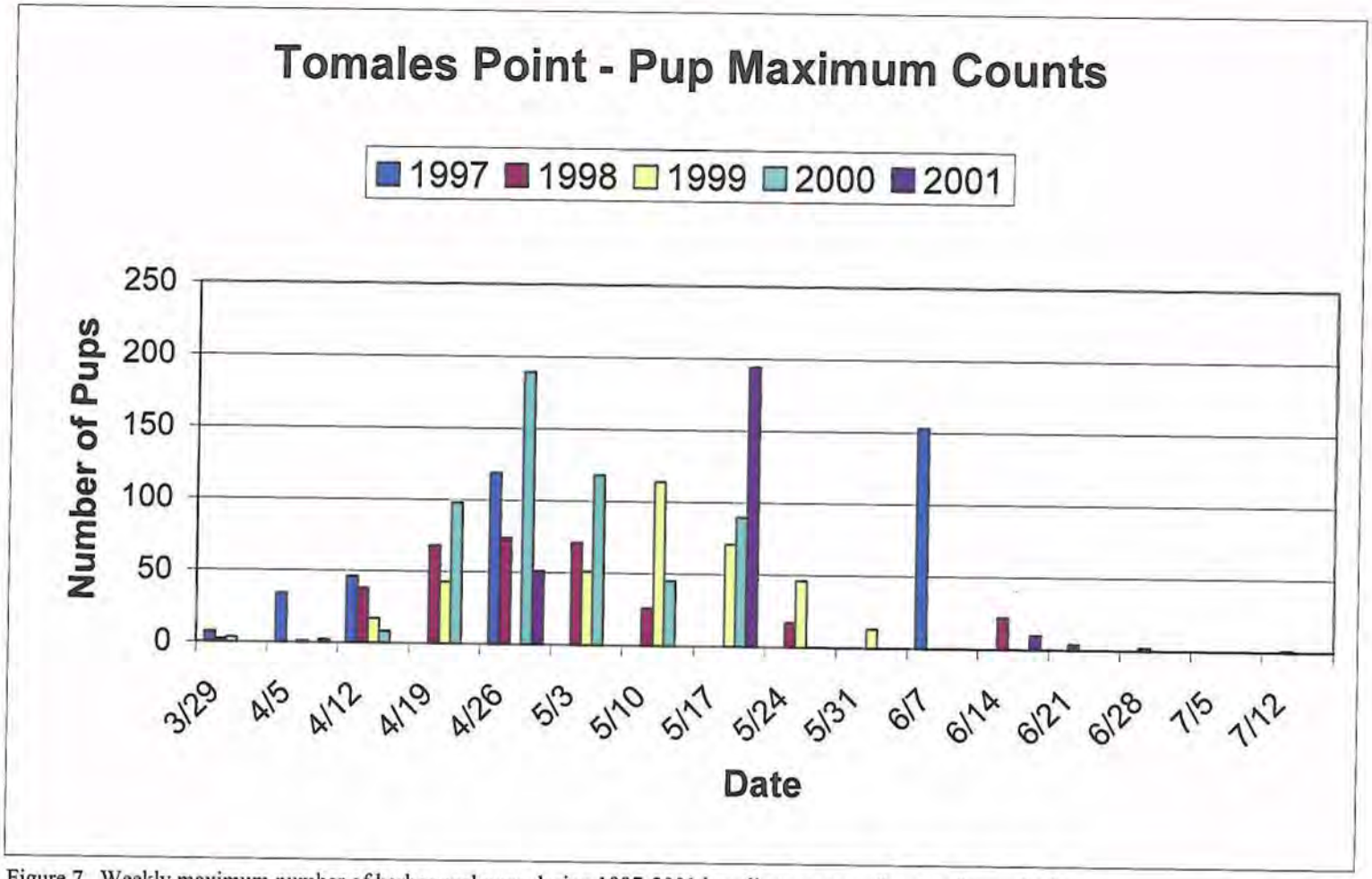

Figure 7. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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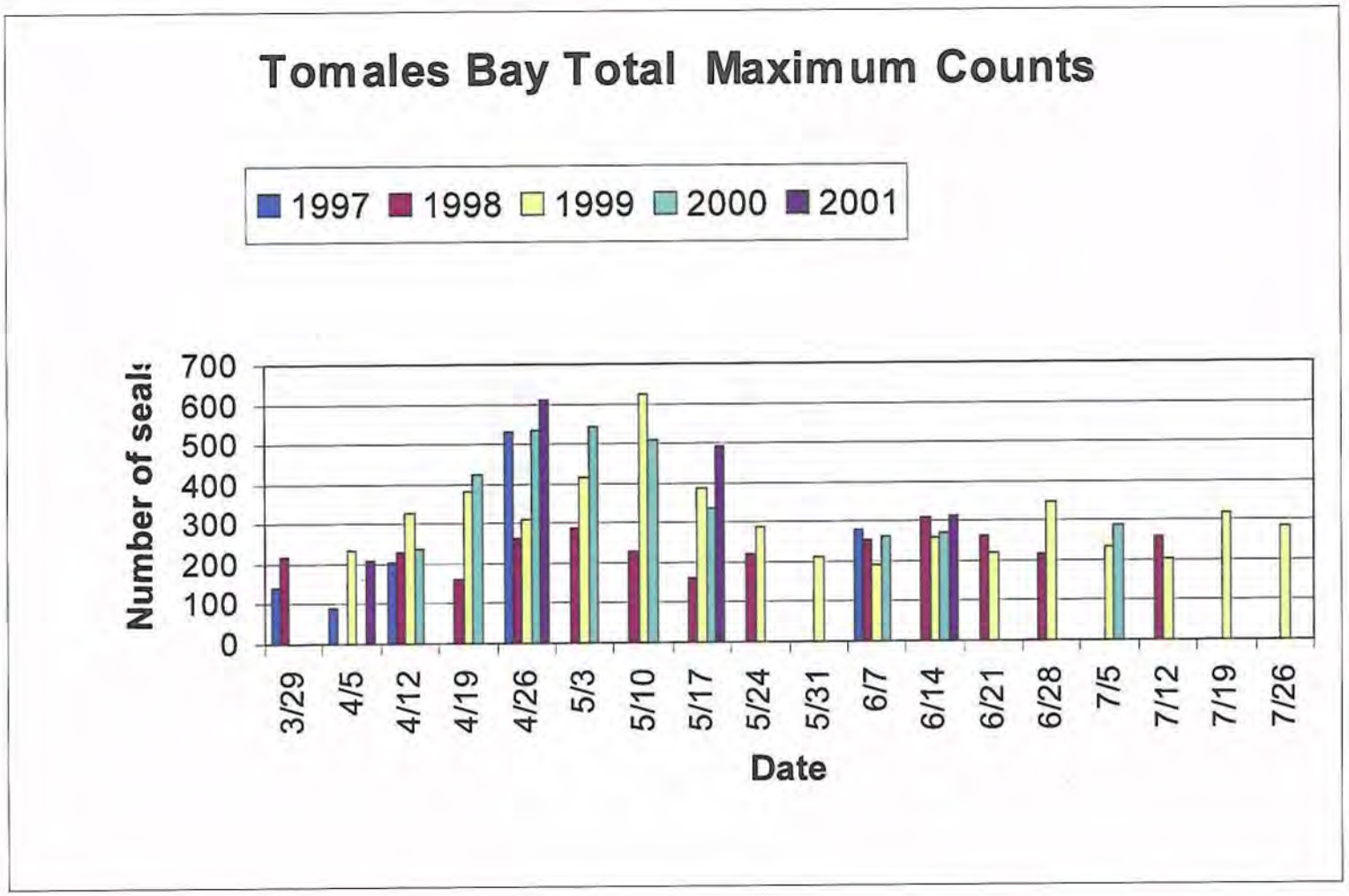

Figure 8. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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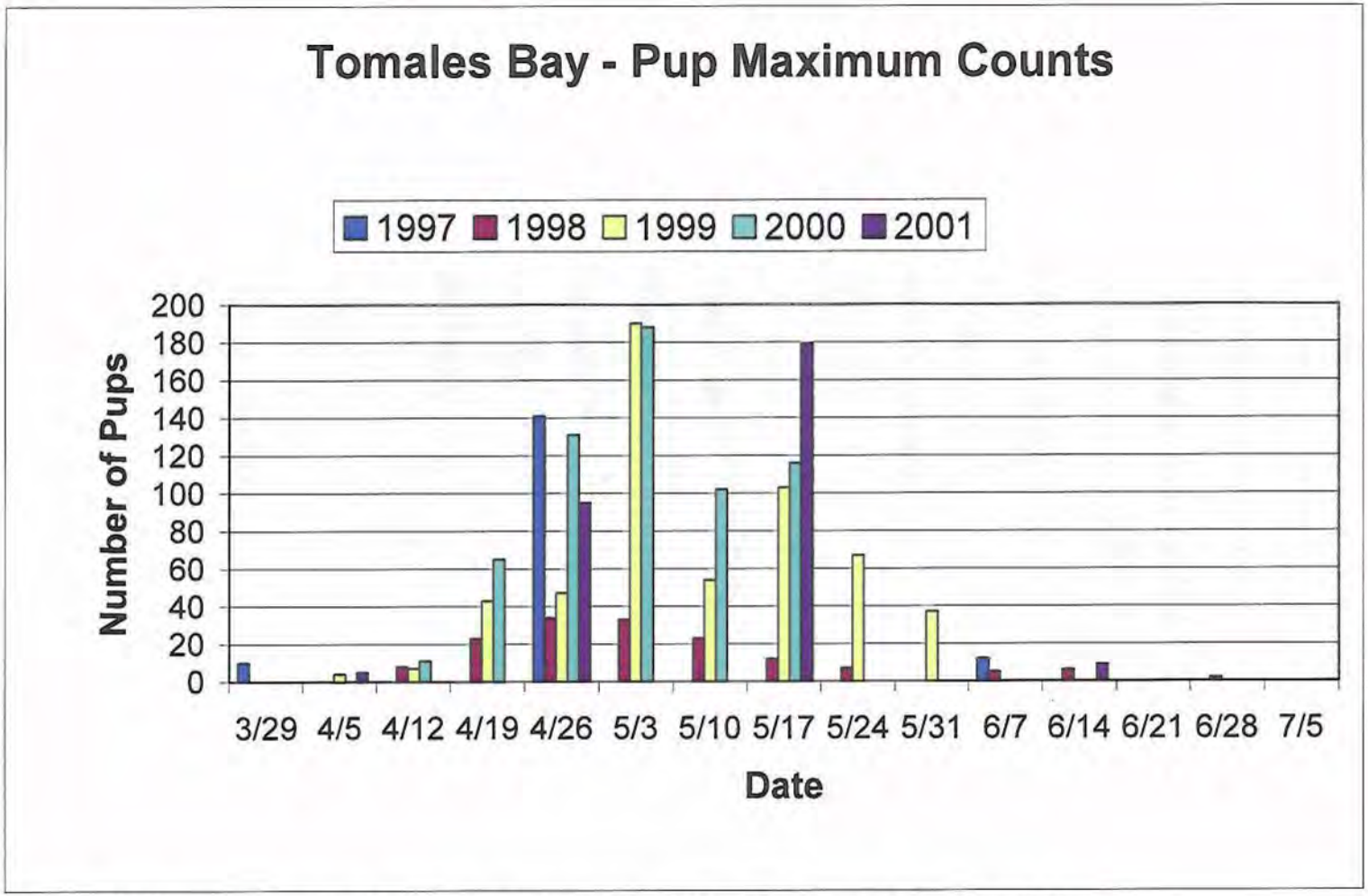

Figure 9. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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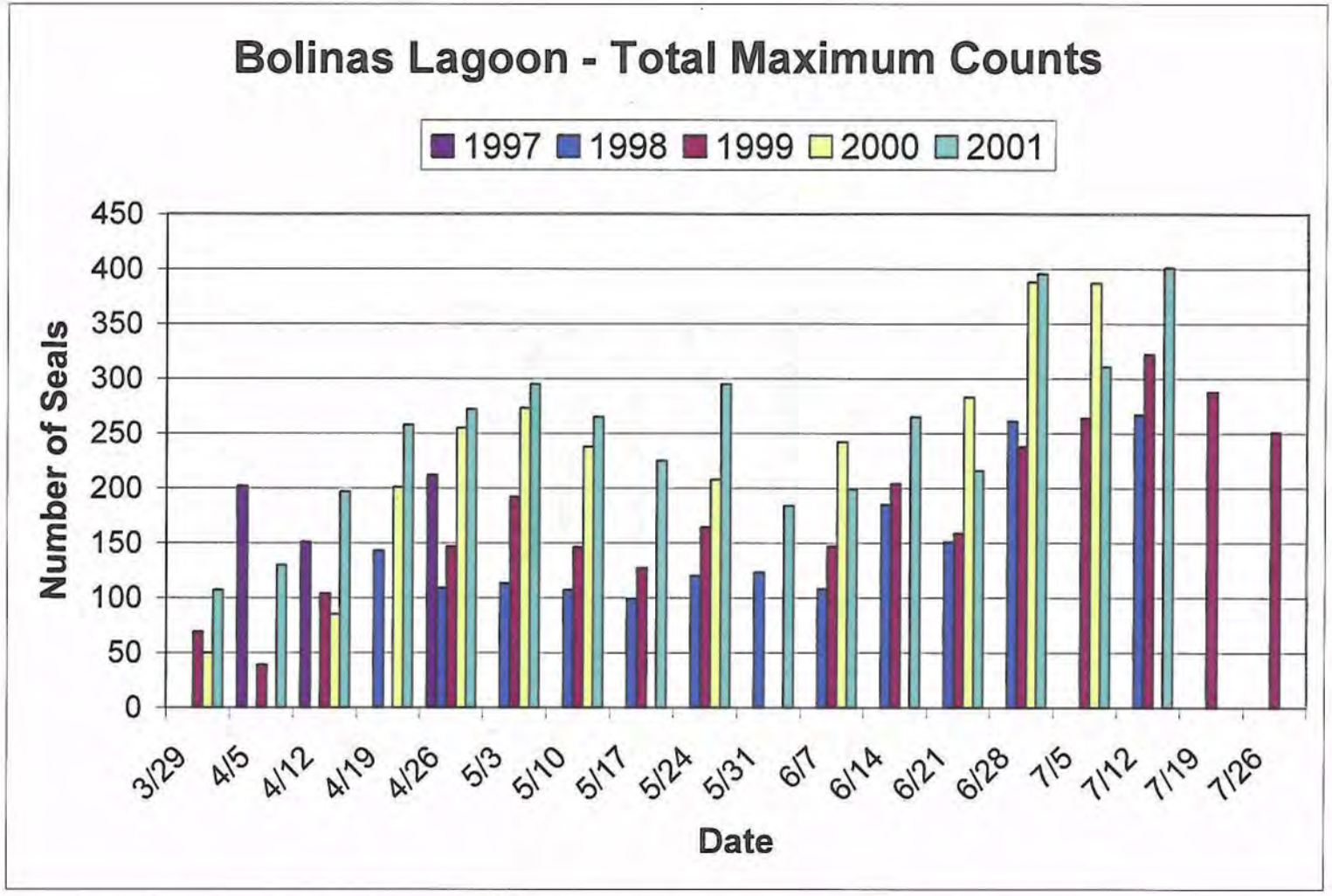

Figure 10. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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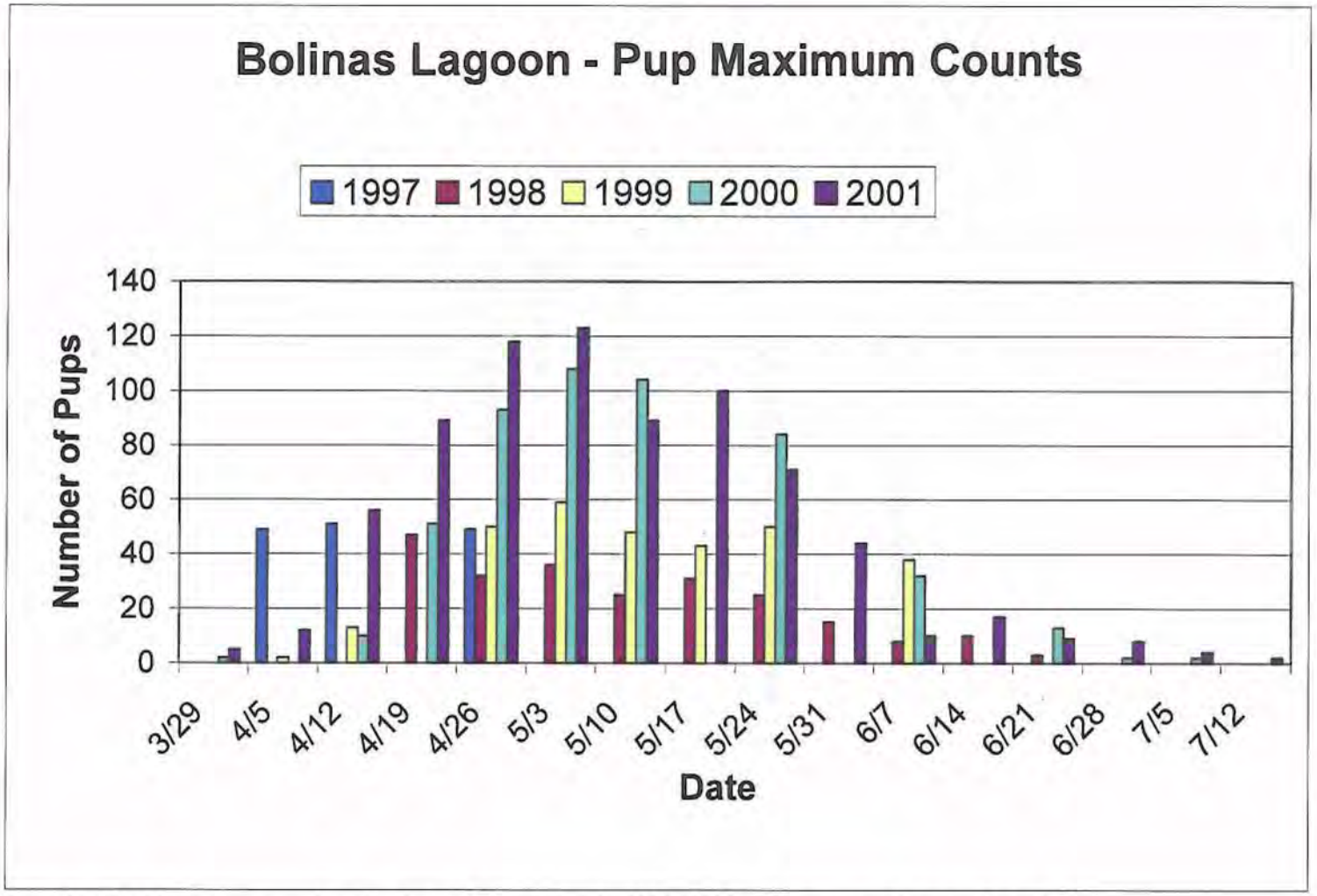

Figure 11. Weekly maximum number of harbor seal pups during the 1997-2001 breeding seasons. See text for methods.

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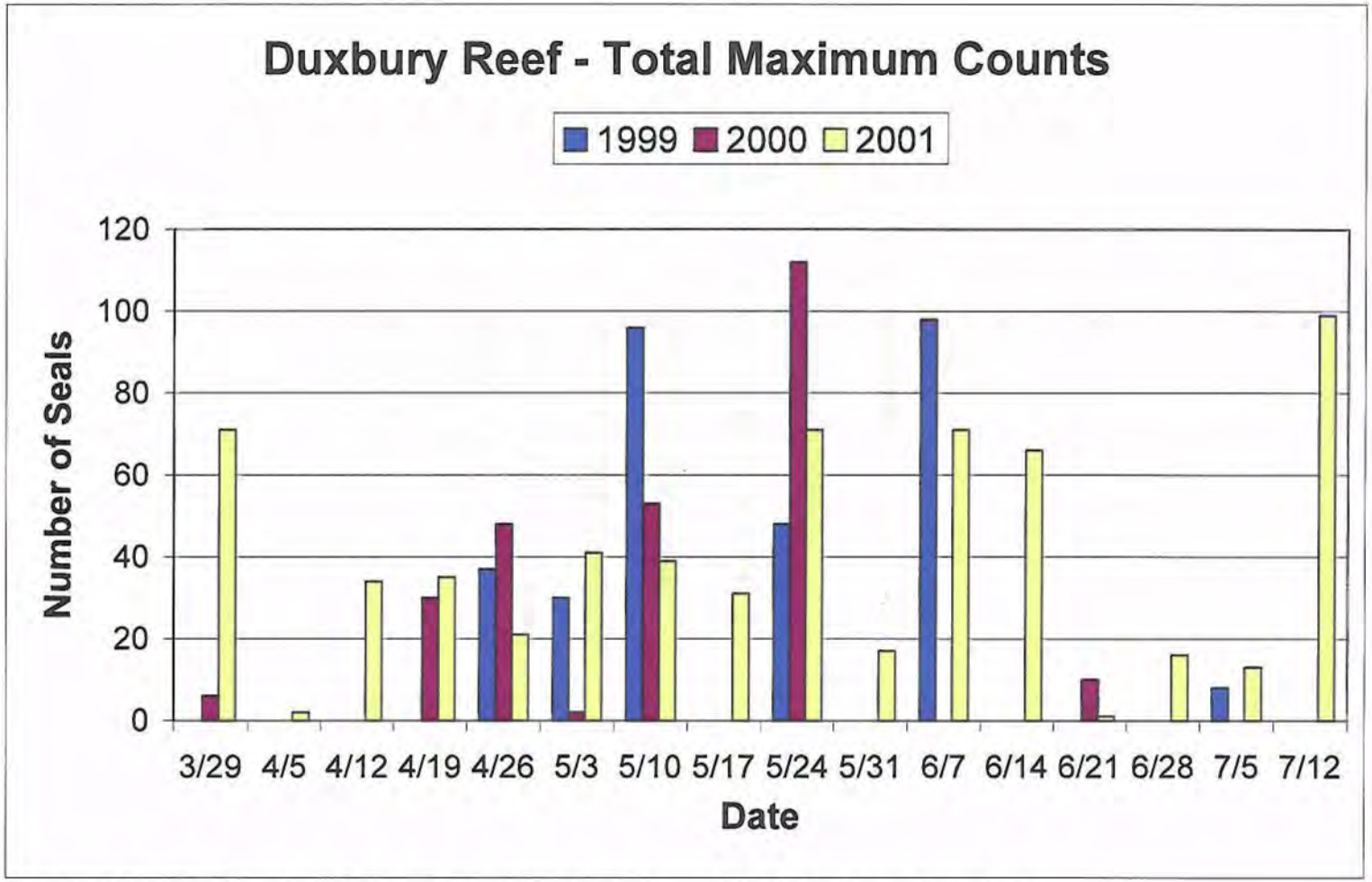

Figure 12. Weekly maximum harbor seal counts, combining all age classes, 1999 - 2001. See text for methods.

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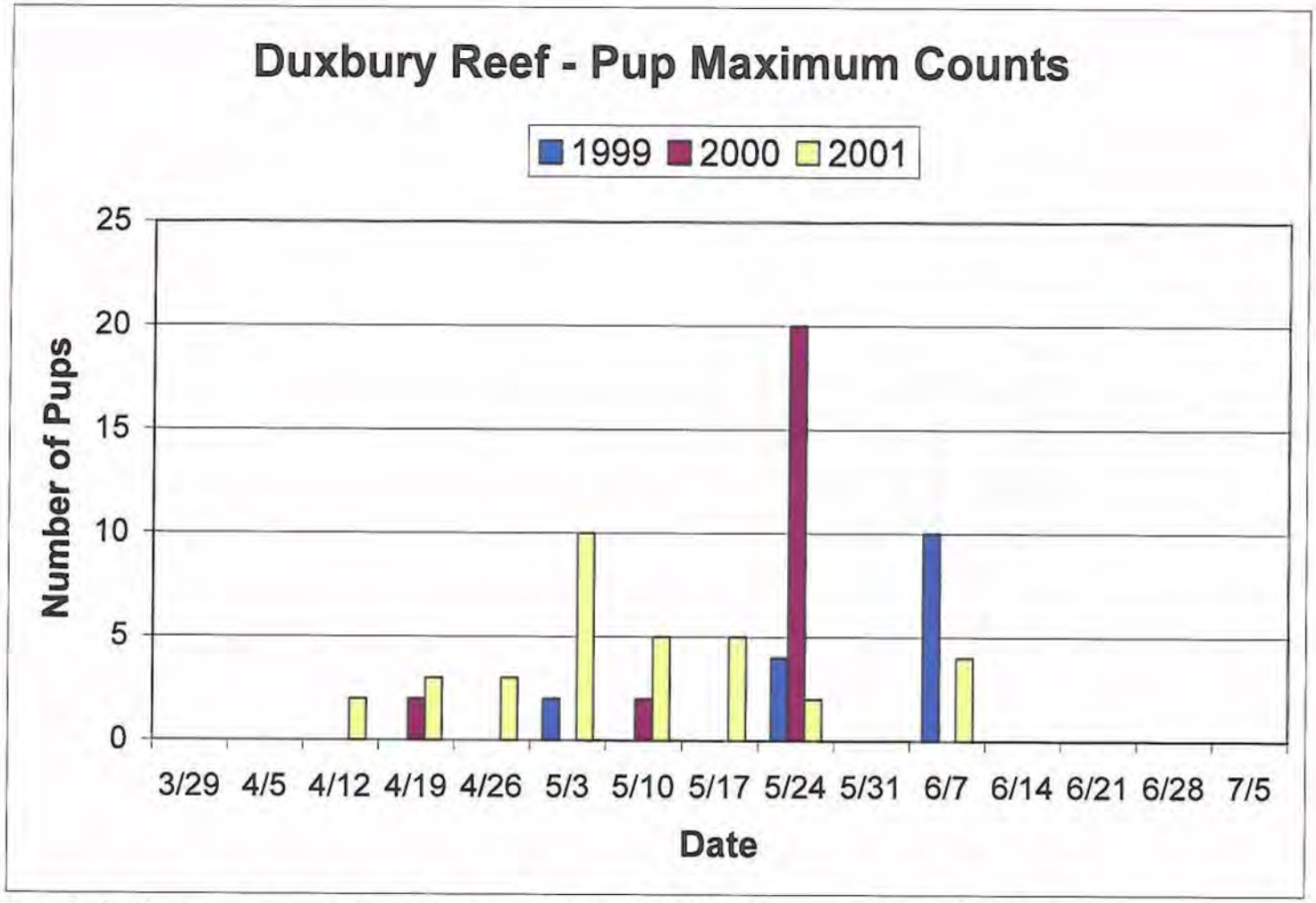

Figure 13. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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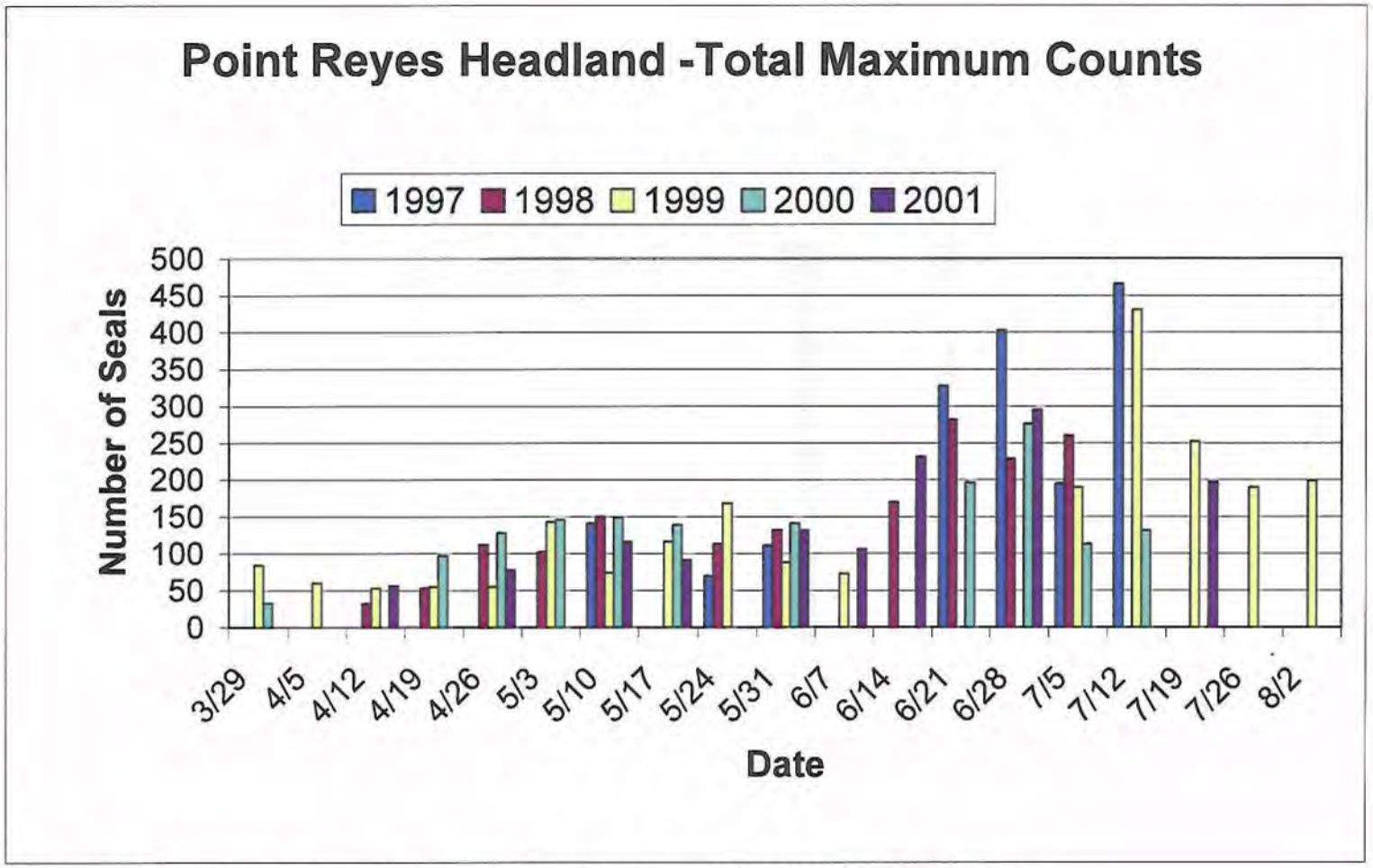

Figure 14. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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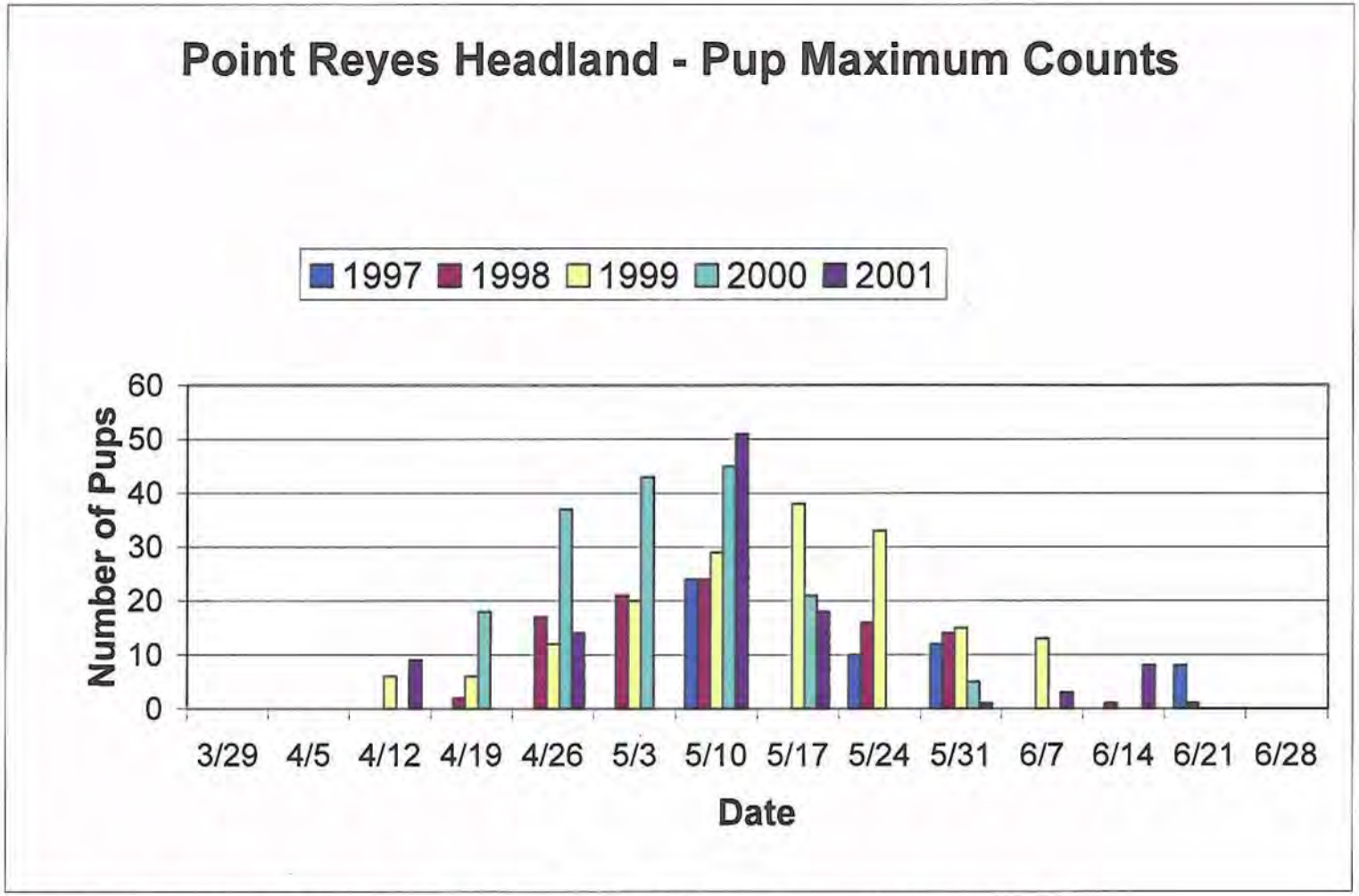

Figure 15. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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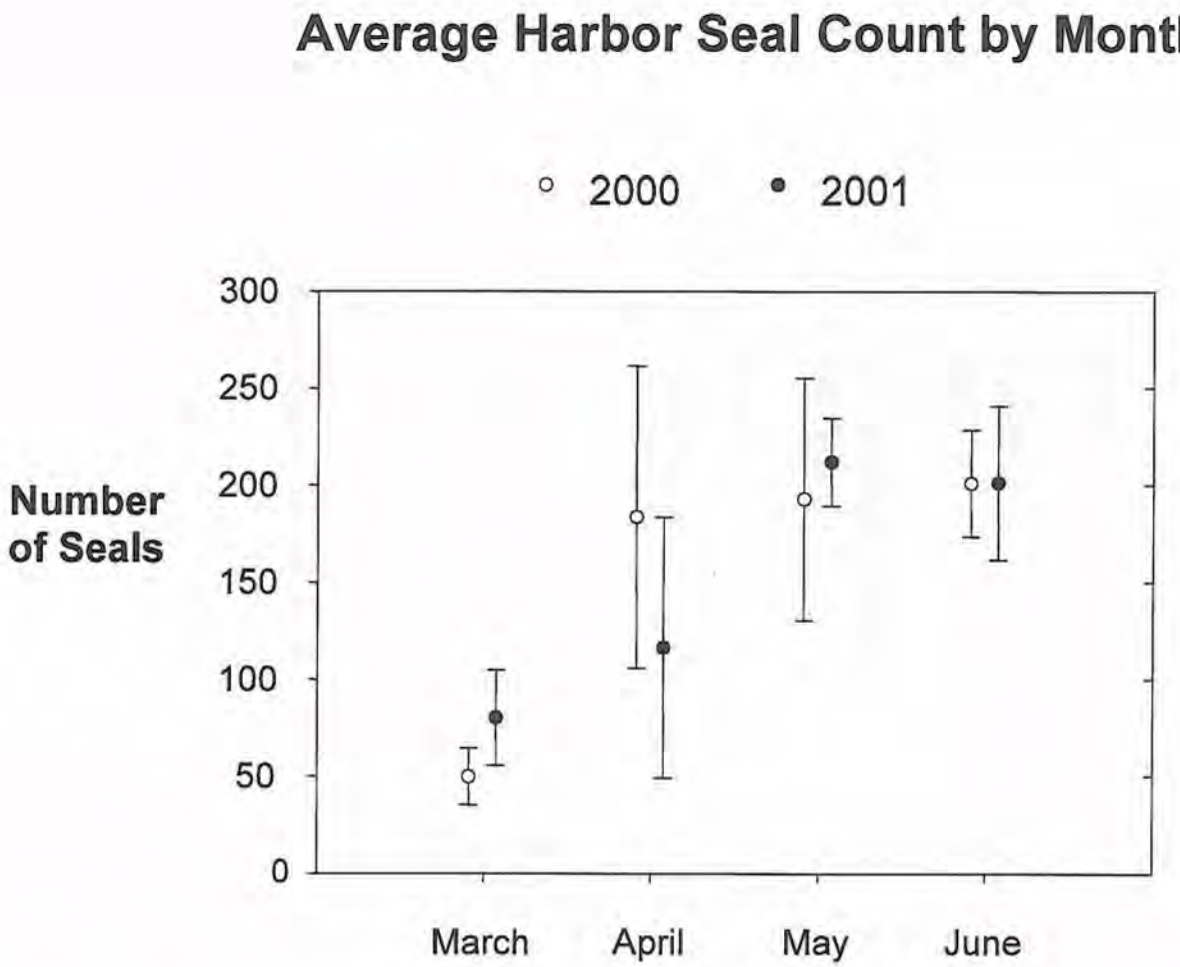

Figure 16. Harbor seal average count and standard deviation, combining all age classes and all sites, by month during the breeding season for 2000 and 2001.

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Table 1a. Summary of the survey data for the1997-2001 seasons, combining all sites at Point Reyes. Maximum # of Breed and Molt, and Average Breed include all age classes.

YEAR	Max # Breed	Average Breed	Max # Pups	Max # Molt	#Surveys	# Disturbances	Disturbances Per Survey	Dead Pups
1997	3,268	1,830.5 SE = 379 N =4	983	NA	Weekday: 44 Weekend: 29 Total: 73	Weekday: 9 Weekend: 37 Total: 46	0.2 1.3	7
1998	2,481	1,744.6 SE = 122.5 N = 8	528	3,070	Weekday: 79 Weekend: 64 Total: 143	Weekday: 24 Weekend: 46 Total: 70	0.3 0.7	15
1999	3,325	1,779.9 SE = 173.5 N = 10	1,068	2,863	Weekday: 139 Weekend: 69 Total: 208	Weekday: 71 Weekend: 54 Total: 125	0.5 0.8	9
2000	3,506	2,511.1 SE = 224.4 N = 7	1,342	3,108	Weekday: 106 Weekend: 91 Total: 197	Weekday: 78 Weekend: 116 Total: 194	0.7 1.3	11
2001	3,485	2,218.8 SE = 244.8 N= 4	1,247	3,769	Weekday: 112 Weekend: 119 Total: 231	Weekday: 57 Weekend: 107 Total: 164	0.5 0.9	7

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Table 1b. Summary of the average number of adult/immature seals combining the breeding and molting seasons at Point Reyes, California, 1997-2001, by location; SE = standard error and N= sample size.

Year	Double Point	Drakes Estero & Limantour	Tomales Point	Tomales Bay	Bolinas Lagoon	Point Reyes Headland
1997	564.0	754.3	304.8	241.0	188.3	107.3
SE	62.0	75.8	47.3	99.0	18.9	20.57
N	11	12	5	4	3	3
1998	468.7	453.9	243.6	233.8	123.0	108.0
SE	44.99	70.9	31.4	15.2	8.8	16.4
N	12	12	9	10	9	8
1999	513.1	523.1	167.1	329.4	133.9	88.09
SE	60.5	60.5	31.65	36.8	16.3	11.6
N	12	12	12	11	10	11
2000	636.1	693.9	270.3	389.8	194.0	119.0
SE	59.9	75.3	39.9	45.3	28.9	15.79
N	12	11	8	8	8	7
2001	**531.1**	**657.4**	**242.0**	**406.3**	**224.3**	**115.6**
SE	**74.3**	**90.6**	**87.7**	**89.88**	**17.9**	**21.4**
N	**8**	**10**	**4**	**4**	**12**	**7**

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Table 1c. Survey summary data for 1997. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt =all age classes during the molting season, June 15 to July 15. NA = data not available.

	Max # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	854	357	NA	Weekday: 12 Weekend: 7	Weekday: 4 Weekend: 6	11	1.3%	3	3
Drakes Estero & Limantour	1111	257	NA	Weekday: 10 Weekend: 16	Weekday: 3 Weekend: 30	13	1.2%	3	1
Tomales Point	420	153	NA	Weekday: 8 Weekend: 1	Weekday: 2 Weekend: 1	3	0.7%	2	1
Tomales Bay	530	141	NA	Weekday: 8 Weekend: 1	Weekday: 0 Weekend: 0	14	2.6%	0	1
Bolinas Lagoon	212	51	NA	Weekday: 1 Weekend: 2	Weekday: 0 Weekend: 0	5	2.4%	0	1
Point Reyes Headland	141	24	466	Weekday: 5 Weekend: 2	Weekday: 0 Weekend: 0	0	0%	NA	0
1997 Total	3268	983	NA	73	46	-	-	-	-

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Table 1d. Summary data for 1998. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt =all age classes during the molting season, June15 to July 15.

	Max # Breed	Max # Pups	Max Molt #	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	708	187	722	Weekday: 18 Weekend: 12	Weekday: 1 Weekend: 5	6	0.8%	6	6
Drakes Estero & Limantour	753	162	985	Weekday: 11 Weekend: 18	Weekday: 8 Weekend: 24	22	2.9%	2	1
Tomales Point	437	74	504	Weekday: 13 Weekend: 16	Weekday: 3 Weekend: 6	5	1.1%	3	3
Tomales Bay	290	34	310	Weekday: 12 Weekend: 14	Weekday: 7 Weekend: 11	8	2.8%	2	1
Bolinas Lagoon	143	47	267	Weekday: 12 Weekend: 0	Weekday: 5 Weekend: 0	8	5.6%	2	1
Point Reyes Headland	150	24	282	Weekday: 13 Weekend: 4	Weekday: 0 Weekend: 0	4	2.7%	1	3
1998 Total	2481	528	3070	143	70	-	-	-	-

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Table 1e. Summary data for 1999 season. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max #Molt =all age classes during the molting season, June15 to July 15.

	Max # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	890	335	486	Weekday: 23 Weekend: 13	Weekday: 11 Weekend: 10	11	1.2%	4	5
Drakes Estero & Limantour	922	285	817	Weekday: 26 Weekend: 19	Weekday: 24 Weekend: 35	27	2.9%	4	2
Tomales Point	430	151	460	Weekday: 19 Weekend: 15	Weekday: 5 Weekend: 0	10	2.3%	3	1
Tomales Bay	625	190	347	Weekday: 19 Weekend: 15	Weekday: 11 Weekend: 4	17	2.7%	1	1
Bolinas Lagoon	192	59	322	Weekday: 18 Weekend: 2	Weekday: 18 Weekend: 4	7	3.6%	0	0
Duxbury Reef	98	10	NA	Weekday: 7 Weekend: 1	Weekday: 0 Weekend: 1	1	1.0%	0	0
Point Reyes Headland	168	38	431	Weekday: 27 Weekend: 4	Weekday: 2 Weekend: 0	2	1.2%	0	0
1999 Total	3325	1068	2863	208	125	-	-	-	-

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Table 1f. Summary data for 2000. The maximum numbers were seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers with 2 or more years of experience. Avg # Breed= adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers of all experience levels. Max # Molt =all age classes during the molting season, June 15 to July 15, recorded by observers with two or more years of experience. Avg # Molt = all age classes during the molting season, June 15 to July 15, recorded by all observers. se =standard error

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	#Disturbances	Red Seals	Shark Bites	Dead Pups
Double Point	960	507.70 se 40.24	416	853	657.28 se 57.39	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	5	4	5
Drakes Estero & Limantour	1020	525.43 se 44.06	376	980	740.83 se 100.58	Weekday: 27 Weekend: 18	Weekday: 43 Weekend: 38	11	2	1
Tomales Point	451	206.41 se 30.42	189	311	210.33 se 40.61	Weekday: 14 Weekend: 13	Weekday: 12 Weekend: 11	5	1	0
Tomales Bay	541	354.75 se 31.40	188	290	280.50 se 6.10	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	17	0	2
Bolinas Lagoon	273	163.10 se 31.41	108	388	352.66 se 35.48	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	9	1	2
Duxbury Reef	112	31.66 se 12.01	20	10	5.00 se 5.05	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	2	0	0
Point Reyes Headland	149	113.62 se 14.84	45	276	179.25 se 36.81	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	2	0	1
2000 Total	3506	-	1342	3108	-	197	194	-	-	-

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Table 1g. Summary data for 2001. The maximum numbers were seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers with 2 or more years of experience. Avg # Breed= adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers of all experience levels. Max # Molt =all age classes during the molting season, June 15 to July 15, recorded by observers with two or more years of experience. Avg # Molt = all age classes during the molting season, June 15 to July 15, recorded by all observers. se=Standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Red Seals	Shark Bites	Dead Pups
Double Point	867	536.20 se 42.12	354	1145	553.12 se 112.83	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	8	3	4
Drakes Estero & Limantour	1023	594.73 se 44.86	336	1292	727.00 se 90.13	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	18	2	1
Tomales Point	487	196.25 se 28.98	194	221	329.14 se 31.06	Weekday: 14 Weekend: 18	Weekday: 6 Weekend: 17	1	0	0
Tomales Bay	611	353.38 se 26.96	179	316	176.57 se 31.81	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	12	0	1
Bolinas Lagoon	295	197.90 se 14.12	123	401	307.57 se 29.58	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	9	2	1
Duxbury Reef	71	32.85 se 4.91	10	99	37.50 se 15.63	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	2	0	0
Point Reyes Headland	131	88.22 se 10.6	51	295	238.00 se 31.67	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	2	0	0
2000 Total	3485	-	1247	3769	-	231	164	-	-	-

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Table 2a. Sources of potential and actual disturbances during 1997.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Total
Double Point	1	-	-	1	-	1	2	5	**10**
Drakes Estero & Limantour	6	-	-	-	1	18	3	5	**33**
Tomales Point	-	-	-	-	-	2	-	1	**3**
Tomales Bay	-	-	-	-	-	-	-	-	**0**
Bolinas Lagoon	-	-	-	-	-	-	-	-	**0**
Point Reyes Headland	-	-	-	-	-	-	-	-	**0**
Total	7	0	0	1	1	21	5	11	**46**

Table 2b. Sources of potential and actual disturbances during the 1998 field seasons.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Total
Double Point	-	-	-	-	1	-	3	2	**6**
Drakes Estero & Limantour	-	1	-	-	-	26	1	4	**32**
Tomales Point	3	-	-	-	-	4	-	2	**9**
Tomales Bay	6	4	-	-	1	4	-	3	**18**
Bolinas Lagoon	-	-	3	-	-	1	1	-	**5**
Point Reyes Headland	-	-	-	-	-	-	-	-	**0**
Total	9	5	3	0	2	35	5	11	**70**

Table 2c. Sources of potential and actual disturbances during the 1999 field seasons.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
Double Point	6	-	-	-	3	5	2	3	2	**21**
Drakes Estero & Limantour	1	5	-	-	5	23	11	11	3	**59**
Tomales Point	1	-	-	-	-	2	1	-	1	**5**
Tomales Bay	7	-	-	1	-	2	2	2	1	**15**
Bolinas Lagoon	-	2	-	3	1	3	6	6	-	**21**
Duxbury Reef	-	-	-	-	-	1	-	-	-	**1**
Point Reyes Headland	2	-	-	-	-	-	-	-	-	**2**
Total	**17**	**7**	**0**	**4**	**9**	**36**	**22**	**22**	**7**	**124**

Table 2d. Sources of potential and actual disturbances during the 2000 field season.

	Motor boat	Non-motor boat	Clammer	Plane	Human	Bird	Unknown	Other	Total
Double Point	4	-	-	7	12	6	18	4	**51**
Drakes Estero & Limantour	-	6	2	9	30	13	19	2	**81**
Tomales Point	8	-	-	4	6	-	4	1	**23**
Tomales Bay	15	2	6	1	-	-	-		**24**
Bolinas Lagoon	-	5	-	-	-	3	3	-	**11**
Duxbury Reef	-	1	-	-	1	-	-	-	**2**
Point Reyes Headland	-	-	-	1	-	-	1	-	**2**
Total	**27**	**14**	**8**	**22**	**49**	**22**	**45**	**7**	**194**

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Table 2e. Sources of potential and actual disturbances during the 2001 field season.

	Motor boat	Non-motor boat	Clammer	Plane	Human	Bird	Unknown	Other	Total
Double Point	3	-	-	1	3	1	4	13	**25**
Drakes Estero & Limantour	-	4	-	3	20	4	10	2	**43**
Tomales Point	-	-	-	3	19	-	1	-	**23**
Tomales Bay	17	5	6	-	1	-	-	-	**29**
Bolinas Lagoon	-	12	-	1	6	4	13	2	**38**
Duxbury Reef	-	-	-	-	6	-	-	-	**6**
Point Reyes Headland	-	-	-	1	-	-	-	-	**1**
Total	**20**	**21**	**6**	**9**	**55**	**9**	**28**	**17**	**165**

Table 3a. Summary of seal responses to disturbances during 1997. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	2	-	7	1	70%
Drakes Estero &Limantour	9	-	24	-	73%
Tomales Point	-	-	3	-	100%
Tomales Bay	-	-	-	-	0%
Bolinas Lagoon	-	-	-	-	0%
Point Reyes Headland	-	-	-	-	0%
Total	11	0	34	1	74%

Table 3b. . Summary of seal responses to disturbances during 1998. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	1	2	3	-	50%
Drakes Estero & Limantour	11	6	15	-	47%
Tomales Point	1	1	7	-	78%
Tomales Bay	8	5	5	-	28%
Bolinas Lagoon	3	1	-	1	0%
Point Reyes Headland	-	-	-	-	0%
Total	24	15	30	1	43%

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Table 3c. Summary of seal responses to disturbances during 1999. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	2	4	11	-	65%
Drakes Estero & Limantour	19	4	31	1	56%
Tomales Point	-	-	3	1	75%
Tomales Bay	2	5	3	1	27%
Bolinas Lagoon	5	-	15	1	71%
Duxbury Reef	-	-	-	1	0%
Point Reyes Headland	-	1	-	1	0%
Total	28	14	63	6	57%

Table 3d. Summary of seal responses to disturbances during 2000. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	3	5	24	10	57%
Drakes Estero & Limantour	15	4	38	13	54%
Tomales Point	3	3	3	10	16%
Tomales Bay	4	1	9	3	53%
Bolinas Lagoon	-	-	11	-	100%
Duxbury Reef	-	-	-	2	0%
Point Reyes Headland	-	1	-	1	0%
Total	25	14	85	39	52%

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Table 3e. Summary of seal responses to disturbances during 2001. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	1	1	18	2	82%
Drakes Estero & Limantour	7	1	24	3	69%
Tomales Point	1	-	6	13	30%
Tomales Bay	4	2	11	3	55%
Bolinas Lagoon	5	1	31	-	84%
Duxbury Reef	-	-	3	3	50%
Point Reyes Headlands	1	-	-	-	0%
Total	**19**	**5**	**93**	**24**	**66%**

Table 4a. Average number of disturbances per hour during 2000. Hours of direct observation represent the total amount of time that researchers were observing the animals. The number of disturbances represents the total of all potential and actual disturbances. See methods for definition of potential and actual disturbances.

Location	Number of Surveys	Number of Disturbances	# Of Hours of Direct Observation	Average # of Disturbances per Hour	Standard Deviation
Double Point	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	45.5 62.5	0.26 0.62	0.37 0.71
Drakes Estero & Limantour	Weekday: 27 Weekend: 18	Weekday: 43 Weekend: 38	53.5 45.3	0.80 0.83	1.04 0.42
Tomales Point	Weekday: 14 Weekend: 13	Weekday: 12 Weekend: 11	46.5 43.8	0.26 0.25	0.43 0.24
Tomales Bay	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	42.0 43.8	0.12 0.43	0.24 0.56
Bolinas Lagoon	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	17.9 22.5	0.23 0.31	0.25 0.36
Duxbury Reef	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	3.0 6.0	0 0.33	0 0.79
Point Reyes Headland	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	50.3 9.0	0.04 0	0.12 0
All Sites Combined Total	Weekday:106 Weekend: 91 197	Weekday: 78 Weekend:116 194	258.5 232.8 491.3	0.30 0.50 0.39	0.66 0.57 0.63

Table 4b. Average number of disturbances per hour during 2001. Hours of direct observation represent the total amount of time that researchers were observing the animals. The number of disturbances represents the total of all potential and actual disturbances. See methods for definition of potential and actual disturbances.

Location	Number of Surveys	Number of Disturbances	# Of Hours of Direct Observation	Average # of Disturbances per Hour	Standard Deviation
Double Point	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	42.0 39.5	0.29 0.33	0.58 0.40
Drakes Estero & Limantour	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	41.5 45.0	0.48 0.49	0.61 0.71
Tomales Point	Weekday:14 Weekend: 18	Weekday: 6 Weekend: 17	34.0 41.5	0.18 0.41	0.34 0.43
Tomales Bay	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	13.3 20.3	0.23 1.28	0.41 2.52
Bolinas Lagoon	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	42.0 45.5	0.33 0.55	0.34 0.50
Duxbury Reef	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	8.3 9.0	0.24 0.44	0.70 1.12
Point Reyes Headland	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	21.5 27.3	0 0.04	0 0.07
All Sites Combined Total 2001	Weekday: 112 Weekend:119 231	Weekday :57 Weekend: 107 164	202.6 228.1 430.7	0.28 0.47 0.38	0.51 1.20 0.94

Table 5a. Summary data for Double Point, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg. # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	854	NA	357	NA	NA	Weekday: 12 Weekend: 7	Weekday: 4 Weekend: 6	11	1.3%	3	3
1998	708	NA	187	722	NA	Weekday: 18 Weekend: 12	Weekday: 1 Weekday: 5	6	0.8%	6	6
1999	890	NA	335	486	NA	Weekday: 23 Weekend: 13	Weekday: 11 Weekend: 10	11	1.2%	4	5
2000	960	507.70 se 40.24	416	853	657.28 se 57.39	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	5	0.5%	4	5
2001	867	536.20 se 42.12	354	1145	553.12 se 112.83	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	8	0.9%	3	4

Table 5b. Sources of potential and actual disturbances at Double Point during 1997 through 2001. NA= data not available.

	Motor boat	Non-motor boat	Elephant seal	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	1	-	NA	1	-	1	2	5	-	**10**
1998	-	-	NA	-	1	-	3	2	-	**6**
1999	6	-	NA	-	3	5	2	3	2	**21**
2000	4	-	1	-	7	12	6	18	3	**51**
2001	3	-	11	-	1	3	1	4	2	**25**

Table 5c. Summary of seal responses to disturbances at Double Point during 1997 through 2001. See methods for a description of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	2	-	7	1	70%
1998	1	2	3	-	50%
1999	2	4	11	-	65%
2000	3	5	24	10	57%
2001	1	1	18	2	82%

Table 5d. Summary of the average numbers of disturbances per hour observed at Double Point during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 24	Weekday: 12	45.5	0.26	0.37
	Weekend: 28	Weekend: 39	62.5	0.62	0.71
2001	Weekday: 22	Weekday: 12	42.0	0.29	0.58
	Weekend: 18	Weekend: 13	39.5	0.33	0.40

Table 6a. Summary data for Drakes Estero and Limantour Estero, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg# Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	1111	NA	257	NA	NA	Weekday: 10 Weekend: 16	Weekday: 3 Weekend: 30	13	1.2%	3	1
1998	753	NA	162	985	NA	Weekday: 11 Weekend: 18	Weekday: 8 Weekend: 24	22	2.9%	2	1
1999	922	NA	285	817	NA	Weekday: 26 Weekend: 19	Weekday: 24 Weekend: 35	27	2.9%	4	2
2000	1020	525.43 se 44.06	376	980	740.83 se 100.58	Weekday: 27 Weekend: 18	Weekday: 43 Weekend: 18	11	1.1%	2	1
2001	1023	594.73 se 44.86	336	1292	727.00 se 90.13	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	18	1.8%	2	1

Table 6b. Sources of potential and actual disturbances at Drakes Estero and Limantour Estero during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	6	-	-	-	1	18	3	5	-	**33**
1998	-	1	-	-	-	26	1	4	-	**32**
1999	1	5	-	-	5	23	11	11	3	**59**
2000	-	6	-	-	9	32	13	19	2	**81**
2001	-	4	1	-	3	20	4	10	2	**44**

Table 6c. Summary of seal responses to disturbances at Drakes Estero and Limantour Estero during 1997 through 2001. Unknown is a disturbance which occurred prior to survey, and the response level is unknown.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	9	-	24	-	73%
1998	11	6	15	-	47%
1999	19	4	31	1	56%
2000	15	4	38	13	54%
2001	7	1	24	3	69%

Table 6d. Summary of the average numbers of disturbances per hour observed at Drakes Estero and Limantour Estero during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 27	Weekday: 43	53.5	0.80	1.04
	Weekend: 18	Weekend: 38	45.3	0.83	0.42
2001	Weekday: 22	Weekday: 20	41.5	0.48	0.61
	Weekend: 21	Weekend: 22	45.0	0.49	0.71

Table 7a. Summary data for Tomales Point, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	420	NA	153	NA	NA	Weekday: 8 Weekend: 1	Weekday: 2 Weekend: 1	3	0.7%	2	1
1998	437	NA	74	504	NA	Weekday: 13 Weekend: 16	Weekday: 3 Weekend: 6	5	1.1%	3	3
1999	430	NA	151	460	NA	Weekday:19 Weekend: 15	Weekday: 5 Weekend: 0	10	2.3%	3	1
2000	451	206.41 se 30.42	189	311	210.33 se 40.61	Weekday: 14 Weekend: 13	Weekday: 12 Weekend: 11	5	1.1%	1	0
2001	487	196.25 se 28.98	194	221	329.14 se 31.06	Weekday: 14 Weekend: 18	Weekday: 6 Weekend: 17	1	0.2%	0	0

Table 7b. Sources of potential and actual disturbances at Tomales Point during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	2	-	1	-	**3**
1998	3	-	-	-	-	4	-	2	-	**9**
1999	1	-	-	-	-	2	1	-	1	**5**
2000	8	-	-	-	4	6	-	4	1	**23**
2001	-	-	-	-	3	19	-	1	-	**23**

Table 7c. Summary of seal responses to disturbances at Tomales Point during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey, and the response level is unknown.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	3	-	100%
1998	1	1	7	-	78%
1999	-	-	3	1	75%
2000	3	3	3	10	16%
2001	1	-	6	13	30%

Table 7d. Summary of the average number of disturbances per hour observed at Tomales Point during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 14:	Weekday: 12	46.5	0.26	0.43
	Weekend: 13	Weekend: 11	43.8	0.25	0.24
2001	Weekday: 14	Weekday: 6	34.0	0.18	0.34
	Weekend: 18	Weekend: 17	41.5	0.41	0.43

Table 8a. Summary data for Tomales Bay, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	530	NA	141	NA	NA	Weekday: 8 Weekend: 1	Weekday: 0 Weekend: 0	14	2.6%	0	1
1998	290	NA	34	310	NA	Weekday: 12 Weekend: 14	Weekday: 7 Weekend: 11	8	2.8%	2	1
1999	625	NA	190	347	NA	Weekday: 19 Weekend: 15	Weekday: 11 Weekend: 4	17	2.7%	1	1
2000	541	354.75 se 31.40	188	290	280.50 se 6.10	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	17	3.1%	0	2
2001	611	353.38 se 26.96	179	316	176.57 se 31.81	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	12	2.0%	0	1

Table 8b. Sources of potential and actual disturbances at Tomales Bay during 1997 through 2001.

	Motor boat	Non-motor boat	Clammer	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	6	4	-	-	1	4	-	3	-	**18**
1999	7	-	-	-	-	3	2	2	1	**15**
2000	15	2	6	-	1	-	-	-	-	**24**
2001	17	5	6	-	-	1	-	-	-	**29**

Table 8c. Summary of seal responses to disturbances at Tomales Bay during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey and the response level is unknown. See methods on definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	8	5	5	-	28%
1999	2	5	3	1	27%
2000	4	1	9	3	53%
2001	4	2	11	3	55%

Table 8d. Summary of the average numbers of disturbances per hour observed at Tomales Bay during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 12	Weekday: 5	42.0	0.12	0.24
	Weekend: 13	Weekend: 19	43.8	0.43	0.56
2001	Weekday: 15	Weekday: 3	13.3	0.23	0.41
	Weekend: 19	Weekend: 26	20.3	1.28	2.52

Table 9a. Summary data for Bolinas Lagoon, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	212	NA	51	NA	NA	Weekday: 1 Weekend: 2	Weekday: 0 Weekend: 0	5	2.4%	0	1
1998	143	NA	47	267	NA	Weekday: 12 Weekend: 0	Weekday: 5 Weekend: 0	8	5.6%	2	1
1999	192	NA	59	322	NA	Weekday: 18 Weekend: 2	Weekday: 18 Weekend: 4	7	3.6%	0	0
2000	273	163.10 SE 31.41	108	388	352.66 SE 35.48	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	9	3.3%	1	2
2001	295	197.90 SE 14.12	123	401	307.57 SE 29.58	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	9	3.1%	2	1

Table 9b. Sources of potential and actual disturbances at Bolinas Lagoon during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	-	-	3	-	-	1	1	-	-	**5**
1999	-	2	-	-	1	4	6	6	3	**22**
2000	-	5	-	-	-	-	3	3	-	**11**
2001	-	12	-	1	1	6	4	13	2	**39**

Table 9c. Summary of seal responses to disturbances at Bolinas Lagoon during 1997 through 2001. Unknown is a disturbance which occurred prior to survey and the response level is unknown. See methods for definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	3	1	-	1	0%
1999	5	-	15	1	71%
2000	-	-	11	-	100%
2001	5	1	31	-	84%

Table 9d. Summary of the average numbers of disturbances per hour observed at Bolinas Lagoon during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 6	Weekday: 4	17.8	0.23	0.25
	Weekend: 9	Weekend: 7	22.5	0.31	0.36
2001	Weekday: 17	Weekday: 14	42.0	0.33	0.34
	Weekend: 18	Weekend: 24	45.5	0.55	0.50

Table 10a. Summary data for Duxbury Reef, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1999	98	NA	10	NA	NA	Weekday: 7 Weekend: 1	Weekday: 0 Weekend: 1	1	1%	0	0
2000	112	31.66 se 12.01	20	10	5 se 5.05	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	2	1.8%	0	0
2001	71	32.85 se 4.91	10	99	37.50 se 15.63	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	2	2.8%	0	0

Table 10b. Sources of potential and actual disturbances at Duxbury Reef during 1999 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other
1999	-	-	-	-	-	1	-	-	1
2000	-	1	-	-	-	1	-	-	2
2001	-	-	-	-	-	6	-	-	6

Table 10c. Summary of seal responses to disturbances at Duxbury Reef during 1999 through 2001. Unknown is a disturbance which occurred prior to a survey, and the response level is unknown. See methods for definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1999	-	-	-	1	0%
2000	-	-	-	2	0%
2001	-	-	3	3	50%

Table 10d. Summary of the average numbers of disturbances per hour observed at Duxbury Reef during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 4	Weekday: 0	3.0	0	0
	Weekend: 7	Weekend: 2	6.0	0.33	0.79
2001	Weekday: 15	Weekday: 2	8.3	0.24	0.70
	Weekend: 17	Weekend: 4	9	0.44	1.12

Table 11a. Summary data for Point Reyes Headland, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	141	NA	24	466	NA	Weekday: 5 Weekend: 2	Weekday: 0 Weekend: 0	0	0	NA	0
1998	150	NA	24	282	NA	Weekday: 13 Weekend: 4	Weekday: 0 Weekend: 0	4	2.7%	1	3
1999	168	NA	38	431	NA	Weekday: 27 Weekend: 4	Weekday: 2 Weekend: 0	2	1.2%	0	0
2000	149	113.62 se 14.84	45	276	179.25 se 36.81	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	2	1.3%	0	1
2001	131	88.22 se 10.64	51	295	238.00 se 31.67	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	2	1.5%	0	0

Table 11b. Sources of potential and actual disturbances at Point Reyes Headland during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	-	-	-	-	-	-	-	-	-	**0**
1999	2	-	-	-	-	-	-	-	-	**2**
2000	-	-	-	-	1	-	-	1	-	**2**
2001	-	-	-	-	1	-	-	-	-	**1**

Table 11c. Summary of seal responses to disturbances at Point Reyes Headland during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey and the response level is unknown. See methods for a description of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	-	-	-	-	0%
1999	-	1	-	1	0%
2000	-	1	-	1	0%
2001	1	-	-	-	0%

Table 11d. Summary of the average numbers of disturbances per hour observed at Point Reyes Headland during 2000 and 2001 sons. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 19	Weekday: 2	50.3	0.04	0.12
	Weekend: 3	Weekend: 0	9	0	0
2001	Weekday: 7	Weekday: 0	21.5	0	0
	Weekend: 8	Weekend: 1	27.3	0.04	0.07

Table 12a. Harbor seal census summary for the San Francisco Bay Area during the 1998 breeding season. NA = data not available.

Date	Location	Total Count	Pups
4/19/98	Jenner	140	5
	Tomales Bay	135	10
	Tomales Point	239	68
	Point Reyes Headlands	49	3
	Drakes/Limantour	499	67
	Double Point	412	71
	Bolinas Lagoon	106	31
	Fitzgerald Marine Reserve	107	7
	San Mateo Co.	65	10
	Sonoma Co.	0	0
	Sea Ranch	108	29
	South Bean Hollow	NA	NA
	Richmond Bridge	NA	NA
	Yerba Buena	NA	NA
	Mowry Slough	NA	NA
	Grand Total	**1,860**	**301**
5/3/98	Jenner	249	12
	Tomales Bay	290	11
	Tomales Point	192	52
	Point Reyes Headlands	62	20
	Drakes/Limantour	583	126
	Double Point	551	160
	Bolinas Lagoon	88	0
	Fitzgerald Marine Reserve	NA	NA
	San Mateo Co.	155	25
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	68	7
	Richmond Bridge	NA	NA
	Yerba Buena	NA	NA
	Mowry Slough	NA	NA
	Grand Total	**2,238**	**413**
5/6/98	Jenner	NA	NA
	Tomales Bay	290	30
	Tomales Point	437	48
	Point Reyes Headlands	102	18
	Drakes/Limantour	661	192
	Double Point	708	144
	Bolinas Lagoon	113	36
	Fitzgerald Marine Reserve	NA	NA
	San Mateo Co.	NA	NA
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	61	7
	Richmond Bridge	113	8
	Yerba Buena	110	2
	Mowry Slough	NA	NA
	Grand Total	**2,595**	**485**
5/30/98	Jenner	NA	NA
	Tomales Bay	218	14
	Tomales Point	214	17
	Point Reyes Headlands	113	14
	Drakes/Limantour	429	96
	Double Point	585	13
	Bolinas Lagoon	120	25
	Fitzgerald Marine Reserve	217	6
	San Mateo Co.	NA	NA
	Sonoma Co.	183	16
	Sea Ranch	NA	NA
	South Bean Hollow	68	10
	Richmond Bridge	121	4
	Yerba Buena	129	4
	Mowry Slough	10	0
	Grand Total	**2,407**	**219**
6/28/98	Jenner	NA	NA
	Tomales Bay	218	2
	Tomales Point	504	2
	Point Reyes Headlands	282	1
	Drakes/Limantour	932	3
	Double Point	573	12
	Bolinas Lagoon	151	3
	Fitzgerald Marine Reserve	102	2
	San Mateo Co.	134	27
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	89	1
	Yerba Buena	122	0
	Mowry Slough	128	0
	Grand Total	**3,235**	**53**

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Table 12b. (Page 1 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
4/18/99	Tomales Bay	187	23
	Tomales Point	103	9
	Point Reyes Headlands	53	6
	Drakes/Limantour	458	74
	Double Point	558	123
	Bolinas Lagoon	104	13
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	114	21
	Yerba Buena	72	3
	Mowry Slough	243	78
	Grand Total	**1892**	**350**
4/25/99	Tomales Bay	308	47
	Tomales Point	35	0
	Point Reyes Headlands	55	12
	Drakes/Limantour	615	208
	Double Point	890	283
	Bolinas Lagoon	147	40
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	108	18
	Yerba Buena	113	4
	Mowry Slough	135	62
	Grand Total	**2406**	**674**
5/10/99	Tomales Bay	625	143
	Tomales Point	232	75
	Point Reyes Headlands	74	29
	Drakes/Limantour	922	237
	Double Point	648	163
	Bolinas Lagoon	146	48
	San Mateo Co.	512	89
	Russian River.	208	24
	South Bean Hollow	NA	
	Richmond Bridge	111	21
	Yerba Buena	NA	NA
	Corte Madera	7	1
	Brooks Island	17	3
	Mowry Slough	132	43
	Grand Total	**3634**	**876**
5/16/99	Tomales Bay	260	55
	Tomales Point	380	71
	Point Reyes Headlands	116	38
	Drakes/Limantour	463	138
	Double Point	738	325
	Bolinas Lagoon	NA	NA
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	108	12
	Yerba Buena	95	7
	Mowry Slough	76	18
	Grand Total	**2236**	**664**

Table 12b. continued next page

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Table 12b. (Page 2 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
5/30/99	Tomales Bay	214	35
	Tomales Point	63	13
	Point Reyes Headlands	88	15
	Drakes/Limantour	293	45
	Double Point	411	81
	Bolinas Lagoon	164	50
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	127	5
	Yerba Buena	110	0
	Mowry Slough	55	7
	Grand Total	**1525**	**251**
6/6/99	Tomales Bay	192	NA
	Tomales Point	147	NA
	Point Reyes Headlands	73	13
	Drakes/Limantour	297	31
	Double Point	428	62
	Duxbury Reef	98	10
	Bolinas Lagoon	142	38
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	139	7
	Yerba Buena	144	1
	Mowry Slough	92	8
	Grand Total	**1752**	**170**

Date	Locations	Total Count	Pups
6/30/99	Tomales Bay	347	0
	Tomales Point	209	0
	Point Reyes Headlands	FOG	FOG
	Drakes/Limantour	624	0
	Double Point	483	0
	Bolinas Lagoon	NA	NA
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	117	2
	Yerba Buena	181	2
	Mowry Slough	203	0
	Grand Total	**2164**	**4**
7/17/99	Tomales Bay	319	-
	Tomales Point	460	-
	Point Reyes Headlands	431	-
	Drakes/Limantour	995	-
	Double Point	300	-
	Duxbury Reef	NA	-
	Bolinas Lagoon	288	-
	San Mateo Co.	NA	-
	Russian River	NA	-
	South Bean Hollow	NA	-
	Richmond Bridge	83	2
	Yerba Buena	NA	NA
	Mowry Slough	135	0
	Grand Total	**3011**	**2**

Table 12b. continued next page

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Table 12b. (page 3 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
7/28/99	Tomales Bay	284	0
	Tomales Point	261	0
	Point Reyes Headlands	190	0
	Drakes/Limantour	451	0
	Double Point	32	0
	Bolinas Lagoon	251	0
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	107	0
	Yerba Buena	137	0
	Mowry Slough	117	0
	Grand Total	**1830**	**0**

Drakes Estero eelgrass, oyster bag, and oyster rack assessment
Trip Report - 3/20/2007

Crew: Don Brown, GIS Specialist, Point Reyes National Seashore
Ben Becker, Marine Ecologist, Point Reyes National Seashore

Equipment: 13 ft Alumicraft skiff with 15 hp 4-stroke outboard motor.
Trimble GeoExplorer3 GPS with real-time differential correction.

03/13/2007
Oyster rack, bag, line and eelgrass assessment

Objectives

1. Map all oyster racks in the estero and categorize as active, inactive or dilapidated. Dilapidated racks were defined as those considered too deteriorated for use.
2. Document any apparently recent repair work done to racks.
3. Map all oyster bags and line systems.
4. Report eelgrass occurrence (dense/patchy/absent) both adjacent and beneath all racks, bags and lines

Field Methods: We launched from Drakes Bay Oyster Company (DBO) at ~11 AM and a + 3 ft tide, and traveled from North to South visiting all racks in the Estero. At each rack, we recorded whether the rack was surrounded by dense or patchy eelgrass, if eelgrass was present beneath the rack, the percentage of the rack currently occupied with oysters (= percent active), and the percent of the racks dilapidated. We mapped all visible bag systems along the intertidal and investigated all marker poles that are often used to mark where bags are kept. Survey was completed at ~2:45 PM and tide appeared to be about 0 ft.

Summary Results: There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There were 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor

seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero.

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

03/20/2007
Eelgrass satellite imagery ground truthing

Objectives

1. Ground truth satellite imagery classification of eelgrass beds.
    - Imagery used for classification was one-meter color digital orthophoto taken August 2005 at low tide classified using Erdas Imagine software.
2. Document any additional racks, bag or line systems not seen on day 1.

Field Methods: Beginning at ~ 10:30AM on 03/20/2007 at about a 0 ft tide, we surveyed the estero to ground truth a draft eelgrass bed map derived from satellite imagery. We traveled the perimeter of the eelgrass beds to verify changes from eelgrass to bare substrate, as well as to verify that eelgrass was dense or patchy within beds. We defined dense as close to 100% cover, patchy was considered down to 40% cover. We also verified that vegetation classified as eelgrass was not *Sargassum muticum* (as happened near the mouth of the estero) or enteromorphic algae (as occurred near some of the seal haul out sand flats in the middle of the estero). We took a total of 243 points throughout the estero noting eelgrass presence/absence/ dense/patchy to reclassify the satellite derived map to reflect actual field conditions. The survey was completed at ~1:30 PM and tide appeared to be about +3 ft.

Summary Results: In the field, the vast majority of satellite derived eelgrass classification appeared correct. Two shortcomings were that (1) channels are too deep to see eelgrass, even at low tide and (2) that during high tide in waters > 4 ft deep with windy conditions, choppy waters, and low sunlight, it was often difficult to see past 3 ft from the surface. In these instances we traveled very slowly until we came to an area shallow or calm enough to see bare bottom or eelgrass.

After analyzing ground truth data, ~ 95% of ground observations appeared to match to satellite image classification. Discrepancies mostly occurred in the southern part of the bay because of misclassification of *Sargassum muticum* and enteromorphic algae, as mentioned previously.

We calculated that 740 acres of the estero are covered by eelgrass, 355 acres dense, and 385 acres patchy. Oyster operations in eelgrass represent ~ 8.5 acres. We calculate that 8 acres (some dilapidated racks have patchy regrowth) of eelgrass beds are lost in Drakes Estero due to mariculture. Another factor affecting eelgrass beds which was noticed was boat propellers. It can be seen from aerial and satellite photos where regular boat paths have cut paths through eelgrass; these calculations do not reflect this factor which will necessitate further study.

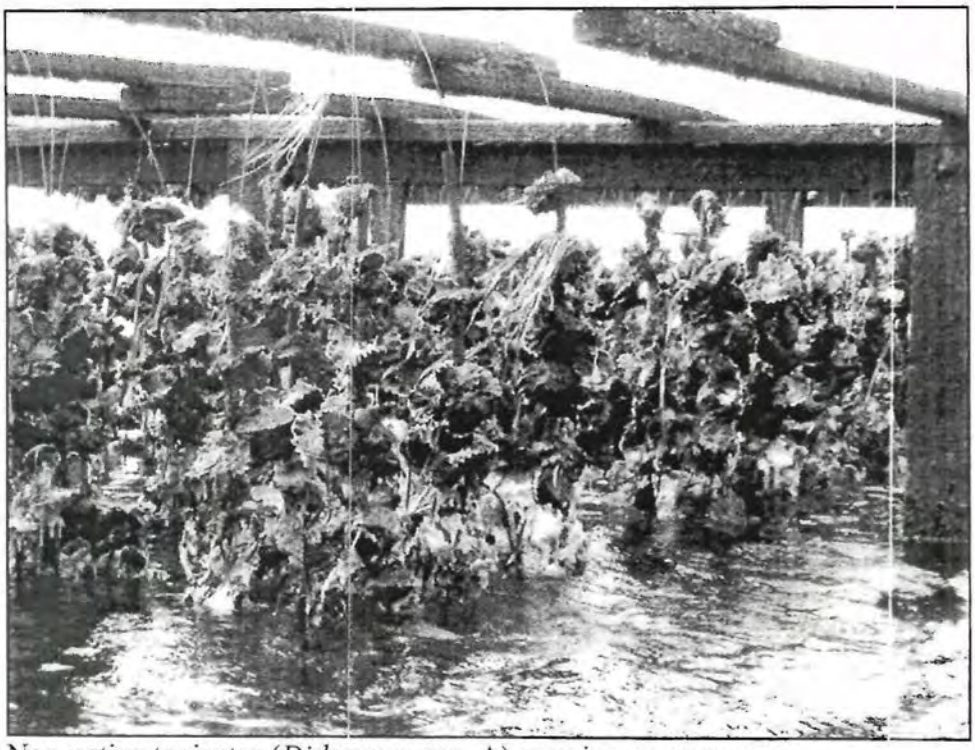
We also documented three additional intertidal oyster bag systems not identified during the first survey.

Summary Statistics

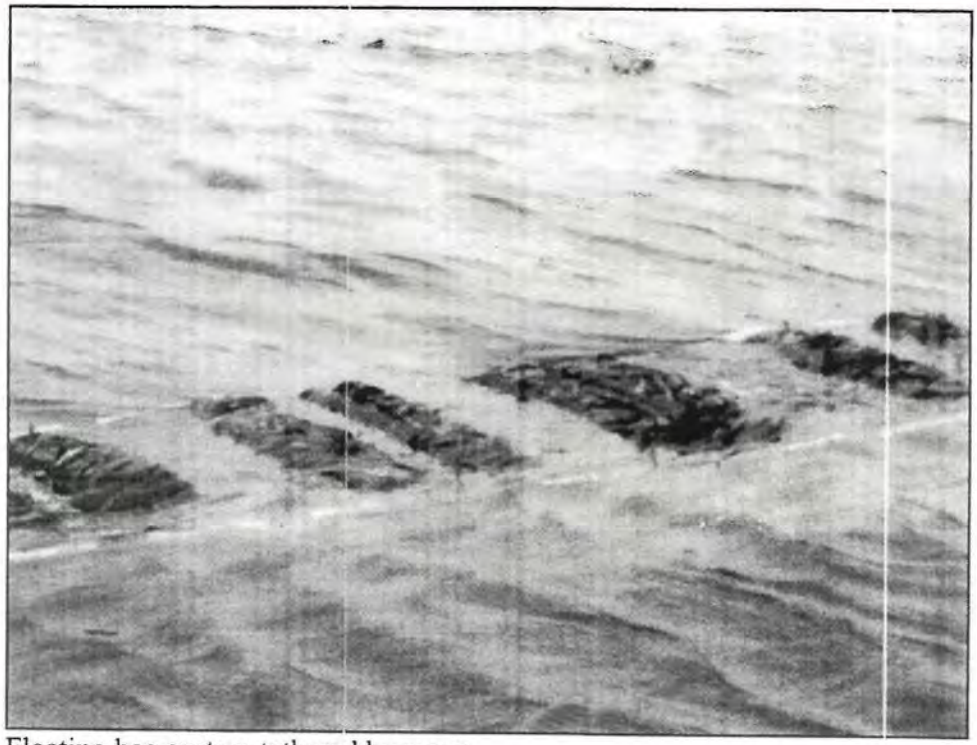
Total Oyster Racks	**93**
Usable Oyster Racks	**66**
Dilapidated racks	**27**
Percentage of racks in eelgrass beds	**96% (89 of 93)**
Percentage of usable racks with eelgrass underneath	**0%**
Percentage of dilapidated racks with eelgrass regrowth	**26% (7 of 27)**
Acres of eelgrass lost to racks	**8 acres**
Number of intertidal oyster bag areas	**12**
Acreage of intertidal oyster bag sites	**10 acres**
Total eelgrass acreage in the Estero	**740 acres**

Images

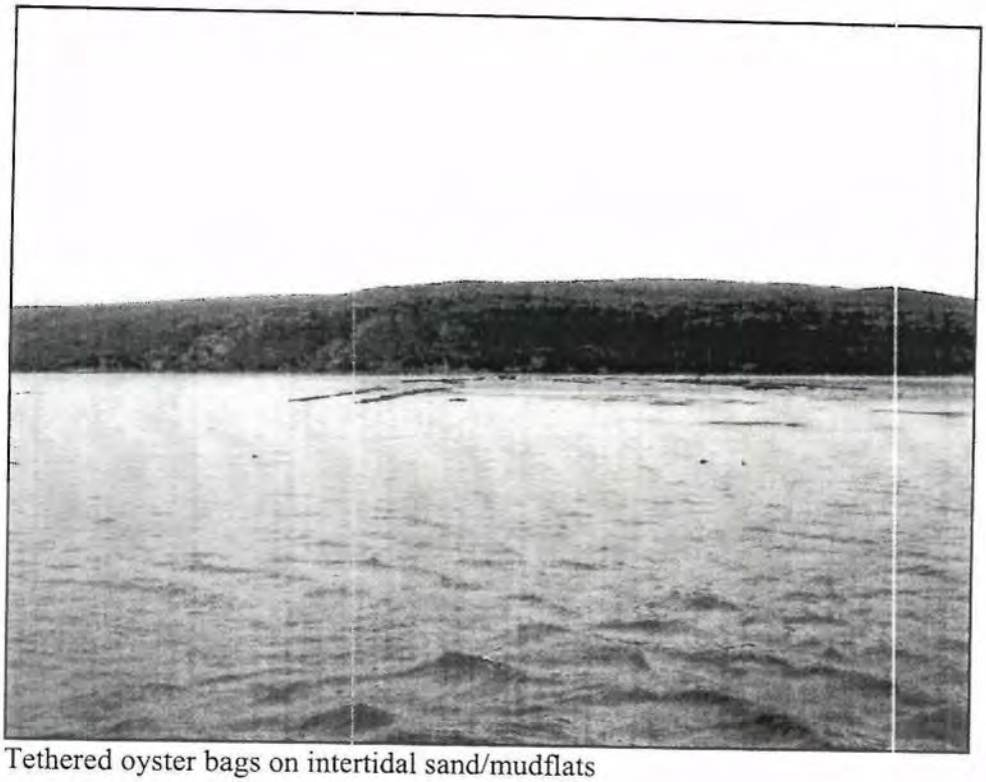
Active oyster racks in Drakes Estero.



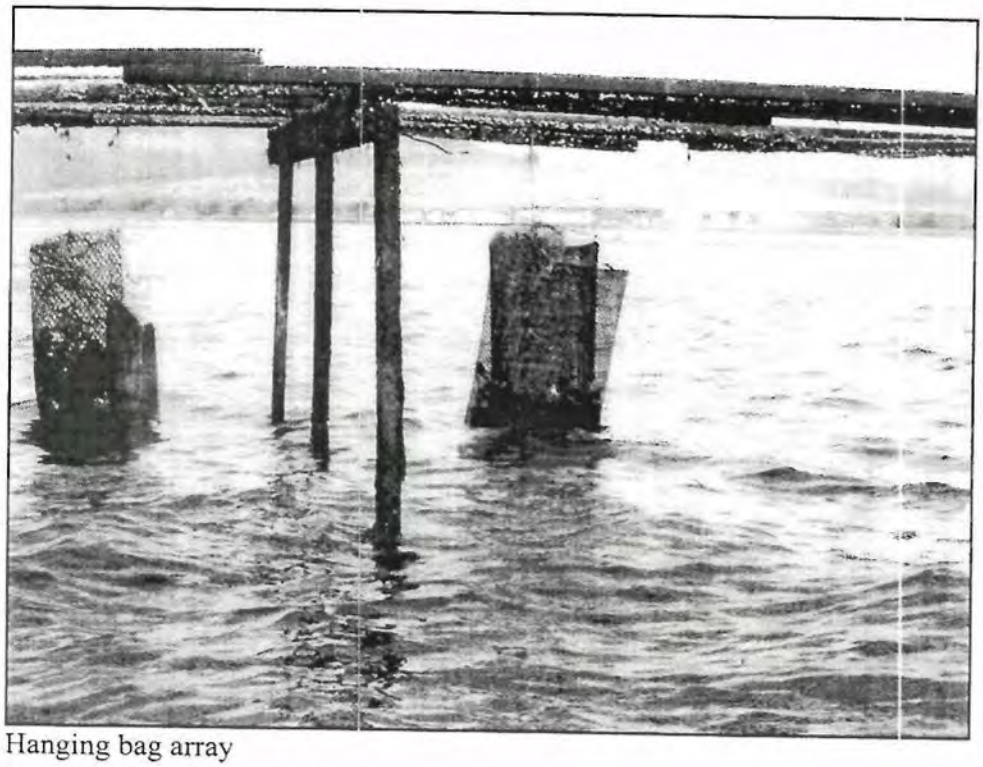
Non-native tunicates (*Didemnum* spp. A) growing on oysters.



Floating bag system tethered by ropes.



Tethered oyster bags on intertidal sand/mudflats



Hanging bag array

Trip Report
Drakes Estero
4/13/07
3:45-5:00 PM

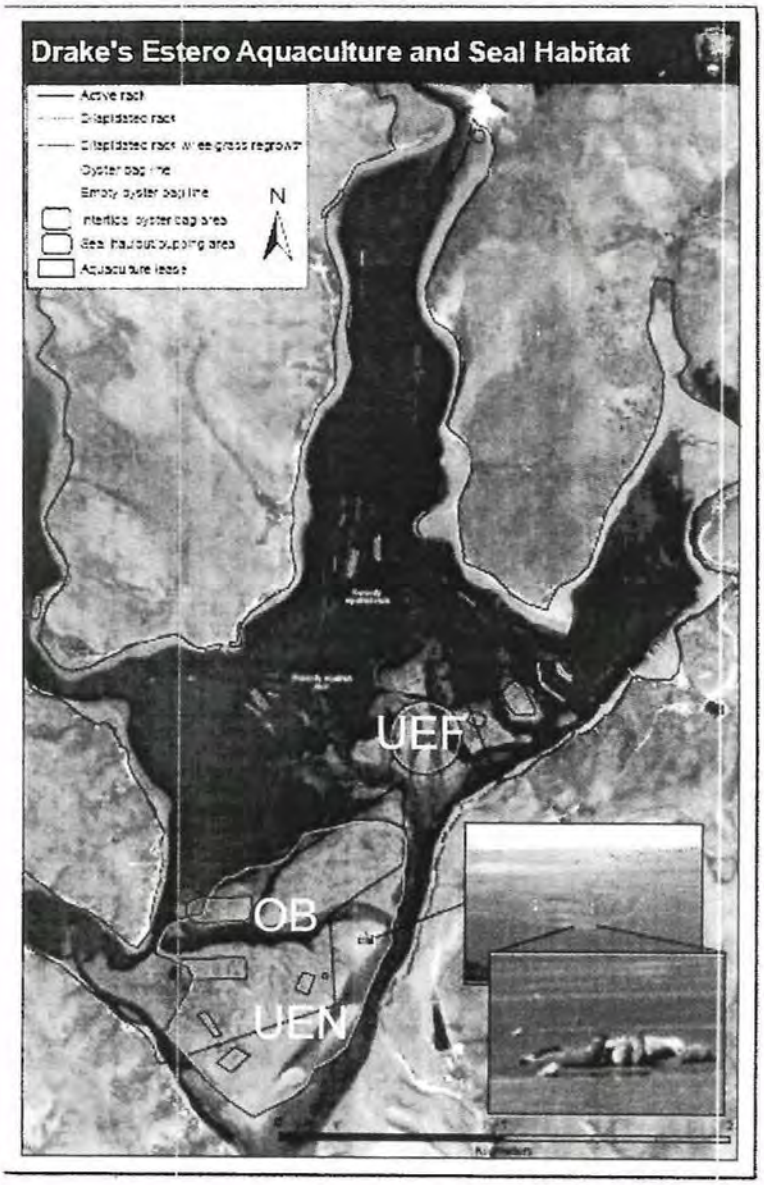
Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Friday during the afternoon low tide to count harbor seals and to determine the distribution and number of oyster bags on the seal haul out sites.

I arrived at 3:40 PM and met a volunteer who surveys harbor seals who had been present since 1:45 PM. She stated that she had observed 2 people in a boat tending oyster bags at the OB sand bar (see map) at around 2:30 PM. There were no seals present on the OB sand bar and the number at UEN was 133 with 21 pups, and the total count for the estero was 525, including 46 pups when she counted the seals at 2:20-30 PM.

When I conducted the survey at 4 PM, there were 10 seals present and 2 pups at the OB sandbar and 117 seals and 54 pups on UEN sand bar, a 157% increase in seals on the UEN sandbar. These two sites have historically had the higher numbers of females with pups likely because the pups are more protected from strong currents and the water is warmer in the middle of the estero. The total count for the estero was 618 including 88 pups, a 120% increase in pups after the boat left, even though it was late in the day. Seal numbers are highest mid day to mid-afternoon, depending on the tide level. The tide was low enough for the seals to haul out at 1:00 PM. For comparison of numbers on OB, in 2005 on April 12, there were 105 seals and 62 pups, and in 2004 on April 11, there were 169 seals and 36 pups.

I observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because of distance, I could not get an accurate count of bags, but the number of rows was around 20. The bags were adjacent to and directly on the haul out sites where the seals historically have hauled out in the past at OB and UEN (see map).


Drake's Estero Aquaculture and Seal Habitat
Active rack
Dilapidated rack
Dilapidated rack w/ eelgrass regrowth
Oyster bag line
Empty oyster bag line
Intertidal oyster bag area
Seal haulout buffer area
Aquaculture lease
N
UEF
OB
UEN

All other enclosures are located at Point Reyes National Seashore

enclosures

CENTRAL FILE COPY 2007-00433 #1 02.106 PORE

Environmental Assessment

Johnson Oyster Company
POINT REYES NATIONAL SEASHORE
Marin County, California

Environmental Assessment
Johnson Oyster Company
Marin County, Point Reyes National Seashore

May 1998
U.S. Department of the Interior
National Park Service
Point Reyes National Seashore

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Purpose and Need

This *Environmental Assessment (EA)* has been prepared to assist National Park Service (NPS) planning and decision making, and to determine whether an Environmental Impact Statement (EIS) is required for the proposed new facilities at the Johnson Oyster Company (JOC) Point Reyes National Seashore (PRNS). JOC is proposing the construction of a new oyster processing plant and the replacement and rehabilitation of several existing accessory structures located on the JOC Reservation of Use and Occupancy at Point Reyes National Seashore. The facilities are located 17171 Sir Francis Drake, Inverness, California (AP #109-130-17).

As a federal facility, the PRNS is subject to the provisions of the National Environmental Policy Act (NEPA), the basic national charter for environmental protection. NEPA requires an interdisciplinary study of the impacts associated with federal actions. For the PRNS, these requirements were initially met with the preparation of the *PRNS/Golden Gate National Recreation Area General Management Plan and Environmental Analysis* (NPS 1980). Because the proposed rehabilitation of the JOC involves new construction, an EA has been prepared to address site-specific impacts to determine whether further environmental review is necessary.

The purpose and need for this proposed project is to bring the JOC into compliance with federal, state and Marin County regulations. Existing facilities do not currently meet federal, state, and county health and safety codes. Failure to perform the necessary improvement would result in Marin County and the NPS issuing cease and desist orders for operation of the facility.

Section 7 of the Endangered Species Act
Section 7 of the Endangered Species Act directs federal agencies to further the purposes of the Act. Under provisions of the Act, federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded or carried out by the agency does not jeopardize the continued existence of listed species or critical habitat. The NPS initiated informal consultation under Section 7 in May 1997 on this project. Based on informal consultation, the NPS has concluded that the proposed action would not adversely affect any federally listed species or critical habitat.

Section 106 of the National Historic Preservation Act
Section 106 of the National Historic Preservation Act requires federal agencies to take into account the effects of their actions on properties listed on the National Register of Historic Places. Because none of the buildings are listed on the List of Classified Structures, or determined eligible or listed for the National Register of Historic Places, the proposed action would not adversely affect an historic property.

Other Environmental Compliance Provisions
Because this project is being reviewed jointly by the County of Marin and the National Park Service, this document has been voluntarily prepared to meet the

requirements of the California Environmental Quality Act (CEQA), Sections 15063A2 and 15221. This EA is incorporated into the Initial Study Checklist in its entirety.

Other environmental provisions which may affect this project are the following:

Americans with Disabilities Act 1990
California Coastal Act
Archeological Resources Protection Act
Clean Water Act

Relationship to Other Plans and Projects

General Management Plan (GMP), Point Reyes National Seashore (NPS 1980) places JOC in a special use zone. These are lands on which the NPS does not have complete jurisdiction, or upon which activities are permitted other than preservation and visitor use. The GMP calls for the JOC to continue until the reservation of use and occupancy expires.

The Statement for Management for Point Reyes National Seashore (NPS 1993) discusses JOC Reservation of Use and Occupancy but does not discuss its long-term future.

Marin Countywide Plan (1994) identifies the project area as Coastal Recreational Zone. Within this zone, the county supports and encourages mariculture for the purposes of producing food, enhancing, and restoring fisheries stock, and contributing to the State of California's economy. The plan states that the need for mariculture sites must be balanced with protection of coastal wildlife, water, and visual resources.

Marin County Local Coastal Program, Unit 2 discusses agriculture and aquaculture and encourages the continuation of this industry in the coastal zone.

Marin County Code Title 22 (Zoning). The proposed project is consistent with the Coastal Open Space District (C-OA) zoning which allows appurtenant waterfront uses (Chapter 22.57.130). The project must prescribe conditions that will assure the promotion of agriculture, preserve scenic beauty, and maintain such land in a permanent open state.

Issues and Impact Topics

This document, prepared by the NPS and the County of Marin, in cooperation with JOC, evaluates three alternatives and the impacts associated with these actions. Evaluation of the project site has identified the following issues of potential concern and provides the basis for the analysis of alternatives: impacts on natural resources, such as soils, threatened and endangered species, water resources and wildlife; impacts on visual quality; impacts on noise; impacts on public health and safety; impacts to public services and utilities; and impacts on cultural resources.

These issues of concern were developed from public scoping and the CEQA Initial Study Checklist located in Appendix E. Those issues, from the Checklist, that were identified as potential concerns are evaluated in the Environmental Consequences section of the document. The Initial Study Checklist summarizes the EA and is adequate to meet the requirements of CEQA Section 15063A2.

Reports Filed

All reports regarding this project will be filed and available at the Headquarters, Point Reyes National Seashore. This includes the project's final monitoring plan, the JOC safety plan, the PRNS Hazardous Waste Plan, Marin County building permits and approvals, and the California Department of Health Services permits.

Alternatives, Including the Proposed Action

Alternative A: No Action

This alternative will leave the site in its present condition; no demolition of buildings would occur. New buildings and septic system would not be constructed. No site improvements would be constructed for parking or public interpretation. JOC would continue to haul sewage daily to a permitted disposal site. Under this alternative, the JOC would fail to comply with county, state, and federal regulations related to health, safety, and building codes.

Alternative B: The Proposed Action: Rehabilitation of Two Facilities and Construction of a New Processing Facility

This proposed alternative will remove the processing plant, seed plant. stringing plant, and garage and replace with new structures. The replacement structures with sizes are: garage, 900 square feet (sf); seed plant, 2,625 sf; stringing plant, 500 sf; and a two story processing plant, 7,600, sf. Total square footage for these new structures will be 11,625 sf. Existing sf is 8,327. No work is proposed for any of the residential structures located on the property. However, fencing will be placed adjacent to the residential structures to screen them from public facilities to provide privacy.

The new processing plant would be moved approximately 100 feet from its current location directly adjacent to the shoreline. Other structures would be located in existing sites. Appendix C provides detailed drawings of this option.

A new septic system, approximately 3000 feet east of the processing plant and two acres in size, would be constructed to accommodate the rehabilitated facilities (See Appendix D for detailed drawings). The NPS would issue a special use permit to accommodate this use. The proposed site was selected because of its acceptable percolation ability and because it is located outside the immediate watershed of the Estero. The new buildings would include a gray water drainage system; waste water would be pumped to the rehabilitated former leach field (.25 acre) field above and south of the JOC facility.

No major changes in the topography is necessary. The proposed site for all new, rehabilitated and replacements structures is relatively flat. All structures will be slab on grade and all drainage will be sloped away from building and use the natural drainage pattern where appropriate.

Gravel entry and parking areas will be developed on the northern extent of the property. Twenty-two parking spaces will be developed, including the appropriate number of handicap spaces. Picnic tables will be placed at the entrance to the facility adjacent to the parking area.

Once the site has been cleared of all debris, the site will be evenly graded and revegetated with native vegetation.

Alternative C: Rehabilitation of Existing Structures Only

This alternative is similar to alternative B, except the processing plant would be reconstructed/rehabilitated at its current location which is directly adjacent to the Estero. The new facility will be the same in terms of overall scale and types of materials.

All other site amenities such as parking and other facilities would be constructed as in Alternative B. The leach field and sewage system also would be constructed as in Alternative B.

Alternatives Considered but Rejected

The removal of the entire complex was rejected as an alternative. JOC has a Reservation of Use and Occupancy (lease-hold interest) until the year 2012. The existing *GMP (NPS 1980)* calls for the continuation of an oyster operation within the park. PRNS is currently in the process of updating and revising the existing GMP which will need to address the issue of JOC lease hold interest.

Affected Environment

Project Site Description
JOC, Drakes Estero, Marin County, California is located within the Point Reyes National Seashore, approximately 30 miles northwest of San Francisco. Drakes Estero, an estuary where freshwater runoff mixes with saltwater, encompasses approximately 2,380 acres and is about 3.5 miles in length from its mouth. JOC operates in the Estero on two state aquaculture leases having a combined area of 1,600 acres. The project area is approximately five acres in size and is located directly adjacent to Drakes Estero. See Appendix A for project location map.

Reservation of Use and Occupancy
JOC, and its successors and assigns, has a terminable right to use and occupy the five acres until the year 2012 "for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items, the interpretation of oyster cultivation to the visiting public, and residential purposes reasonably incidental thereto." The PRNS GMP is currently is being revised. An issue to be addressed is the long-term status of the lease agreement past 2012.

History
The original allotment of which the subject operation now grows its oysters was recorded on January 18, 1934. It was recorded in the name of David C. Drier, for the purpose of growing oysters. The first transfer was to Drakes Bay Oyster Company on March 30, 1935 (Harding Appraisal 1972). Later transfers occurred in 1954 to the Van Camp Sea Food Company. In 1955, the Coast Oyster Company held the allotment which was a wholly-owned subsidiary of Van Camp Food Company. On November 18, 1960 Coast Oyster transferred the allotment to Charles Johnson, who assigned the allotment to JOC. When transferred from Coast Oyster to Charles Johnson, the price paid was $75,000 according to Charles Johnson, with an additional $35,000 being paid for the existing oysters and buildings.

Improvements
Except for the oyster racks in the bays, the majority of the improvements associated with JOC are located withinon the five acre reserved parcel. However, the seed plant and stringing plant are currently located outside the reserved area. Building improvements include the processing plant, a seeding building, office, main residence, four trailers, and cabin.

Processing Plant. This structure, constructed in 1948, contains a total of 3,600 sf and has a concrete and frame construction with a concrete foundation. The roof has hip construction and roll composition covering floors are concrete. An office complex was added at a later date on the second floor. In addition, the building contains another 400 sf of office and storage. A cold storage room (80 sf) is attached to the main processing plant. Two detached containers associated with the operation of the plant are approximately 560 sf. A lunch room and associated trailer (893 sf) were added to the site. These buildings do not currently meet health, safety, and building codes. In total, existing square footage in the processing plant and associated structures is 5,533 sf.

Main Residence. The main residence has a floor area of 1,385 sf and a covered porch area of 60 sf. This structure was constructed in 1956.

Cabin. The cabin is approximately 672 sf and is constructed of wood with a concrete pier foundation.

Seed Plant. The seed plant, for growing small larval oysters before placement in the estuary, is located on the south side of the project area, is 2,178 sf, and is currently in poor condition.

Stringing Plant. The stringing plant is used for preparing oysters for placement in the estuary. This 616 sf structure is constructed of sheet metal with a wood frame and is in poor condition.

Utilities

Pacific Gas & Electric Company (PG&E) provides electrical service in the project area. Pacific Bell provides telephone service to the project area. Both services are currently available to the JOC. No natural gas, municipal water or sewage service is available. JOC must maintain their own sewage and water systems. One potential source of pollution is the JOC sewage septic field which failed in early 1994. The original Marin County Septic Permit was for seven bedrooms. When the septic field failed, 12 trailers plus the two residences were on the site, clearly exceeding the capacity of the system. Since that time, all sewage has been pumped daily from the septic tank and transported to a waste disposal facility. In addition, eight trailers have been removed from the site.

The site also has a waiver from the Regional Water Quality Control Board to operate a leach pit for rinse water from the oyster processing plant.

Geology, Topography, Soils

Geologically, land at JOC is part of the Drakes Bay Formation the foundation is comprised of marine sediments that filled the basin between Inverness Ridge and the Point Reyes Headlands toward the end of the Tertiary age during the early Pliocene epoch (about eight million years ago). The site is relatively flat, with major portions of the site having been compacted due to road use. Road base material has been supplemented with crushed oyster shells. Tomales-Steinbeck soils exist at the JOC project site. These soils, derived from soft sandstone of the underlying Drakes Bay Formation, are deep (to about four feet) and moderately well drained.

Vegetation

The project area has vegetation typical of those plant communities found in northern coastal scrub characterized by densely packed shrubs less than 6 feet tall interspersed with scattered grassy openings. This scrub community is found on windy, exposed sites with shallow soils. Most flowering takes place in late spring and early summer. Typical species include California sagebrush, bush lupine, coyote bush, bush monkeyflower, and poison oak. Weedy exotic species, such as scotch broom and poison hemlock, are also present on the site. One intermittent drainage is fed by springs transecting the property. A large pond is located on the northern edge of the project area. Tidal salt marsh species, predominately pickleweed and saltgrass, are located on the northern edge of the project area.

Cultural Resources
The project area does not contain any structures that have been placed on the List of Classified Structures determined eligible for the National Register of Historic Places. An archeological site does exist at the southern edge of the project site. Marin 296 is a shell midden which has suffered extensive damage from cultural modifications over time. These include fencing, grazing, impoundments of stock, grading, gardening, and the dumping of oyster shells.

Wildlife
Drakes Estero provides approximately 2,380 acres of shallow estuary habitat for a variety of wildlife. A large number of shorebirds and migratory waterfowl species utilize the habitat, particularly during the winter months. The estuary also serves as an important pupping ground for harbor seals, whose population ranges between 700 to over 1,000 individuals year-round. Coyotes, gray fox, mountain lions, bobcat, black-tailed deer, striped skunk and other small mammals are known to occur in the area.

Invertebrates
Drakes Estero, an estuary where freshwater runoff mixes with saltwater, encompasses approximately 2,380 acres. The rich habitat of the estuary supports a variety of intertidal life such as various species of clam, ghost shrimp, phoronid worms, geoducks, moon snail, and hundreds of other invertebrate species. The estuary borders the western edge of the project area.

Special Status Species
No special status species, such as threatened or endangered plants or animals, are found in the project site area. Brown pelicans, brandt geese, and peregrine falcons are known to occur in the vicinity of the project area. See Appendix B for correspondence from the U.S. Fish and Wildlife Service identifying special status species in the vicinity of the project site.

Recreation
Drakes Estero is accessible to kayaks and canoes at the JOC Schooner Bay facility and via Drakes Bay. Access from Drakes Bay is possible only during high tides, and the shallow nature of the Estero, as well as the presence of a sand bar across the mouth of the Estero, discourages kayakers and canoeists. The only motorized watercraft allowed on the Estero are the JOC work boats and barges. The Estero has been designated "potential wilderness"; therefore, recreational motorboats are prohibited by regulation.

Environmental Consequences

Environmental impacts associated with each alternative are addressed below:

Alternative A: No Action (Continue to operate under current conditions)

Impacts on Natural Resources

Under the No Action alternative, impacts on natural resources would be limited to those associated with natural processes and human activities already occurring on site.

Vegetation. Under this alternative, impacts associated with vegetation would be limited to those associated with human activities already occurring at the site. Negative impacts would occur as non-native plants continue to flourish at JOC.

Water Resources. Some potential negative impacts could occur due to sewage spills if hauling continues off-site. Sewage could be spilled on the roadway and into the estuary if an accident occurred.

Air. Because the current facility does not emit pollutants, this alternative would not produce or adversely affect air quality.

Wildlife. Some potential negative impacts could occur if JOC continues hauling sewage off-site. Sewage could be spilled on roadway and into the estuary if an accident occurred. This could potentially damage wildlife species should the water become contaminated.

Threatened and Endangered Species. Since no federally listed or special status species have been detected on the project site, there will be no effect on threatened or endangered species.

Soils and Topography. No new ground disturbance or change to topography would occur under this alternative. Therefore, no new impacts would occur as a result of this alternative.

Conclusion. Although there would be no further ground disturbance, topography change, and no improvements to the area, non-native plants would continue to flourish if site restoration is not accomplished. In turn, negative impacts could occur to water quality and wildlife from improper sewage treatment and potential sewage spills due to current practices of off-site treatment of waste.

Impacts on Cultural Resources

There would be no direct impact on archeological or historic structures as a result of this alternative. However, disturbance to the archeological site that has occurred in the past may continue. This could result in a negative impact to the archeological site. No historic structures would be adversely affected.

Conclusion. Under this alternative, the NPS would continue to monitor and fence the archeological site in the area to deter any additional impacts. Therefore, no new impacts are anticipated.

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Impacts on Visual Quality

Negative impacts would continue. Current structures were not designed to visually accommodate the landscape and are in serious need of repair. The site also has debris stored around the facilities that would continue to visually impair views toward the estuary.

Conclusion. No new impacts would occur. However, negative impacts from the dilapidated buildings would continue to impair scenic views of the estuary.

Impacts on Human Health and Safety

Under this alternative, the JOC would fail to comply with local, state, and federal regulations. This alternative would constitute an adverse impact on health and human safety. In addition, failure to comply with building codes for life and safety would pose a potential threat to anyone in or near the buildings.

Conclusion. Significant negative impacts to human health and safety would continue to occur due to noncompliance with health and safety codes.

Impacts on Noise

Noise levels would continue to be at the same levels; no positive or negative impacts anticipated. Limited noise is currently generated by worker activity, occasional use of heavy equipment, and motorboat use.

Conclusion. Since there will be no construction activities, there would be no new disturbance or inconvenience to park visitors as a result of this alternative.

Impacts on Public Facilities and Services

Water Supply. Under this alternative, water supply and amount of use would remain unchanged.

Roadways and Public Transportation. Under Alternative A, public roadways would remain unaffected.

Energy Consumption. Energy consumption, because of the potential closing of the facility, would be reduced. Changes are insignificant because of the small amount of electricity currently used by Johnson Oyster Company.

Fire Protection. No change to fire protection services would occur under this option.

Schools. No change to enrollment in local schools would occur under this alternative. Residences in area are expected to remain constant.

Other Government Services. Under this alternative, no new government services will be needed.

Conclusion. Because this option may result in the continuation of Johnson Oyster Company on the site without new construction or the closing of the facilities, public services and utilities are not expected to be adversely affected. Some reduction of services needed may occur if the facilities are closed but the effect will be less than significant.

Impacts on the Local Economy

Negative economic effects could occur because JOC would eventually be closed due to noncompliance with federal, state, and local codes and regulations.

Conclusion. This alternative may negatively affect the local economy. However, because Johnson Oyster Company is a very small percentage of the total economy of Marin, the effect will be less than significant to the regional economy.

Alternative B: The Proposal: Construction of New Facilities

Impacts on Natural Resources

Vegetation. On the main construction site the proposed action would result in approximately three (3) acres of ground disturbance on a developed site dominated by non-native vegetation. To mitigate any potential negative impacts, in accordance with NPS management policies and guidelines, disturbed areas would be revegetated with native plant materials (e.g., seeds, cuttings, transplants) that originated from the genetic stock on site or from other adjacent sources. Revegetation efforts would be concentrated in and around the pond and shoreline to establish native salt grass, grindelia, and coyote brush.

The development of the main leach field and the rehabilitation of the former leach field will disturb approximately 2.25 acres of native coastal scrub/grassland dominated by coyote brush. Any impacts are expected to be mitigated by rapid regrowth of native vegetation in the leach field area and full restoration of the site is anticipated in 1-2 years. If necessary, any impacts will be mitigated by planting native vegetation in accordance with NPS revegetation policies.

The proposed project will not result in negative impacts to native vegetation, wetlands, stream/riparian habitat, coastal dunes, or significant adverse impacts to other sensitive habitats.

Water Resources. Some short-term minor impacts could result due to ground disturbance and grading. However, actions such as installing protection fencing and strategically placing straw bale berms would be taken to ensure that sediment and runoff from the construction site does not enter Drakes Estero or the adjacent pond. To eliminate the possibility of water contamination of the Estero, buildings would be equipped with internal drains that empty into a holding tank and pumped to an approved septic system.

Because this project primarily involves the rehabilitation of existing structures, surface runoff and drainage patterns will not be altered significantly or increased substantially. No impervious surfaces such as asphalt will be installed within the parking area; the area will remain as a graveled surface. Minor drainage swales will be installed behind the main building to drain storm water runoff to the estuary. Another drainage swale will be installed along the eastern edge of the building to drain storm water away from the building. No significant impacts are therefore anticipated.

No changes to surface or ground waters will result from this project. Grading will be minimal and limited to the construction area and will not increase existing flow. Storm water runoff will continue towards the estuary and adjacent pond and remain as natural as possible. Drainage will be reviewed and approved by the Marin County Department of Public Works. Because the current flow and drainages are not be significantly altered, less than significant impacts are anticipated.

Air. Oyster processing in the new facilities will not release significant types or levels of air pollutants. Heating systems, the only source of exhaust, will meet current

standards and codes. Some dust will be generated from construction activities; however, these impacts will be mitigated to less than significant levels by implementing mitigation measures, including watering of disturbed areas and covering the beds of trucks hauling material from the project site.

Wildlife. Existing noise and human activity levels coupled with the disturbed nature of the site make it highly unlikely that wildlife would reside on the grounds of the JOC. Those that do fequent the site are accustomed to human disturbance. It is doubtful that construction activities would result in permanent displacement of wildlife in the immediate area.

Because the proposed action would result in only temporary and localized impacts on wildlife, these effects are considered insignificant since animals and shorebirds would be expected to return to the area once construction and restoration activities are completed.

Because of the abundance of coastal scrub/grassland habitat adjacent to the proposed leach field site, recolonization of the area by birds and other species will occur over the long-term. During construction, there will be some short-term insignificant impacts to resident avian species such as wrentits and scrub jays as well as small mammals such as the brush rabbit and white-footed mouse.

Threatened and Endangered Species. Since no federally protected species or their host plants have been detected at the site, there would be no advsere effect on threatened or endangered species.

Soils. In addition to ground disturbance and minor grading that would occur, the potentially liquefiable soils are anticipated to need stabilization. Based on site conditions, compaction could be used to stabilize the soil beneath buildings and structures. All work would be closely monitored to minimize soil disturbance and its potential impact on the adjacent estuary.

To minimize ground disturbance, equipment and materials would be stock-piled on existing disturbed areas. Pockets of native vegetation would be identified and a combination of fencing and signing would be installed to protect these areas from disturbance during construction activities.

Topography. The project will not substantially change the topography; surface grading will be limited to minor alterations required to provide a level parking area and for foundation construction for the new facilities. Fill area for foundation construction will be approximately 9,000 sf in size. The estimated quantity of fill material is 170 cubic yards. Therefore, because the grade change will be less than 12 inches and fill will be minimal, less than significant impacts are anticipated on the site. To mitigate any unforeseen impact, a qualified soil engineer will investigate soil conditions to ensure long-term stability of proposed structures. The proposed project will not alter any unique geologic or ground surface features.

Conclusion. Under this alternative, no special-status species would be adversely affected. Some short-term impacts may occur to wildlife but would be temporary in nature. Water resources will be protected from impacts by mitigation measures to reduce potential impacts to less than significant levels. Ground disturbance and

change to topography will be minimal and monitored to ensure soil erosion does not occur. Overall, this alternative is not anticipated to have any significant impacts to natural resources.

Impacts on Cultural Resources

The site does not contain historic structures or significant cultural landscape elements. No ethnic cultural values or religious or sacred uses currently occur within the project area.

One disturbed archeological site is known in the area. The archeological site will be fenced temporarily during construction activities to ensure disturbance does not occur. The NPS will also stabilize the site to protect it from further disturbance. If any archeological material is found during construction, construction will stop and a qualified archeologist will evaluate the situation to mitigate any impacts.

Conclusion. With mitigation measures in place, no adverse effects are anticipated to occur to cultural resources.

Impacts on Visual Quality

The project will enhance the site's overall visual quality and views of and from Drakes Estero. The current buildings are in a dilapidated condition and are primarily located along the edge of the estuary. Because the main building will be located over 100 feet away from the estuary, the view south along the estuary will be greatly enhanced. In turn, wood fencing\screening on the east side of the complex will enhance views in this direction from the proposed parking lot. Unsightly trailers and other storage areas will be screened from public view by wooden fencing and vegetation.

The project incorporates height, mass and bulk characteristics that are proportional to the site. The new structures would maintain adequate setbacks from other structures in the vicinity and would not adversely impact existing scenic vistas within the Point Reyes National Seashore.

The proposed design of the new structures would better blend with the surrounding natural environment. Proposed colors and construction materials would compliment the surrounding natural environment, as well as integrate well with the existing residential units located nearby. Each of the new structures would maintain adequate setbacks from other structures in the vicinity and, therefore, no impacts upon the light, air or privacy of people living or working in nearby structures would occur.

Conclusion. This alternative will enhance the visual quality of the site by removing dilapidated buildings, removing debris, screening buildings from public view, and relocation of the main facility away from the estuary edge.

Impacts on Human Health and Safety

By bringing the complex into compliance with health and safety codes, JOC will no longer pose a health risk In addition, by modifying existing buildings and constructing new facilities to comply with building codes for life and safety hazards (e.g., fire detection, handicap access, seismic stability) to the operating staff at the site would be minimized.

The former septic system at JOC has been abandoned because of overall general failure. Under Marin County supervision, sewage is now being stored on-site and hauled to approved disposal area. New water and septic systems will ensure that ground water and the estuary system are not contaminated by JOC operations. All surface drains in the facilities will be connected to the gray water leach field for proper disposal. This gray water and septic systems will meet Marin County and State of California requirements. Monitoring requirements for the septic systems will be established by Marin County and the State of California. The new sewage systems with appropriate monitoring will reduce any potential discharge of pollutants to a less than significant level.

JOC is approximately five miles west of the San Andreas Fault. Because of the geology, there is a potential for a moderate susceptibility to ground shaking intensity. Also, the maximum ground shaking intensity potential is considered strong. To mitigate any impacts to less than significant, the new facilities will be constructed in conformance with Uniform Building Code (UBC), Chapter 16, (Zone 4) and fully meet standards for wind and earthquakes.

Liquefaction susceptibility is considered low in the Drakes Bay Formation.

Tsunami risk is considered low; the site is located three miles inland from the Pacific Ocean within a shallow estuary. The tsunami warning system through the National Weather Service and the Marin County Office of Emergency Services will be utilized to evacuate the site if necessary.

Historical records indicate that drainage at this site has been a problem when extreme high tides and major storm events occur simultaneously. Because these two events are predictable, sand bags and other mitigation measures will be implemented to reduce/eliminate hazards to humans or property. To mitigate any impacts to property, the main processing building will have a cement wall perimeter to limit potential flood waters from entering and all electrical equipment will be raised off the floor area.

Based on site investigations and historical records, the area is not prone to mudslides or landslides. Because of past minor slope failure on the southern bluff area, a retaining wall is planned for construction, and adequate space (25 feet) between the bluff and the main building will be maintained. These two actions will mitigate any impact to less than significant.

The proposed project area is situated near coastal scrub/grassland vegetation. The proposed facilities will contain flammable materials such as cleaners, lubricants, solvents and other potential hazards. In consultation with Marin County Fire Department, mitigation measures have been adopted to ensure the project will not significantly increase fire hazards in the area. These include access enhancements along the main entrance road, proper storage of hazardous material and waste, fully automatic sprinkler systems in buildings, proper removal of vegetation around complex, and adequate space around buildings for emergency vehicle access. In addition, the main objective of the project is the rehabilitation of buildings to meet current health and safety codes and reduce potential fire hazards.

All hazardous materials and waste, such as paint and oil, will be properly stored in the new facility and be in accordance with federal/state standards and regulations and the *Point Reyes National Seashore Hazardous Waste Management Plan*. In addition, all hazardous waste such as paint and oil will be disposed of according to the *Hazardous Waste Management Plan*. No pesticides are used by JOC. As no major or unusual quantities of explosives or hazardous materials will be present on the project site during construction or when improvements are completed, the likelihood of an explosive hazard is extremely remote and deemed insignificant.

Conclusion. Code compliance upgrades will have a positive effect on human health and safety. Once the buildings and septic system meet current codes, they will no longer be a health and safety risk to park visitors and JOC staff. In addition, once hazardous material is properly stored and disposed of, potential impacts to visitors and JOC staff will be minimal and not significant. Building and site improvements will also improve fire safety.

Impacts on Noise

The proposed project will result in the periodic generation of noise associated with short-term construction activities. Vehicles traveling to and from the site will result in the generation of intermittent low levels of noise. Although ambient noise levels in the surrounding area are expected to increase during construction, the construction-related noise would represent a temporary increase of limited duration, and therefore, is not considered a significant impact. In addition, all construction activity will be regulated by the County's Design Review and building permit process, in compliance with standard regulations controlling permitted hours of activity and permitted noise levels.

Conclusion. Some short-term impacts to local residents related to noise will occur during construction. However, there will be no new long-term impacts.

Impacts on Public Facilities and Services

Water Supply. Johnson Oyster Company has a County regulated well water supply operated under a permit from the National Park Service. No other public or private entities utilize this water source. Therefore, no impacts to other public water sources will occur.

Roadways and Public Transportation. The buildings are replacement structures and not an expansion of the existing facilities. Therefore, no new transportation impacts are anticipated. Because overall traffic is generated primarily by recreational users, some increase in the use of Sir Francis Drakes may occur over the next 15 years, but the increase will be related to park visitation. Park visitation, however, peaked at 2.6 million in 1992 but has dropped over the last five years to 2.4 million in 1996. The NPS anticipates park visitation will slowly increase approximately 2-3% per year. The Point Reyes National Seashore GMP does not call for any additional facilities in the north district of the park which would have a cumulative impact with this proposed project on traffic. No public or NPS transportation facilities are available in the area. Therefore, this project will have a less than significant impact on traffic and public transportation facilities.

Energy Consumption. Energy use is anticipated to increase only slightly, approximately (10%), because of the small increase in square footage. Current energy use is estimated at 5,000 kilowatts per month.

Fire Protection. Increased square footage of replacement buildings will add minor impacts to Marin County Fire Department responsibilities. In addition, based on correspondence with Marin County Fire Department, improvements to street and site address labeling, road access, water storage, and facility automatic fire sprinkler systems will be needed. These improvements will be added to the overall JOC plan for the site to mitigate impacts as directed by the Marin County Fire Department and NPS. With these mitigation measures, the impact will be minimized and less than significant.

Police Protection. NPS is the primary law enforcement agency in the project area. No increase in service is anticipated. Marin County Sheriff's Department currently provides adequate back-up law enforcement protection to the subject property. No increase in this service is necessary. Therefore, less than significant impacts will occur.

Schools. The project will not increase housing or number of employees working at JOC. Because there will be no increase in housing or number of employees, school children attending local schools is not anticipated to change and will remain at current levels. Therefore, a less than significant impact will occur to the Shoreline School District.

Other Government Services. Because of the small scale nature of this project, no new governmental services will be needed. Current facilities are being upgrade to meet current codes and correct deficiencies.

Utilities. Pacific Gas and Electric Company has adequate facilities in the project area to provide service to the proposed project. Only a minor increase in power and propane is anticipated. No new phone or communication services will be required for the project.

Conclusion. Public facilities and services, such as fire, police, public services and utilities, and schools will not be significantly increased or adversely affected.

Impacts on the Local Economy

No positive or negative impacts are anticipated. Construction costs are estimated to exceed $500,000.

Conclusion. Under this alternative, JOC will continue to operate and contribute to the local economy. Since JOC produces 38% of the total harvest of oysters in California, they are a major contributor to the State's oyster supply.

Cumulative Impacts

Because the proposed improvements would bring JOC into compliance with local, state and federal regulations and laws, the project's overall impact on the environment and NPS operations would be beneficial.

Conclusion. The NPS concludes that this project, by itself and in conjunction with the long-range goal to provide the public with safe facilities, does not constitute a significant cumulative impact.

Alternative C: Rehabilitation of Existing Structures

Impacts on Natural Resources

Vegetation. Because the rehabilitated processing facilities would be located in the same location, this action would result in only approximately two (2) acres of ground disturbance. The ground disturbance would occur on a developed site dominated by non-native vegetation. In accordance with NPS management polices and guidelines, disturbed areas would be revegetated with native plant materials (e.g., seeds, cuttings, transplants) that originated from the genetic stock on site or from other adjacent sources. Efforts would concentrate in revegetation in and around the pond and shoreline to establish native salt grass, grindelia, and coyote brush.

In addition, this alternative would require 2.25 acres of native vegetation to be disturbed for the septic system. The area would be allowed to revegetate naturally and monitored for weed removal. If necessary, any impacts will be mitigated by planting native vegetation.

Water Resources. Some short-term minor impacts could result due to ground disturbance and grading. However, actions such as plastic protection fencing and soil/straw bale berms would be employed to ensure that sediments and runoff from the construction site do not enter Drakes Estero or the adjacent pond.

To eliminate the possibility of contamination of the Estero, buildings would be equipped with internal drains that would empty into a holding tank and them pumped to an approved septic system.

Because this project only involves the rehabilitation of existing structures, volume of surface runoff and drainage patterns will not be altered significantly or increased substantially. No impervious surfaces such as asphalt will be installed within the parking area; the area will remain gravel. Minor drainage swales will be installed behind the main building to drain storm water into the estuary. Another drainage swale will be installed along the eastern edge of the building to drain storm water away from the building. No significant impacts are therefore anticipated.

No changes to surface or ground water will result from this project. Grading will be minimal and limited to the construction area and will not increase flows. Rain water drainage will continue towards the estuary and adjacent pond and remain as natural as possible. Drainage will be reviewed and approved by the Marin County Department of Public Works. Because the current flows and drainages are not be significantly altered, less than significant impacts are anticipated.

Air. Oyster processing in the newly rehabilitated facilities will not result in the release of significant air pollutants. Heating systems, the only source of exhaust, will meet current standards and codes. Some dust will be generated from construction activities; however, it will be mitigated to a less than significant level by implementing mitigation measures, including watering disturbed areas and covering the beds of trucks hauling material from the project site.

Wildlife. Noise and human activity, coupled with the current disturbed nature of the site, make it highly unlikely that wildlife would reside on the grounds of the

JOC. Those species that do inhabit the site are accustomed to human activity. It is doubtful that construction activities would result in the permanent displacement of wildlife in the immediate area. Because the proposed action would result in only temporary and localized impacts on wildlife, these effects are considered less than significant since animals and shorebirds would be expected to return to the area once construction and restoration activities are completed.

Threatened and Endangered Species. Since no federally protected species or their host plants have been detected at the site, there would be no effect on threatened or endangered species.

Soils. In addition to ground disturbance and minor grading adjustments that would occur, the potentially liquefiable soils are anticipated to need stabilization. Based on the site conditions, compaction would be used to stabilize the soil beneath buildings and structures. All work would be closely monitored to minimize ground movement and its potential impact on buildings and structures.

To minimize ground disturbance, equipment and materials would be stock-piled on existing disturbed areas to be impacted by construction. Pockets of native vegetation would be identified and fenced or signed to protect these areas from disturbance.

Topography. This alternative will not substantially change the topography; surface grading will be limited to minor alterations for leveling the parking area and foundation construction for the new rehabilitated facilities. Therefore, because the change in topography will be minimal, less than significant impacts are anticipated on the site. To mitigate any unforeseen impacts, a qualified soil engineer will investigate soil conditions to ensure long-term stability of proposed rehabilitated structures. The proposed project will not alter any unique geologic or ground surface features.

Conclusion. Actions under this alternative would not adversely affect special-status species. Some short-term impacts may occur to wildlife but would be temporary in nature. Water resources will be protected from impacts by implementing mitigation measures to reduce adverse impact to less than significant levels. Ground disturbance would be less acreage than Alternative B. Ground and soil movement will be monitored to ensure soil erosion does not occur. Overall, this alternative is not anticipated to have any significant impacts to natural resources.

Impacts on Cultural Resources

The site does not contain historic structures or significant cultural landscape elements. One disturbed archeological site is known in the area. The archeological site will be fenced to ensure disturbance does not occur. If any archeological material is found during construction, the project will stop and a qualified archeologist will evaluate the situation to mitigate any impacts.

Conclusion. With mitigation measures in place, no adverse effects are anticipated to occur to cultural resources.

Impacts on Visual Quality

Same as Alternative B, except the main processing facility will remain on the western side of the project area adjacent to Drakes Estero. The building will be sided with wood and allowed to weather (gray) to blend in with the surroundings. The overall visual quality of the site will be enhanced by removing the dilapidated buildings and removing unwanted debris. The main building would, however, have a negative visual impact along the shoreline, restricting visitor views of the estuary.

Conclusion. This alternative will enhance the visual quality of the site by removing dilapidated buildings and removing debris. However, the main building would remain on the shoreline and have a negative visual impact on scenic views by park visitors.

Impacts on Human Health and Safety

Impacts to Human Health and Safety are the same as Alternative B. By bringing the complex into compliance with health and safety codes, JOC will no longer pose a health risk In addition, by modifying existing buildings and construction of new facilities to comply with building codes for life and safety (e.g., fire detection, handicap access, seismic stability) hazards to the operating staff at the site would be minimized.

The former septic system at JOC has been abandoned because of overall general failure. Under Marin County supervision, sewage is now being stored on-site and hauled to approved disposal area. New water and septic systems will ensure ground water and the estuary system are not contaminated by JOC operations. All surface drains in the facilities will be connected to the gray water leach field for proper disposal. This gray water and septic systems will meet Marin County and State of California requirements. Monitoring requirements for the septic systems will be established by Marin County and the State of California. The new sewage systems with appropriate monitoring will reduce any potential discharge of pollutants to a less than significant level.

JOC is approximately five miles west of the San Andreas Fault. Because of the geology, there is a potential for a moderate susceptibility to ground shaking intensity. Also, the maximum ground shaking intensity potential is considered strong. To mitigate any impacts to a less than significant level, the new facilities will be constructed in conformance with Uniform Building Code (UBC), Chapter 16, (Zone 4) and fully meet standards for wind and earthquakes.

Liquefaction susceptibility is considered low in the Drakes Bay Formation.

Tsunami risk is considered low; the site is located three miles inland from the Pacific Ocean within a shallow estuary. The tsunami warning system through the National Weather Service and the Marin County Office of Emergency Services will be utilized to evacuate the site if necessary.

Historical records indicate that drainage at the site has been a problem when extreme high tides and major storm events occur simultaneously. Because these two events are predictable, sand bags and other mitigation measures will be installed to reduce/eliminate hazards to humans or property. To mitigate any impacts to property, the main processing building will

have a cement wall perimeter to limit potential flood waters from entering and all electrical equipment will be raised off the floor area.

Based on site investigations and historical records, the area is also not prone to mudslides or landslides. Because of past minor slope failure on the southern bluff area, a retaining wall is planned for construction, and adequate space (25 feet) between the bluff and the main building will be maintained. These two actions will mitigate any impact to a less than significant level.

The proposed project area is situated near coastal scrub/grassland vegetation. The proposed facilities will contain flammable materials such as cleaners, lubricants, solvents and other potential hazards. In consultation with MCFD, mitigation measures have been adopted to ensure the project will not significantly increase fire hazards in the area. These mitigation measures include: access enhancements along the main entrance road; proper storage of hazardous material and waste; fully automatic sprinkler systems in buildings; proper removal of vegetation around complex; and adequate space around buildings for emergency vehicle access. In addition, the main objective of the project is to rehabilitate the buildings to meet current health and safety codes and reduce potential fire hazards.

All hazardous materials and waste, such as paint and oil, will be properly stored in the new facility and be in accordance with federal/state standards and regulations and the *Point Reyes National Seashore Hazardous Waste Management Plan*. In addition. hazardous wastes such as paint and oil will be disposed according to the *Hazardous Waste Management Plan*. No pesticides are used by JOC. As no major or unusual quantities of explosives or hazardous materials will be present on the project site during construction, or following the project completion, the likelihood of an explosive hazard is extremely remote and deemed insignificant.

Conclusion. Code compliance upgrades will have a positive effect on human health and safety. Once the buildings and septic system meet current codes, they will no longer be a health and safety risk to park visitors and JOC staff. In addition, once hazardous material is properly stored and disposed, potential impacts to visitors and JOC staff will be minimal and less than significant. Building and site improvements will also improve fire safety.

Impacts on Public Facilities and Services

These potential impacts are the same as Alternative B.

Water Supply. Johnson Oyster Company has an independent well water supply permitted to them from the National Park Service. No other public or private entities utilize this water source. Therefore, no impacts to other public sources will occur.

Roadways and Public Transportation. The buildings are replacement structures and not an expansion of the existing facilities. Therefore, no new transportation impacts are anticipated. Because overall traffic is generated primarily by recreational users, some increase in the use of Sir Francis Drake Blvd. may occur over the next 15 years, but the increase will be related to park visitation. Park visitation, however,

peaked at 2.6 million in 1992 but has dropped over the last five years to 2.4 million in 1996. The NPS anticipates park visitation will slowly increased approximately 2-3% per year. The Point Reyes National Seashore GMP does not call for any additional facilities in the north district of the park which would have a cumulative impact with this proposed project on traffic. No public or NPS transportation facilities are available in the area. Therefore, this project will have a less than significant impact on traffic and public transportation facilities.

Energy Consumption. Energy use is anticipated to only slightly increase, approximately (10%) because of the small increase in square footage. Current energy use is estimated at 5,000 kilowatts per month.

Fire Protection. Increased square footage of replacement buildings will add minor impact to Marin County Fire Department responsibilities. In addition, based on correspondence with MCFD, improvements to street and site address labeling, road access, water storage, and facility automatic fire sprinkler systems are needed. These improvements will be added to overall JOC plan for the site to mitigate impacts as directed by the MCFD and NPS. With these mitigation measures, the impact will be minimized and less than significant.

Police Protection. NPS is the primary law enforcement agency in the project area. No increase in service is anticipated. Marin County Sheriff's Department currently provides adequate back-up law enforcement protection to the subject property. No increase in this service is necessary. Therefore, less than significant impacts will occur.

Schools. The project will not increase housing or number of employees working at JOC. Because there will be no increase in housing or number of employees, school children attending local schools is not anticipated to change and will remain at current levels. Therefore, a less than significant impact will occur to the Shoreline School District.

Other Government Services. Because of the small scale nature of this project, no new governmental services will be needed. Current facilities are being upgrade to meet current codes and correct deficiencies.

Utilities. Pacific Gas and Electric Company has adequate facilities in the project area to provide service to the proposed project. Only minor insignificant increase in power and propane are anticipated. No new phone or communication services are required for the project.

Conclusion. Public facilities and services, such as fire, police, public services and utilities, and schools will not be significantly increased or adversely affected.

Impacts on Noise

There would be no long-term or significant impact on ambient noise levels. There will be some short-term impacts due to construction noise; however, restriction on noise levels and timing of construction activities will mitigate any short-term impacts.

Conclusion. Some short-term impacts to local residents related to noise will occur during construction. However, there will be no new long-term impacts.

Impacts on the Local Economy

Positive impacts would occur because the operation of JOC would continue. Construction cost, associated with this option, are estimated at over $450,000.

Conclusion. Under this alternative, JOC will continue to operate and contribute to the local economy. Since JOC produces 38% of the total harvest of oysters in California, they are a major contributor to the State's oyster supply.

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Consultation and Coordination

The Golden Gate National Recreation Area/Point Reyes National Seashore Citizen's Advisory Commission, Point Reyes Committee, was consulted during the formulation of the draft environmental assessment.

The U. S. Fish and Wildlife Service was consulted regarding special status species, including threatened and endangered species.

The County of Marin, Community Development Agency, (MCCDA) has been consulted in the formulation of this environmental assessment. The MCCDA has conducted a design review of the project and prepared the visual quality section of the document. Environmental Health Services has evaluated the sewage waste disposal system.

The Marin County Fire Department was consulted regarding the formulation of fire protection needs.

California Regional Water Quality Control Board was consulted to provide guidance on facilities needed to treat drain water.

Others consulted on the project include:

Sarah Allen, Wildlife Biologist, Point Reyes National Seashore
Frank Dean, Assistant Superintendent, Point Reyes National Seashore
John Dell'Osso, Chief of Interpretation, Point Reyes National Seashore
Chuck Desler, Architect, Johnson Oyster Company
Rick Dorrance, Landscape Architect, Point Reyes National Seashore
Larry Harris, Chief of Maintenance, Point Reyes National Seashore
Dale Hopkins, California Regional Water Quality Control Board
Tom Johnson, Johnson Oyster Company
Roger Kelly, Archeologist, Pacific Great Basin Support Office, NPS
Rich Lincoln, Rich Lincoln & Sons, Waste Water Disposal Systems
Dewey Livingston, Historical Technician, Point Reyes National Seashore
Don Neubacher, Superintendent, Point Reyes National Seashore
Point Reyes National Seashore Citizen's Advisory Committee
Bill Shook, Chief, Resource Management, Point Reyes National Seashore
Robert Studdert, Attorney at Law, Johnson Oyster Company

Preparers

Don L. Neubacher, Superintendent, Point Reyes National Seashore

Anne Clemons, Assistant Planner, Point Reyes National Seashore

Tod Carr, Planner, Marin County Community Development Agency

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National Park Service, 1980. *General Management Plan, Point Reyes National Seashore.*

National Park Service, 1993. *Statement for Management, Point Reyes National Seashore.*

National Park Service, 1997. *Hazardous Waste Management Plan. Point Reyes National Seashore.*

Riley, Lynn M. Assessment of Endangered Archeological site at Point Reyes National Seashore. 1976.

U.S. Fish and Wildlife Service, Letter March 21, 1997. Species Lists for Proposed Construction of a New Oyster Processing Plant and the Rehabilitation of several accessory Structures located on the Johnson Oyster Company.

Uniform Building Code. Chapter 16. 1994.

Summary Impact/Mitigation Matrix

Park: Point Reyes National Seashore

Project: Construction/rehabilitation of Johnson Oyster Company and Development of Parking and Other Site Amenities.

IMPACT	PRESCRIBED MITIGATION AND RESPONSIBILITY
1. Natural Resources	
Vegetation	To mitigate the invasion of non-native vegetation, the main disturbed building site will be monitored and non-native plants removed after construction from disturbed areas. Areas will be replanted with natives where needed. At the leach field area, the site will be monitored to ensure rapid regrowth by surrounding native vegetation. All weed species will be removed. If necessary, planting with natives will occur. (PRNS Resource Management)
Water Resources	The site will be monitored during construction and appropriate measures taken to ensure Drakes Estero and adjacent pond are not contaminated with sediments and construction debris. Soil and straw bale berms and plastic fencing will be established, as necessary, to protect the estuary from sediments and construction debris. (Johnson Oyster Company)
Air	Some dust will be generated from construction activities. Dust will be monitored and mitigated by watering of area and covering truck leaving area with debris. (Johnson Oyster Company)
Wildlife	PRNS Resources Management Staff will monitor species before, during, and after the proposed project to insure disturbance is minimal. Resident bird nesting season will be avoided.
T/E Species	NA

	Soils	Some short-term impacts due to heavy equipment on-site will occur. These impacts can be mitigated by JOC by regrading and restoring the site quickly to allow regrowth of vegetation. To minimize any soil loss during construction, the area will be sprayed with water regularly to reduce dust and soil erosion. In addition, ground disturbance will be kept to a minimum(less than three acres on the main construction area and 2.25 acres on the leach field site) to ensure soil erosion is minimal. Any materials stockpiled will be on previously disturbed sites away from the estuary. (Johnson Oyster Company)
	Topography	To mitigate any potential impact to new structures, a qualified soil engineer will investigate soil conditions to ensure long-term stability of proposed structures. (Johnson Oyster Company)
2.	**Cultural Resources**	Archeological site will be fenced to protect from any impacts and monitored throughout the construction period. If any archeological material is located during construction, the project will be stopped and the area evaluated by the NPS Regional Archeologist.
3.	**Visual Quality**	NA
4.	**Health and Safety**	NA
5.	**Noise**	Short-term impacts only during normal business hours on weekdays as demolition crews remove the structures and debris. Residents will be notified of construction activity and hours of all construction activity will be regulated. No construction can occur before 7:00 am and after 7:00 pm. (Johnson Oyster Company)
6.	**Public Services**	NA
7.	**Economic**	NA

Appendix A: Location Map and Plot Plan

Appendix B: Special Status Species in Vicinity

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

Ecological Services
Sacramento Field Office
3310 El Camino Avenue, Suite 130
Sacramento, California 95821-6340

1-1-97-SP-950

March 21, 1997

Mr. Tod Carr
Planner
Marin County Community Development Agency
3501 Civic Center Drive #308
San Rafael, California 94903-4157

Subject: Species Lists for Proposed Construction of a New Oyster Processing Plant and the Rehabilitation of several accessory structures located on the Johnson Oyster Company, Point Reyes National Seashore, Marin County, CA

Dear Mr. Carr:

The enclosed lists are in reply to your letter of January 23, 1997 requesting information about the endangered and threatened species that may be present in your project area (see Enclosure A). Information concerning the life history, distribution, and habitat requirements for the listed species is available upon request.

The Fish and Wildlife Service (Service) used your map and/or other information to locate the proposed project on a U.S. Geological Survey (USGS) 7.5 minute quadrangle map. The animal species listed in Enclosure A are those species we believe may occur within, *or be affected by projects within*, the USGS Tomales Quad, where your project is planned.

The plants listed in Enclosure A are those *that have actually been observed* in the project quad. Plants on the enclosed county list may also occur in the quad where your project is located.

Some of the species listed in Enclosure A may not be affected by the proposed action. A trained biologist or botanist, familiar with the habitat requirements of the listed species, should determine whether these species or habitats suitable for these species may be affected by the proposed action. For plant surveys, the Service recommends using the enclosed Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species.

Information and maps concerning candidate species in California are available from the California Natural Diversity Data Base, a program of the California Department of Fish and Game. Address your request to: Marketing Manager, California Department of Fish and Game, Natural Diversity Data Base, 1416 Ninth Street, Sacramento, California 95814 (916) 322-2493.

All listed species identified in Enclosure A are fully protected under the mandates of the Endangered Species Act of 1973, as amended (Act). Section 9 of the Act and its implementing regulations prohibit the "take" of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such wildlife species. Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures. If a Federal agency is involved with the permitting, funding, or carrying out of this project, then initiation of formal consultation between that agency and the Service pursuant to section 7 of the Act is required if it is determined that the proposed project may affect a federally listed species. Such consultation would result in a biological opinion that addresses anticipated effects of the project to listed and proposed species and may authorize a limited level of incidental take. If a Federal agency is not involved with the project, and federally listed species may be taken as part of the project, then an "incidental take" permit pursuant to section 10(a) of the Act should be obtained. The Service may issue such a permit upon completion by the permit applicant of a satisfactory conservation plan for the listed species that would be affected by the project.

If suitable habitat for federally listed species exists in the project area, we recommend that surveys for them be undertaken by qualified biologists during or prior to the environmental review process. We also recommend that surveys be undertaken for the proposed and candidate species included in Enclosure A if suitable habitat exists on site. The results of these surveys should be published in any environmental documents prepared for this project.

Should these surveys determine that federally listed or proposed species occur in the area and are likely to be affected by the proposed project, the Service recommends that the project proponent, in consultation with this office and the California Department of Fish and Game, develop a plan that mitigates for the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. The mitigation plan also should be included in the environmental document.

We also recommend addressing adverse impacts to candidate species. One of the benefits of considering these species early in the planning process is that by exploring alternatives, it may be possible to avoid conflicts that could develop, should a candidate species become listed before the project is complete.

In the Federal Register of February 28, 1996, the Service changed its policy on candidate species. The term *candidate* now strictly refers to species for which the Service has on file enough information to propose listing as endangered or threatened. Former *category 2* candidate species - species for which listing is possibly appropriate but for which the Service lacks sufficient information to support a listing proposal - are now called *species of concern*. They are no longer monitored by the Service. However we have retained them on the enclosed list for general information. We encourage consideration of them in project planning, as they may become candidate species in the future.

If the proposed project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by the U.S. Army Corps of Engineers (Corps), a Corps permit will be required, pursuant to section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 979-2113.

We appreciate your concern for endangered species. If you have further questions, please call Michael Thabault of this office at (916) 979-2725. For the fastest response to species list requests, address them to the attention of the section 7 office assistant at this address.

Sincerely,

(for) Wayne S. White

ENCLOSURE A

Endangered and Threatened Species that May Occur in
or be Affected by Projects in the Following Selected Quads
March 20, 1997

QUAD : 485B TOMALES

Listed Species

Mammals

Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Birds

American peregrine falcon, *Falco peregrinus anatum* (E)

California brown pelican, *Pelecanus occidentalis californicus* (E)

California clapper rail, *Rallus longirostris obsoletus* (E)

marbled murrelet, *Brachyramphus marmoratus* (T)

western snowy plover, *Charadrius alexandrinus nivosus* (T)

bald eagle, *Haliaeetus leucocephalus* (T)

northern spotted owl, *Strix occidentalis caurina* (T)

Reptiles

Leatherback sea turtle, *Dermochelys coriacea* (E)

Loggerhead sea turtle, *Caretta caretta* (T)

Green Sea turtle, *Chelonia mydas (incl. agassizi)* (T)

Olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

Amphibians

California red-legged frog, *Rana aurora draytonii* (T)

Fish

tidewater goby, *Eucyclogobius newberryi* (E)

Coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Invertebrates

Myrtle's silverspot butterfly, *Speyeria zerene myrtleae* (E)

California freshwater shrimp, *Syncaris pacifica* (E)

Plants

beach layia, *Layia carnosa* (E)

Proposed Species

Fish

Central California steelhead, *Oncorhynchus mykiss* (PE)

QUAD : 485B TOMALES

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Plants

Baker's larkspur, *Delphinium bakeri* (C)

Species of Concern

Mammals

Point Reyes mountain beaver, *Aplodontia rufa phaea* (SC)

greater western mastiff-bat, *Eumops perotis californicus* (SC)

long-eared myotis bat, *Myotis evotis* (SC)

fringed myotis bat, *Myotis thysanodes* (SC)

long-legged myotis bat, *Myotis volans* (SC)

Yuma myotis bat, *Myotis yumanensis* (SC)

Pacific western big-eared bat, *Plecotus townsendii townsendii* (SC)

Point Reyes jumping mouse, *Zapus trinotatus orarius* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)

ferruginous hawk, *Buteo regalis* (SC)

little willow flycatcher, *Empidonax traillii brewsteri* (SC)

saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)

Harlequin duck, *Histrionicus histrionicus* (SC)

black rail, *Laterallus jamaicensis* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)

California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

northern red-legged frog, *Rana aurora aurora* (SC)

foothill yellow-legged frog, *Rana boylii* (SC)

QUAD : 485B TOMALES

Species of Concern

Fish

Pacific lamprey, *Lampetra tridentata* (SC)

Invertebrates

Sonoma arctic skipper, *Carterocephalus palaemon ssp* (SC)

sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)

globose dune beetle, *Coelus globosus* (SC)

William's bronze shoulderband snail, *Helminthoglypta arrosa williamsi* (SC)

Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)

Point Reyes blue butterfly, *Icaricia icarioides ssp* (SC)

bumblebee scarab beetle, *Lichnanthe ursina* (SC)

Plants

Blasdale's bentgrass, *Agrostis blasdalei var. blasdalei* (SC)

Point Reyes stickyseed, *Blennosperma nanum var. robustum* (SC)

swamp harebell, *Campanula californica* (SC)

Mt. Vision ceanothus, *Ceanothus gloriosus var. porrectus* (SC)

Tomales clarkia, *Clarkia concinna ssp. raichei* (SC)

northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC)

fragrant fritillary, *Fritillaria liliacea* (SC)

San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)

Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)

San Francisco owl's-clover, *Triphysaria floribunda* (SC)

#1

Appendix E: Initial Study Checklist

MARIN COUNTY COMMUNITY DEVELOPMENT AGENCY
PLANNING DIVISION

JOINT ENVIRONMENTAL ASSESSMENT/INITIAL STUDY
(The EA is incorporated into the Initial Study)

Replacement and Rehabilitation of Johnson Oyster Company Facilities

I. BACKGROUND

A. Project Sponsor's Name and Address: Johnson Oyster Company

B. Lead Agencies Name and Address: National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

Marin County Community Development Agency,
Planning Division, 3501 Civic Center Dr., Room 308
San Rafael, CA 94903

C. Contact Person and Phone Number: Charles Desler, Architect, 916-626-9416

II. PROJECT DESCRIPTION

A. Project Title: Replacement and Rehabilitation of Johnson Oyster Company Facilities

B. Type of Application(s): Design Review

C. Project Location: APN #109-130-17
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

D. General Plan Designation: Coastal Open Space (C-OS)

E. Zoning: Coastal, Open Area (C-O-A)

F. Description of Project:

Environmental Setting and Existing Conditions

Located on the northern shore of Drakes Estero within Point Reyes National Seashore, Johnson Oyster Company (JOC) has been in existence under various owners since June 1934. JOC utilizes two state aquaculture leases covering approximately 1060 acres of Drakes Estero for their oyster production. This project is limited to the onshore facilities which occupy a five acre parcel that is under a reservation of possession from the National Park Service, which purchased the land from the Johnson family in 1972. This reservation provides JOC with the right to use the five acres until the year 2012 for the purpose of processing and selling oysters. The oyster operation on Drakes Estero is consistent with the *Point Reyes National Seashore General Management Plan* (GMP).

The existing oyster processing facilities and office are located at sea level along the shore line and occupy approximately three acres of land. An existing leach field, located approximately 100 yards to the south, was formerly authorized under a separate permit from the National Park Service (NPS).

The site is accessible by vehicle from Sir Francis Drake Blvd. and then by a one half mile one lane dirt road.

The existing processing facilities are as follows:

1. 3,600 square foot (sf) oyster processing plant of concrete and wood frame construction.
2. 400 sf business office and storage addition to structure #1.
3. 80 sf cold storage room addition to structure #1.
4. Two detached shipping storage containers totaling 560 sf.
5. 893 sf lunch room and trailer.
6. 2,178 sf seed plant for growing small oysters prior to placement in the Estero.
7. 616 sf stringing plant for assembling oyster growing equipment.

Proposal and Project History

In the spring of 1996, a failing leach field prompted JOC to approach the NPS for permission to develop a new wastewater system in a more favorable soil area. The NPS agreed to consider the replacement leach field if JOC would look at the condition of all the developed facilities and bring them up to existing Health and Safety codes. With the cooperation of various state and county agencies, the JOC facilities were inspected on May 7, 1996.

The inspection revealed that many of the facilities did not meet code and were in a deteriorated state. It was then determined that the most prudent action would be to replace, rather than repair, the existing buildings and waste water system.

This proposed alternative will remove the oyster processing plant, seed plant, stringing plant, and garage and replace with new structures. The replacement structures with sizes are:

1. garage, 900 square feet (sf),
2. seed plant, 2,625 sf,
3. stringing plant, 500 sf, and
4. a two story processing plant, 7,600 sf.

Total size for these structures will be 11,625 sf. No work is proposed for any of the residential structures located on the property.

The new processing plant would be moved from directly adjacent to the shoreline to approximately 100 feet from Drakes Estero. Other structures would be located in existing sites. Appendix C provides detailed drawings of this option. A new septic system, approximately 3000 feet east from the processing plant, would be constructed to accommodate the rehabilitated facilities (See Appendix D for detailed drawings). The new leach field will disturb approximately two acres of area currently grazed by a special use permittee. The NPS plans to issue a special use permit to accommodate this use. The site was selected because of its acceptable percolation ability and its location outside the immediate watershed of the Estero. A new gray water drainage system from floor drains would be constructed and pumped to the rehabilitated former leach field above and south of the JOC facility. This rehabilitated leach field is

approximately .25 acre in size. Both areas temporarily disturbed by the construction of the two new septic facilities will be replanted with native vegetation.

No major change in the topography is necessary. The projected site for all new, rehabilitated and replacements structures is relatively flat. All structures will be slab on grade and all drainage will be sloped away from building and use the natural drainage pattern where appropriate. Drainage from processing operation will be collected and treated with the approved wastewater facility.

Gravel entry and parking areas will be developed on the northern extent of the property. Twenty-two parking spaces will be developed, with appropriate handicap spaces. Picnic tables will be placed at the entrance to the facility adjacent to the parking area.

Once the site has been cleared of all debris, the site will be evenly graded and the area restored with native vegetation.

III. CIRCULATION AND REVIEW

This Initial Study is being circulated to all agencies which have jurisdiction over the subject property or natural resources affected by the project to attest to the completeness and adequacy of the information contained in the Initial Study as it relates to the concerns which are germane to the agency's jurisdictional authority.

(The agencies listed in the section include County departments or divisions which have jurisdictional authority and/or oversight over the project, as well as State, Federal or other jurisdiction-by law agencies which may use this document in executing their respective permit authority over the project.)

a) Marin County Agencies:

The following signature of the agency reviewing officer attests to the completeness and adequacy of the information contained in the Initial Study as it relates to the concerns which are germane to the agency's jurisdictional authority.

Marin County Community Development Agency (CDA), Planning Division

Signature of Reviewing Officer — Date: 4/1/98

Marin County Community Development Agency, Environmental Health Services Division

Signature of Reviewing Officer — Date: 4/8/98

Marin County Department of Public Works, Land Use and Water Resources Division

Signature of Reviewing Officer — Date: 4/1/98

b) Responsible Agencies: *(agencies whose approval is required and permits needed)*

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105

National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

c) Trustee Agencies: *(State agencies who have jurisdiction by law over natural resources affected by project)*

California Dept. of Fish and Game
P. O. Box 47
Yountville, CA 94599

d) Other Jurisdiction-By-Law Agencies: *(other agencies which have permit authority over the project)*

California Dept. of Health Services
Don Gomsi, Public Health Biologist
Pre-Hervoit Shellfish Sanitation Unit
2151 Berkeley Way, #118
Berkeley, CA 94704

Calif. State Food & Drug
Mike Hernandez
185 Berry Street, #260
San Francisco, CA 94107

e) Other Interested Parties:

Army Corps of Engineers
33 Market St.
San Francisco, CA 94105

California Reg. Water Quality, Control Brd.
2101 Webster Street, Suite 500
Oakland, CA 94612

Gulf of the Farallones Nat. Marine Sanctuary
Fort Mason, Bldg. 201
San Francisco, CA 94123

California State Lands Commission
Betty Eubanks
100 Howe Avenue, Suite #188
Berkeley, CA 94704

Sierra Club, Marin Group
Chair
934 Bel Marin Keys Blvd.
Novato, CA 94949

Marin Conservation League
President
55 Mitchell Blvd., #21
San Rafael, CA 94903

EAC of West Marin
John Grissim
Box 609
Point Reyes Station, CA 94956

Env. Forum of Marin
P.O. Box 74
Larkspur, CA 94977

Marin Audubon
Barbara Salzman
48 Ardmore Road
Larkspur, CA 94977

Johnson Oyster Company
c/o Charles Desler Architect
864 Oak Terrace
Placerville, CA 95667

Robert Studdert, Attorney
P .O. Box 6
Inverness, CA 94937

IV. EVALUATION OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Pursuant to Section 15063 of the State CEQA Guidelines, and the County EIR Guidelines, Marin County will prepare an Initial Study for all projects not categorically exempt from the requirements of CEQA. The Initial Study evaluation is a preliminary analysis of a project which provides the County with information to use as the basis for deciding whether to prepare an Environmental Impact Report (EIR) or Negative Declaration. The points enumerated below describe the primary procedural steps undertaken by the County in completing an Initial Study checklist evaluation and, in particular, the manner in which significant environmental effects of the project are made and recorded.

A. The determination of significant environmental effect is to be based on substantial evidence contained in the administrative record and the County's environmental data base consisting of factual information regarding environmental resources and environmental goals and policies relevant to Marin County. As a procedural device for reducing the size of the Initial Study document, relevant information sources cited and discussed in topical sections of the checklist evaluation are incorporated by reference into the checklist (e.g. general plans, zoning ordinances). Each of these information sources has been assigned a number which is shown in parenthesis following each topical question and which corresponds to a number on the data base source list provided herein as Attachment 1. See the sample question below. Other sources used or individuals contacted may also be cited in the discussion of topical issues where appropriate.

B. In general, a Negative Declaration shall be prepared for a project subject to CEQA when either the Initial Study demonstrates that there is no substantial evidence that the project may have one or more significant effects on the environment. A Negative Declaration shall also be prepared if the Initial Study identifies potentially significant effects, but revisions to the project made by or agreed to by the applicant prior to release of the Negative Declaration for public review would avoid or reduce such effects to a level of less than significance, and there is no substantial evidence before the Lead County Department that the project as revised will have a significant effect on the environment. A signature block is provided in Section VII of this Initial Study to verify that the project sponsor has agreed to incorporate mitigation measures into the project in conformance with this requirement.

C. All answers to the topical questions must take into account the whole of the action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts. Significant unavoidable cumulative impacts shall be identified in Section VI of this Initial Study (Mandatory Findings of Significance).

D. A brief explanation shall be given for all answers except "Not Applicable" answers that are adequately supported by the information sources the Lead County Department cites in the parenthesis following each question. A "Not Applicable" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "Not Applicable" answer shall be discussed where it is based on project-specific factors as well as general standards (e.g. the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

E. "Less Than Significant Impact" is appropriate if an effect is found to be less than significant based on the project as proposed and without the incorporation of mitigation measures recommended in the Initial Study.

F. "Potentially Significant Unless Mitigated" applies where the incorporation of recommended mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The Lead County Department must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section V, "Earlier Analyses", may be cross-referenced).

G. "Significant Impact" is appropriate if an effect is significant or potentially significant, or if the Lead County Department lacks information to make a finding that the effect is less than significant. If there are one or more effects which have been determined to be significant and unavoidable, an EIR shall be required for the project.

V. **ISSUES (and Supporting Information Sources):**

1. **LAND USE AND PLANNING.** ***Would the proposal:***

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a) **Conflict with applicable Countywide Plan designation or zoning standards? (source #(s): 1, 2, 3, 15, 22)**	[ ]	[X]	[ ]	[ ]

Project is governed by the *Marin Countywide Plan (MCP), Reyes National Seashore GMP,* Title 22 (Zoning) of the Marin County Code, and Local Coastal Plan, Unit II (LCP).

The Marin Countywide Plan

The subject property is located on the northern edge of Drakes Estero within Point Reyes National Seashore. The site is designated Coastal Open Space. The continuation operation of JOC would be consistent with the intent of the Coastal Recreation Corridor (Policy EQ-1.3). As stated in MCP, open space, recreational, and agricultural land uses will be emphasized in the Coastal Recreation Corridor along with the preservation of existing communities. Specific policies contained in the Environmental Quality Element pertain to the proposed project: 1. Conservation of Coastal Resources; 2. Species Preservation; 3. Prevention of Air, Water, and Noise pollution; 4. Wildlife, Vegetation and Habitat Preservation; 5. Visual Qualities and Views Conservation; 6. Public Open Space; and 7. Preserve and Promote Agriculture.

1. Policy EQ-2.41. Conservation of Coastal Resources. The conservation of coastal resources shall be maintained following detailed policies in the Local Coastal Plan I and II adopted by the County and the Coastal Commission.

The proposed project will not result in significant adverse impacts to native vegetation, aquatic resources, wetlands, streams and riparian habitat, coastal dunes and other coastal resources. The replacement and rehabilitation of JOC facilities will be constructed on a already disturbed site (approximately 3 acres in size). No dune, wetland, steam/riparian habitat will be lost as a result of this project. Because the main facility will be located over 100 feet from the estuary and because new sewage facilities will be constructed, the project will have a positive impact on water quality. The project also reduces the potential for accidental spills of hazardous material from entering Drakes Estuary. The new septic facilities will temporarily disturb 2.25 acres of coastal scrub/grassland, but the impacts will be short-term in nature. These impacts are expected to be mitigated by rapid regrowth of native vegetation in the leach field area is expected and full restoration of the site is anticipated in 1-2 years. If necessary, any impacts will be mitigated by planting native vegetation.

2. Policy EQ-2.87. Species Preservation in the Environmental Review Process. Environmental review of development applications shall consider the impact of the proposed development on species and habitat diversity. Environmental review documents should propose mitigation measures for ensuring the protection of the habitat and species therein.

As stated above under the discussion regarding Policy EQ-2.41, the proposed project will not result in significant adverse impacts to native vegetation, wetlands, stream/riparian habitat, coastal dunes, and other sensitive habitats. The development of the main leach field will disturb approximately 2.25 acres of native coastal scrub/grassland dominated by coyote brush. However, because native vegetation will be planted in the disturbed area to mitigate any temporary loss of native vegetation, the long-term

impacts will not be significant. Because of the abundance of coastal scrub/grassland habitat adjacent to the Drakes Estero, recolonization of the area by birds and other species will occur in the long-term. During construction, there will be some short-term impact to resident avian species such as wrentits and scrub jays and small mammals such as the brush rabbit and white-footed mouse. These impacts will be less than significant because the recolonization of the area is expected to be rapid, only 1-2 years.

3. Policy EQ-3-2. Air, Water, and Noise Pollution. Air, water, and noise pollution shall be prevented or minimized.

Oyster processing in the new facilities will not release significant air pollutants. Heating systems, the only source of exhaust, will meet current standards and codes. Some dust will be generated from construction activities; however, these will be mitigated to less than significant by mitigation measures, including watering of disturbed areas and covering the beds of trucks hauling material from the project site.

Because the main facility will be located over 100 feet from the estuary and because new sewage facilities will be constructed, the project will have a positive impact on water quality. The project also reduces the potential for accidental spills of hazardous material from entering Drakes Estuary. Currently, sewage is being hauled from the site for disposal.

To reduce any short-term minor impacts related to nearby residential use due to any construction noise, construction will be limited to between 7:00 am to 7:00 pm.

4. Policy EQ-3.6 Wildlife, Vegetation, and Habitats. A diversity and abundance of wildlife and marine life shall be maintained. Vegetation and animal habitats shall be preserved wherever possible.

See comments under Policy EQ-2.87.

5. Policy EQ-3.11. Visual Qualities and Views. Visual qualities and the view potential of the natural and built environment shall be considered in any project or operation review. Tree-cutting and damage shall be avoided wherever possible.

The project will enhance the site's overall visual quality and views of and from Drakes Estero. The current buildings are in a dilapidated condition and are primarily located along the edge of the estuary. Because the main building will be located over 100 feet away from the estuary, the view south along the estuary will be greatly enhanced. In turn, wood fencing\screening on the east side of the complex will enhance views in this direction from the proposed parking lot. Unsightly trailers and other storage areas will be screened from public view by wooden fencing and vegetation.

6. Policy EQ-4.7a. Public Open Space. The Countywide Plan recommends that the National Seashore be retained in its natural condition to the greatest extent possible, and that it provide primarily low-intensity recreational uses such as hiking and wilderness education.

This project will not enhance open space; however, it does not impact any additional open space preserved within Point Reyes National Seashore. The project will be constructed primarily on disturbed areas already utilized by JOC.

7. Policy A-1.11. Preserve and Promote Mariculture. The County shall seek to preserve and promote maricultural usage of tidelands and on-shore production areas. The need for mariculture sites in coastal water should be balanced with the need to provide for other uses, such as commercial fishing, recreation calming and boating, and the need to protect coastal wildlife, water and visual resources.

Because the oyster operation will be allowed to continued, the proposed project will preserve aquaculture, specifically oyster processing and harvesting, at Drakes Estero. In turn, the project will not displace any other potential recreational activity. As stated under various other sections above, the project will have a direct positive impact on water quality and will not significantly affect coastal wildlife or visual resources.

Point Reyes National Seashore General Management Plan

The proposed replacement of structures and rehabilitation of JOC would be consistent with the special use zone of the Point Reyes National Seashore GMP Plan which specifically allows the JOC to operate until its reservation of use and occupancy expires (2012).

Marin County Code Title 22 (Zoning)

The proposed project is consistent with the Coastal Open Space District (C-OA) zoning which allows appurtenant waterfront uses (Chapter 22.57.130). The project must prescribe conditions that will assure the promotion of agriculture, preserve scenic beauty, and maintain such land in a permanent open state. This project promotes the continuation of aquaculture within the Drakes Estero area.

Local Coastal Plan (LCP), Unit II

The LCP concurs "that mariculture operations be considered in park waters, provided that they are compatible with other park uses and that they are subject to consistency review by the Coastal Commission." The project is also consistent with the natural resource concerns/policies in the document as stated in the above sections.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b) **Conflict with applicable environmental plans or policies adopted by Marin County? (source #(s): 1, 2, 15)**	[ ]	[ ]	[X]	[ ]

Please refer to Section 1(a) of this initial study for a discussion of the project's conformance with pertinent section of the Environmental Quality Section of the MCP and applicable environmental plans.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
c) **Affect agricultural resources, operations, or contracts (e.g. impacts to soils or farmlands, impacts from incompatible land uses, or conflicts with Williamson Act contracts)? (source #(s): 1, 3)**	[ ]	[ ]	[X]	[ ]

The proposed project will allow the continuation of an aquaculture operation in Drakes Estero of approximately 1060 acres and will not affect upland agricultural operations currently operating under lease and permit agreements within Point Reyes National Seashore.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
d) **Disrupt or divide the physical arrangement of an established community (including a low-income or minority community)? (source #(s): 1, 3)**	[ ]	[ ]	[X]	[ ]

The project area is not within an established community plan area; the project site is in rural Marin. JOC is the only facility of this kind at this location within Point Reyes National Seashore.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
e) **Result in substantial alteration of the character or functioning of the community, or present or planned use of an area? (source #(s): 1, 3, 15)**	[ ]	[ ]	[X]	[ ]

The project site is not an established community and will not alter present or planned use of area. As described in Section 1a, the project is also consistent with the *Marin Countywide Plan, Point Reyes National Seashore GMP* and the *LCP*. Oyster harvesting at the project site was first established in 1934 and has been continuously used for oyster production since this first allotment by the State of California.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
f) **Substantially increase the demand for neighborhood or regional parks or other recreational facilities, or affect existing recreational opportunities? (source #(s): 3)**	[ ]	[ ]	[X]	[.]

The existing facilities are being replaced and rehabilitated, including the septic system and gray water system; its main purpose is to bring all facilities into code compliance. No impacts to Point Reyes National Seashore will occur. The project will provide the public better access to the shoreline; therefore, some increase in recreational use such as scenic viewing and hiking/walking can be anticipated. In addition, the area will be cleared of debris and therefore kayak and canoe access to the estuary will be enhanced and could increase public use of the estuary system. However, because boating access is limited by the National Park Service and the shoreline access to the estuary is less than 200 yards, no significant impact to estuary resources are anticipated.

2. POPULATION AND HOUSING. *Would the proposal:*

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a) **Increase density that would exceed official population projections for the planning area within which the project site is located as set forth in the Countywide Plan and/or community plan? (source #(s): 1, 3, 15)**	[ ]	[ ]	[ ]	[X]

No increase in population density will occur from this project. Main objective of this project is to bring current buildings and septic system into compliance with state, federal, and county codes. In addition,

the project areas is not located within an adopted Community Plan Area. According to the LCP, mariculture operations should be considered in park waters, provided that they are compatible with other park uses. The LCP also calls for existing facilities to be used for any development; however, in the project area, no existing facilities such as historic structures are available, adjacent to the estuary, for a processing plant and support facilities.

b) **Induce substantial growth in an area either directly or indirectly (e.g. through projects in an undeveloped area or extension of major infrastructure)? (source #(s): 1, 3, 15)**	**Significant Impact**	**Potentially Significant Unless Mitigated**	**Less Than Significant Impact**	**Not Applicable**
	[ ]	[ ]	[ ]	[X]

The project will not induce growth in the area. The *Point Reyes National Seashore GMP* does not allow any additional growth in adjacent areas; the plan also does not allow oyster operations in other areas of the park. The septic system has been sized to only accommodate the current operation and residential level and not for any future growth. In addition, the water system will not be increased by this proposed project and therefore will not induce any additional growth. This project does not entail the extension of electric and phone systems with capacity to service additional development.

c) **Displace existing housing, especially affordable housing? (source #(s): 1, 3, 15)**	**Significant Impact**	**Potentially Significant Unless Mitigated**	**Less Than Significant Impact**	**Not Applicable**
	[ ]	[ ]	[ ]	[X]

Project does not increase or decrease housing units. Affordable housing is currently at the facility. Two houses and four trailers will continue to be available for JOC staff. In addition, the *Point Reyes GMP* and *LCP*, do not call for additional housing in the area. The *LCP* expressly states that Point Reyes National Seashore minimize development and use existing structures when possible.

3. GEOPHYSICAL. ***Would the proposal result in or expose people to potential impacts involving:***

a) **Location in an area of geologic hazards, including but not necessarily limited to: 1) active or potentially active fault zones; 2) landslides or mudslides; 3) slope instability or ground failure; 4) subsidence; 5) expansive soils; 6) liquefaction; 7) tsunami ; or 8) similar hazards? (source #(s): 1, 4, 16, 18)**	**Significant Impact**	**Potentially Significant Unless Mitigated**	**Less Than Significant Impact**	**Not Applicable**
	[ ]	[X]	[ ]	[ ]

JOC is approximately five miles west of the San Andreas Fault. Because of the geology, there is a potential for a moderate susceptibility to ground shaking intensity. Also, the maximum ground shaking intensity potential is considered strong. To mitigate any impacts to less than significant, the new facilities will be constructed in conformance with Uniform Building Code (UBC), Chapter 16, (Zone 4) and fully meet standards for wind and earthquakes.

Liquefaction susceptibility is considered low in the Drakes Bay Formation.

Tsunami risk is considered low; the site is located three miles inland from the Pacific Ocean within a shallow estuary. The tsunami warning system through the National Weather Service and the Marin County Office of Emergency Services will be utilized to evacuate site if necessary.

Based on site investigations and historical records, the area is also not prone to mudslides or landslides. Because of past minor slope failure on the southern bluff area, a retaining wall is planned for construction, and adequate space (25 feet) between the bluff and the main building will be maintained. These two actions will mitigate any impact to less than significant.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b)	**Substantial erosion of soils due to wind or water forces and attendant siltation from excavation, grading, or fill? (source #(s): 6, 17)**	[ ]	[X]	[ ]	[ ]

Project area is relatively (grade change is less than one foot in construction area) flat and highly disturbed by existing JOC activities. Grading to be conducted is minimal and limited to approximately .25 acres for foundation grading. Fill needed is estimated at 170 cubic yards. For the septic field areas, site work will be limited to 2.25 acres.

During construction, mitigation measures will be implemented to reduce any soil loss. These measures include: temporary berms and hay bale dikes to reduce any sediments into Drakes Estero and spraying the area with water to reduce wind generated dust. In turn, the landscape plan for the revised project specifies plants to stabilize soils and reduce any potential soil erosion. NPS resource management staff will regularly monitor site work.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
c)	**Substantial changes in topography from excavation, grading or fill, including but not necessarily limited to: 1) ground surface relief features; 2) geologic substructures or unstable soil conditions; and 3) unique geologic or physical features? (source #(s): 4, 6, 17)**	[ ]	[X]	[ ]	[ ]

The project will not substantially change the topography; surface grading will be limited to minor alterations for leveling parking area and foundation construction for the new facilities. Fill area for foundation construction will be approximately 9,000 sf in size. The estimated quantity of fill material is 170 cubic yards. Therefore, because the grade change will be less than 12 inches and fill will be minimal, less than significant impacts are anticipated on the site. To mitigate any unknown impact, a qualified soil engineer will investigate soil conditions to ensure long-term stability of proposed structures. The proposed project will not alter any unique geologic or ground surface features.

4. WATER. *Would the proposal result in*:

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a)	**Substantial changes in absorption rates, drainage patterns, or the rate and amount of surface runoff? (source #(s): 6, 17)**	[ ]	[X]	[ ]	[ ]

Because this project primarily involves the rehabilitation of existing structures, surface runoff and drainage patterns will not be altered significantly or increased substantially. No impervious surfaces

such as asphalt will be installed within the parking area; the area will remain gravel. Minor drainage swales will be installed behind the main building to drain rain water to the estuary. Another drainage swale will be installed along the eastern edge of the building to drain rain water away from the building. No significant impacts are therefore anticipated.

Because all washing and processing drains will be directly linked to a septic system, water quality of the estuary and pond area will be enhanced. Currently, drains flow to a sump area and then seep into Drakes Estero, the pond area, and surrounding soils.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b)	**Exposure of people or property to water related hazards, including, but not necessarily limited to: 1) flooding; 2) debris deposition; or 3) similar hazards ?** **(source #(s): 16)**	[ ]	[X]	[ ]	[ ]

Historical records indicate that drainage at this site can be problem when extreme high tides and major storm events occur simultaneously. Because these two events are predictable, sand bags and other mitigation measures will be installed to reduce/eliminate hazards to humans or property. To mitigate any impacts to property, the main processing building will have a cement wall perimeter to limit potential flood waters from entering and all electrical equipment will be raised off the floor area.

Debris deposition historically has not occurred; the watershed adjacent to the project site is relatively small and free from debris. Surface grading will ensure proper drainage of site during normal storm events.

With adequate mitigation measures in place, the proposed project will not expose people or property to significant water related hazards.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
c)	**Discharge of pollutants into surface or ground waters or other alteration of surface or ground water quality (e.g. temperature, dissolved oxygen or turgidity)?** **(source #(s): 6, 17)**	[ ]	[X]	[ ]	[ ]

The former septic system at JOC has been abandoned because of overall general failure. Under Marin County supervision, sewage is now being stored on-site and hauled to approved disposal area. New gray water and septic systems will ensure ground water and the estuary system are not contaminated by JOC operations. All surface drains in the facilities will be connected to the gray water leach field for proper disposal. This gray water and septic systems will meet Marin County and State of California requirements. Monitoring requirements for the septic systems will be established by Marin County and the State of California. The new sewage systems with appropriate monitoring will reduce any potential discharge of pollutants to a less than significant level.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
d) **Substantial change in the amount of surface water in any water body or ground water either through direct additions or withdrawals, or through intersection of an aquifer by cuts or excavations? (source #(s): 6, 19)**	[ ]	[ ]	[X]	[ ]

No substantial change in the amount of surface water will occur as a result of this project. No aquifer will be excavated. Water use, provided on site by a well system which produces 20 gal/min, will not be altered to increase capacity. Water system will be approved by the State of California and Marin County. Monitoring of water system will be by the appropriate agency.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
e) **Substantial changes in the flow of surface or ground waters, including, but not necessarily limited to: 1) currents; 2) rate of flow; or 3) the course or direction of water movements? (source #(s): 6, 17)**	[ ]	[ ]	[X]	[ ]

No changes to surface or ground waters will result from this project. Grading will be minimal and limited to the construction area and will not increase flows. Water direction will continue towards the estuary and adjacent pond and remain as natural as possible. Drainage will be reviewed and approved by the Marin County Department of Public Works. Because the current flows and drainages are not be significantly altered, less than significant impacts are anticipated.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
f) **Substantial reduction in the amount of water otherwise available for public water supplies? (source #(s): 10, 19, 20)**	[ ]	[ ]	[X]	[ ]

Johnson Oyster Company has an independent water supply. The well produces 20 gal/min of exceptionally good water. The water supply is on NPS land and used only by JOC and is authorized by a Special Use Permit from the Superintendent, PRNS. No other public or private entities utilize this water source.

5. AIR QUALITY. *Would the proposal:*

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a) **Generate substantial air emissions that could violate official air quality standards or contribute substantially to an existing or projected air quality violation? (source #(s): 6, 8)**	[ ]	[X]	[ ]	[ ]

The rehabilitated facility will not generate substantial air emissions that could violate air quality standards. Processing oysters does not generate regulated air emissions. During construction, some

short-term impacts will result from dust becoming airborne. To reduce impacts to a less than significant level, construction areas will be watered regularly and beds of trucks will be covered during hauling. NPS resource management staff will regularly monitor the production of dust during construction and ensure compliance

b) **Expose sensitive receptors to pollutants, such as noxious fumes or fugitive dust? (source #(s): 6, 8)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[X]	[ ]	[]

Some construction dust is expected during construction; this will be a insignificant short-term impact and will be mitigated as described in the mitigation matrix and in Section 3b.

c) **Alter air movement, moisture, or temperature, or cause any change in climate? (source #(s): 17)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[ ]	[ ]	[X]

The project, because of its small size, will not alter moisture, temperature, or air movement in the area.

d) **Create objectionable odors? (source #(s): 6, 10)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[ ]	[X]	[ ]

There are three possible receptors for objectionable odors: the general public; employees; and adjacent housing residents. No other sensitive receptor is within .5 miles of the site. Historically, processing of oysters has not created objectionable odors; Point Reyes National Seashore has not received any complaints over the last ten years regarding odors related to the current facilities.

If not properly collected weekly, garbage may create objectionable odors to the visiting public, residents and employees. Therefore, proper storage and collection of garbage is a current enforceable condition of the use and occupancy agreement for the site. Monitoring will occur by NPS staff to ensure any potential odors and impacts to possible receptors are less than significant level.

6. TRANSPORTATION/CIRCULATION. *Would the proposal result in:*

a) **Substantial increase in vehicle trips or traffic congestion such that existing levels of service on affected roadways will deteriorate below acceptable County standards? (source #(s): 3, 6, 10)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[ ]	[X]	[ ]

The buildings are replacement structures and not an expansion of the existing facilities. Therefore, no new transportation impacts are anticipated. Because overall traffic is generated primarily by recreational users, some increase in the use of Sir Francis Drakes may occur over the next 15 years, but the increase will be related to park visitation. Park visitation, however, peaked at 2.6 million in 1992 but has dropped over the last five years to 2.4 million in 1996. The NPS anticipates park visitation will slowly increased approximately 2-3% per year. The Point Reyes National Seashore GMP does not call

for any additional facilities in the north district of the park which would have a cumulative impact with this proposed project on traffic. Therefore, this project will have a less than significant impact on traffic.

b)	**Traffic hazards related to: 1) safety from design features (e.g. sharp curves or dangerous intersections); 2) barriers to pedestrians or bicyclists; or 3) incompatible uses (e.g. farm equipment)? (source #(s): 6, 10, 14)**	**Significant Impact** [ ]	**Potentially Significant Unless Mitigated** [ ]	**Less Than Significant Impact** [X]	**Not Applicable** [ ]

Project does not involve creating new access roads or new intersections. No barriers to pedestrians are to be constructed. Enhanced public access will be provided to the estuary shoreline by the project. Current equipment will be used and limited primarily to a forklift. To ensure access for emergency equipment, road will be improved as directed by the Marin County Fire Department.

c)	**Inadequate emergency access or access to nearby uses? (source #(s): 14)**	**Significant Impact** [ ]	**Potentially Significant Unless Mitigated** [X]	**Less Than Significant Impact** [ ]	**Not Applicable** [ ]

Road access will be improved as directed by Marin County Fire Department (MCFD) to ensure access will be adequate for emergency services. The actions proposed by MCFD as described in Section 9e related to road improvement will mitigate any impacts to less than significant level.

d)	**Insufficient parking capacity on-site or off-site? (source #(s): 6)**	**Significant Impact** [ ]	**Potentially Significant Unless Mitigated** [ ]	**Less Than Significant Impact** [X]	**Not Applicable** [ ]

Parking will meet Marin County and NPS standards; current level of 22 parking spaces will meet projected demand as verified by Marin County Department of Public Works and the NPS.

e)	**Substantial impacts upon existing transportation systems, including rail, waterborne or air traffic systems? (source #(s): 10)**	**Significant Impact** [ ]	**Potentially Significant Unless Mitigated** [ ]	**Less Than Significant Impact** [ ]	**Not Applicable** [X]

No public or NPS transportation facilities are available in area.

7. BIOLOGICAL RESOURCES. *Would the proposal result in:*

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a) **Reduction in the number of endangered, threatened or rare species, or substantial alteration of their habitats including, but not necessarily limited to: 1) plants; 2) fish; 3) insects; 4) animals; and 5) birds listed as special-status species by State or Federal Resource Agencies? (sources #(s): 5, 11)**	[ ]	[X]	[ ]	[ ]

In consultation with the Fish and Wildlife Service and NPS biologists, this project has been determined to not adversely affect any special status species or alter any critical habitat.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b) **Substantial change in the diversity, number, or habitat of any species of plants or animals currently present or likely to occur at any time throughout the year? (source #(s): 5, 11)**	[ ]	[X]	[ ]	[ ]

The proposed project will not result in significant adverse impacts to native vegetation, wetlands, stream/riparian habitat, coastal dunes, and other sensitive habitats. The development of the main leach field will disturb approximately 2.25 acres of native coastal scrub/grassland dominated by coyote brush. However, because native vegetation will be planted in the disturbed area to mitigate the any loss of native vegetation, the long-term impacts will not be significant. Because of the abundance of coastal scrub/grassland habitat adjacent to the Drakes Estero, recolonization of the area by birds and other species will occur in the long-term. During construction, there will be some short-term insignificant impacts to resident avian species such as wrentits and scrub jays and small mammals such as the brush rabbit and white-footed mouse.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
c) **Introduction of new species of plants or animals into an area, or improvements or alterations that would result in a barrier to the migration, dispersal or movement of animals? (source #(s): 8)**	[ ]	[X]	[ ]	[ ]

Project will be monitored by NPS Vegetation Management staff to ensure the invasion of non-native vegetation will not occur. As a mitigation measure, any non-native species found at the site will be removed after construction and the site would be monitored each year.

8. ENERGY AND NATURAL RESOURCES. *Would the proposal result in:*

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a)	**Substantial increase in demand for existing energy sources, or conflict with adopted policies or standards for energy use? (source #(s): 6)**	[ ]	[ ]	[X]	[ ]

Energy use is anticipated to only slightly increase, approximately (10%) because of the small increase in square footage. Current energy use is estimated at 5,000 kilowatts per month.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b)	**Use of non-renewable resources in a wasteful and inefficient manner? (source #(s): 6)**	[ ]	[ ]	[X]	[ ]

This project will not use non-renewable resources in an inefficient manner. Buildings are primarily metal with exterior wood siding; concrete will be used for the foundation. Cedar wood siding (not redwood), a renewable resource, will be used because it is regionally abundant.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
c)	**Loss of significant mineral resource sites designated in the Countywide Plan from premature development or other land uses which are incompatible with mineral extraction? (source #(s): 1)**	[ ]	[ ]	[ ]	[X]

The JOC is not an area designated as a mineral extraction site. This area is part of Point Reyes National Seashore and mineral extraction is prohibited.

9. HAZARDS. *Would the proposal involve:*

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a)	**A risk of accidental explosion or release of hazardous substances including, but not necessarily limited to: 1) oil, pesticides; 2) chemicals; or 3) radiation)? (source #(s): 6, 21)**	[ ]	[ ]	[X]	[ ]

All hazardous materials and waste, such as paint and oil, will be properly stored in the new facility and be in accordance with federal/state standards and regulations and the *Point Reyes National Seashore Hazardous Waste Management Plan* In addition, all hazardous waste such as paint and oil will be disposed of according to the *Hazardous Waste Management Plan*. No pesticides are used by JOC. As no major or unusual quantities of explosive or hazardous materials will be present on the project site during construction or when improvements are completed, the likelihood of a explosive hazard is extremely remote and deemed insignificant.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b)	**Possible interference with an emergency response plan or emergency evacuation plan? (source #(s): 10)**	[ ]	[ ]	[X]	[ ]

The project does not interfere with the NPS service or county emergency response or evacuation plan.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
c)	**The creation of any health hazard or potential health hazard? (source #(s): 6, 10)**	[ ]	[X]	[ ]	[ ]

The proposed project under consideration is to improve public health and safety. This construction will bring facilities and processing operations into compliance with state, federal, and Marin County building and health/safety codes. Mitigation measures as described in Section 5a will eliminate some short-term potential health hazards related to airborne dust and water contamination. With these mitigation measures in place, less than significant impacts are anticipated.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
d)	**Exposure of people to existing sources of potential health hazards? (source #(s): 6, 16)**	[ ]	[X]	[ ]	[ ]

No existing sources of potential health hazards will be exposed to the public or employees. Current health hazards have been documented by Marin County, NPS, and State of California agencies. These deficiencies are related to building code violations, food processing violations, and health and safety code violations. Existing health hazards will be eliminated by the construction of the new processing facilities and septic systems.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
e)	**Increased fire hazard in areas with flammable brush, grass, or trees? (source #(s): 7, 14)**	[ ]	[ ]	[X]	[ ]

The proposed project area is situated near coastal scrub/grassland vegetation. The proposed facilities will contain flammable materials such as cleaners, lubricants, solvents and other potential hazards. In consultation with MCFD, mitigation measures have been adopted to ensure the project will not significantly increase fire hazards in the area. These include access enhancements along the main entrance road, proper storage of hazardous material and waste, fully automatic sprinkler systems in buildings, proper removal of vegetation around complex, and adequate space around buildings for emergency vehicle access. In addition, the main objective of the project is the rehabilitation of buildings to meet current health and safety codes and reduce potential fire hazards.

All hazardous materials and waste, such as paint and oil, will be properly stored in the new facility and be in accordance with federal/state standards and regulations and the *Point Reyes National Seashore Hazardous Waste Management Plan* In addition, all hazardous waste such as paint and oil will be disposed of according to the *Hazardous Waste Management Plan*. No pesticides are used by JOC. As no major or

unusual quantities of explosive or hazardous materials will be present on the project site during construction or when improvements are completed, the likelihood of a explosive hazard is extremely remote and deemed insignificant.

10. NOISE. ***Would the proposal result in:***

a) **Substantial increases in existing ambient noise levels? (source #(s): 1, 6)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[ ]	[X]	[ ]

The proposed project will result in the periodic generation of noise associated with short-term construction activities. Vehicles traveling to and from the site will result in the generation of intermittent low levels of noise. Although ambient noise levels in the surrounding area are expected to increase during construction, the construction-related noise would represent a temporary increase of limited duration, and therefore, is not considered a significant impact. In addition, all construction activity will be regulated by the County's Design Review and building permit process, in compliance with standard regulations controlling permitted hours of activity and permitted noise levels.

b) **Exposure of people to significant noise levels, or conflicts with adopted noise policies or standards? (source #(s): 1, 6)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[ ]	[X]	[ ]

See Section 10a above. To ensure the public is not allowed to enter the construction site, appropriate barriers will be installed to keep individuals at least 100 feet from noise sources. Therefore, they will not be exposed to significant noise levels during construction.

11. PUBLIC SERVICES. ***Would the proposal have an effect upon, or result in a need for new or altered government service in any of the following areas:***

a) **Fire protection? (source #(s): 14)**	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
	[ ]	[X]	[ ]	[ ]

Increased square footage of replacement buildings will add minor impact to Marin County Fire Department responsibilities. In addition, based on correspondence with Marin County Fire Department, improvements to street and site address labeling, road access, water storage, and facility automatic fire sprinkler systems are needed. These improvements will be added to overall JOC plan for the site to mitigate impacts as directed by the Marin County Fire Department and NPS. With these mitigation measures, the impact will be minimized.

b) **Police protection?** (source #(s): 7)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

NPS is the primary law enforcement agency in the project area. No increase in service is anticipated. Marin County Sheriff's Department currently provides adequate back-up law enforcement protection to the subject property. No increase in this service is necessary. Therefore, less than significant impacts will occur.

c) **Schools?** (source #(s): 10)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

The project will not increase housing or number of employees working at JOC. Because there will be no increase in housing or number of employees, school children attending local schools is not anticipated to change and will remain at current levels. Therefore, a less than significant impact will occur to the Shoreline School District.

d) **Maintenance of public facilities, including roads?** (source #(s): 6)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

Vehicle use on park and county roadways is not anticipated to change. The facilities are being replaced to accommodate current codes and correct deficiencies, not for increased capacity. Therefore, a less than significant impact will occur.

e) **Other governmental services?** (source #(s): 10)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[ ]	[X]

Because this is a small scale project, no new governmental services will be needed. Current facilities are being upgraded to meet current codes and correct deficiencies.

12. UTILITIES AND SERVICE SYSTEMS. ***Would the proposal result in a need for new systems, or substantial alterations to the following utilities:***

a) **Power or natural gas?** (source #(s): 6)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

Pacific Gas and Electric Company has adequate facilities in the project vicinity to provide service to the propose project. Only minor increases in power and propane are anticipated. No new services are required for this project.

b) **Communications systems?** (source #(s): 6)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

Normal communication systems are available to serve the proposed project. No new phones lines or connections are needed at the project site.

c) **Local or regional water treatment or distribution facilities?** (source #(s): 6)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[ ]	[X]

Septic system is being upgraded on NPS lands adjacent to JOC facilities. A regional system is not available in the area.

d) **Sewer or septic tanks?** (source #(s): 6)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

The former septic system at JOC has been abandoned because of overall failure. Under Marin County supervision, sewage is now being storage on-site and hauled to approved disposal area. New gray water and septic systems will ensure ground water and the estuary system are not contaminated by JOC operations. All surface drains in the facilities will be connected to the gray water leach field for proper disposal. These new gray water and septic systems have been designed to meet Marin County and State of California requirements and are being reviewed by Marin County Environmental Health Service staff. Monitoring requirements for the septic systems will be established by Marin County and the State of California. The new sewage systems, with appropriate monitoring, will reduce any potential discharge of pollutants to a less than significant level.

e) **Storm water drainage?** (source #(s): 6)

Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
[ ]	[ ]	[X]	[ ]

Because this project is focused on the rehabilitation of existing structures, surface runoff and drainage patterns will not be altered significantly or increased substantially. No impervious surfaces such as asphalt will be installed within the parking area; the area will remain gravel. Minor drainage swales will be installed behind the main building to drain rain water to the estuary. Another drainage swale will be installed along the eastern edge of the building to drain rain water away from the building. No significant impacts are therefore anticipated.

Because all washing and processing drains will be directly linked to a septic system, water quality of the estuary and pond area will be enhanced. Currently, drains flow to a sump area and then seep into Drakes Estero, the pond area, and surrounding soils.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
f)	**Solid waste disposal? (source #(s): 6)**	[ ]	[ ]	[X]	[ ]

The current JOC facility solid waste disposal is performed by the NPS on a fee basis. Because the primary purpose of the project is to rehabilitate existing operational facilities, the new complex will not significantly increase current levels of solid waste disposal. Therefore, no significant impact to NPS solid waste garbage service is not anticipated.

13. AESTHETICS/VISUAL RESOURCES. ***Would the proposal:***

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a)	**Substantially reduce, obstruct, or degrade a scenic vista open to the public or scenic highway, or conflict with adopted aesthetic or visual policies or standards? (source #(s): 3, 22)**	[ ]	[ ]	[X]	[ ]

The project proposes to remove all existing on-shore processing facilities and construct a new processing facility and accessory structures appurtenant thereto. The existing processing facility and accessory structures do not meet Uniform Building Code and are in a deteriorated condition. Their removal and the construction of new structures would result in a positive visual improvement of the immediate area. The project incorporates height, mass and bulk characteristics that are proportional to the site. The new structures would maintain adequate setbacks from other structures in the vicinity and would not adversely impact existing scenic vistas within the Point Reyes National Seashore.

		Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b)	**Have a demonstrable negative aesthetic effect by causing a substantial alteration of the existing visual resources including, but not necessarily limited to: 1) an abrupt transition in land use; 2) disharmony with adjacent uses because of height, bulk or massing of structures; or 3) cast of a substantial amount of light, glare, or shadow? (source #(s): 3,22)**	[ ]	[ ]	[X]	[ ]

The proposed project would not have negative aesthetic effect upon existing visual resources in the area. The removal of the existing deteriorated processing facility and dilapidated accessory buildings and the construction of new structures which meet Uniform Building Code would result in a beneficial visual improvement of the area. The proposed design of the new structures would better blend with the surrounding natural environment. Proposed colors and construction materials would compliment the surrounding natural environment, as well as integrate well with the existing residential units located nearby. Each of the new structures would maintain adequate setbacks from other structures in the vicinity and, therefore, no impacts upon the light, air or privacy of people living or working in nearby structures would occur.

14. CULTURAL RESOURCES. *Would the proposal:*

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a) **Disturb paleontological, archaeological, or historical sites, objects, or structures? (source #(s): 9, 12)**	[ ]	[X]	[ ]	[ ]

No historic structures or sites are known in the project area. One archeological site is located next to and on the bluff at the southern edge of the project area. The site is highly disturbed. To mitigate any impacts, the site will be fenced off during construction and monitored weekly by NPS staff. Archeological clearance, including an additional site survey, will be conducted by the NPS Regional Archeologist before the project begins If any artifacts are located during construction, all work will cease and a NPS archeologist team will provide consultation of how to proceed and/or what additional mitigation measures are needed.

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
b) **Have the potential to cause a physical change which would adversely affect unique ethnic cultural values, or religious or sacred uses within the project area? (source #(s): 9)**	[ ]	[ ]	[ ]	[X]

No ethnic cultural values or religious or sacred uses currently occur within the project area.

15. SOCIAL AND ECONOMIC EFFECTS. *Would the proposal result in:*

	Significant Impact	Potentially Significant Unless Mitigated	Less Than Significant Impact	Not Applicable
a) **Any physical changes which can be traced through a chain of cause and effect to social or economic impacts. (source #(s): 13)**	[ ]	[ ]	[X]	[ ]

Project will positively impact the local economy. JOC accounts for 39% of the State of California's commercial oyster harvest. Tomales Bay and Drakes Estero oysters operations are estimated to contribute $2,500,000 to the local economy.

VI. **MANDATORY FINDINGS OF SIGNIFICANCE.** Pursuant to Section 15065 of the State EIR Guidelines, a project shall be found to have a significant effect on the environment if any of the following are true:
(Please explain your answer after each question)

		Yes	No	Mayb
a)	Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory? *As described in Section V of this Initial Study, any potential environmental impacts from the proposed project would be mitigated to a level of insignificance.*	[ ]	[X]	[ ]
		Yes	**No**	**Maybe**
b)	Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? *As described in Section V of this Initial Study, any potential environmental impacts from the proposed project would be mitigated to a level of insignificance.*	[ ]	[X]	[ ]
		Yes	**No**	**Maybe**
c)	Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects). *As described in Section V of this Initial Study, any potential environmental impacts from the proposed project would be mitigated to a level of insignificance.*	[ ]	[X]	[ ]
		Yes	**No**	**Maybe**
d)	Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly? *As described in Section V of this Initial Study, any potential environmental impacts from the proposed project would be mitigated to a level of insignificance.*	[ ]	[X]	[ ]

VII. PROJECT SPONSOR'S INCORPORATION OF MITIGATION MEASURES:

Acting on behalf of the project sponsor or the authorized agent of the project sponsor, I (undersigned) have reviewed the Initial Study for the Johnson Oyster Company and have particularly reviewed the mitigation measures and monitoring programs identified herein. I accept the findings of the Initial Study, including the recommended mitigation measures, and hereby agree to modify the proposed project applications now on file with Marin County to include and incorporate all mitigation measures and monitoring programs set out in this Initial Study.

[signature] 3/30/98

Superintendent, Point Reyes National Seashore Date

VIII. DETERMINATION: (Completed by Marin County Environmental Coordinator). Pursuant to Sections 15081 and 15070 of the State Guidelines, the forgoing Initial Study evaluation, and the entire administrative record for the project:

[ ] I find that the proposed project WILL NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

[X] I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared.

[ ] I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

[signature] 3/30/98

Signature Date

Tim Haddad

Printed Name For

ATTACHMENT 1
INITIAL STUDY ENVIRONMENTAL CHECKLIST FORM
DOCUMENTS INCORPORATED BY REFERENCE

The following is a list of relevant information sources which have been incorporated by reference into the foregoing Initial Study pursuant to Section 15150 of the State Guidelines. The number assigned to each information sources corresponds to the number listed in parenthesis following the incorporating topical questions of the Initial Study Checklist. These documents are both a matter of public record and available for public inspection. The information incorporated from these documents shall be considered to be set forth fully in the Initial Study.

1. *Marin Countywide Plan*, CDA - Planning Division, 1994.

2. *Marin County Zoning Ordinance*, Title 22, CDA - Planning Division.

3. *Point Reyes National Seashore, General Management Plan*, National Park Service, 1980.

4. Geology of Point Reyes Peninsula, Marin County, California. California Division of Mines and Geology. 1977.

5. Fellers, Dr. Gary, U.S.G.S. Biological Resource Division. Personal Communication. May 1997.

6. Desler, Chuck. Personal Communication. June 1997

7. Dean, Frank, Chief Ranger, Point Reyes National Seashore. Personal Communication. June 1997.

8. Koenig, Sara, Vegetation Management Specialist, Point Reyes National Seashore. Personal Communication.1997.

9. Kelly, Roger, Regional Archeologist, National Park Service Pacific Great Basin Support Office. May 9, 1997.

10. Neubacher, Don L., Superintendent, Point Reyes National Seashore. Personal Communication. June 1997.

11. Allen, Dr. Sarah, Research Biologist, Point Reyes National Seashore. Personal Communication. May 1997.

12. Riley, Lynn M. Assessment of Endangered Archeological Sites at Point Reyes National Seashore. 1976.

13. Moore, Tom. California Department of Fish and Game. Files. 1994.

14. Parker, Keith. Marin County Fire Department. Letter. May 1997.

15. Marin County Local Coastal Program, Unit II. Adopted by Marin County Board of Supervisors, 1980.

16. Johnson, Tom. Personal Communication. September 1997.

17. Smith, Frank. Civil Engineer, Point Reyes National Seashore. Personal Communication September 1997.

18. Uniform Building Code. Chapter 16. 1994.

19. State of California, Department of Water Resources. Water Well Drillers Report. February 22, 1989.

20. Gannon, Tom. Consulting Sanitary Engineer. Water Supply Sanitary Survey, Johnson Oyster Farm. April 1994.

21. Hazardous Waste Management Plan. Point Reyes National Seashore. June 1997.

22. Marin County Community Development Agency. Staff 1998.

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United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L7617

June 11, 1999

Johnson Oyster Company
P.O. Box 69
Point Reyes, CA 94537

Dear Tom,

Environmental planning for the proposed construction of a new oyster processing plant and the replacement and rehabilitation of several existing accessory structures including upgrading and construction of a new wastewater disposal system at the Johnson Oyster Company is complete. You may proceed with final project design in coordination with park staff and the County of Marin. As you know, the Advisory Commission, at its July 18, 1998 public meeting, concurred with park staff in its Finding of No Significant Impact based on the Environmental Assessment (EA) prepared earlier this year. This approval completes the design review portion for this project.

Your park contact during design and construction will be Larry Harris, 415-663-8522 ext. 237, Chief of Maintenance for Point Reyes National Seashore. Although your wastewater permit and building permits will be issued by Marin County authorities, park staff will need to review and approve your design to ensure that the environmental, historic preservation, and life safety requirements described in the EA are reflected in the final construction documents.

Park review of the construction specifications for the new sewage disposal system as referenced in County of Marin permit #97-18 have been reviewed by park staff. The following comments and requirements are provided for your information.

1. As requested by Sky Construction a temporary electrified cattle fence will be allowed to keep cattle out of the construction site of the new leachfield and to help with the revegetation of the site to current conditions. The fence will be removed after complete revegetation of the site has occurred. This is anticipated to take at least 12 months.
2. Park staff have agreed that re-vegetation of the leachfield may be accomplished by removing and reusing the top three (3) inches of top soil. The contractor must be careful not to mix or otherwise contaminate the stored topsoil with other materials from the site. Staff recommends that dirt or material piles on site be marked or labeled to insure differing soils are not mixed.

3. During the revegetation cycle, the leachfield site must be monitored for non-native/exotic plant species and as needed removed. Park staff is available to provide assistance in plant identification during this time. Johnson Oyster Company will be responsible for actual removal of non-native/exotic plants or weeds.
4. Preparing the route for the 3000' pipeline will be done without undue disturbance of soils. Specifically, it is advised that the removing of brush and plants to allow site access for the trenching equipment and installation of the pipeline be done by either cutting at ground level or by rolling over (crushing) the brush. Any undue or extensive soil disturbance will require a higher level of restoration and re-vegetation at the end of the project.
5. A construction/material storage trailer will be allowed if located at main facility site. This unit cannot be used for sleeping quarters at any time.

Thank you for your continuing efforts to improve and enhance the facilities and utility systems at the Johnson Oyster Company.

Sincerely,

Don L. Neubacher
Superintendent

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
600 Harrison Street, Suite 600
San Francisco, California 94107-1372

IN REPLY REFER TO:

RECEIVED
Point Reyes
National Seashore
AUG 13 '98

✓	SUPT.
	ASST. SUPT.
	SPEC. PK. USES
	LAW ENFORC.
	RES./SCIENCE
	RANGE CONS.
	FIRE MGT.
	INTERP.
	CULT. RES.
	MAINT.
	CONTRACTING
	PERSONNEL
	BUDGET
✓	CENTRAL FILES

L7617 (PGSO-PP)

AUG 11 1998

Memorandum

To: Superintendent, Point Reyes National Seashore

From: ACTING Regional Director, Pacific West Region

Subject: Environmental Compliance for Replacement and Rehabilitation of Johnson Oyster Company Facilities

The revised *Finding of No Significant Impact* (FONSI) for this facility management project is approved. To finish this particular impact analysis-conservation planning process, the park should send notice of the decision (along with copy of the FONSI document) to all individuals and organizations who received or commented on the *Environmental Assessment*.

for John J. Reynolds
Attachment

U.S. Department of the interior
National Park Service
Point Reyes National Seashore

Finding of No Significant Impact (FONSI)

Johnson Oyster Company Replacement and Rehabilitation of Facilities
Point Reyes National Seashore

The National Park Service (NPS) has completed the Environmental Assessment (EA) for construction and replacement of facilities at Johnson's Oyster Company (JOC) on Drakes Estero. The EA was prepared to assist the NPS planning and decision making process to determine if an Environmental Impact Statement (EIS) was required for the proposed replacement facilities and the construction of a new processing facility at JOC. The EA describes the NPS proposal and the affected environment, and evaluates the effects of the proposed action and alternatives on the environment. The EA was prepared in consultation with the Marin County Community Development Agency to aid their use of the analysis in fulfilling California Environmental Quality Act requirements.

The EA evaluates and describes the following alternatives: A) a no action alternative; B) rehabilitation of two facilities and construction of a new processing facility; and C) rehabilitation of existing structures at same location.

The preferred Alternative B was selected for implementation to bring the JOC into compliance with federal, state, and Marin County health and safety regulations. In addition, this alternative provides improvements to area's visual quality. The no action was rejected because it would not meet the goals of the park's General Management Plan and would result in failure to perform the necessary improvements which would result in Marin County and the NPS issuing cease and desist orders for the operation of the facility. Alternative C did not provide environmental benefits which would occur under the proposed action.

The NPS/Marin County conducted public review of the EA for 30 days with the comment period ending on June 19, 1998. The park received 11 letters regarding the project. Letters were received from the Marin Conservation League, California Department of Fish and Game (CDFG), Marin Audubon Society, Sierra Club Marin Group, Tomales Bay Association, the Environmental Forum of Marin, Gulf of the Farallones National Marine Sanctuary and two individuals.

Two of the letters endorsed Alternative B: The Proposed Action. Both specifically discussed the positive aspects of moving the main facility away from Drakes Estero.

Three of the letters expressed concern that the new facilities would create additional growth in the overall oyster operation in the Bay. The letters indicated that additional growth may create potential negative impacts. The project is not sized to create additional growth in oyster production in Drakes Bay. The building has been only sized to meet public health and safety codes. In addition, JOC has agreed, as a condition of the NPS permit, to not exceed an annual processing/production limit of 700,000 lbs (oyster weight). This limit is the past peak production level over the last 10 years. This 700,000 lbs limit will ensure that the new facilities will not create additional growth (and any new negative impacts) in overall oyster production in the estuary.

General stewardship of the estuary by JOC was discussed in a number of letters. Several of the letters discussed oyster production related debris--particularly black plastic tubes and deteriorated plastic oyster bag--around the JOC facility and on the shores of the estuary and adjacent beaches. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the shoreline. The NPS and CDFG have agreed to monitor JOC and inspect the shoreline on a regular basis. JOC has also agreed to immediately remove any unused or abandoned oyster racks. In addition, JOC has agreed to pay the Gulf of the Farallones National Marine Sanctuary for quarterly monitoring of the shoreline.

Long-term impacts of oyster production to resources in the estuary was a concern of a number of organizations. As stated above, the NPS has concluded that there will not be any new impacts in the estuary as a result of the alternative chosen. However, as a condition of the permit, NPS, JOC, Gulf of the Farallones National Marine Sanctuary, and CDFG agree to begin a three year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern of several of the organizations. To mitigate any impacts related to this issue, both JOC, and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment, and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster stock shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed in Drakes Estero.

At the July 18, 1998 Point Reyes National Seashore/Golden Gate National Recreation Area Citizens Advisory Commission meeting, the project was unanimously approved.

The required mitigation measures necessary to eliminate and minimize environmental impacts are addressed in the mitigation matrix that follow.

Impacts	Proposed Mitigation	Responsible Party
Vegetation	To mitigate the invasion of non-native vegetation, the main disturbed site will be monitored and non-native plants removed after construction from disturbed areas. Areas will be replanted with natives where needed. At the leach field area, the site will be monitored to ensure rapid regrowth by surrounding native vegetation. All weed species will be removed. If necessary, planting with natives will occur.	Point Reyes National Seashore Resource Management Staff
Water Resources	The site will be monitored during construction and appropriate measures taken to ensure Drakes Estero and adjacent pond are not contaminated with sediments and construction debris. Soil and straw bale berms and plastic fencing will be established, as necessary, to protect the estuary from sediments and construction debris.	Johnson Oyster Company
Air	Some dust will be generated from construction activities. Dust will be mitigated by watering of area and covering truck leaving area with debris.	Johnson Oyster Company
Wildlife	Park staff will monitor species before, during, and after the project to insure disturbance is minimal. Resident bird nesting season will be avoided.	Point Reyes National Seashore Resource Management Staff
Threatened and Endangered Species	NA	
Soils	Some short-term impacts due to heavy equipment on-site will occur. These impacts can be mitigated by JOC by regrading and restoring the site quickly to allow regrowth of vegetation. To minimize any soil loss during construction, the area will be sprayed with water regularly to reduce dust and soil erosion. In addition, ground disturbance will be kept to a minimum (less than three acres on the main construction area and 2.25 acres on the leach field site) to ensure soil erosion is minimal. Any materials stockpiled will be on previously disturbed sites away from the estuary.	Johnson Oyster Company
Topography	To mitigate any potential impact to new structures, a qualified soil engineer will investigate soil conditions	Johnson Oyster Company

	to ensure long-term stability of proposed structures.	
Cultural Resources	Archeological site will be fenced to protect from any potential impacts and monitored throughout the construction period. If any archeological material is located during construction, the project will be stopped and the area evaluated.	NPS Regional Archeologist
Visual Quality	NA	
Health & Safety	NA	
Noise	Short-term impacts only during normal business hours on weekdays as demolition crews remove the structures and debris. Residents will be notified of construction activity and hours of all construction activity will be regulated. No construction can occur before 7:00 am and after 7:00 pm.	Johnson Oyster Company
Public Services	NA	
Economic	NA	

Based on the analysis of the environmental assessment and the alternatives, required mitigation measures, and with consideration of the public comment, the National Park Service will be authorized to undertake the replacement of two facilities and construction of a new processing facility at JOC. The National Park Service has determined that this action will not have a significant impact upon the environment. There are no cumulative impact nor is precedent established by these actions. Therefore, the project will be implemented and an environmental impact statement (EIS) will not be prepared.

Recommended: Frank Dean
Acting Superintendent, Point Reyes National Seashore

August 11, 1998
Date

Approved: Cynthia Orlando
for Acting Regional Director, Pacific West

8-11-98
Date

L7617

August 6, 1998

Memorandum

To: Regional Director, Pacific West
ATTN: Alan Schmierer, Environmental Compliance Coordinator

From: Superintendent, Point Reyes National Seashore

Subject: Environmental Assessment and FONSI

The enclosed Environmental Assessment (EA) and FONSI address the replacement and rehabilitation of facilities at Johnson's Oyster Company (JOC). The National Park Service and Marin County Community Development Agency conducted public review of the EA for thirty days and closed to public comment on June 19,1998. Eleven letters were received from the public. Two letters endorsed Alternative B, the preferred alternative. Three letters expressed concerns regarding the new facilities would create additional growth in the overall oyster operation in Drakes Estero.

At the July 18, 1998 Point Reyes National Seashore/Golden Gate National Recreation Area Citizens Advisory Commission meeting, the project was unanimously approved.

We will appreciate your favorable review and approval.

Don L. Neubacher

Enclosures

U.S. Department of the interior
National Park Service
Point Reyes National Seashore

Finding of No Significant Impact (FONSI)

Johnson Oyster Company Replacement and Rehabilitation of Facilities
Point Reyes National Seashore

The National Park Service (NPS) has completed the Environmental Assessment (EA) for construction and replacement of facilities at Johnson's Oyster Company (JOC) on Drakes Estero. The EA was prepared to assist the NPS planning and decision making process to determine if an Environmental Impact Statement (EIS) was required for the proposed replacement facilities and the construction of a new processing facility at JOC. The EA describes the NPS proposal and the affected environment, and evaluates the effects of the proposed action and alternatives on the environment.

The EA evaluates and describes the following alternatives: A) a no action alternative; B) rehabilitation of two facilities and construction of a new processing facility; and C) rehabilitation of existing structures at same location.

The preferred Alternative B was selected for implementation to bring the JOC into compliance with federal, state, and Marin County health and safety regulations. In addition, this alternative provides improvements to area's visual quality. The no action was rejected because it would not meet the goals of the park's General Management Plan and would result in failure to perform the necessary improvements which wouuld result in Marin County and the NPS issuing cease and desist orders for the operation of the facility. Alternative C did not provide environmental benefits which would occur under the proposed action.

The NPS/Marin County conducted public review of the EA for 30 days with the comment period ending on June 19, 1998. The park received 11 letters ~~(attached)~~ regarding the project. Letters were received from the Marin Conservation League, California Department of Fish and Game (CDFG), Marin Audubon Society, Sierra Club Marin Group, Tomales Bay Association, the Environmental Forum of Marin, Gulf of the Farallones National Marine Sanctuary and two individuals.

Two of the letters endorsed Alternative B: The Proposed Action. Both specifically discussed the positive aspects of moving the main facility away from Drakes Estero.

Three of the letters expressed concern that the new facilities would create additional growth in the overall oyster operation in the Bay. The letters indicated that additional growth may create potential negative impacts. The project is not sized to create additional growth in oyster production in Drakes Bay. The building has been only sized to meet public health and safety codes. In addition, JOC has agreed, as a condition of the NPS permit, to not exceed an annual processing/production limit of 700,000 lbs (oyster weight). This limit is the past peak production level over the last 10 years. This 700,000 lbs limit will ensure that the new facilities will not create additional growth (and any new negative impacts) in overall oyster production in the estuary.

General stewardship of the estuary by JOC was discussed in a number of letters. Several of the letters discussed oyster production related debris--particularly black plastic tubes and deteriorated plastic oyster bag--around the JOC facility and on the shores of the estuary and adjacent beaches. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the shoreline. The NPS and CDFG have agreed to monitor JOC and inspect the shoreline on a regular basis. JOC has also agreed to immediately remove any unused or abandoned oyster racks. In addition, JOC has agreed to pay the Gulf of the Farallones National Marine Sanctuary for quarterly monitoring of the shoreline.

Long-term impacts of oyster production to resources in the estuary was a concern of a number of organizations. The NPS agrees that long-term impacts to estuary resources are not fully known. As stated above, the NPS has concluded that there will not be any new impacts in the estuary as a result of the alternative chosen. However, as a condition of the permit, NPS, JOC, Gulf of the Farallones National Marine Sanctuary, and CDFG agree to begin a three year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern of several of the organizations. To mitigate any impacts related to this issue, both JOC, and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment, and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster stock shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed in Drakes Estero.

At the July 18, 1998 Point Reyes National Seashore/Golden Gate National Recreation Area Citizens Advisory Commission meeting, the project was unanimously approved.

The required migiation measures necessary to eliminate and minimize environmental impacts are addressed in the mitigation matrix that follow.

Impacts	Prescribed Mitigation	Responsible Party
Vegetation	To mitigate the invasion of non-native vegetation, the main disturbed site will be monitored and non-native plants removed after construction from disturbed areas. Areas will be replanted with natives where needed. At the leach field area, the site will be monitored to ensure rapid regrowth by surrounding native vegetation. All weed species will be removed. If necessary, planting with natives will occur.	Point Reyes National Seashore Resource Management Staff
Water Resources	The site will be monitored during construction and appropriate measures taken to ensure Drakes Estero and adjacent pond are not contaminated with sediments and construction debris. Soil and straw bale berms and plastic fencing will be established, as necessary, to protect the estuary from sediments and construction debris.	Johnson Oyster Company
Air	Some dust will be generated from construction activities. Dust will be mitigated by watering of area and covering truck leaving area with debris.	Johnson Oyster Company
Wildlife	Park staff will monitor species before, during, and after the project to insure disturbance is minimal. Resident bird nesting season will be avoided.	Point Reyes National Seashore Resource Management Staff
Threatened and Endangered Species	NA	
Soils	Some short-term impacts due to heavy equipment on-site will occur. These impacts can be mitigated by JOC by regrading and restoring the site quickly to allow regrowth of vegetation. To minimize any soil loss during construction, the area will be sprayed with water regularly to reduce dust and soil erosion. In addition, ground disturbance will be kept to a minimum (less than three acres on the main construction area and 2.25 acres on the leach field site) to ensure soil erosion is minimal. Any materials stockpiled will be on previously disturbed sites away from the estuary.	Johnson Oyster Company
Topography	To mitigate any potential impact to new structures, a	Johnson Oyster

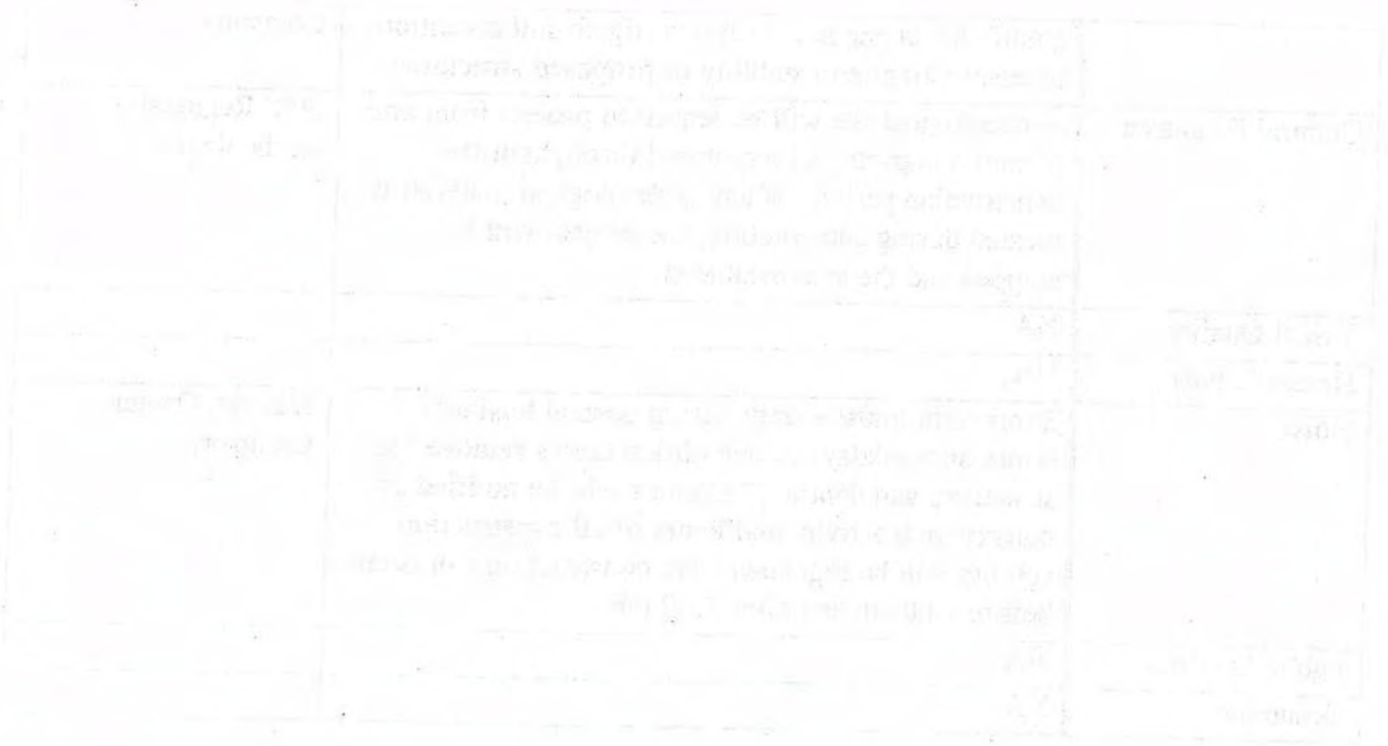
	qualified soil engineer will investigate soil conditions to ensure long-term stability of proposed structures.	Company
Cultural Resources	Archeological site will be fenced to protect from any potential impacts and monitored throughout the construction period. If any archeological material is located during construction, the project will be stopped and the area evaluated.	NPS Regional Archeologist
Visual Quality	NA	
Health & Safety	NA	
Noise	Short-term impacts only during normal business hours on weekdays as demolition crews remove the structures and debris. Residents will be notified of construction activity and hours of all construction activity will be regulated. No construction can occur before 7:00 am and after 7:00 pm.	Johnson Oyster Company
Public Services	NA	
Economic	NA	

Additional Mitigation Efforts Required Related to Public Comments

Three letters received during the public comment period expressed concerns that new facilities would create additional growth in the production of oysters. The building is not sized to create added space but to meet public health and safety codes of Marin County. In addition, Johnson Oyster Company (JOC) has agreed as a conditional use of the permit not to exceed an annual processing/production limit of 700,000 lbs (oyster weight) which is the past peak production over the last 10 years.

General stewardship of Drakes Estero by JOC was mentioned in a number of letters. Specifically, the letters concerned the production related debris - particularly black plastic tubing and deteriorated oyster bags. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the adjacent shoreline. The National Park Service and California Department of Fish & Game have agreed to monitor JOC and inspect the shoreline regularly. JOC has also agreed to immediately remove any unused or abandoned oyster racks and pay the Gulf of the Farallones National Marine Sanctuary to monitor the shoreline quarterly.

Long-term impacts of oyster production to resources in the estuary was a concern from a number of organizations. ~~The NPS agrees that these impacts are not fully known.~~ As another condition of the permit, the NPS, JOC, CDFG, and the Gulf of the Farallones NMS will begin



a three-year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern by several organizations. To mitigate any impacts related to this issue, both JOC and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed into Drakes Estero.

Based on the analysis of the environmental assessment and the alternatives, required mitigation measures (detailed on attached matrix), and with consideration of the public commentthe National Park Service will be authorized to undertake the replacement of two facilities and construction of a new processing facility at JOC. The National Park Service has determined that this action will not have a significant impact upon the environment. There are no cumulative ipmact nor is precedent established by these actions. Therefore, the project will be implemented and an environmental impact statement (EIS) will not be prepared.

Recommended: _____ 8/6/98
Superintendent, Point Reyes National Seashore — Date

Approved: _____ _____
Regional Director, Pacific West — Date

KEY:

(E)	*Endangered*	Listed (in the Federal Register) as being in danger of extinction.
(T)	*Threatened*	Listed as likely to become endangered within the foreseeable future.
(P)	*Proposed*	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(C)	*Candidate*	Candidate to become a *proposed* species.
(SC)	*Species of Concern*	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
(*)		Possibly extinct.
	Critical Habitat	Area essential to the conservation of a species.

ENCLOSURE A

Endangered and Threatened Species that May Occur in or be Affected by Projects in the Area of the Following California County or Counties

March 20, 1997

MARIN COUNTY

Listed Species

Mammals

- salt marsh harvest mouse, *Reithrodontomys raviventris* (E)
- Steller (=northern) sea-lion, *Eumetopias jubatus* (T)

Birds

- American peregrine falcon, *Falco peregrinus anatum* (E)
- California brown pelican, *Pelecanus occidentalis californicus* (E)
- California clapper rail, *Rallus longirostris obsoletus* (E)
- marbled murrelet, *Brachyramphus marmoratus* (T)
- marbled murrelet critical habitat, *Brachyramphus marmoratus* (T)
- western snowy plover, *Charadrius alexandrinus nivosus* (T)
- bald eagle, *Haliaeetus leucocephalus* (T)
- northern spotted owl, *Strix occidentalis caurina* (T)

Reptiles

- Leatherback sea turtle, *Dermochelys coriacea* (E)
- Loggerhead sea turtle, *Caretta caretta* (T)
- Green Sea turtle, *Chelonia mydas (incl. agassizi)* (T)
- Olive (=Pacific) ridley sea turtle, *Lepidochelys olivacea* (T)

Amphibians

- California red-legged frog, *Rana aurora draytonii* (T)

Fish

- tidewater goby, *Eucyclogobius newberryi* (E)
- winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)
- winter-run chinook salmon crit. habitat, *Oncorhynchus tshawytscha* (E)
- delta smelt, *Hypomesus transpacificus* (T)
- Coho salmon - central CA coast, *Oncorhynchus kisutch* (T)

Invertebrates

- mission blue butterfly, *Icaricia icarioides missionensis* (E)
- San Bruno elfin butterfly, *Incisalia mossii bayensis* (E)

MARIN COUNTY

Listed Species

Invertebrates

Myrtle's silverspot butterfly, *Speyeria zerene myrtleae* (E)

California freshwater shrimp, *Syncaris pacifica* (E)

Plants

Tiburon paintbrush, *Castilleja affinis ssp. neglecta* (E)

Sonoma spineflower, *Chorizanthe valida* (E)

beach layia, *Layia carnosa* (E)

Pt. Reyes clover lupine, *Lupinus tidestromii var. layneae* (E)

Tidestrom's clover lupine, *Lupinus tidestromii var. tidestromii* (E)

Tiburon jewelflower, *Streptanthus niger* (E)

Tiburon mariposa lily, *Calochortus tiburonensis* (T)

Marin dwarf-flax, *Hesperolinon congestum* (T)

white-rayed pentachaeta, *Pentachaeta bellidiflora* (E)

Proposed Species

Fish

Central California steelhead, *Oncorhynchus mykiss* (PE)

Sacramento splittail, *Pogonichthys macrolepidotus* (PT)

Plants

Sonoma alopecurus, *Alopecurus aequalis var. sonomensis* (PE)

soft bird's-beak, *Cordylanthus mollis ssp. mollis* (PE)

showy Indian clover, *Trifolium amoenum* (PE)

Candidate Species

Amphibians

California tiger salamander, *Ambystoma californiense* (C)

Plants

Baker's larkspur, *Delphinium bakeri* (C)

Santa Cruz tarweed, *Holocarpha macradenia* (C)

MARIN COUNTY

Species of Concern

Mammals

Point Reyes mountain beaver, *Aplodontia rufa phaea* (SC)
greater western mastiff-bat, *Eumops perotis californicus* (SC)
long-eared myotis bat, *Myotis evotis* (SC)
fringed myotis bat, *Myotis thysanodes* (SC)
long-legged myotis bat, *Myotis volans* (SC)
Yuma myotis bat, *Myotis yumanensis* (SC)
Pacific western big-eared bat, *Plecotus townsendii townsendii* (SC)
Point Reyes jumping mouse, *Zapus trinotatus orarius* (SC)

Birds

tricolored blackbird, *Agelaius tricolor* (SC)
Bell's sage sparrow, *Amphispiza belli belli* (SC)
ferruginous hawk, *Buteo regalis* (SC)
little willow flycatcher, *Empidonax traillii brewsteri* (SC)
saltmarsh common yellowthroat, *Geothlypis trichas sinuosa* (SC)
Harlequin duck, *Histrionicus histrionicus* (SC)
black rail, *Laterallus jamaicensis* (SC)
San Pablo song sparrow, *Melospiza melodia samuelis* (SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata* (SC)
California horned lizard, *Phrynosoma coronatum frontale* (SC)

Amphibians

northern red-legged frog, *Rana aurora aurora* (SC)
foothill yellow-legged frog, *Rana boylii* (SC)
western spadefoot toad, *Scaphiopus hammondii* (SC)

Fish

green sturgeon, *Acipenser medirostris* (SC)
river lamprey, *Lampetra ayresi* (SC)
Pacific lamprey, *Lampetra tridentata* (SC)
longfin smelt, *Spirinchus thaleichthys* (SC)

Invertebrates

Opler's longhorn moth, *Adela oplerella* (SC)

MARIN COUNTY

Species of Concern

Invertebrates

Sonoma arctic skipper, *Carterocephalus palaemon ssp* (SC)
sandy beach tiger beetle, *Cicindela hirticollis gravida* (SC)
globose dune beetle, *Coelus globosus* (SC)
William's bronze shoulderband snail, *Helminthoglypta arrosa williamsi* (SC)
Nicklin's Peninsula Coast Range ....., *Helminthoglypta nickliniana awania* (SC)
Ricksecker's water scavenger beetle, *Hydrochara rickseckeri* (SC)
Point Reyes blue butterfly, *Icaricia icarioides ssp* (SC)
Marin elfin butterfly, *Incisalia mossii* (SC)
bumblebee scarab beetle, *Lichnanthe ursina* (SC)

Plants

Blasdale's bentgrass, *Agrostis blasdalei var. blasdalei* (SC)
Tamalpais manzanita, *Arctostaphylos hookeri ssp. montana* (SC)
Point Reyes stickyseed, *Blennosperma nanum var. robustum* (SC)
Thurber's reedgrass, *Calamagrostis crassiglumis* (SC)
swamp harebell, *Campanula californica* (SC)
Humboldt Bay owl's-clover, *Castilleja ambigua ssp. humboldtiensis* (SC)
Mt. Vision ceanothus, *Ceanothus gloriosus var. porrectus* (SC)
Mason's ceanothus, *Ceanothus masonii* (SC)
San Francisco Bay spineflower, *Chorizanthe cuspidata var. cuspidata* (SC)
Mt. Tamalpais thistle, *Cirsium hydrophilum var. vaseyi* (SC)
Tomales clarkia, *Clarkia concinna ssp. raichei* (SC)
northcoast bird's-beak, *Cordylanthus maritimus ssp. palustris* (SC)
San Francisco wallflower, *Erysimum franciscanum* (SC)
fragrant fritillary, *Fritillaria liliacea* (SC)
San Francisco gumplant, *Grindelia hirsutula var. maritima* (SC)
seaside tarweed, *Hemizonia multicaulis ssp. multicaulis* (SC)
Tiburon tarweed, *Hemizonia multicaulis ssp. vernalis* (SC)
Point Reyes horkelia, *Horkelia marinensis* (SC)
delta tule-pea, *Lathyrus jepsonii var. jepsonii* (SC)
Tamalpais lessingia, *Lessingia micradenia var. micradenia* (SC)
Mason's lilaeopsis, *Lilaeopsis masonii* (SC)
Point Reyes meadowfoam, *Limnanthes douglasii ssp. sulphurea* (SC)
Santa Cruz microseris, *Microseris decipiens* (SC)

MARIN COUNTY

Species of Concern

Plants

Gairdner's yampah, *Perideridia gairdneri ssp. gairdneri* (SC)
northcoast phacelia, *Phacelia insularis var. continentis* (SC)
northcoast semaphore grass, *Pleuropogon hooverianus* (SC)
Marin knotweed, *Polygonum marinense* (SC)
California beaked-rush, *Rhynchospora californica* (SC)
valley sagittaria, *Sagittaria sanfordii* (SC)
Marin checkermallow, *Sidalcea hickmanii ssp. viridis* (SC)
Tamalpais streptanthus, *Streptanthus batrachopus* (SC)
San Francisco owl's-clover, *Triphysaria floribunda* (SC)
supple daisy, *Erigeron supplex* (SC)
Diablo rock-rose, *Helianthella castanea* (SC)
Kellogg's (wedge-leaved) horkelia, *Horkelia cuneata ssp. sericea* (SC)
coast lily, *Lilium maritimum* (SC)

KEY:

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(SC)	*Species of Concern*	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
(*)	Possibly extinct.	
	Critical Habitat	Area essential to the conservation of a species.

Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants

(September 23, 1996)

These guidelines describe protocols for conducting botanical inventories for federally listed, proposed and candidate plants, and describe minimum standards for reporting results. The Service will use, in part, the information outlined below in determining whether the project under consideration may affect any listed, proposed. or candidate plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted in a manner that will locate listed, proposed, or candidate species (target species) that may be present. The entire project area requires a botanical inventory, except developed agricultural lands. The field investigator(s) should:

1. Conduct inventories at the appropriate times of year when target species are present and identifiable. Inventories will include all potential habitats. Multiple site visits during a field season may be necessary to make observations during the appropriate phenological stage of all target species.

2. If available, use a regional or local reference population to obtain a visual image of the target species and associated habitat(s). If access to reference populations(s) is not available, investigators should study specimens from local herbaria.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Report results of botanical field inventories that include:

   a. a description of the biological setting, including plant community, topography, soils, potential habitat of target species, and an evaluation of environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species

   b. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name

   c. survey dates and survey methodology(ies)

   d. if a reference population is available, provide a written narrative describing the target species reference population(s) used, and date(s) when observations were made

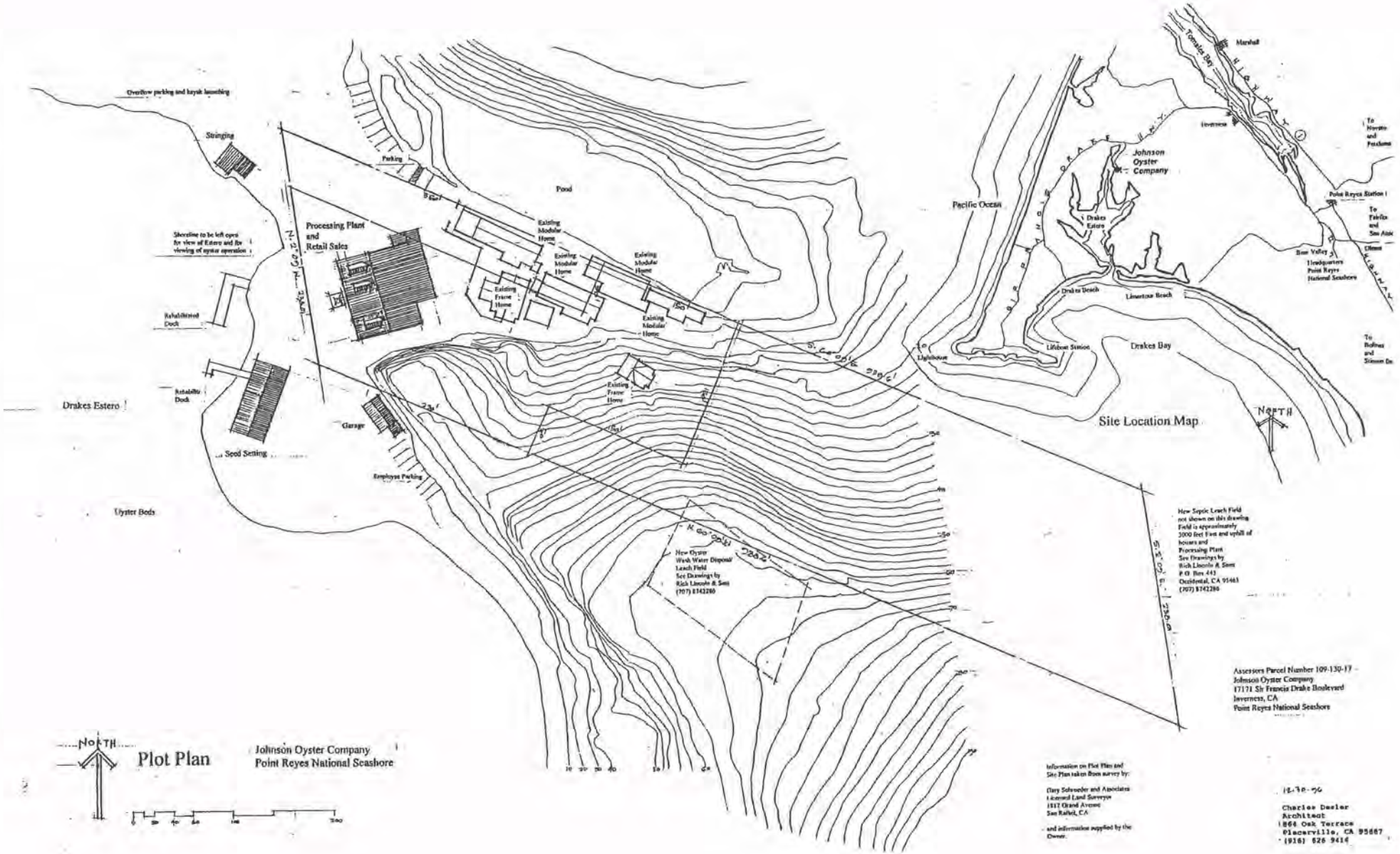
   e. a comprehensive list of all vascular plants occurring on the project site for each habitat type

   f. current and historic land uses of the habitat(s) and degree of site alteration

   g. presence of target species off-site on adjacent parcels, if known

   h. an assessment of the biological significance or ecological quality of the project site in a local and regional context

Appendix C: Site Plan, Building Perspectives and Elevations



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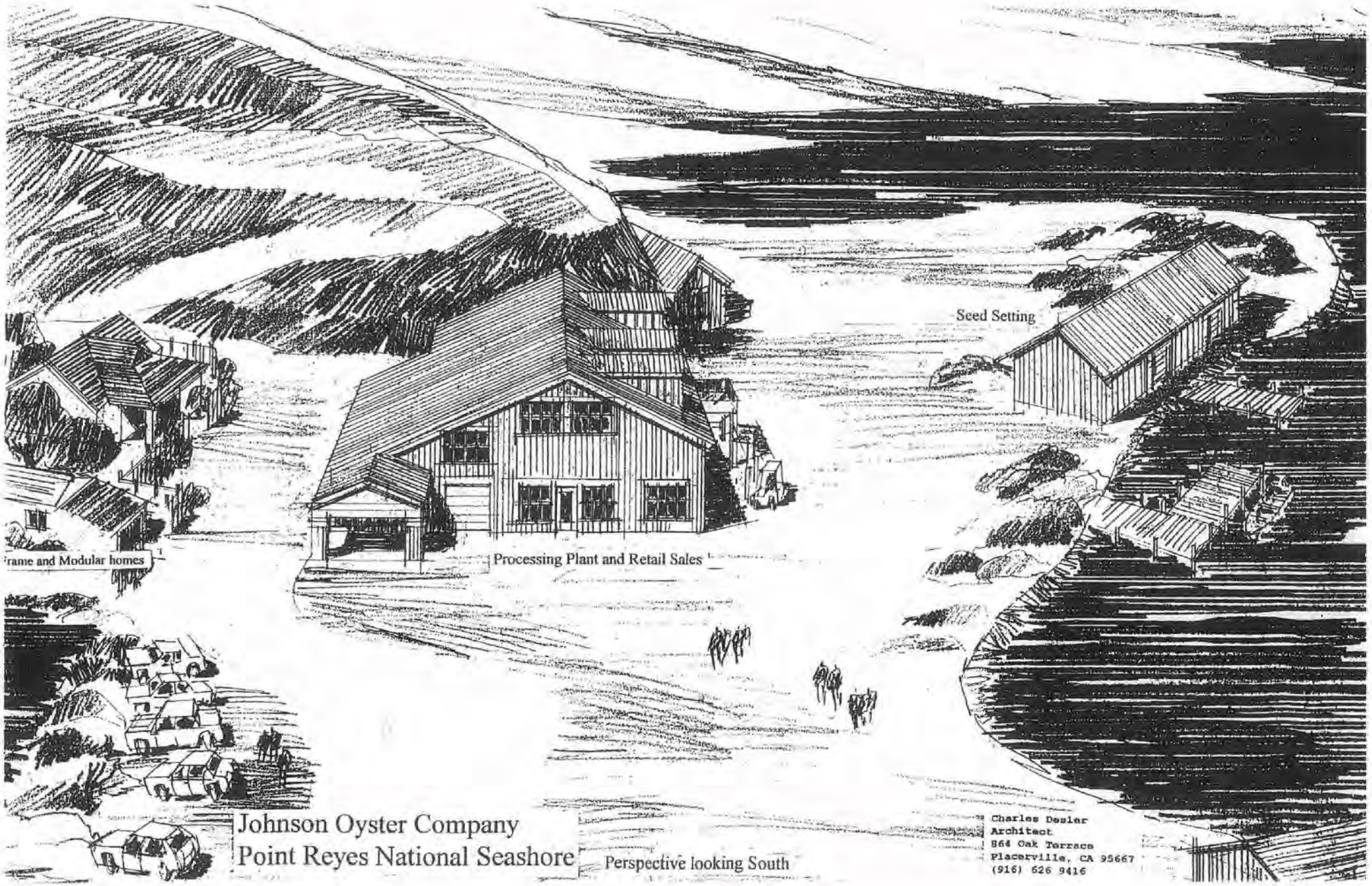

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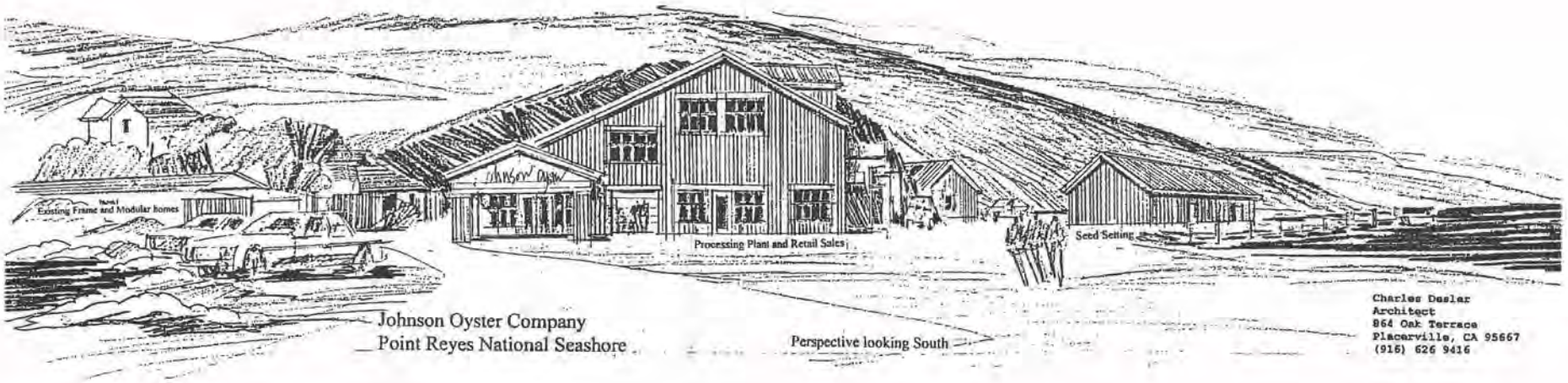

Johnson Oyster Company
Point Reyes National Seashore

Perspective looking South

Charles Desler
Architect
864 Oak Terrace
Placerville, CA 95667
(916) 626 9416

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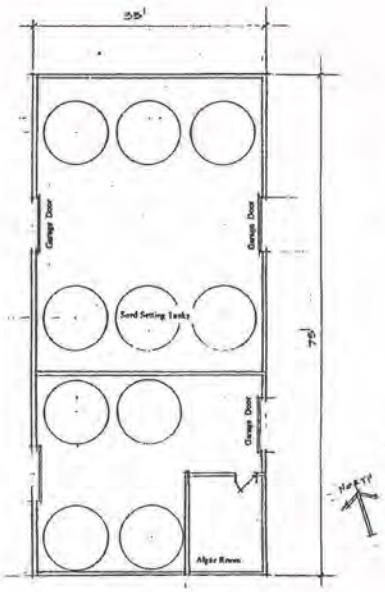
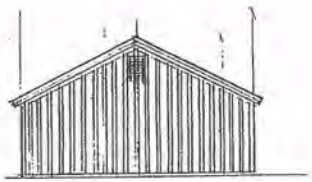
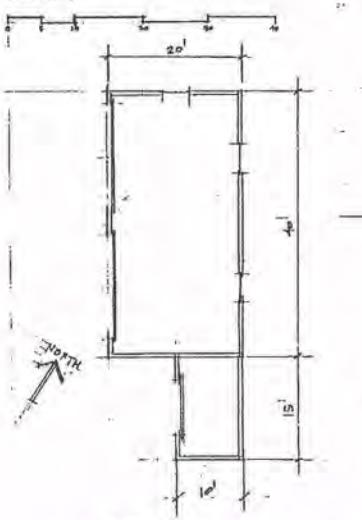
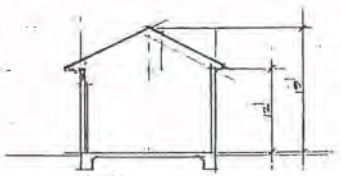


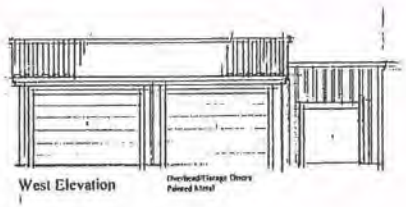
Floor Plan 2625 SQUARE FEET
Seed Setting

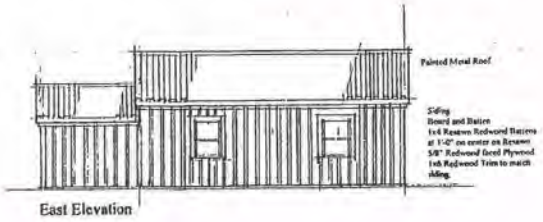


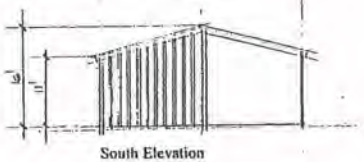


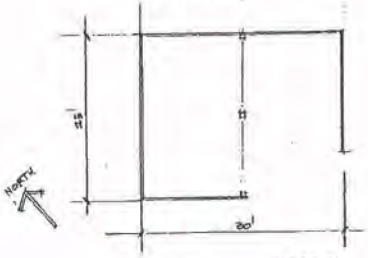
Floor Plan
Garage 300 SQUARE FEET











Floor Plan
Stringing

12·30·76

Johnson Oyster Company
Point Reyes National Seashore

Charles Dealer
Architect
884 Oak Terrace
Placerville, CA 95667
(916) 626 8416

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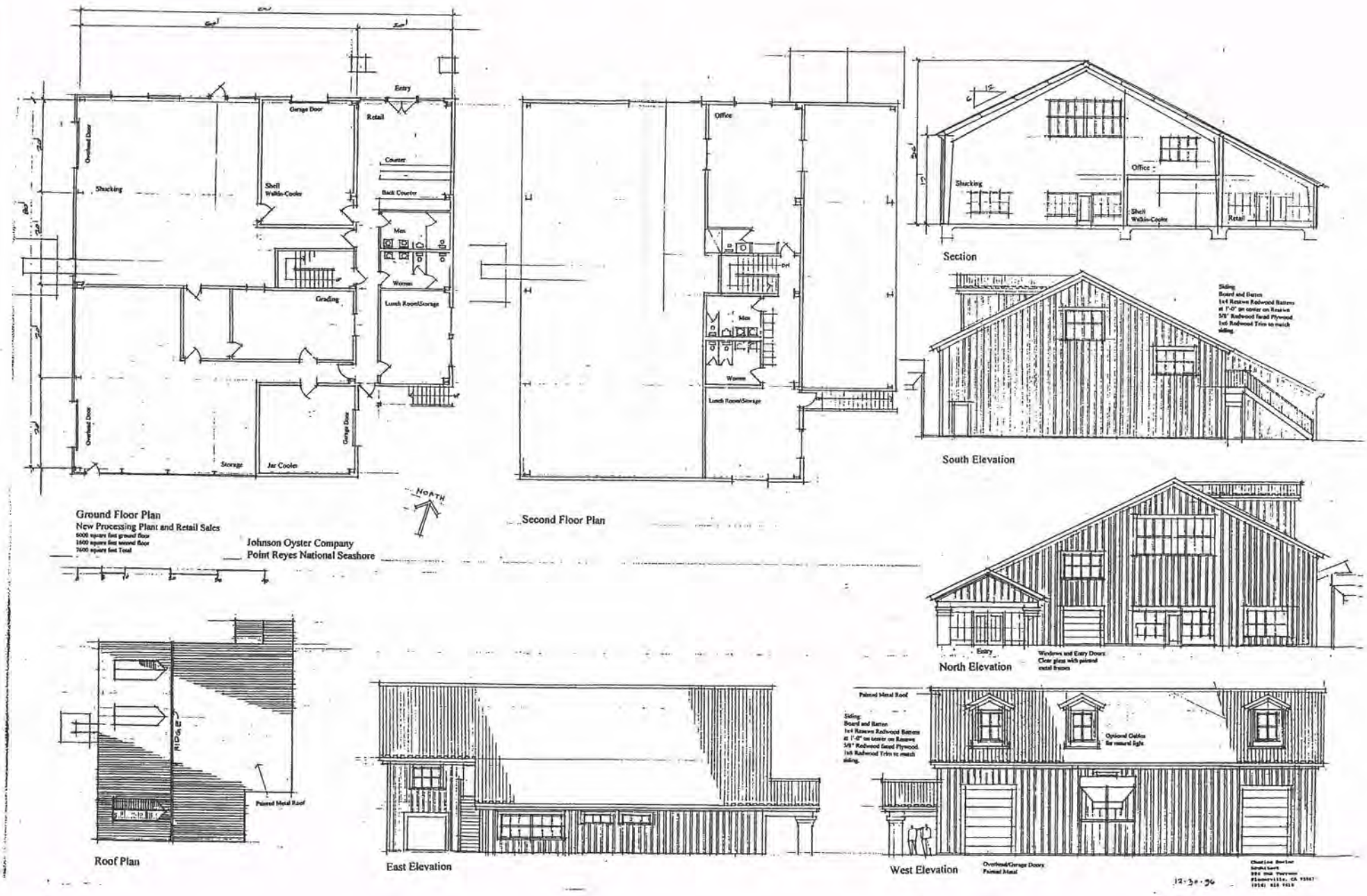

Ground Floor Plan
New Processing Plant and Retail Sales
6000 square feet ground floor
1600 square feet second floor
7600 square feet Total

Johnson Oyster Company
Point Reyes National Seashore

Second Floor Plan

Section

South Elevation

North Elevation

Roof Plan

East Elevation

West Elevation

12-30-96

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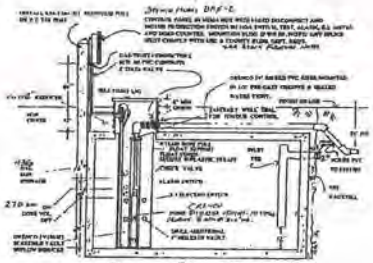
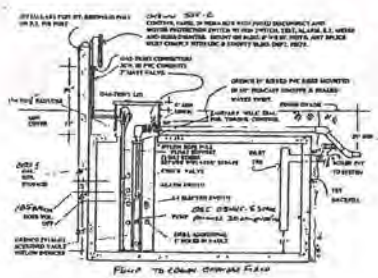


SUMP AND PUMP DETAILS



SUMP AND PUMP DETAILS

REQUIRED ELECTRICAL FEATURES:

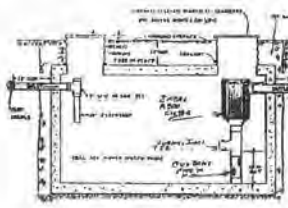
NOTES:

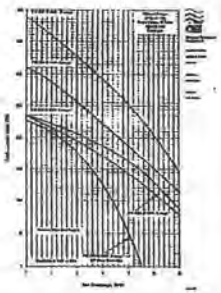
CONSTRUCTION INSPECTION SCHEDULE & DETAILS

CONTINGENCY PLAN FOR REPAIR OR REPLACEMENT OF SYSTEM

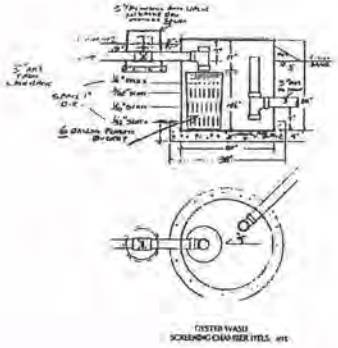
OPERATION AND MAINTENANCE

MONITORING & MAINTENANCE:





1500 GALLON ONE COMPARTMENT CONCRETE SEPTIC TANK DETAILS



CHESTER WASELI SCREENING CHAMBER DETAIL

Wastewater Disposal System Design

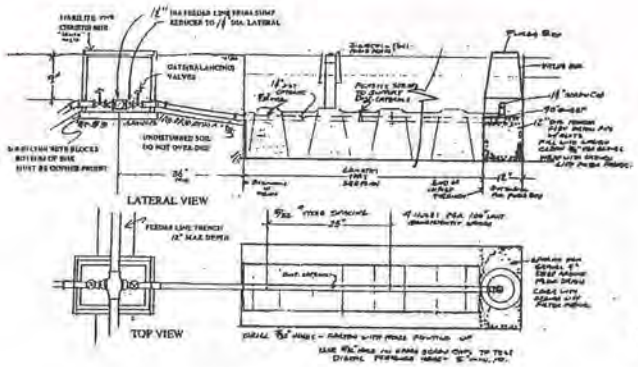
for
Johnson Oyster Farm
17171 Sir Francis Drake Blvd.
Inverness

by
Rich Lincoln & Sons
P O Box 443
Occidental, CA 95465 707 874-2286

Date 3/15/97
Drawn By: RLS
Design By:
Revisions:
1
2
3

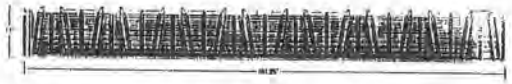
Sht. 5
Construction Inspection Schedule Details, Guidelines, Monitoring Maintenance & Operation

00033002 NPS-PWR-B04-00002-000002 Page 6 of 9



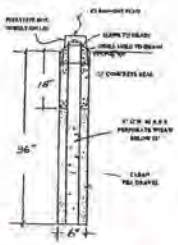
VALVED DISTRIBUTION DETAILS

THE EQUALIZER 24

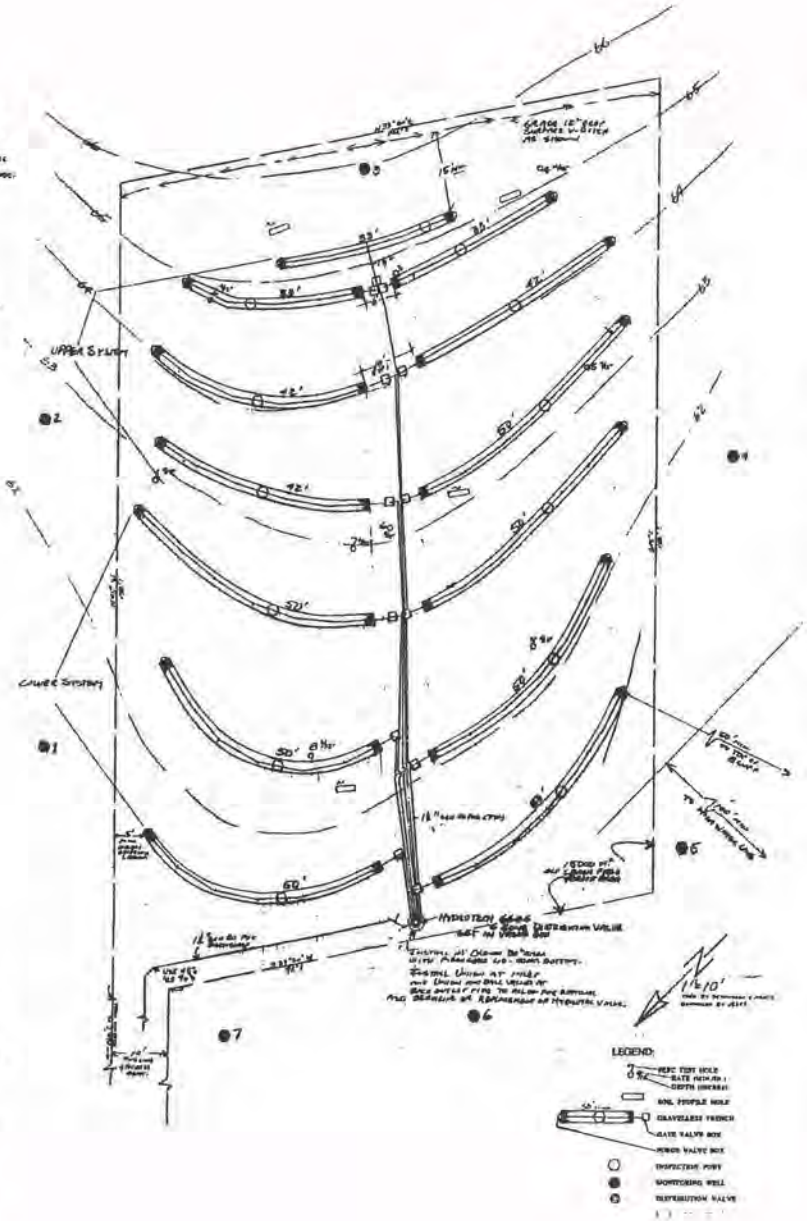


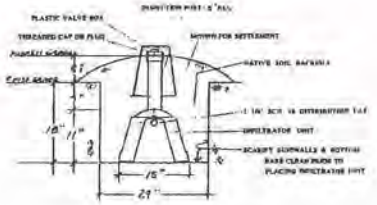
DIMENSIONS:	1.25 feet (15 in.) wide 8.25" feet (105 in.) long * connected 0.92 feet (11 in.) tall
MATERIAL:	High Density Poly-ethylene
STRENGTH:	H-10 Loading (16,000 lbs/axle) with 1' of compacted backfill
STORAGE:	4 gallons / foot or 33.3 gal. / unit

INFILTRATOR SYSTEMS INC.



MONITORING WELL





TYPICAL TRENCH X-SECT.

GRAVELESS TRENCH INSTALLATION GUIDELINES

(1) INSTALLATION ONLY WHEN THE SOIL IS DRY.
(2) AFTER LAYOUT HAS BEEN APPROVED BY DESIGNER, EXCAVATE TRENCHES TO THE AVERAGE DEPTH OF 18", MAKING SURE BOTTOM OF TRENCHES ARE LEVEL.
(3) SCARIFY SIDEWALLS OF TRENCHES WITH A PICK OR RAK, CHIPPING AWAY ANY GLAZED PORTIONS OF THE SIDEWALLS AND RAKING AND SHOVELING THE LOOSE MATERIAL OUT OF THE TRENCHES. TRENCHES SHOULD BE 12" TO 14" LONGER THAN SHOWN TO ALLOW FOR THE PURGE BOX INSTALLATION.
(4) TEMPORARILY INSTALL EQUALIZER UNITS TO DETERMINE IF ADDITIONAL COVERS ARE NEEDED TO MAKE THE NECESSARY CONTOUR RISES. THIS IS ALSO THE TIME TO MAKE-UP THE DIST. LATERALS AND SPACERS AND BEND AND TO MARK HOLE SPACING. HOLES MUST BE LAID OUT DIRECTLY UNDER THE DOMED PART OF THE UNITS TO BE MOST EFFECTIVE AND REDUCE THE POSSIBILITY OF WASHOUT FROM A MISDIRECTED ORIFICE.
(5) LAY THE EQUALIZER UNITS AND DIST. PIPES SIMULTANEOUSLY, SNAPPING ENDS AND GLUING AND SECURING THE DIST. PIPE AS SHOWN ON THE PLAN. MAKE EVERY EFFORT TO COMPLETE THIS PHASE PERFECTLY. INSTALL INSPECTION PORTS ALSO AT THIS TIME.
(6) BACKFILL AROUND THE EQUALIZER UNITS BY HAND AND COMPACT WITH FEET UNTIL THE SIDES OF THE UNITS ARE COVERED. FINAL BACKFILLING AND LEVELING MUST BE DONE WITH A TRACTOR LAYER TO ASSURE EVEN COMPACTION.
(7) EXCAVATE THE SUPPLY LINE TRENCH NO DEEPER THAN 8". MAKE CONNECTOR TRENCHES FROM BALANCING VALVES TO BEGINNING OF TRENCHES BY HAND. DO NOT OVER-DIG!
(8) PURGE BOXES AND GRAVEL CAN BE INSTALLED AND THEN PRESSURE TESTED WHILE BALANCING VALVES ARE STILL UNCOVERED.
(9) ONCE THE PRESSURE TEST IS APPROVED, FINAL COVERING OF ALL COMPONENTS CAN BE DONE AND THE SURFACE DRAIN EXCAVATED. SEED WITH ANNUAL RYE GRASS AND HAND RAKE AND COVER WITH LOCAL HAY TO PREVENT EROSION.
(10) INSTALL MONITORING WELLS AND MARK EACH WELL AND THE DIVERSION VALVE AND EACH INFILTRATE VALVE WITH A T-BAR FENCE POST AT COMPLETION.

DESIGN ANALYSIS:

Wastewater Disposal System Design

for
Johnson Oyster Farm
17171 Sir Francis Drake Blvd.
Inverness

by
Rich Lincoln & Sons
P O Box 443
Occidental, CA 95465 707 874-2286

Date: 2/1/97
Drawn By: RGL
Design By: RGL
Revisions: 1. 2. 3.

Sht. 3
Oyster Wash Water Disposal Field

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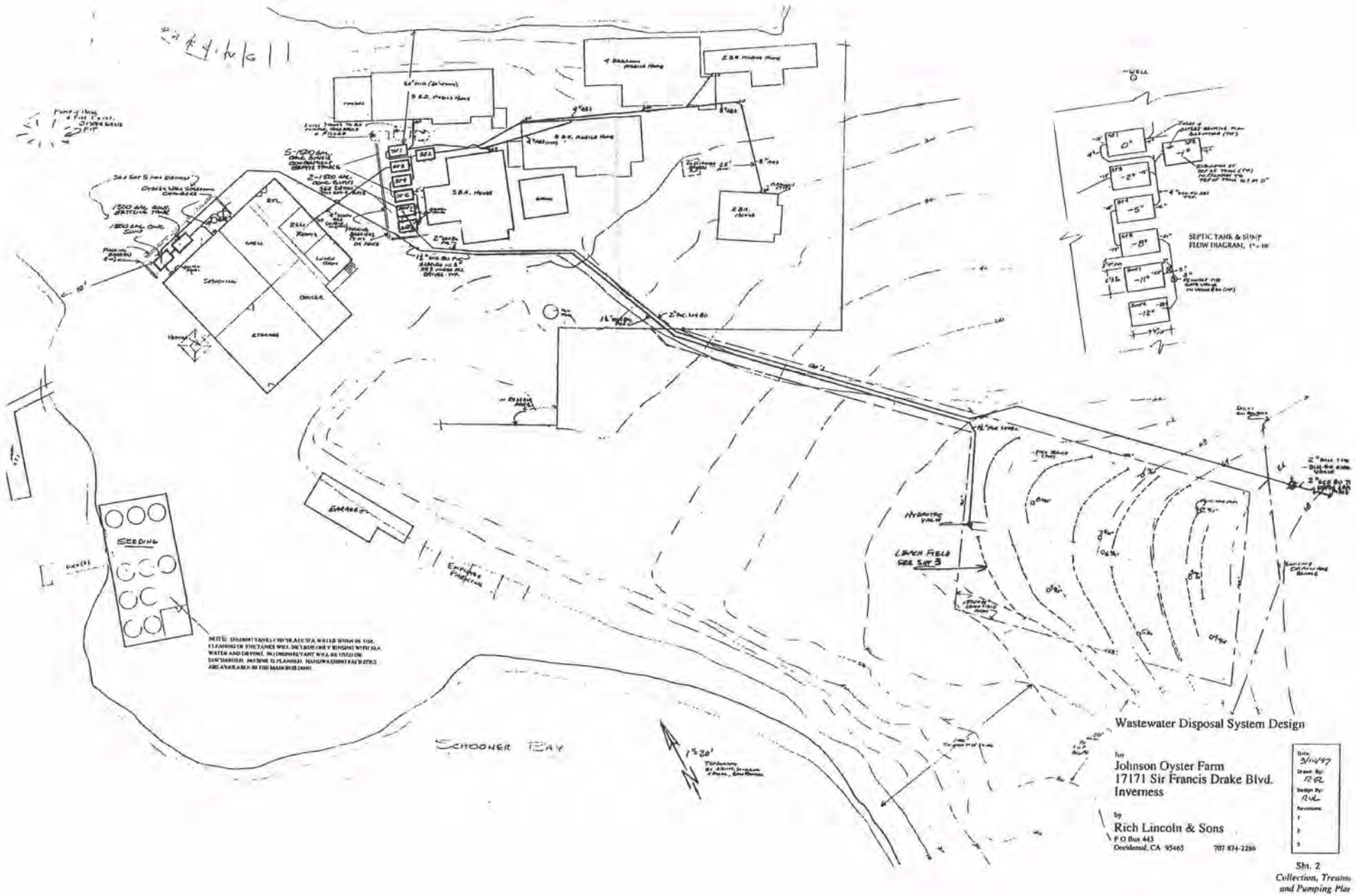
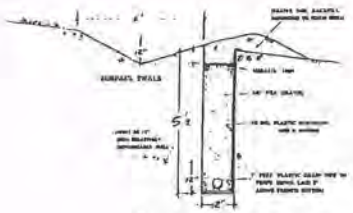
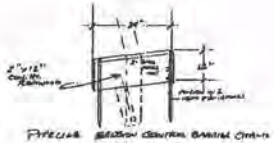


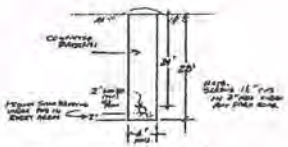
00033002 NPS-PWR-B04-00002-000002 Page 8 of 9



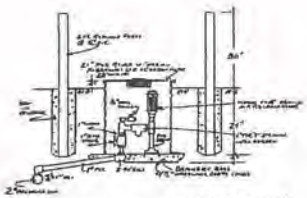
INTERCEPT DRAIN DTLS.



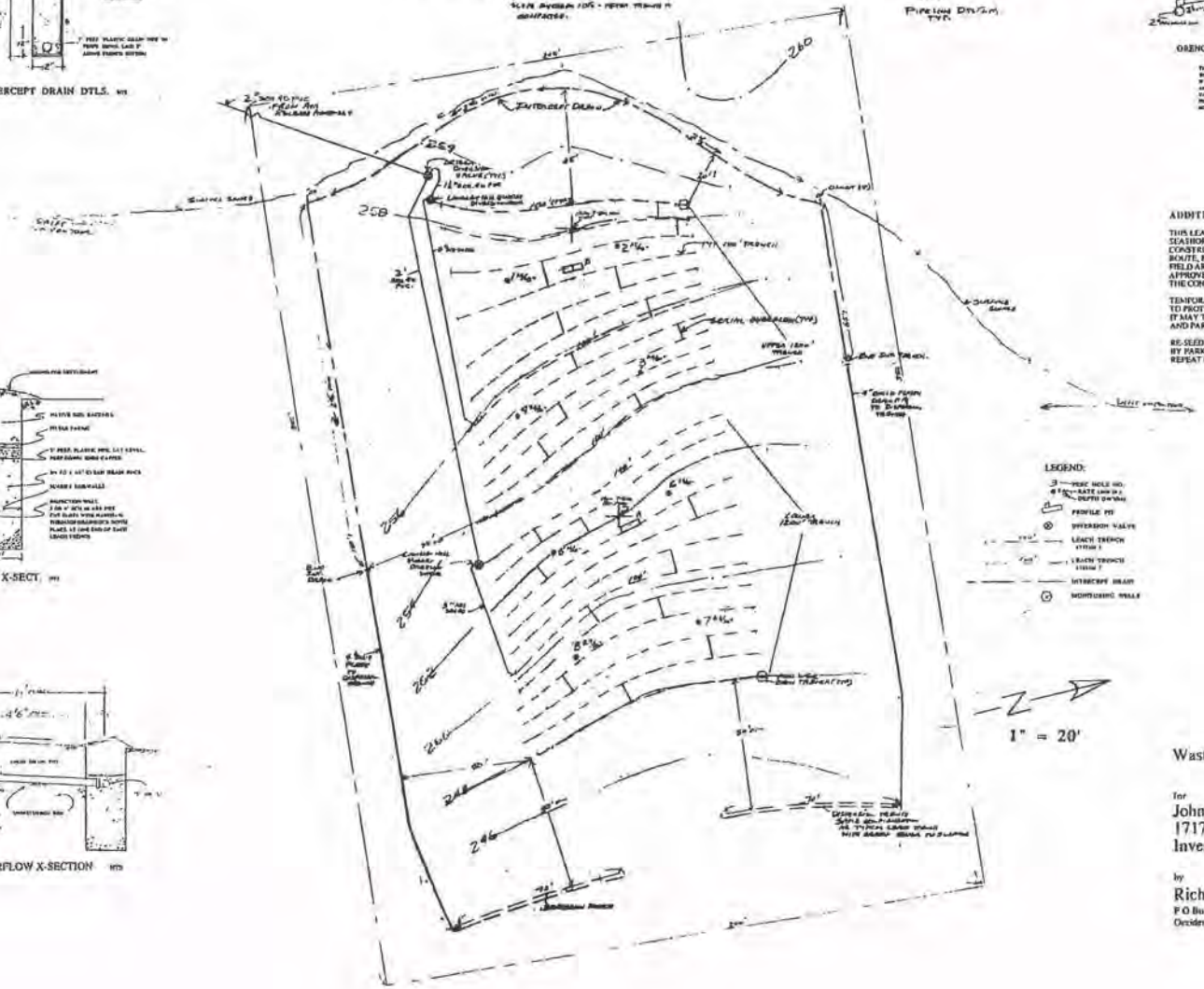
PIPELINE



PIPELINE DITCH TYP.



ORENCO AR-21-4405 AIR RELEASE ASSEMBLY DTL.

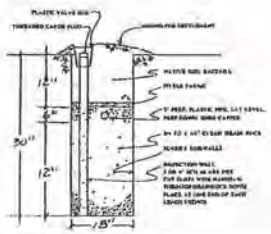


ADDITIONAL LEACH FIELD NOTES:

THIS LEACH FIELD AS WELL AS THE PIPELINE IS ON NATIONAL SEASHORE LANDS. EVERY ATTEMPT MUST BE MADE DURING CONSTRUCTION TO RESTRICT THE IMPACT ON THE ACCESS ROUTE, PIPELINE AND CONSTRUCTION STAGING AND LEACH FIELD AREAS. FINAL GRADING AND CLEAN UP MUST BE APPROVED BY THE PARK SERVICE AND DESIGNER PRIOR TO THE CONTRACTOR VACATING THE SITE.

TEMPORARY ELECTRICAL FENCE OR STOCK FENCE TO BE ERECTED TO PROTECT THIS AREA THE FIRST YEAR AFTER INSTALLATION. IT MAY THEN BE REMOVED WITH CONCURRENCE OF DESIGNER AND PARK SERVICE.

RE-SEED WITH ANNUAL RYE OR OTHER SEED RECOMMENDED BY PARK SERVICE. SEED AND RAKE JUST PRIOR TO FALL RAINS REPEAT IF LESS THAN 2/3 COVERAGE.

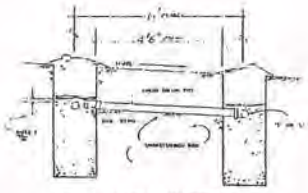


TYPICAL TRENCH X-SECT.

LEGEND:

- PROFILE PIT
- DIVERSION VALVE
- LEACH TRENCH
- INTERCEPT DRAIN
- MONITORING WELL

DESIGN ANALYSIS:



SERIAL OVERFLOW X-SECTION

1" = 20'

Wastewater Disposal System Design

for
Johnson Oyster Farm
17171 Sir Francis Drake Blvd.
Inverness

by
Rich Lincoln & Sons
P O Box 843
Occidental, CA. 95465 707 874-2206

Date: 3/12/97
Drawn By: RSL
Design By: RSL
Revisions:
1
2
3

Sht. 4
Upper Leach Field Det.

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Items 1 and 6

Errata sheet

Acknowledgment of corrections to previous versions of the Park News document "Drakes Estero – A Sheltered Wilderness Estuary"

Research conducted by Dr. Roberto Anima of the U.S. Geological Survey in Drakes Estero in the late 1980s resulted in a report to the National Park Service (Anima 1990) and a U.S. Geological Survey report (Anima 1991). The NPS incorrectly interpreted the report by Dr. Roberto Anima (1990) stating that he had detected oyster feces and pseudofeces in sediment core samples, that he estimated the amount of fecal matter produced by oyster rafts, and that he considered oyster farming as the primary source of sedimentation in the estero. Instead, Anima (1991; page 92) states that "Because they are filter feeders, the oysters being grown and harvested in the estero play an important role in the deposition of fine grained sediment". Although, Anima did not quantify sedimentation related to the oyster farming, he references another study - "Ito and Imai (1955) calculated that in Japanese waters a raft of oysters 60 m square would annually produce 0.6 to 1.0 metric tons (dry weight) of fecal material."

Fish research in Drakes Estero conducted by Jesse Wechsler, a geography graduate student at UC Davis, resulted in his Master's thesis (Wechsler 2004) and contributed to a report to the National Park Service (Elliott-Fisk 2005). The NPS incorrectly interpreted that the Estero de Limantour supports a different fish community than Schooner Bay. To clarify, the fish found at sampling sites in Estero de Limantour were most different from sites associated with the oyster racks in Schooner Bay, not the entirety of Schooner Bay. Although not tested for statistical significance, Wechsler reports that "Four of the five indices used to asses the similarity of the fish assemblage showed the greatest compositional divergence was between Estero de Limantour and Schooner Adjacent".

NPS acknowledges the errors and will periodically update information when corrections and new information are available.

Items 1 and 6

May 11, 2007 version of *A Sheltered Wilderness Estuary*

Point Reyes National Seashore

Drakes Estero

Photo © Robert Campbell

A Sheltered Wilderness Estuary

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. This is the only federal marine coastal wilderness from Washington State to the Mexican Border. Only 11 marine wilderness areas exist in the US.

Drakes Estero

A Sheltered Wilderness Estuary

Background

Drakes Estero is within Point Reyes National Seashore, established in 1962. The estuary is the only coastal bay with special congressional designation as wilderness in the western United States, south of Alaska. The estuary was recently designated a Western Hemisphere Shorebird Reserve Network (WHSRN), a site of Regional Importance in the U.S. Shorebird Conservation Plan because it is important to a great diversity and abundance of shorebirds. A portion of the estero is currently managed as Wilderness and the remainder is potential wilderness that will be fully managed as Wilderness when a mariculture lease expires in 2012. Drakes Estero is adjacent to Estero de Limantour, a State Ecological Marine Reserve, established in 1974 by the California Department of Fish and Game. Coastal scrub and grassland habitat surrounds the estuary; and the only current human activities on, or adjacent, to the estuary include recreation, cattle/dairy grazing and oyster farming.

At the time of purchase in 1972, the National Seashore provided a 40 year Reservation of Use and Occupancy Agreement to Johnson's Oyster Company (JOC). The agreement allows for use of a park site for oyster processing, but requires compliance with local, state, and federal laws and regulations. The agreement expires in 2012. In 2005, the JOC sold the leasehold interest to the Drakes Bay Oyster Company (DBO). At the time of the sale, the NPS notified DBO that the lease would expire in 2012.

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. The legislative history (House Report 94-1680) indicates Congressional intent: "it is the intention that those lands and waters designated as potential wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these land and waters to wilderness status." This is the only federal marine coastal wilderness along the Pacific coast from Washington to the Mexican Border. Only 11 marine wilderness areas exist in the US.

> *The need for wilderness and the refuge it offers to Americans will only increase with the passage of time. Our generation of Americans has an obligation to preserve for future generations more areas that qualify for wilderness designation."*
>
> *--Theodore Roosevelt IV*

The General Management Plan (GMP, 1980) designates the estuary as wilderness, where no mechanized equipment or development may occur.

The estuary area of approximately 1,000 acres is used by DBO for oyster cultivation under a lease by the California Department of Fish and Game (CDFG). The ocean floor was ceded by the State of California to the National Park Service, except for the "right to fish." The estuary floor is thus owned by Point Reyes National Seashore.

The 2001 NPS Management Policies direct staff to actively seek to remove from potential wilderness the temporary, non-conforming conditions that preclude wilderness designation (6.3.1 Wilderness Resource Management). Moving from Congressionally authorized potential to full wilderness status is an administrative action only requiring publishing a notice in the Federal Register.

Point Reyes legislation also stipulates that "No freehold, leasehold, or lesser interest in any lands hereafter acquired within the boundaries of Point Reyes National Seashore shall be conveyed for residential or commercial purposes except for public accommodations, facilities, and services provided pursuant to the Act of October 9, 1953."

"Wilderness is a resource which can shrink but not grow. Invasions can be arrested or modified in a manner to keep an area usable either for recreation, or for science or for wildlife, but the creation of new wilderness in the full sense of the word is impossible."

--Aldo Leopold, Sand County Almanac

The activities of Johnson's Oyster Company (JOC) produced many adjudicated environmental problems. As a condition of a stipulated agreement (Marin County Superior Court No. 165361, March 1997), JOC was ordered to complete several actions, including obtaining building permits and upgrading facilities and septic systems to meet state and county code requirements. DBO is in the process of upgrading the facilities but is still under a Cease and Desist Order from the California Coastal Commission.

Oyster bags that cover the shoreline at Bull Point.

Under this order, DBO is required to obtain a permit from the California Coastal Commission for the facilities, but has not yet acquired a Coastal Development Permit for its activities.

DBO wishes to extend the lease past 2012; NPS has instructed DBO that the issuance of a new lease cannot be extended beyond 2012 because of the GMP, NPS Management Policies, and the enacted Wilderness legislation.

Point Reyes enabling legislation indicates that natural environment will be the park's first priority.

"the property acquired by the Secretary under such sections shall be administered by the Secretary without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area . . . . (16 USC Sec. 459c; Enabling Legislation for Point Reyes National Seashore)

Ecology of the Estuary

An ecosystem consists of interactions of plants, animals, and microorganisms with their physical (e.g., soil conditions and processes) and climatic conditions. The primary natural processes that drive the ecological function of any estuary, including Drakes Estero, are the terrestrial hydrology (the timing and amounts of freshwater inputs), sedimentation from land and sea, terrestrial nutrient loading, and coastal shoreline change from tides, storms and sea level rise. The presence and abundance of plants and animals are based on their ability to adapt to these processes and eek out a living in microhabitats within the larger estuary.

Drakes Estero complex is a large, convoluted coastal estuary with one narrow, unobstructed opening to Drakes Bay. Shaped like a hand, the estuary consists of five fingers that feed into a 1,300 acre central bay; the estuary reaches a total area of 2,270 acres at the highest tides. Geologically, the estuary is recognized as a system of drowned river valleys invaded by the sea. Sea level rise following the Late Pleistocene glacial period formed the contemporary estuary 6,000 years ago. The depth is mostly shallow, less than 6 feet deep, with a deeper channel (about 25 ft) that traverses the main bay. Intertidal sand and mud flats exposed at low tide make up approximately 1,200 acres of the estuary (Anima 1990). The estuary is surrounded by low bluffs composed of the Drakes Bay Formations which includes fine-grained siltstone embedded with mudstone (Galloway 1977). The bay is protected from ocean wave action by the sand spits of Drakes and Limantour Beaches (Mudie and Byrne 1980).

The sediments of the outer estuary near the mouth consist mostly of sand, which is the long shore transport of sand in Drakes Bay and the overtopping by tides and storms of the sandspits near the mouth. Rocky bottom is limited to the deep channels at the seaward part of the estuary near the mouth; no boulders were found in cores taken within the estero (Anima 1990 and Harbin-Ireland 2004). Pebble and cobble stones

are limited to a few places along the shoreline in parts of Estero de Limantour, along bluffs in the main part of the bay and along the east shoreline in Home Bay.

Wilderness areas only comprise about 2.5 percent of all the land in the lower forty-eight states.

Tidal exchanges occur through a narrow inlet that is 21 feet deep. Tidal exchanges are cycled completely with a tidal bore that travels the length of the estero to Bull Point; however, exchanges are less complete in the fingers of the estero. The deepest point is 25 feet at the first bend along the major channel from the entrance. The tidal range is twelve feet from -6.0 to 6.6 feet with currents ranging between 32 cm/sec to 46 cm/sec (Anima 1990). Because the estuary is mostly shallow, the water column is well mixed from wind and tides, resulting in a mostly homogenous saline level. Salinity ranges measured in 1987-88 varied little between the upper and lower reaches of the estuary (33.67-34.356 ppt; Anima 1990).

Drakes Estero from the air looking towards Point Reyes headlands showing extensive eel grass beds. Photo © Robert Campbell

In Drakes Estero, natural sediment and nutrient loading is relatively moderate and attributed to shifting sand bars and decomposed granite from streams. Freshwater

feeds into the estero from six perennial streams and four ephemeral streams/springs that drain the small watersheds surrounding the 7,847 acre estuary. The water quality throughout the estuary, as measured by the presence of coliform, is well within the safe established limits measured by the California Department of Public Health (NPS report 2006). Home Bay had a spike of elevated coliform counts when a septic system failed. This septic system, though, is being replaced by the Seashore in 2006. Ranching in the watershed is limited to grazing around 1000 cattle managed by five separate ranches. None of Point Reyes' dairy ranches are within the Drakes Estero watershed.

Within Drakes Estero, there are several distinct, natural habitats. Along the shoreline, the dominant habitats are sandstone flats (as occur at Bull Point), mudflats along the inner finger bays and sand flats near the mouth. Pickleweed (*Salicornia virginica*), arrow-grass (*Triglochin maritima*) and saltgrass (*Distichlis spicata*) are the dominant shoreline native vegetation; however, the size and number of marshes are limited. Within the estuarine waters, dominant habitats include mudflats and sand flats exposed at low tides, eelgrass beds, and soft-bottom substrate. Cobble and hard substrate is limited towards the mouth of the estuary. Each habitat supports distinct communities. The dominant plants and animals of the estuary that are major drivers of the estuarine ecosystem include eel grass beds, invertebrates in the soft-bottom sediment, estuarine fish such as herring, migratory waterbirds and shorebirds, and harbor seals.

Eelgrass beds are highly significant to the ecological function of the estuary because they provide cover, food and a nursery for fish and invertebrates. The eelgrass beds of Drakes Estero include around 642 acres, or 36% of the estuary. Several marine species spend their larval and juvenile stages in eelgrass beds such as lingcod, English sole, speckled sanddab, several species of nearshore rockfish, and Dungeness crab (see Larson and Mello – www.dfg.ca.gov/local). Large, eelgrass beds are found in only a few estuaries in California and many species are entirely dependent on them for a part of their life cycle. For example, within Drakes Estero many species such as Pacific herring, bay pipefish, gammarid and caprellid amphipods, the sea slug (*Phyllaplysia taylori*), and several shrimp species are directly dependent on eelgrass beds.

The native invertebrates of Drakes Estero are primarily species adapted to soft-bottom sediment and eelgrass beds, and rarely include the common species found in rocky intertidal habitats around Point Reyes, such as limpets, chitons, mussels, and native oysters. In Drakes Estero, the dominant species that filter feed phytoplankton from the water column are bivalves such as *Nutricola* sp., Washington clams (*Saxidomus nuttalli*), gaper clams (*Tresus capax*), and rock-boring piddock clams at Bull Point and the mouth of the Estero. In addition, predominantly deposit-feeding *Macoma* clams, which filter-feed, are found in densities up to 250 per square meter in the outer, sandy tidal flats of Drakes Estero. Additional dominant benthic invertebrates include tanaid crustaceans (*Leptochelia dubia*), cumaceans (*Cumella vulgaris*), phoronids (*Phoronopsis viridis*), shore crabs (*Hemigrapsus oregonensis*), gammarid amphipods, polychaete worms, and ostsracods (Harbin-Ireland 2004, Press 2005). Native limpets, oysters, mussels and chitons have never been abundant in the esteros due to the lack of rocky substrate, except towards the mouth of the estero. Currently, there is a modest number of invasive invertebrate species in Drakes Estero relative to a highly urbanized estuary such as San Francisco Bay, such as green crabs (*Carcinus maenas*).

Approximately 60 fish species have been documented in the area (Miller 1972, Wechsler 2004, D. Jacobs, unpubl. data). A recent study identified 35 species from 20 families. Five species were dominant and represented 89% of the fish assemblage, including topsmelt, three-spined stickleback, staghorn sculpin, bay pipefish, and kelp surfperch (Elliott-Fisk et al. 2005, Wechsler 2004). Steelhead trout, a federally protected species, were documented in a tributary to Schooner Bay in the late 1990s.

The bird life in Drakes Estero and Estero de Limantour is highly diverse and abundant, and the esteros are recognized as significant sites for bird conservation. The Fish and Wildlife Service recognized Drakes Estero as a Western Hemisphere Shorebird Reserve and as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan. The maximum population of all shorebirds combined was estimated at between 10,000 and 100,000, and the estero regularly holds thousands of shorebirds in winter (Hickey et al. 2003; http://www.waterbirdconservation.org/). A similar designation is pending for waterbirds.

Brown pelican and marbled godwits. Photos © Rich Stallcup.

PRBO identified over 100 species of waterbirds and shorebirds during winter surveys in the 1980s and 1997-99 (White 1999), and 86 species of birds at Drake's Cove during 2004, with counts of Buffleheads, Ruddy Ducks, Western Sandpipers, Least Sandpipers, and Dunlin numbering over 1000 individuals. PRBO and NPS biologists identified several federal threatened, endangered, or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, Western Snowy Plover and Marbled Murrelet. During the late summer and fall, shorebirds and waterbirds arrive and stay in the estero throughout the winter months to feed and rest.

The bird life in Drakes Estero is highly diverse and abundant, and as a consequence, the estero is recognized as a significant site for conservation.

The estero is one of only a few locations where thousands of Black Brant over-winter where they rest and feed on eelgrass (Shuford et al. 1989). "Brant is a holarctic species (it has populations in boreal regions all around the world) that nests on tundra near saltwater environments" (http://www.prbo.org/obs_cms). They are on the Audubon species Watch List because of their sensitivity to habitat loss. From the summer through December, hundreds to thousands of Brown Pelicans, a federally protected species, congregate at the esteros, feeding on large schooling fish such as anchovies, herring and smelt, and resting on tidal mudflats. Other species that occur in large numbers are Caspian Terns, Gadwall, Ruddy Duck, American Widgeon, Bufflehead, and Green-winged Teal, Western and Least Sandpiper, Dunlin and Black-bellied Plover. In the past 15 years, an egret colony formed near the mouth of the estero where Snowy Egrets, Great Egrets, and Great Blue Herons nest. In the past, Snowy Plovers nested at the mouth of the estero, but have not since the late 1990s due to predation, changes in habitat and disturbance.

A flock of marbled godwits and willets. The waters and shoreline of the estuary provide a home to over a 100 species of birds. Photo © Rich Stallcup.

Harbor seals are the only year-round, resident marine mammal in the estero. Other marine mammals that occur intermittently include California sea lions and northern elephant seals. The narrow mouth of the estero is restrictive to larger marine mammals; although, several dead whales have washed into and deposited at the mouth of the estero including an adult male sperm whale. The harbor seal population within the estero is one of the largest concentrations in California, annually producing between 300 and 500 pups, and reaching a maximum of nearly 2,000 seals during the breeding and molt seasons (Allen et al. 2004). Drakes Estero is largest seal colony in Marin County and one of only five major seal colonies at Point Reyes. All together, the Marin County colonies represents around 20% of the state mainland population of harbor seals, and are the highest concentration of seals in California (Allen et al. 2004). Seals that breed in the estero range nearly 500 km north as far as the Smith River in the winter months but return to Drakes Estero to breed (Allen 1988). The colony at Drakes Estero has grown significantly over the past 10 years, in part because

the park implemented a seasonal closure to kayaks during the pupping season and because JOC was operating at a reduced level in the mid-1990s (Vanderhoof and Allen 2005). The pup count in 1986 was 255 compared with 464 in 2004, an 82% increase.

Harbor seals resting on mudflats. Photo by Jamie Hall.

Overlooking the harbor seal haul out sites in Drakes Estero.

Drakes Estero is one of only 5 major seal colonies in Point Reyes and together represent around 20% of the state mainland population of harbor seals, the highest concentration in the state (Allen et al. 2004).

Human Activities and Changes to Ecological Function

Ocean health globally is in dire condition according to a recent publication in the Journal Science (Worm et al. 2006), and if the long-term trend continues, all fish species are projected to collapse within the next 50 years. Already, the researchers found that 90 percent of all the fish and seafood species in the world's oceans have been depleted within the past century. Seven percent of the fish in several studies already have become extinct. Significantly, less than 1 percent of the global ocean is effectively protected right now. Despite inclusion in this 1%, most ocean parks are experiencing degradation, deterioration and extirpation of species.

Ocean parks have been degraded by habitat alterations that have had a cascading effect on ecosystem function. Coastal waters have been degraded by water diversion, chemical and biological pollution, oil spills, and noise. Invasive non-native species have been introduced through bilge water, mariculture and recreational activities that further degrade ecosystems and water quality.

Specifically in Drakes Estero, ecological function has been degraded and altered over the past several decades due to activities associated with oyster farming and ranching. Other than the oyster operation, there is no development along the shores of the estuary.

Sedimentation rates and types of material have changed because of a combination of factors over the past 150 years. The primary water arteries into the estuary were dammed by ranchers to create stock ponds for cattle. These impoundments reduce the flushing action of winter rains and the size of marshes at the stream mouths flowing into the esteros. The commercial oyster operation has also changed the type and rate of sedimentation where oyster equipment is located. The oyster operation included 1) stakes with plastic tubing that were embedded into intertidal mudflats, 2) bags that were placed on top of the intertidal mudflats, and 3) racks that were located on mudflats and open water channels. Oyster bags and racks have been documented in Drakes Estero and elsewhere to trap fine particulate sediment resulting in an alteration of hydrologic function and the type of substrate, and have integrated feces into the sediment below and around the structures (Anima 1990, Cranford et al. 2003, Porter et al. 2004). The reduced freshwater flushing from the watershed enables fine-grained sediments to build up within the estero around the oyster racks. USGS (Anima 1990) collected sediment cores from the estero and identified pseudo feces of oysters as the primary source for sediment fill, as has been seen in studies elsewhere. An estimate of 0.6 to 1.0 metric tons of fecal matter can be produced per year by a 60 meter square oyster raft. This sediment material is resistant to erosion because oyster racks are located in upper reaches of the estero where tidal action is lowest and the arrangement of the oyster racks acts as a "baffle to tidal currents where rack density is highest ...silt material accumulates on the leeward side of stacked oyster beds (Anima 1990)."

Affiliated debris found with oyster operations.

Metal and plastic bags from oyster operations.

The ecology of the estero is altered by changes in hydrology and sedimentation, which in turn change habitats and their associated species. Eelgrass beds, for example, in Estero de Limantour where there is no oyster farming, had higher densities of standing stock, as measured by the number of turions and blades, compared to Drakes Estero (AMS 2002). Eel grass is very sensitive to light, nutrients, pollution and sedimentation, and is thus an excellent indicator of estuarine health. Oyster farming reduces the amount of light available to eelgrass beds because of shading by racks, increases the amount of sedimentation due to deposition of oyster pseudo-feces and trapping sediment, and contributes pollution from treated construction materials and from general operations (trash). Researchers from Oregon State University found through experimental tests that both stake and rack culture (as practiced in Drakes

Estero) reduced submerged aquatic vegetation by 25% after one year. This was attributed to increased sedimentation and disturbance during placement and harvest of stakes, and increased shading and erosion under racks (Everett et al. 1995). They conclude that there is the potential for significant loss of submerged aquatic vegetation due to oyster culture. UC Davis researchers working in co-operation with the NPS have qualitatively noted that eelgrass growth is severely restricted under active oyster racks in Drake's Estero (Elliott-Fisk et al. 2005).

In 2003, Wechsler noted that 38 oyster racks were in operation, which would affect 5,700 square meters (nearly 1.5 acres) of affected eelgrass cover. A resurvey of the racks by NPS scientists in 2007 found that the number of active racks had increased by 66%, to a total of 63 active racks. There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There are 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero. However, recent aerial images indicate the impact is much larger approaching 50 acres. Hundreds of channels cut into the eelgrass by boat propellers affect a much larger area. Frequent disturbance by boat traffic may significantly alter eelgrass coverage.

Extensive outboard motor cuts in the eelgrass. Image taken 5/6/2007. (photo by Robert Campbell).

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

Didemnum infestation at Bull Point, May 2007.

Extensive outboard motor cuts in the eelgrass. Image taken 5/6/2007 (photo by Robert Campbell).

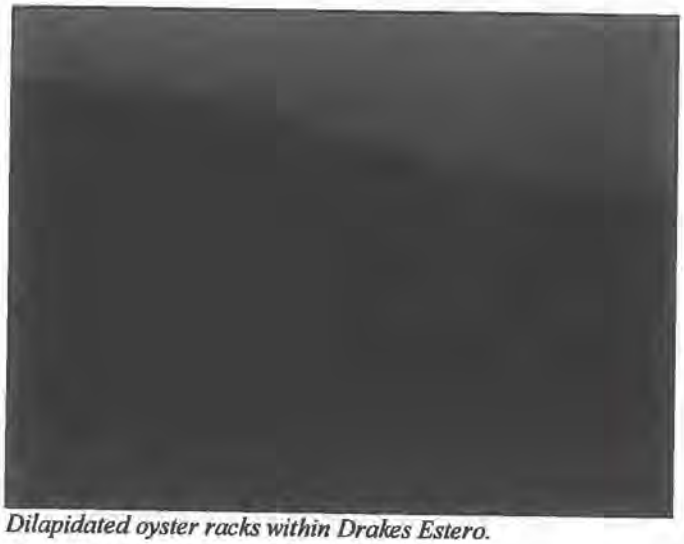
Dense assemblages of oysters may reduce recruitment of other species with a planktonic larval stage and reduce plankton in the water column by filter-feeding. This feeding limits the amount of food available to native bivalves and ostracods. Clam abundance is reduced under oyster racks, possibly due to changes in bottom sediment grain-size, particulate organics that contribute to higher sulfide levels, or increased predation by fish and decapod crustaceans attracted to the oyster racks. In other parts of Drakes Estero, clams can be found in extremely high densities - up to 250 per square meter.

A recent California Department of Fish and Game Report (March 2007) indicated that the estuary now holds approximately 9,000,000 individual non-native oysters and 1,000,000 non-native Manila clams. Oysters generally filter ~ 50g/day, thus 450,000,000 gallons of water may be filtered by the non-native oysters in the bay, depriving native species of these plankton resources. This is about 10 times the volume of a large oil tanker filtered every day. "The result of culturing bivalves in systems such as Drakes Estero is that there is a shift in the carbon from the pelagic food web to the benthic food web ….. we would also expect a shift in organic matter and nutrients to the bed. The pelagic to benthic shift can result in quite dramatic losses in the pelagic communities (zooplankton and fish) as have been seen with some exotic bivalve introductions (Zebra Mussel, Asian clam)" (Dr. Janet Thompson, a USGS benthic scientist, letter dated May 7, 2007).

Oyster racks create habitat in the estero by acting as a hard surface substrate in an ecosystem composed of predominantly soft-bottom substrate. This direct change in habitat substrate significantly alters the native species composition and abundance, and provides habitat for non-native species.

Wechsler (2004) detected few Pacific herring; even though this species was historically found in high numbers and spawns in eelgrass beds (Blunt 1984). D. Jacobs surveyed for tidewater goby, another federally listed species, throughout the seashore in the mid-1990s and did not find them in Drakes Estero, speculating that they may have been extirpated by the presence of predatory, non-native fish (D. Jacobs, pers. com.).

Disturbance and displacment of wildlife by oyster farming activities have been documented at Drakes Estero and elsewhere. Kelly et al. (1996) documented how oyster racks influenced shorebird use of tidal flats in Tomales Bay by enhancing feeding opportunities and food for some species, such as gulls and willets, while decreasing them for others, such as the dunlin. Additionally, the bags create an anoxic dead zone underneath by smothering native infauna and trapping sediment; consequently, there is less food available in the mud for birds to feed on. Currently, there are thousands of oyster bags on mudflats in Drakes Estero throughout the estero, and the number of shorebird species and their distributuion may be affected.



Dilapidated oyster racks within Drakes Estero.

Harbor seals have been directly affected by oyster operations in the 1970s-1990s because of disturbance to seals resting onshore; and seals have been affected by placement of racks on tidal sandbars where they rest and pup (Allen, pers. com.). Seal haul out sites in the upper estero are more important to pupping seals than those near the mouth, so mothers with pups were disproportionately disturbed when disturbance was caused by the oyster operation (Allen 1988; pers. obs.). During the early 1980s, seals at Drakes Estero were disturbed on 29% of the days surveyed; primary sources for disturbance were fishermen (38%) and boats (28%) (Allen and Huber 1984). Kayaks were restricted during the breeding season (March-June) in 1995 and the oyster activity declined significantly in the 1990s. Consequently, the number of disturbances declined within the estero from both the oyster operation and kayaks (Allen et al. 2004). During the breeding season, researchers observed seals disturbed by motor boats associated with the oyster operation six times in 1997 and once between 1998 and 2001. Disturbances to resting and breeding seals increased dramatically in 2007. Since March, park biologists documented oyster boats disturbing mothers with pups, and they noted that oyster bags were located on sandbars where seals would normally give birth and nurse their pups. One area where

250 seals nursed more than 100 pups two years ago, have around 50 total seals including around 25 pups in 2007, an 80% decline.

Non-native species can have profound effects on ecosystems by changing ecosystem structure, function, species abundance, and community composition. The introduction of non-native, invasive species by oyster operations has been documented for decades in Marin County (Bonnot 1935, Carlton 1992, Cohen and Carlton 1998) and is a major concern (California Department of Fish and Game 2001). Carlton (1992) summarized the introduction of 28 non-native species of mollusk into estuaries in the Pacific by oyster operations. Hard structures used to cultivate oysters provide habitat that would not otherwise exist, supporting non-native invertebrates and fish. Examples of non-native species introduced into Drakes Estero include gem clam, green crab, slipper snail, Japanese oyster drill, Atlantic oyster drill and *Batillaria.attramentaria* The non-native *Batillaria*, a gastropod, was introduced with Japanese oysters to California and was documented to displace the native confamillial species in northern California (Byers 1999). This invasive gastropod was found in Drakes Estero (Byers, pers. com.; Press, pers. com.). Elliott-Fisk et al. (2005) noted that "the marine invertebrate fouling community of sessile organisms could be properly characterized as "introduced" and "invasive" due to lack of hard, shallow water substrate in Drakes Estero. This community is present and associated with the oyster farming operation in Schooner Bay, but nearly non-existent in Estero de Limantour."

One, invasive, non-native species found on oyster farming structures in Drakes Estero was the colonial tunicate (*Didemnum spp.*), a highly aggressive, invasive species that could alter Drakes Estero ecology. "In the Northwest Atlantic, a closely related species has covered 50-90% of the George's Bank. Such coverage can smother organisms living on the bottom and in the sediment, and block the settlement of larvae (http://www.sfei.org/). A small infestation of the species was also found on natural sandstone habitat at Bull Point in May of 2007. Removal of oyster racks in Drakes Estero would eliminate habitat for this invasive species.

Harbor seals resting on sand bar. Photo by Jamie Hall.

Natural Resource Significance

- Only congressionally designated coastal bay wilderness area in the western United States, south of Alaska.
- Adjacent Estero de Limantour is a recognized as a Marine Reserve by the state of California.
- One of only a few sites with significant eelgrass beds which are specially protected by California and critical for many species, including spawning fish, over wintering Black Brandt, and invertebrates.
- A Western Hemisphere Shorebird Reserve Network, identified as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan.
- PRBO identified over 100 species of birds during winter surveys in 1999 and 2000, including several listed species or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, and Marbled Murrelet.
- The estuary is very important to over-wintering Black Brant that only migrate to a few places along the Pacific Flyway.
- The estero is important to resident and spawning fish where they are associated with eelgrass beds and benthic sediment. The federally listed steelhead trout spawns in the Schooner Bay tributary.
- Harbor seal population is one of the largest in the state of California and the largest in Marin County, with as many as 2,000 breeding/molting individuals and 300-500 pups, annually.

Oyster farming impacts on the ecological communities of Drakes Estero

- A USGS researcher stated that a source for sediment fill in the estero was from oyster feces and from structures trapping sediment.
- Eelgrass beds are found in all suitable habitats within Drakes Estero, except between active oyster racks, where they do not exist due to shading and possibly other effects. In 2003, with 38 active oyster racks, this amounted to at least 1.5 acres of lost eelgrass cover
- Oyster racks and bags provide structural habitat that does not naturally occur in the estero except in limited areas. The equipment and structures change the community composition and abundance of species and provide habitat for invasive, non-native species.
  - Invasive organisms were found on the hard substrates provided by the oyster racks in Schooner Bay. These organisms were limited in Estero de Limantour where no oyster facilities exist.
  - The invasive non-native species, *Didemnum spp.*, is commonly present on oyster racks and is a highly aggressive, invasive species that could alter Drakes Estero ecology.
  - Schooner Bay, where there are many oyster racks, supported a different fish community than Estero de Limantour where no mariculture occurs.
- Clam abundance is reduced under oyster racks, possibly due to changes in bottom sediment composition or increased predation by fish and decapod crustaceans attracted to the oyster racks. In parts of Drakes Estero, clams are found in extremely high densities away from oyster racks - up to 250 per meter squared.
- The oyster operation is a potential source for many invasive species because non-native species hitchhike on oysters and equipment that are brought to the estero.
- Placement of oyster bags and racks in intertidal mudflats and sand bars displace wildlife such as shorebirds and harbor seals because of spatial coverage of racks and disturbance by oyster operations. In 2007, oyster bags and disturbance have reduced one sub colony by 80%

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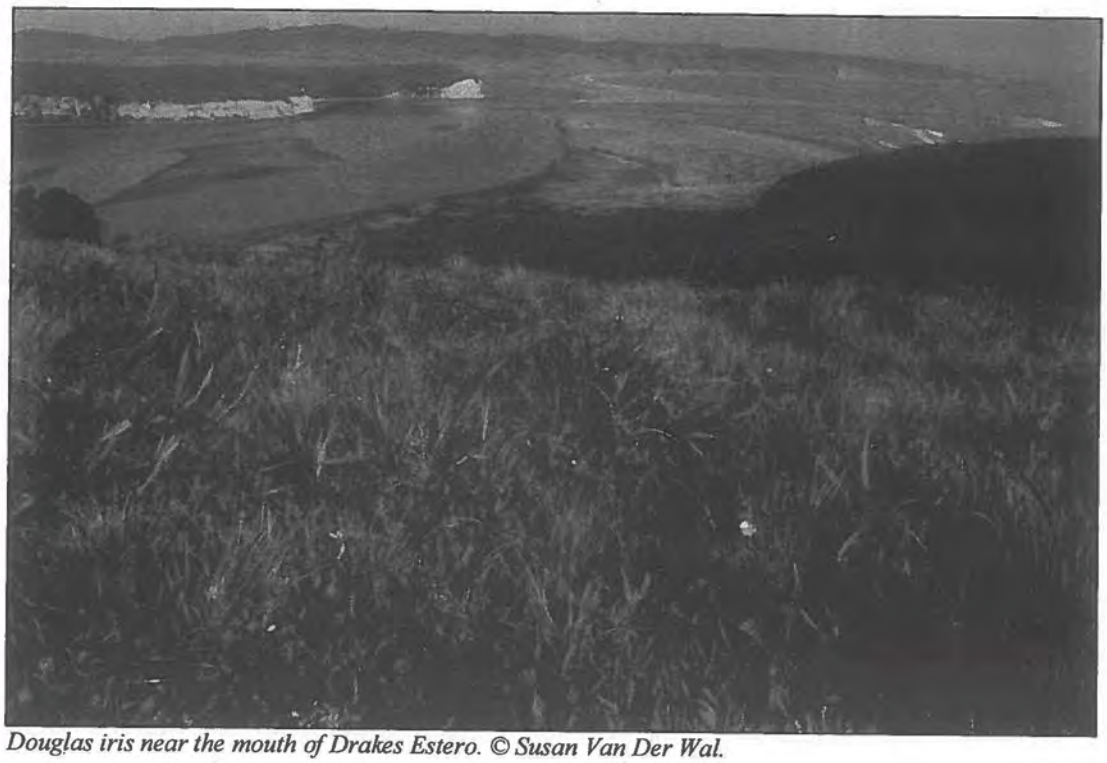

Douglas iris near the mouth of Drakes Estero. © Susan Van Der Wal.

"...without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area."

P.L. 94-544 and 94-567 establishing the Point Reyes Wilderness

Aerial view of the mouth of Drakes Estero. © Alexandra Kruse.

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Items 1 and 6

February 9, 2007, version of *A Sheltered Wilderness Estuary*

Point Reyes National Seashore

Drakes Estero

Photo © Robert Campbell

A Sheltered Wilderness Estuary

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. This is the only federal marine coastal wilderness from Washington State to the Mexican Border. Only 11 marine wilderness areas exist in the US.

Drakes Estero

A Sheltered Wilderness Estuary

Background

Drakes Estero is within Point Reyes National Seashore, established in 1962. The estuary is the only coastal bay with special congressional designation as wilderness in the western United States, south of Alaska. The estuary was recently designated a Western Hemisphere Shorebird Reserve Network (WHSRN), a site of Regional Importance in the U.S. Shorebird Conservation Plan because it is important to a great diversity and abundance of shorebirds. A portion of the estero is currently managed as Wilderness and the remainder is potential wilderness that will be fully managed as Wilderness when a mariculture lease expires in 2012. Drakes Estero is adjacent to Estero de Limantour, a State Ecological Marine Reserve, established in 1974 by the California Department of Fish and Game. Coastal scrub and grassland habitat surrounds the estuary; and the only current human activities on, or adjacent, to the estuary include recreation, cattle/dairy grazing and oyster farming.

At the time of purchase in 1972, the National Seashore provided a 40 year Reservation of Use and Occupancy Agreement to Johnson's Oyster Company (JOC). The agreement allows for use of a park site for oyster processing, but requires compliance with local, state, and federal laws and regulations. The agreement expires in 2012. In 2005, the JOC sold the leasehold interest to the Drakes Bay Oyster Company (DBO). At the time of the sale, the NPS notified DBO that the lease would expire in 2012.

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. The legislative history (House Report 94-1680) indicates Congressional intent: "it is the intention that those lands and waters designated as potential wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these land and waters to wilderness status." This is the only federal marine coastal wilderness along the Pacific coast from Washington to the Mexican Border. Only 11 marine wilderness areas exist in the US.

> *The need for wilderness and the refuge it offers to Americans will only increase with the passage of time. Our generation of Americans has an obligation to preserve for future generations more areas that qualify for wilderness designation."*
>
> *--Theodore Roosevelt IV*

The General Management Plan (GMP, 1980) designates the estuary as wilderness, where no mechanized equipment or development may occur.

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The estuary area of approximately 1,000 acres is used by DBO for oyster cultivation under a lease by the California Department of Fish and Game (CDFG). The ocean floor was ceded by the State of California to the National Park Service, except for the "right to fish." The estuary floor is thus owned by Point Reyes National Seashore.

The 2001 NPS Management Policies direct staff to actively seek to remove from potential wilderness the temporary, non-conforming conditions that preclude wilderness designation (6.3.1 Wilderness Resource Management). Moving from Congressionally authorized potential to full wilderness status is an administrative action only requiring publishing a notice in the Federal Register.

Point Reyes legislation also stipulates that "No freehold, leasehold, or lesser interest in any lands hereafter acquired within the boundaries of Point Reyes National Seashore shall be conveyed for residential or commercial purposes except for public accommodations, facilities, and services provided pursuant to the Act of October 9, 1953."

"Wilderness is a resource which can shrink but not grow. Invasions can be arrested or modified in a manner to keep an area usable either for recreation, or for science or for wildlife, but the creation of new wilderness in the full sense of the word is impossible."

--Aldo Leopold, Sand County Almanac

The activities of Johnson's Oyster Company (JOC) produced many adjudicated environmental problems. As a condition of a stipulated agreement (Marin County Superior Court No. 165361, March 1997), JOC was ordered to complete several actions, including obtaining building permits and upgrading facilities and septic systems to meet state and county code requirements. DBO is in the process of upgrading the facilities but is still under a Cease and Desist Order from the California Coastal Commission.

Oyster bags that cover the shoreline at Bull Point.

Under this order, DBO is required to obtain a permit from the California Coastal Commission for the facilities, but has not yet acquired a Coastal Development Permit for its activities.

DBO wishes to extend the lease past 2012; NPS has instructed DBO that the issuance of a new lease cannot be extended beyond 2012 because of the GMP, NPS Management Policies, and the enacted Wilderness legislation.

Point Reyes enabling legislation indicates that natural environment will be the park's first priority.

"the property acquired by the Secretary under such sections shall be administered by the Secretary without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area . . . . (16 USC Sec. 459c; Enabling Legislation for Point Reyes National Seashore)

Ecology of the Estuary

An ecosystem consists of interactions of plants, animals, and microorganisms with their physical (e.g., soil conditions and processes) and climatic conditions. The primary natural processes that drive the ecological function of any estuary, including Drakes Estero, are the terrestrial hydrology (the timing and amounts of freshwater inputs), sedimentation from land and sea, terrestrial nutrient loading, and coastal shoreline change from tides, storms and sea level rise. The presence and abundance of plants and animals are based on their ability to adapt to these processes and eek out a living in microhabitats within the larger estuary.

Drakes Estero complex is a large, convoluted coastal estuary with one narrow, unobstructed opening to Drakes Bay. Shaped like a hand, the estuary consists of five fingers that feed into a 1,300 acre central bay; the estuary reaches a total area of 2,270 acres at the highest tides. Geologically, the estuary is recognized as a system of drowned river valleys invaded by the sea. Sea level rise following the Late Pleistocene glacial period formed the contemporary estuary 6,000 years ago. The depth is mostly shallow, less than 6 feet deep, with a deeper channel (about 25 ft) that traverses the main bay. Intertidal sand and mud flats exposed at low tide make up approximately 1,200 acres of the estuary (Anima 1990). The estuary is surrounded by low bluffs composed of the Drakes Bay Formations which includes fine-grained siltstone embedded with mudstone (Galloway 1977). The bay is protected from ocean wave action by the sand spits of Drakes and Limantour Beaches (Mudie and Byrne 1980).

The sediments of the outer estuary near the mouth consist mostly of sand, which is the long shore transport of sand in Drakes Bay and the overtopping by tides and storms of the sandspits near the mouth. Rocky bottom is limited to the deep channels at the seaward part of the estuary near the mouth; no boulders were found in cores taken within the estero (Anima 1990 and Harbin-Ireland 2004). Pebble and cobble stones

are limited to a few places along the shoreline in parts of Estero de Limantour, along bluffs in the main part of the bay and along the east shoreline in Home Bay.

Wilderness areas only comprise about 2.5 percent of all the land in the lower forty-eight states.

Tidal exchanges occur through a narrow inlet that is 21 feet deep. Tidal exchanges are cycled completely with a tidal bore that travels the length of the estero to Bull Point; however, exchanges are less complete in the fingers of the estero. The deepest point is 25 feet at the first bend along the major channel from the entrance. The tidal range is twelve feet from -6.0 to 6.6 feet with currents ranging between 32 cm/sec to 46 cm/sec (Anima 1990). Because the estuary is mostly shallow, the water column is well mixed from wind and tides, resulting in a mostly homogenous saline level. Salinity ranges from 31 ppt in upper reaches in winter to 41 ppt in fall (Harbin-Ireland 2004).

Drakes Estero from the air looking towards Point Reyes headlands showing extensive eel grass beds. Photo © Robert Campbell

In Drakes Estero, natural sediment and nutrient loading is relatively moderate and attributed to shifting sand bars and decomposed granite from streams. Freshwater

feeds into the estero from six perennial streams and four ephemeral streams/springs that drain the small watersheds surrounding the 7,847 acre estuary. The water quality throughout the estuary, as measured by the presence of coliform, is well within the safe established limits measured by the California Department of Public Health (NPS report 2006). Home Bay had a spike of elevated coliform counts when a septic system failed. This septic system, though, is being replaced by the Seashore in 2006. Ranching in the watershed is limited to grazing around 1000 cattle managed by five separate ranches. None of Point Reyes' dairy ranches are within the Drakes Estero watershed.

Within Drakes Estero, there are several distinct, natural habitats. Along the shoreline, the dominant habitats are sandstone flats (as occur at Bull Point), mudflats along the inner finger bays and sand flats near the mouth. Pickleweed (*Salicornia virginica*), arrow-grass (*Triglochin maritima*) and saltgrass (*Distichlis spicata*) are the dominant shoreline native vegetation; however, the size and number of marshes are limited. Within the estuary waters, habitats include mudflats and sand flats exposed at low tides, eelgrass beds, and soft-bottom substrate. Each habitat supports distinct communities. The dominant plants and animals of the estuary that are major drivers of the estuarine ecosystem include eel grass beds, invertebrates in the soft-bottom sediment, estuarine fish such as herring, migratory waterbirds and shorebirds, and harbor seals.

Eelgrass beds are highly significant to the ecological function of the estuary because they provide cover, food and a nursery for fish and invertebrates. Several marine species spend their larval and juvenile stages in eelgrass beds such as lingcod, English sole, speckled sanddab, several species of nearshore rockfish, and Dungeness crab (see Larson and Mello – www.dfg.ca.gov/local). Large, eelgrass beds are found in only a few estuaries in California and many species are entirely dependent on them for a part of their life cycle. For example, within Drakes Estero many species such as Pacific herring, bay pipefish, gammarid and caprellid amphipods, the sea slug (*Phyllaplysia taylori*), and several shrimp species are directly dependent on eelgrass beds.

The native invertebrates of Drakes Estero are primarily species adapted to soft-bottom sediment and eelgrass beds, and rarely include the common species found in rocky intertidal habitats around Point Reyes, such as limpets, chitons, mussels, and native oysters. In Drakes Estero, the dominant species that filter feed phytoplankton from the water column are bivalves such as *Nutricola* sp., Washington clams (*Saxidomus nuttalli*), gaper clams (*Tresus capax*), and rock-boring piddock clams at Bull Point and the mouth of the Estero. In addition, predominantly deposit-feeding *Macoma* clams, which facultatively filter-feed, are found in densities up to 250 per square meter in the outer, sandy tidal flats of Drakes Estero. Additional dominant benthic invertebrates include tanaid crustaceans (*Leptochelia dubia*), cumaceans (*Cumella vulgaris*), phoronids (*Phoronopsis viridis*), shore crabs (*Hemigrapsus oregonensis*), gammarid amphipods, polychaete worms, and ostsracods (Harbin-Ireland 2004, Press 2005). Native limpets, oysters, mussels and chitons have never been abundant in the esteros due to the lack of rocky substrate.

Approximately 60 fish species have been documented in the area (Miller 1972, Wechsler 2004, D. Jacobs, unpubl. data). A recent study identified 35 species from 20 families. Five species were dominant and represented 89% of the fish assemblage,

including topsmelt, three-spined stickleback, staghorn sculpin, bay pipefish, and kelp surfperch (Elliott-Fisk et al. 2005, Wechsler 2004). The survey documented a difference in species composition between Drakes Estero and Estero de Limantour, with schooling fish that forage on plankton (topsmelt and herring) and benthic–oriented fish (staghorn sculpin) occurring primarily in Estero de Limantour and structure-feeding fish (several species of surfperch) occurring primarily in Drakes Estero associated with oyster racks. Crevice-dwelling fish were also more common in Estero de Limantour (Elliott-Fisk et al. 2005). Steelhead trout, a federally protected species, were documented in a tributary to Schooner Bay in the late 1990s.

The bird life in Drakes Estero and Estero de Limantour is highly diverse and abundant, and the esteros are recognized as significant sites for bird conservation. The maximum population of all shorebirds combined was estimated at between 10,000 and 100,000, and the estero regularly holds thousands of shorebirds in winter (Hickey et al. 2003; http://www.waterbirdconservation.org/). A similar designation is pending for waterbirds.

Brown pelican and marbled godwits. Photos © Rich Stallcup.

PRBO identified over 100 species of waterbirds and shorebirds during winter surveys in the 1980s and 1997-99 (White 1999), and 86 species of birds recorded at Drake's Cove during 2004, with counts of Buffleheads, Ruddy Ducks, Western Sandpipers, Least Sandpipers, and Dunlin numbering over 1000 individuals. PRBO and NPS biologists identified several federal threatened, endangered, or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, Western Snowy Plover and Marbled Murrelet. During the late summer and fall, shorebirds and waterbirds arrive and stay in the estero throughout the winter months to feed and rest.

The bird life in Drakes Estero is highly diverse and abundant, and as a consequence, the estero is recognized as a significant site for conservation.

The estero is one of only a few locations where thousands of Black Brant over-winter where they rest and feed on eelgrass (Shuford et al. 1989). "Brant is a holarctic species (it has populations in boreal regions all around the world) that nests on tundra near saltwater environments" (http://www.prbo.org/obs_cms). They are on the Audubon species Watch List because of their sensitivity to habitat loss. From the summer through December, hundreds to thousands of Brown Pelicans, a federally protected species, congregate at the esteros, feeding on large schooling fish such as anchovies, herring and smelt, and resting on tidal mudflats. Other species that occur in large numbers are Caspian Terns, Gadwall, Ruddy Duck, American Widgeon, Bufflehead, and Green-winged Teal, Western and Least Sandpiper, Dunlin and Black-bellied Plover. In the past 15 years, an egret colony formed near the mouth of the estero where Snowy Egrets, Great Egrets, and Great Blue Herons nest. In the past, Snowy Plovers nested at the mouth of the estero, but have not since the late 1990s due to predation, changes in habitat and disturbance.

A flock of marbled godwits and willets. The waters and shoreline of the estuary provide a home to over a 100 species of birds. Photo © Rich Stallcup.

Harbor seals are the only year-round, resident marine mammal in the estero. Other marine mammals that occur intermittently include California sea lions and northern elephant seals. The narrow mouth of the estero is restrictive to larger marine mammals; although, several dead whales have washed into and deposited at the mouth of the estero including an adult male sperm whale. The harbor seal population within the estero is one of the largest concentrations in California, annually producing between 300 and 500 pups, and reaching a maximum of nearly 2,000 seals during the breeding and molt seasons (Allen et al. 2004). Drakes Estero is one of only five major seal colonies at Point Reyes and together represents around 20% of the state population of harbor seals, and the highest concentration of seals in California (Allen et al. 2004). Seals that breed in the estero range nearly 500 km north as far as the Klamath River in the winter months but return to Drakes Estero to breed (Allen 1988). The colony at Drakes Estero has grown significantly over the past 10 years, in part because the park implemented a seasonal closure to kayaks during the

pupping season and because JOC was operating at a reduced level in the 1990s (Vanderhoof and Allen 2005). The pup count in 1986 was 255 compared with 464 in 2004, an 82% increase.

Harbor seals resting on mudflats. Photo by Jamie Hall.

Overlooking the harbor seal haul out sites in Drakes Estero.

Drakes Estero is one of only 5 major seal colonies in Point Reyes and together represent around 20% of the state population of harbor seals and the highest concentration in the state (Allen et al. 2004).

Human Activities and Changes to Ecological Function

The ecological function of Drakes Estero has been altered over the past several decades due to activities associated with oyster farming and ranching. Other than the oyster operation, there is no development along the shores of the estuary.

Sedimentation rates and types of material have changed because of a combination of factors over the past 150 years. The primary water arteries into the estuary were dammed by ranchers to create stock ponds for cattle. These impoundments reduce the flushing action of winter rains and the size of marshes at the stream mouths flowing into the esteros. The oyster operation has also changed the type and rate of sedimentation. The operation includes 1) stakes with plastic tubing that are embedded into intertidal mudflats, 2) bags that are placed on top of the intertidal mudflats, and 3) racks that are located on mudflats and open water channels. The bags and racks have trapped fine particulate sediment resulting in an alteration of hydrologic function and the type of substrate. The reduced freshwater flushing from the watershed enables fine-grained sediments to build up within the estero around the oyster racks. USGS (Anima 1990) collected sediment cores from the estero and identified pseudo feces of oysters as the primary source for sediment fill, as has been seen in studies elsewhere. An estimate of 0.6 to 1.0 metric tons of fecal matter can be produced per year by a 60 meter square oyster raft. This sediment material is resistant to erosion because oyster racks are located in upper reaches of the estero where tidal action is lowest and the arrangement of the oyster racks acts as a "baffle to tidal currents where rack density is highest ...silt material accumulates on the leeward side of stacked oyster beds (Anima 1990)."

Affiliated debris found with oyster operations.

Metal and plastic bags from oyster operations.

The ecology of the estero is altered by changes in hydrology and sedimentation, which in turn changes habitats and their associated species. Eelgrass beds, for example, in Estero de Limantour where there is no oyster farming, had higher densities of standing stock, as measured by the number of turions and blades, compared to Drakes Estero (AMS 2002). Eel grass is very sensitive to light, nutrients, pollution and sedimentation, and is thus an excellent indicator of estuarine health. Oyster farming reduces the amount of light available to eelgrass beds because of shading by racks, increases the amount of sedimentation due to deposition of oyster pseudo-feces and trapping sediment, and contributes pollution from treated construction materials and from general operations (trash). Although eelgrass cover has not been quantitatively measured in Drake's Estero, UC Davis researchers working in co-operation with the NPS have all qualitatively noted that eelgrass growth is severely restricted under active oyster racks in Drake's Estero (Harbin-Ireland 2004, Wechsler 2004, Elliott-Fisk et al. 2005). In 2003, Wechsler noted that 38 oyster racks were in operation, which would affect 5,700 square meters (nearly 1.5 acres) of affected eelgrass cover.

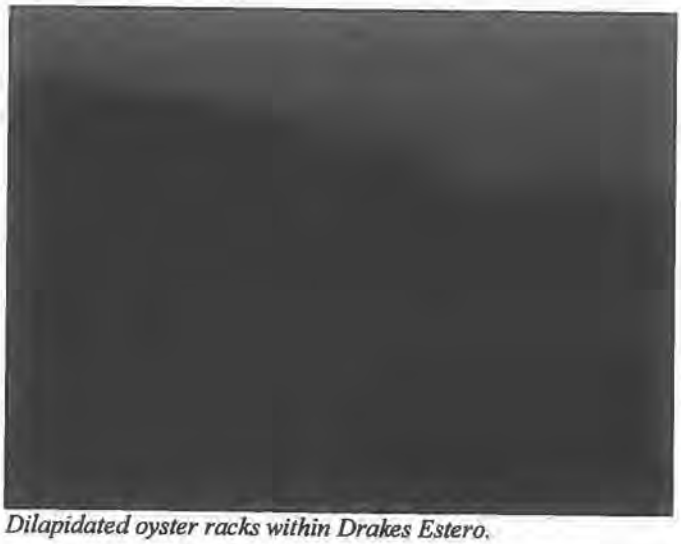
Oyster racks create a hard surface in an ecosystem composed of predominantly soft-bottom substrates. This change in habitat significantly alters the native species composition and abundance, and provides habitat for non-native species. Species that are dependent on soft-bottom substrates such as benthic fish and invertebrates are replaced by those that associate with hard substrates. "A significant increase in the abundance of infaunal invertebrates was observed in areas 50 meters away from oyster racks in Drakes Estero compared to areas beneath oyster racks" (Harbin-Ireland 2004).

Dense assemblages of oysters reduce recruitment of other species with a planktonic laval stage and reduce plankton in the water column by filter-feeding. This feeding limites the amount of food available to native bivalves and ostracods. In Drakes Estero, the percentage of ostracods and native bivalves was higher 50 m away from oyster racks than adjacent to or under racks (Harbin-Ireland 2004). Clam abundance is reduced under oyster racks, possibly due to changes in bottom sediment composition or increased predation by fish and decapod crustaceans attracted to the oyster racks. In other parts of Drakes Estero, clams can be found in extremely high densities - up to 250 per meter squared.

Oyster racks create habitat in the estero by acting as a hard surface substrate in an ecosystem composed of predominantly soft-bottom substrate. This direct change in habitat substrate significantly alters the native species composition and abundance, and provides habitat for non-native species.

The species richness of fish (the number of species) was the same between Estero de Limantour and Drakes Estero, but the species guilds were different. Schooner Bay where there are many oyster racks supported a completely different fish community than that in Estero de Limantour where no mariculture occurs. Wechsler (2004) concluded that the diversity of fish species was enhanced by the presence of the oyster rack structures (or any hard structure); however, his sample size was small and he was not able to sample eelgrass beds thoroughly because of logistical difficulties. Consequently, he may have missed species that are dependent on eelgrass. Surprisingly, Wechsler (2004) detected few herring, even though this species was historically found in high numbers and spawns in eelgrass beds (Blunt 1984). D. Jacobs surveyed for tidewater goby, another federally listed species, throughout the seashore in the mid-1990s and did not find them in Drakes Estero, speculating that they may have been extirpated by the presence of predatory, non-native fish (D. Jacobs, pers. com.).

Disturbance and displacment of wildlife by oyster farming activities have been documented at Drakes Estero and elsewhere. Kelly et al. (1996) documented how oyster racks influenced shorebird use of tidal flats in Tomales Bay by enhancing feeding opportunities for some species, such as gulls and willets, while decreasing them for others, such as the dunlin. Currently, there are few oyster bags on mudflats in Drakes Estero except around Bull Point, but if the number and placement of bags were to increase, then the number of shorebird species and their distributuion might be affected.



Dilapidated oyster racks within Drakes Estero.

Harbor seals have been directly affected by oyster operations in the 1970s-1990s because of disturbance to seals resting onshore; and seals have been affected by placement of racks on tidal sandbars where seals rest and pup (Allen, pers. com.). Seal haul out sites in the upper estero are more important to pupping seals than those near the mouth, so mothers with pups were disproportionately disturbed when disturbance was caused by the oyster operation (Allen 1988; pers. obs.). During the early 1980s, seals at Drakes Estero were disturbed on 29% of the days surveyed; primary sources for disturbance were fishermen (38%) and boats (28%) (Allen and Huber 1984). Kayaks were restricted during the breeding season (March-June) in 1995 and the

oyster activity declined significantly in the 1990s. Consequently, the number of disturbances declined within the estero from both the oyster operation and kayaks (Allen et al. 2004). During the breeding season, researchers observed seals disturbed by motor boats associated with the oyster operation six times in 1997 and once between 1998 and 2001. Disturbances to resting and breeding seals currently remain low because oyster activities are not occurring at existing seal haul out sites.

Non-native species can have profound effects on ecosystems by changing ecosystem structure, function, species abundance, and community composition. The introduction of non-native, invasive species by oyster operations has been documented for decades in Marin County (Bonnot 1935, Carlton 1992) and is a major concern (California Department of Fish and Game 2001). Carlton (1992) summarized the introduction of 28 non-native species of mollusk into estuaries in the Pacific by oyster operations. Hard structures used to cultivate oysters provide habitat that would not otherwise exist, supporting non-native invertebrates and fish. Examples of non-native species introduced into Drakes Estero include gem clam, green crab, slipper snail, Japanese oyster drill, Atlantic oyster drill and *Batillaria*. The non-native *Batillaria*, a gastropod, was introduced with Japanese oysters to California and was documented to displace the native confamillial species in northern California (Byers 1999). This invasive gastropod was found in Drakes Estero (Byers, pers. com.; Press, pers. com.). Elliott-Fisk et al. (2005) noted that "the marine invertebrate fouling community of sessile organisms could be properly characterized as "introduced" and "invasive" due to lack of hard, shallow water substrate in Drakes Estero. This community is present and associated with the oyster farming operation in Schooner Bay, but nearly non-existent in Estero de Limantour (where no fouling organisms settled or grew on the plates other than one *Balanus* species on one plate)."

One, invasive, non-native species found on oyster farming structures in Drakes Estero was the colonial tunicate (*Didemnum lahillei*), a highly aggressive, invasive species that could substantially alter Drakes Estero ecology. "In the Northwest Atlantic, it has infested a 100 square km area on Georges Bank, with coverage of 50-90% of the bottom over large parts of the area. Such coverage can smother organisms living on the bottom and in the sediment, and block the settlement of larvae" (http://www.sfei.org/). Removal of oyster racks in Drakes Estero would eliminate habitat for this invasive species.

Harbor seals resting on sand bar. Photo by Jamie Hall.

Natural Resource Significance

- Only congressionally designated coastal bay wilderness area in the western United States, south of Alaska.
- Adjacent Estero de Limantour is a recognized as a Marine Reserve by the state of California.
- One of only a few sites with significant eelgrass beds which are specially protected by California and critical for many species, including spawning fish, over wintering Black Brandt, and invertebrates.
- A Western Hemisphere Shorebird Reserve Network, identified as significant for the conservation of shorebirds in the Southern Pacific Shorebird Conservation Plan.
- PRBO identified over 100 species of birds during winter surveys in 1999 and 2000, including several listed species or species of special concern such as Osprey, White Pelican, Brown Pelican, Peregrine Falcon, Black Brant, and Marbled Murrelet.
- The estuary is very important to over-wintering Black Brant that only migrate to a few places along the Pacific Flyway.
- The estero is important to resident and spawning fish where they are associated with eelgrass beds and benthic sediment. The federally listed steelhead trout spawns in the Schooner Bay tributary.
- Harbor seal population is one of the largest in the state of California with as many as 2,000 breeding/molting individuals and 300-500 pups, annually.

Oyster farming impacts on the ecological communities of Drakes Estero

- A USGS researcher stated that a primary source for sediment fill in the estero was from oyster feces and from structures trapping sediment.
- Eelgrass beds are found in all suitable habitats within Drakes Estero, except between active oyster racks, where they do not exist due to shading effects. In 2003, with 38 active oyster racks, this amounted to at least 1.5 acres of lost eelgrass cover
- Oyster racks and bags provide structural habitat that would not naturally occur in the estero. The equipment and structures change the community composition and abundance of species and provide habitat for invasive, non-native species.
  - Invasive organisms were found on the hard substrates provided by the oyster racks in Schooner Bay. These organisms were not present in Estero de Limantour where no oyster facilities exist.
  - The invasive non-native species, *Didemnum lahillei,* is present only on oyster racks and is a highly aggressive, invasive species that could alter Drakes Estero ecology.
  - Schooner Bay, where there are many oyster racks, supported a different fish community than Estero de Limantour where no mariculture occurs.
- Clam abundance is reduced under oyster racks, possibly due to changes in bottom sediment composition or increased predation by fish and decapod crustaceans attracted to the oyster racks. In parts of Drakes Estero, clams are found in extremely high densities away from oyster racks - up to 250 per meter squared.
- The oyster operation is a source for many invasive species because non-native species hitchhike on oysters and equipment that are brought to the estero.
- Placement of oyster bags and racks in intertidal mudflats and sand bars can displace wildlife such as shorebirds and harbor seals because of spatial coverage of racks and disturbance by oyster operations.

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Douglas iris near the mouth of Drakes Estero. © Susan Van Der Wal.

"...without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area."

P.L. 94-544 and 94-567 establishing the Point Reyes Wilderness

Aerial view of the mouth of Drakes Estero. © Alexandra Kruse.

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cc:
Subject: Re: your comments

>Hi Roberto:
>
>Here is the wording that I would like you to review. Have I presented the
>results and recommendations of your study correctly?
>
> Sedimentation rates and types of material have changed in the
> estero because of a combination of factors over the past 150
> years. The primary water arteries into the estuary were dammed
> by ranchers to create stock ponds for cattle, which reduced the
> flushing action of winter rains at the stream mouths flowing
> into the esteros. The commercial oyster operation likely has an
> important role in the deposition of fine-grained sediment and
> in trapping of sediment. The oyster operation presently
> includes several thousand bags that are placed on top of
> intertidal mudflats, and 85 racks that are located on mudflats
> and open water channels. In other estuaries, oyster bags and
> racks have been documented to trap fine particulate sediment
> resulting in an alteration of hydrologic function and the type
> of substrate, and have integrated oyster feces into the
> sediment below and around oyster farming structures (Cranford
> et al. 2003; Porter et al. 2004). Within Drakes Estero, USGS
> (Anima 1990) noted that oyster racks act as a "baffle to tidal
> currents where rack density is highest Šsilt material
> accumulates on the leeward side of stacked oyster beds." Anima
> (1990) reported that the oyster operation likely played "an
> important role" in the sedimentation of Drakes Estero with
> oyster feces contributing to the amount of fine-grained
> sediment. Anima (1990) also noted that the sediment material
> is resistant to erosion because oyster racks are located in the

> upper reaches of the estero where tidal action is lowest. To
> determine the past and current effects of oyster operations on
> sedimentation rates within the Drakes Estero, though, requires
> a more focused and site specific study.
>
>
> Also I was looking up the paper by Ito and Imai 1955 and could
> not find it in your references - could you give me the full
> reference or a copy of the paper?
>
> Thanks for your time on this.
>
> Sarah
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email: ranima@usgs.gov

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Please visit our World Wide Web Site:
"http://walrus.wr.usgs.gov" -Coastal and Marine Geology
"http://www.usgs.gov" -USGS info & links to other home pages
http://TerraWeb.wr.usgs.gov/TRS/projects/MontereySonar/ - Monterey Bay sonar-mosaic browser
http://www.esri.com/library/userconf/proc99/proceed/papers/pap659/p659.htm -Monterey Bay general info

Sarah Allen
06/21/2007 07:29 AM
PST

To: Ann Nelson/PORE/NPS@NPS
cc:
Subject: Fw: your comments

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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----- Forwarded by Sarah Allen/PORE/NPS on 06/21/2007 07:29 -----

Roberto Anima
<ranima@usgs.gov>
05/30/2007 08:07 MST

To: Sarah_Allen@nps.gov
cc:
Subject: Re: your comments

Hi Sarah,
What you've written is good. I would re-read the text. some grammatical work is needed, but the central idea is good and I feel comfortable with it.
I will look through my references and try to fine the Ito and Imai paper. I'm in the field today but will be in the office tomorrow.

Roberto
--
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Roberto J. Anima, Ph.D.
Coastal and Marine Geology Team
U.S. Geological Survey MS-999
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Menlo Park, CA 94025 USA
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-Monterey Bay general info

Sarah Allen
06/21/2007 07:30 AM PST

To: Ann Nelson/PORE/NPS@NPS
cc:
Subject: Fw: Goodman Testimony & Wigert Statement

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
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Phone 415-464-5187
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----- Forwarded by Sarah Allen/PORE/NPS on 06/21/2007 07:30 -----

Sarah Allen
05/15/2007 17:59 PST

To: Roberto Anima <ranima@usgs.gov>
cc:
Subject: Re: Fw: Goodman Testimony & Wigert Statement

Hi:

Many thanks for your quick reply. I would like to discuss this further because my memory of discussioins that we had and that Gary Fellers had with you implied that your were very concerned about the oyster racks, pseudo feces and sedimentation, and that in the upper reaches of the estero where the current was lower and the racks were located, the feces were the primary source of sediment.

I cannot comment on the Coastal Post article because I did not write it; however, the following was part of the article in the light which I was a coauthor of.

"Research has identified oyster feces as the primary source of sediment in the Estero, and this sediment smothers native species. Oyster racks act as baffles, accumulating sediments on their leeward sides." The section, smothers native species was based on conversations with another USGS researcher, Janet Thompson with whom I spoke regarding the placement of bags on sediment, trapping sediment and creating an anoxic zone under the bags that smothers native species. The baffle section is based on your thesis.

I will call you later this week if you are around to discuss further.

Sarah

Sarah G. Allen, Ph.D.
Senior Science Advisor
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Fax 415-464-5182
sarah_allen@nps.gov

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Sarah Allen
06/21/2007 07:29 AM
PST

To: Ann Nelson/PORE/NPS@NPS
cc:
Subject: Fw: your comments

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---- Forwarded by Sarah Allen/PORE/NPS on 06/21/2007 07:29 ----

Roberto Anima
<ranima@usgs.gov>
06/04/2007 08:16 MST

To: Sarah_Allen@nps.gov
cc:
Subject: Re: your comments

Morning Sarah,
Here's what I did to your write up.
Let me know if you received it in time.

Roberto
--
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%Drakes Estero Sediment.doc

Sedimentation rates and (the) types of (sediment) ~~material~~ have changed in Drakes~~the~~ eEstero because of a combination of factors over the past 150 years. The (streams that drain the water shed surrounding the estero)~~primary water arteries into the estuary~~ were dammed by ranchers to create stock ponds for cattle, which reduced (sediment input) ~~the flushing action of winter rains at the stream mouths flowing~~ into the estero (during winter rains). (Oysters that are grown in Drakes Estero by) ~~T~~the commercial oyster operation likely (play) ~~has~~ an important role in the deposition of fine-grained sediment, and in (the) trapping of sediment. The oyster operation presently (places) ~~includes~~ several thousand bags (of oysters) ~~that are placed~~ on top of intertidal mudflats (and sandflats?), (including) ~~and~~ 85 racks that are located on mudflats and open water channels. In other estuaries, oyster bags and racks have been documented to trap fine particulate sediment resulting in an alteration of (the hydrology and substrate type due to the placement of oysters and related racks). (Research has found that the deposition of oyster feces and pseudofeces tends to be focused below and around oyster farming structures) ~~hydrologic function and the type of substrate, and have integrated oyster feces into the sediment below and around oyster farming structures~~ (Cranford et al. 2003; Porter et al. 2004). Within Drakes Estero, USGS (Anima(,) 1990) noted that oyster racks act as a "baffle to tidal currents where rack density is highest …silt material accumulates on the leeward side of stacked oyster beds." Anima (1990) reported that the oyster operation likely played "an important role" in the sedimentation of Drakes Estero with oyster feces contributing to the amount of fine-grained sediment. Anima (1990) also noted that the sediment material is resistant to erosion because oyster racks are located in the upper reaches of the estero where tidal action is lowest. To determine the past and current effects of oyster

operations on sedimentation rates within ~~the~~ Drakes Estero~~, though~~, requires a more focused and site specific study.

Item 7

May 7, 2007, letter from Dr. Janet Thompson to the PRNS

IN REPLY REFER TO:

United States Department of the Interior

U. S. GEOLOGICAL SURVEY

Water Resources
National Research Program
Phone: (650) 329-4364 Fax: (650) 329-43
http://water.wr.usgs.gov/

MEMORANDUM

7 May 2006

To: Dr. Sarah Allen

From: Janet K. Thompson, Research Ecologist

Subject: Aquaculture in Drakes Estero

I am happy to respond to your request for information about how exotic oyster and clam aquaculture might affect Drakes Estero. As a federal science agency, scientists within the USGS do not recommend specific actions in cases such as this one, but it is well within our purview to respond to requests for knowledge based on our scientific expertise.

I have been working in the San Francisco Estuary for over 30 years studying the ecological function of native and non-native clams in the bay and freshwater delta ecosystems. My background and research are in the areas of marine ecology and environmental engineering with a specialty in hydrodynamics, so I feel qualified to respond to your questions about the ecological effects of aquaculture in Drakes Estero.

Your questions are in italics, followed by my responses.

In general, how has the culture of non-native oysters changed Drakes estero?
As background information, the source of food in Drakes Estero is a strong structuring force for the ecosystem. Given the very short water column residence time, the source of pelagic food to the main stem of the Estero is likely to be predominately from the ocean, not from locally produced phytoplankton. Thus the carrying capacity of the main stem of the Estero is dependent on oceanic production and the transport rate of that production into the Estero.

If the California oyster was ever present in Drakes Estero it is unlikely that it had the same effect on the pelagic food web as does the cultured, exotic oyster, *Crassostrea gigas* (the Pacific Oyster). The native California oyster (*Ostreola conchalphila*) is much smaller (maximum 6 cm long as opposed to 30cm long for *C. gigas*). I do not personally know if *Ostreola conchaphila* has ever lived, or presently lives in Drakes Estero but if so, it is unlikely that the biomass of the native oysters and clams would approach the

biomass of the cultured- exotic *Crassostrea gigas*. Because the native fauna reside on the bottom and are usually limited to a specific tidal zone, they are dependent on food either settling to the bottom or being transported to the bottom for there survival. Racks of oysters as are used in Drakes Estero artificially raise the filter feeders in the water column thereby increase their access to planktonic food as well as increasing the surface area available for oyster habitat beyond what would be available in a natural system. The Pacific Oyster is also known to grow at a much faster rate than the California Oyster (Ruesink et al 2005) so the culture of oysters in Drakes Estero has likely changed the pelagic food supply substantially relative to its "native" state.

The Pacific Oyster production for 2006 of about 290,000 shucked lbs can be converted to about 63,800 lbs dry weight of oyster tissue (conversion ≈0.22 as per Kobayashi et al 1997). This is the minimum amount of oyster tissue produced by the aquaculture because it only considers the harvested tissue. A reasonable trophic pyramid for filter feeders is a ratio of 5-10 times the carbon consumed to the amount produced. Therefore if a standard ratio of dry tissue to carbon is used (0.4 for bivalves) we find that the oysters are consuming, at a minimum, between 125,000 and 250,000 lbs of carbon from the pelagic system each year. The smaller culture of the manila clam (*Ruditapes philippinarum*) has a smaller effect on the pelagic food web: assuming 1,000,000 clams in culture, a dry weight of about 1 g/individual if clams are ≈3/4 inches long (Solidoro et al 2003), then there are about 2,200 lbs of clam dry wt in the system. This converts to about 4,000 – 9,000 lb of carbon removed from the pelagic system. The oysters and clams are filtering the volume of the outer bay where the culturing activities occur (≈1000 acres) about once every 10 days at a minimum. As stated above the rate would be higher if all oysters and clams, including those not included in the annual landing values were included. The carbon removed by the cultured clams and oysters was likely used by native benthic invertebrates (clams, crustaceans, worms, etc) or by pelagic species that have less carbon available to them in the pelagic food web. Without data from the period prior to the onset of culturing in the Estero it is not possible to establish the impact of the removal of carbon from the pelagic system. It is safe to say that given the possible native clams that could have lived in the area that none could reach the biomass or filtering capacity of the Pacific Oyster as it is presently cultured. The result of culturing bivalves in systems such as Drakes Estero is that there is a shift in the carbon from the pelagic food web to the benthic food web and as I describe below we would also expect a shift in organic matter and nutrients to the bed. The pelagic to benthic shift can result in quite dramatic losses in the pelagic communities (zooplankton and fish) as has been seen with some exotic bivalve introductions (Zebra Mussel, Asian clam).

What are the trade-offs of ecological services provided by non-native oysters in Drakes Estero.

Oysters provide habitat for epibenthic flora and fauna and may increase the biodiversity of this group of benthic organisms. In natural systems, oysters can help clarify the

water column by trapping sediment within the hummocks of oysters and by the filter-feeding process of the oysters. This increase in clarity can be considered a benefit to some species but not all – for example this is not a benefit to prey organisms who are no longer hidden from visual predators. The increase in water clarity in combination with the accumulation of nutrients and organic matter on the bottom may also increase the biomass of benthic primary producers (Newell 2004). This will in general encourage a new group of benthic invertebrates that we would not usually live in high numbers in this energetic environment (snails and deposit feeding clams and worms are likely to benefit from this new food source.)

What are effects of the oyster operations (bags, racks, boats etc) on the nutrient and organic matter cycling in the Estero?

Racks and bags change the local hydrodynamics and therefore change the accretion and erosion of sediments in and around the structures. Groups of racks both inside and outside of eelgrass beds will reduce water velocities and there will be a net increase in the sedimentation rates around and under the structures. If there are many racks separated by open spaces we would expect to see the opposite pattern with water velocity increasing in areas between the structures. The areas between racks will therefore have less accreted organic and inorganic (sediment) matter and are likely to experience higher disturbance of the sediment surface than the areas under the racks.

Aquaculture racks and bags have been the focus of many studies looking at the accumulation and integration of feces into the sediment below and around the structures (Cranford et al. 2003, Porter et al. 2004). If the mass is high, bacterial reduction of the organics can reduce the oxygen content of the sediment (Newell 2004, Newell et al. 2002)). The sediment will become enriched and the sediment grain size may be reduced as the fecal pellets become incorporated into the sediment. This type of fecal pellet sequestration to the sediment and microbial action on the sediment is likely to be most extreme under bags that lay on the sediment surface and therefore present a barrier to re-suspension and aeration of the sediment surface.

Are the effects reversible?

Many of these changes will revert to an equilibrium condition. If the sediment grain size is markedly changed and the fecal pellets mixed down into the sediment, then it might take years for the sediment surface to rebound once the culture structures are removed. I would expect invertebrate communities to respond rather quickly to the removal of racks and bags given the reported presence of an invertebrate community between the structures.

What are effects of the oyster operations (bags, racks, boats etc) on the actual and potential presence and spread of non-native invasive species?

This is the one effect which is not likely to be reversible. There are no examples of extirpating aquatic exotic animals once they have spread in a system. The chance of

introducing exotics on spat and equipment is worrisome. The presence of hard structures such as racks supplies a habitat for epifauna that might be less likely to successfully invade this system. The long history of exotic species introductions with cultured oysters (Cohen and Carlton 1995) and introduction of a feather duster worm on cultured abalone in California and the resultant concerns that it will escape to the wild (Bower 2006) are good lessons in the potential for exotic species introductions aquaculture.

Sincerely,

Janet K. Thompson, Ph.D.
Research Ecologist

Literature Cited:

Bower, S.M. 2006. Synopsis of Infectious Diseases and Parasites of Commercially Exploited Shellfish: Sabellid Polychaete Infestation Disease in Abalone. **URL:** http://www-sci.pac.dfo-mpo.gc.ca/shelldis/pages/sabelab_e.htm

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Newell, R.I.E, J.C.Cornwell and M.S.Owens. 2002. Influence of simulated bivalve biodeposition and microphytobenthos on sediment nitrogen dynamics: a laboratory study. Limnol. Oceanogr. 47: 1367-1379.

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Items 8 and 9

Janet Thompson correspondence

Sarah Allen
05/10/2007 11:19 PST

To: jthompso@usgs.gov
cc:
Subject:

Many thanks for your answer to questions.

It did not go so well at the Supervisors Meeting, thoug, and they went ahead and sent a letter of support to Seanor Feinstein....I was accused of being a "big tobacco" scientist by one individual and another "scientist" accused me of misuse of data. He denied that Didenum could get established in Drakes Estero except on the oyster racks based on a conversation with the Woodshole scientist. Ben has pictures of it on the sandstone at Bull Point.

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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Janet K Thompson
<jthompso@usgs.gov>
05/07/2007 15:13 MST

To: Sarah_Allen@nps.gov
cc:
Subject: letter

Sarah
sorry it took so long - let me know if it is unclear - I did get clearance to write the letter but of course not to testify without jumping through legal hoops
good luck - let me know how it turns out
Jan

Janet Thompson
U.S. Geological Survey
345 Middlefield Rd. MS-496
Menlo Park, CA 94025
(650)329-4364
FAX (650)329-4327

jthompso@usgs.gov JThompson_drakes_estero.doc

IN REPLY REFER TO

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
Water Resources
National Research Program
Phone: (650) 329-4364 Fax: (650) 329-43
http://water.wr.usgs.gov/

MEMORANDUM

7 May 2006

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From: Janet K. Thompson, Research Ecologist

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Sincerely,

Janet K. Thompson, Ph.D.
Research Ecologist

Literature Cited:

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Newell, R. 2004. Ecosystem influences of natural and cultivated populations of suspension-feeding bivalves: a review. J. of Shellfisheries Research. 23:51-61

Newell, R.I.E, J.C.Cornwell and M.S.Owens. 2002. Influence of simulated bivalve biodeposition and microphytobenthos on sediment nitrogen dynamics: a laboratory study. Limnol. Oceanogr. 47: 1367-1379.

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Janet K Thompson
<jthompso@usgs.gov>

05/06/2007 21:21 MST

To: Sarah_Allen@nps.gov
cc:
Subject: its coming

Sarah
In case you are a night owl and fretting - you will get my writeup tomorrow morning. I have it written but need to make sure it makes sense (there's a thought!) and I need to check a couple of references that I didn't bring home with me. If you don't get it by 8:30AM or so, you will get it before noon (I have a meeting at 9) - I promise
cheers
Jan

Janet Thompson
U.S. Geological Survey
345 Middlefield Rd. MS-496
Menlo Park, CA 94025
(650)329-4364
FAX (650)329-4327
jthompso@usgs.gov

Sarah Allen
03/05/2007 14:25 PST

To: Janet K Thompson <jthompso@usgs.gov>
cc:
Subject: Re: phone call

Hi:

my number is below - I will gone too this week so maybe we can connect next week.

Thanks for trying!

Sarah

Sarah G. Allen, Ph.D.
Senior Science Advisor
National Park Service
Point Reyes National Seashore
One Bear Valley Road
Point Reyes Station, CA 94956
Phone 415-464-5187
Fax 415-464-5182
sarah_allen@nps.gov

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Janet K Thompson <jthompso@usgs.gov>

Janet K Thompson
<jthompso@usgs.gov>
03/05/2007 13:54 PST

To: sarah_allen@nps.gov
cc:
Subject: phone call

Sarah,
I have tried to return your call but I think I probably wrote your phone number (415-461-2319?) down incorrectly - I keep getting a busy signal. I will be on the ship for a couple of days and then available on thurs and friday before being gone for a week.

So if it is urgent you should try the end of this week
Jan

Janet Thompson
U.S. Geological Survey
345 Middlefield Rd. MS-496
Menlo Park, CA 94025
(650)329-4364
FAX (650)329-4327
jthompso@usgs.gov

SARA'S CELL 415-457-0871

SARA'S 8/2 COMMENTS ON SUZANNA'S DRAFT

With reference to your earlier FOIA requests, dated May 12 and May 13:

We plan to provide you with harbor seal data on one or more disks by August 13, 2007. The Park is currently in the process of preparing this data. Survey dataand associated metadata for the years 1996 to 2006 exist in one or more Park databases. This information must be checked before transmittal because the database(s) may contain information about Volunteers in Parks (VIPs) that is exempt from disclosure under FOIA exemption 6 (5 U.S.C. § 552(b)(6)), which permits an agency to withhold information about individuals in "personnel and medical files and similar files" when the disclosure of such information "would constitute a clearly unwarranted invasion of personal privacy." We do not perceive, nor have you enunciated any public interest that would be served in disclosing this information about VIPs which would outweigh the privacy interest of the subject individuals. We plan to remove this information about VIPs before transmitting this data to you, and the Park is in the process of preparing this data for release.

Prior to your FOIA requests, the databases for 1996 to 2006 did not consistently contain subsite information for Drakes Estero. FOIA does not require agencies to create records in order to respond to requests. Due to our discussions at the July 21 meeting, we have agreed as a courtesy to enter into a database subsite data, where available, for these prior years for Drakes Estero. It may be that this subsite data will not be available for some of the period from 1997 to 2006, but the Park will provide you with subsite data for
Drakes Estero for the years that it has. This data entry and error checking as per the National Park Service San Francisco Bay Area Data Management Plan (Press 2005)should be completed within the next week, and the Park will provide this subsite data on disk as well.

With regard to the data for 2007, the data collection season for 2007 has just ended as of July 31. As noted above, FOIA does not require agencies to create records in order to respond to requests. As was discussed at the July 21 meeting, we have agreed as a courtesy to expedite the data entry for 2007. This data entry and error checkingshould also be completed within the next week, and the Park will provide the 2007 data, including subsite data on Drakes Estero, on disk.

Primary data for years prior to 1996 is not contained in the records of the National Park Service. Consequently, we cannot provide this early primary data in response to your FOIA request. In our June 13, 2007 response, we have provided you with the reports in the possession of the National Park Service that address data for these prior years.

The National Park Service plans to have the data analysis for 2007 performed by an independent party, likely marine mammalogists from either the National Marine Fisheries Service or the Marine Mammal Commission, who are experts in this area. We expect this analysis to be completed within the next few months. We request that you refrain from publishing analysis based on this data until these experts have had an opportunity to perform their analyses. In addition, the scientist(s) at the Park who have supervised this data collection plan to publish in one or more scientific journals based on this primary data, and we request as a professional courtesy that you refrain from publishing in a scientific journal based on these data until the scientist(s) who were involved in the primary data collection have published in a scientific journal based on their work.

LOI response

2007-00453

Don Neubacher
06/04/2007 08:19 AM
PDT

To: Ann Nelson/PORE/NPS@NPS
cc:
Subject: FOIA Request

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Don Neubacher/PORE/NPS on 06/04/2007 08:19 AM -----

"Donna" <Donna@gstex.com>
06/04/2007 07:46 AM
MST

To: <Don_Neubacher@nps.gov>
cc: <Holly_Bundock@nps.gov>
Subject: FOIA Request

Dear Mr. Neubacher,

Enclosed is a FOIA request from the Alliance for Local Sustainable Agriculture.

Please respond to this email to indicate you have received it.

Sincerely,

Donna Yamagata
Secretary

ALSA
PO Box 1316
Pt. Reyes Station, CA 94956
415-669-9691

ALSAfoia#2.pdf

John DiGregoria
05/30/2007 04:59 PM PDT

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject: Lunny - Silage

Don,

I need a little guidance for the few paragraphs for the letter.

Who is the letter to?

Are we strictly focusing on silage?

Should I include language that they needed to cut in the unauthorized areas due to their overstocking and grazing down their authorized silage areas (190 acres)?

Any other tidbits I should include?

Will pull the paragraphs together tommorrow. I am out on Friday will be in all week next week.

I just talked with Helgen from Marin Organic. He thought I would be at the site inspection for Salmon Safe tommorrow. Wanted to know what issues we have with their operation. I gave him 4 points that Lunny's are out of compliance with their SUP:

Overstocking this winter (met AUMs in a little over 4 months.

Due to overstocking, grazed down their authorized silage areas so nothing left to cut.

They don't fix their fences

The pile of plastic in their feed lot is huge and the wind blows plastic pieces towards Drake's Estero and Abbott's Lagoon/Ocean (they don't keep the place clean).

John DiGregoria
Range Management Specialist
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956
(415) 464-5172

Dan Kent
<dan@salmonsafe.org>
04/05/2007 04:52 PM
MST

To: Don_Neubacher@nps.gov
cc:
Subject: Re: Photos

hi Don:

Thanks for the follow up. I'll look forward to receiving those photos and staying in touch.

best regards, Dan

.....

Dan Kent
Salmon-Safe
503.232.3750
503.232.3791 FAX
dan@salmonsafe.org
www.salmonsafe.org

On Apr 5, 2007, at 2:01 PM, Don_Neubacher@nps.gov wrote:

> Dan, thanks for a good conversation on your program. I can't find the photos and our range conservationist is gone to Monday. I will send them after he gets back early next week.
>
> Don
>
> ---
>
> Don Neubacher
> Superintendent
> Point Reyes National Seashore
> Point Reyes Station, CA 94956
>
> 415-464-5101 (office)
> 415-233-0303 (cell)
> 415-663-8132 (fax)
>
> The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Dan Kent
<dan@salmonsafe.org>
04/23/2007 01:44 PM
MST

To: Don_Neubacher@nps.gov
cc:
Subject: Re: Photos

hi Don:

I thought I'd check back in with you regarding those Lunny Ranch photos.

I'd also welcome any other info you might have that outlines NPS concerns with that particular grazing operation.

Thanks again,
Dan

On Apr 5, 2007, at 2:01 PM, Don_Neubacher@nps.gov wrote:

> Dan, thanks for a good conversation on your program. I can't find the
> photos and our range conservationist is gone to Monday. I will
> send them
> after he gets back early next week.
>
> Don
>
> _____
>
> Don Neubacher
> Superintendent
> Point Reyes National Seashore
> Point Reyes Station, CA 94956
>
> 415-464-5101 (office)
> 415-233-0303 (cell)
> 415-663-8132 (fax)
>
> The National Park Service cares for special places saved by the
> American
> people so that all may experience our heritage.
>

4001-00469

L1425
02-106

March 15, 2004

Mr. Tom Moore
California Department of Fish and Game
Marine Region Laboratory
P. O. Box 1560
Bodega Bay, CA 94923

Dear Tom:

We appreciated receiving a copy of the correspondence dated February 2, 2004, regarding Tom Johnson's interest in renewing his lease in Drakes Bay. As we discussed at our last meeting, we are enclosing copies of the legal opinions from our Solicitor's Office about the aquaculture activities of Tom Johnson for your perusal. We requested these opinions because of the complexity of the activities and ownership situation of the submerged lands in Drakes Estero.

As you know, Mr. Johnson is under a Marin County Superior Court Order that requires actions to improve the health and safety of his operation. In turn, he is now under a clean-up and abatement order from the California Coastal Commission. It seems prudent and in the best interest of the public to not entertain a renewal of his submerged lands until these problems are rectified with these two agencies.

After reading the legal opinions from our Solicitor's Office, we wish to have a meeting with you regarding how to proceed. At this time, we still believe Mr. Johnson will need a permit from the National Park Service to operate in Drakes Estero and additional environmental compliance may be necessary.

Again, we appreciate you working with us on this issue and we are prepared to work together to ensure the resources are protected in Drakes Estero. We look forward to hearing from you.

Sincerely,

Don L. Neubacher
Superintendent

Enclosures

DLNeubacher:an 3/15/04

United States Department of the Interior

IN REPLY REFER TO

OFFICE OF THE SOLICITOR
San Francisco Field Office
1111 Jackson Street, Suite 735
Oakland, California 94607

RECEIVED
Point Reyes
National Seashore
MAR 3 '04
SUPT.
ASST. SUPT.
SPEC. PK. USES
LAW ENFORCE.
RES./SCIENCE
RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
PERSONNEL
SUPPORT
CENTRAL FILES

MEMORANDUM

To: Superintendent
Point Reyes National Seashore

February 27, 2004

From: Field Solicitor
San Francisco Field Office

Re: Johnson Oyster Company Property Status

As requested, this office has reviewed the case file pertaining to the long standing non compliance by the Johnson Oyster Company (JOC) with the terms and conditions of its Reservation of Use and Occupancy. ("Reservation")

The Johnson Oyster Company is operating on National Park Service fee land in Point Reyes National Seashore under a 1972 Reservation in which Tom Johnson, as a condition of his sale to the Park Service, reserved the right to operate an oyster farm for 40 years until 2012[1]. For the last many years, the JOC has operated in violation of the agreed upon conditions contained in the Reservation. Some of this property and the adjoining Drakes Estero where the oysters are farmed are currently within designated "potential wilderness" Area 2 and will become "wilderness" upon cessation of JOC's operations. As soon as the property and waters are vacated, NPS would proceed with its conversion to wilderness preservation, as required by the Wilderness Act (16 U.S.C. 1131-1136), and more specifically the Point Reyes Wilderness Act of 1976. (PL 94-544, Oct.18, 1976)

"Potential wilderness" is an area which contains "lands that are surrounded by or adjacent to lands with the wilderness designation but that do not themselves qualify for immediate designation due to temporary, non-conforming, or incompatible conditions." National Park Service Management Policies 2001, Section 6.2.2.1. This designation imposes land management obligations on NPS in that the NPS's 2001 Management Policies direct that the Park seek to remove the non-conforming conditions that preclude wilderness designation.

The October 12, 1972, Charles W. Johnson (Tom Johnson's father) sold his five acres of property for $79,200.00 to the National Park Service. The Reservation

[1] In addition, the National Park Service has issued various special use permits to Mr. Johnson over the years.

retained for the "Vendor, its successors and assigns, a terminable right to use and occupy the ... property ... together with the improvements situated thereon, for a period of 40 years for the purpose of processing and selling wholesale and retail oysters, seafood and complimentary food items, the interpretation of oyster cultivation to the visiting public, and residential purposes reasonably incidental thereto...."

The right to engage in these activities, however, was made contingent upon the satisfaction of various conditions including maintaining the property in a "safe, sanitary, and sightly condition, open to reasonable inspection by the National Park Service, and meeting all Federal, State, and County health, sanitation, and safety standards applicable to operation of and residence within areas engaged in the processing and retail sale of oysters." In addition, the JOC was made responsible for utility services, including sanitation, not committing waste, and complying with all National Park Service rules and regulations. It also precluded constructing any temporary or permanent structures without the approval of the Park Service.

On December 5, 1995, the Superintendent, wrote JOC a letter describing a variety of violations of the conditions of the Reservation, i.e., operating a septic system, water system and buildings in violation of Marin County health and safety codes (Condition 1 of the Reservation); maintaining numerous buildings and trailers that were not authorized by NPS or permitted by Marin County (Condition 5); and erecting structures that were not authorized by NPS or permitted by Marin County (Condition 7).[2] Six months later, on April 10, 1996, the Superintendent sent JOC another letter explaining his noncompliance with the mobile home conditions imposed on JOC in the Reservation. [3]

To date JOC continues to violate the terms of the Reservation. In his most recent communication with Mr. Johnson on September 17, 2003, the Superintendent wrote a letter detailing JOC's continuous violations of the Reservation. The letter notes that required permits have not been obtained, a sewage system was not installed, and design and environmental compliance reviews have expired. The letter also describes other violations found during a recent inspection including water draining into the Estero from JOC's shucking room; the presence of overflowing oil and gas drums; inadequately contained above-ground fuel storage tanks; the careless presence of fuel containers, engines, refrigerators, and other items; operation of essentially a junkyard; and other health and safety violations.

Because JOC operates with major violations of the terms of the Reservation, well documented noncompliance JOC is clearly in breach of contract, which relieves the National Park Service of its obligation to permit JOC to remain on the property until

---

[2] The letter also described a variety of violations of the conditions of JOC's special use permits for the use of a water-well drilled on Seashore land, and also for parking facilities.

[3] Despite Mr. Johnson's continuous violation of both the terms of his agreements with the National Park Service and Marin County's regulations, the County sought to find a friendly solution that would avoid forcing Mr. Johnson off the property on which he operated JOC. Thus, on January 9, 1997, Marin County and Mr. Johnson entered into a Stipulated Agreement Between the Parties and Order ("Stipulated Agreement") detailing Mr. Johnson's maintenance obligations and specifying the consequences of noncompliance. Marin County Superior Court #165361.

2012.[4] Given the requirements of the Reservation and JOC's failure to satisfy them, the Park Service clearly has the authority to terminate the Reservation and to direct JOC to vacate the property on which it operates.

Removal of JOC from the Point Reyes National Seashore property and its oyster farming from the Estero, would allow the Service to begin the conversion of the area to wilderness status, which directive Congress charged the Park Service to accomplish.

Ralph G. Mihan

[4] In contrast to the Reservation , the Marin County Court approved Stipulated Agreement does specify consequences for failure to comply with its conditions. These consequences are cessation and removal of the offending activity.

United States Department of the Interior

IN REPLY REFER TO:

OFFICE OF THE SOLICITOR
San Francisco Field Office
1111 Jackson Street, Suite 735
Oakland, California 94607

February 26, 2004

To: Superintendent
Point Reyes National Seashore

From: Field Solicitor
San Francisco Field Office

Re: Point Reyes Wilderness Act

As requested, this memorandum opinion reviews the Point Reyes wilderness situation as it related to the Johnson Oyster Company 40-year Reservation of Use and Occupancy which expires in 2011, or might be terminated sooner for cause or other processes. The Wilderness Act of 1964, and the Point Reyes Wilderness Act of 1976, provide the guidance for implementation of wilderness within the Seashore and are the basis for NPS's obligations to manage the subject land and waters toward conversion of the potential wilderness areas to wilderness status.

In conjunction with the Seashore authorization Act of 1962, the State of California, by 1965 legislation (copy attached), conveyed to the United States all of the right, title and interest of the State in lands one-quarter mile seaward of the mean high tide. More precisely the State granted "all the tide and submerged lands or other lands beneath navigable waters situated within the boundaries of the Point Reyes National Seashore . . . " to the United States. Excepted from this grant and reserved to the State were the "right to fish upon, and all oil, gas and other hydrocarbons in the lands ... together with the right to explore or prospect . . . " within the tidal and submerged lands. However, these reserved rights were not to be "exercised in such manner as to cause ... unnecessary pollution of the coastal waters", and no "well or drilling operations of any kind shall be conducted upon the surface of such lands."

On October 18, 1976, the Point Reyes Wilderness Act designated 25,370 acres as wilderness, and 8003 acres as potential wilderness. Public Law 94-544, Oct. 18, 1976. The area designated as potential wilderness (2811 acres) for area 2 of three areas

included the waters of the Drakes Estero and the adjoining inter-tidal land and upon which Johnson Oyster Farm operates a commercial oyster business.[1] (map attached)

This Congressional designation of the wilderness and potential wilderness (see the House and Senate discussions of the legislation in the Congressional Record -copy attached) was made notwithstanding a September 8, 1976 letter written by John Kyl, Assistant Secretary of the Interior, to James A. Haley, Chairman of the Committee on Interior and Insular Affairs wherein he stated the Department's position on the Point Reyes Wilderness Act. While DOI was largely supportive of the Act, Mr. Kyl's letter said that the Department did not recommend the inclusion of the tidelands extending one-quarter mile offshore within the boundaries of Point Reyes, as granted by the State of California as potential wilderness. According to the Kyl's letter, the State's retention of mineral and fishing rights rendered this area "inconsistent with wilderness." This letter is the only record in the legislative history that raises this point in the area's wilderness and potential wilderness designation. After review of the 1965 State Act, the Wilderness Act, Point Reyes Wilderness Act, case law and present day NPS Directors' orders and Management Policies, it is the view of this office that the remarks in the Kyl letter are not only inaccurate but overridden by the Congressional action, as explained below.

The 1965 State Act is very limited in its two reservations of rights, i.e., public right to fish and severely restricted mineral exploration access, i.e., no surface disturbance of any kind. Both reservations would not conflict with the Secretary converting the potential water area and shore land wilderness acres into designated wilderness. Further, notwithstanding the Departments' letter, the Congress ultimately designated 25,370 wilderness and 8000 potential wilderness acres which exceeded the acreage recommended by the Administration. This reflects that Congress did not heed Mr. Kyl's recommendation and conclusions and enacted its preferred wilderness act.

Addressing the potential wilderness lands and water, the House Report 94-1680, accompanying the eventually enacted Bill (HR 8002) states that it was its intent that there be "efforts to steadily continue to remove all obstacles to the eventual conversion of these lands and waters to wilderness status." (copy attached) The designations are implemented by the Park Service's 2001 Management Policies on wilderness which state that "[I]n the process of determining suitability, lands will not be excluded solely because of existing rights or privileges (e.g., mineral exploration and development, *commercial*

---

1. It is noted that the State continues to issue to Johnson Oyster Company commercial allotments in Drakes Estero which seem to be in conflict with the 1965 State legislative grant and 1976 Congressional mandate to convert the bays of the Estero into wilderness status. On the other hand, the continued public fishing in the Estero is consistent with the State legislative grant and the conversion to wilderness status.

Further, since the United States owns the tide and submerged lands in Drakes Estero, it clearly follows that permission of NPS is appropriate for commercial activities taking place on those granted lands.

operations...")[2] Further, the Park Service's Management Policies clearly state that the Park Service must make decisions regarding the management of potential wilderness even though some activities may temporarily detract from its wilderness character. The Park Service is to manage potential wilderness as wilderness to the extent that existing non-conforming conditions allow. The Park Service is also required to actively seek to remove from potential wilderness the temporary, non-conforming conditions that preclude wilderness designation. 6.3.1. Wilderness Resource Management, General Policy. (selected excerpts attached)

Hence, the Park Service is mandated by the Wilderness Act, the Point Reyes Wilderness Act and its Management Policies to convert potential wilderness, i.e., the Johnson Oyster Company tract and the adjoining Estero, to wilderness status as soon as the non conforming use can be eliminated. [3]

Ralph G. Mihan

2. See the District Court ruling that past commercial activities, in this case timber harvesting, do not preclude an area's wilderness designation. Minnesota Public Interest Research Group v. Butz, 401 F. Supp. 1276, 1329 (1975)

3. The status of the Johnson Oyster Company will be addressed in a separate document.

6.1 General Statement

The National Park Service will manage wilderness areas for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness. Management will include the protection of these areas, the preservation of their wilderness character, and the gathering and dissemination of information regarding their use and enjoyment as wilderness. The public purpose of wilderness in the national parks includes the preservation of wilderness character and wilderness resources in an unimpaired condition, as well as for the purposes of recreational, scenic, scientific, education, conservation, and historical use.

The policies contained in this chapter are supplemented by Director's Order #41: Wilderness Preservation and Management; and by Reference Manual 4, which accompanies the Director's Order. Those documents should be referred to for more detailed information on the topics covered in this chapter.

6.2 Identification and Designation of the Wilderness Resource

The National Park Service will use the following wilderness study process to consider National Park Service areas for inclusion within the congressionally designated national wilderness preservation system.

6.2.1 Assessment of Wilderness Suitability or Non-suitability

All lands administered by the National Park Service, including new units or additions to existing units since 1964, will be evaluated for their suitability for inclusion within the national wilderness preservation system. Additionally, lands that were originally assessed as non-suitable for wilderness because of a non-conforming or incompatible uses must be re-evaluated if the non-conforming uses have been terminated or removed. A wilderness suitability assessment will consist of a brief memorandum, from the regional director to the Director, that makes a managerial determination as to the suitability of the park lands for wilderness designation. The assessment must be completed no later than one year after the establishment of the park or the acquisition of new lands.

For existing parks in which wilderness suitability determinations have never been undertaken, the superintendent must complete the suitability assessment within one year of the effective date of this edition of NPS Management Policies. Also, for parks with land originally determined to be unsuitable, but where a non-conforming use has been terminated or removed, a reevaluation must be conducted within one year of the time in which the non-conforming use is terminated or removed.

6.2.1.1 Primary Suitability Criteria

National Park Service lands will be considered suitable for wilderness if they are at least 5000 acres or of sufficient size to make practicable their preservation and use in an unimpaired condition, and if they possess the following characteristics (as identified in the Wilderness Act):

- The earth and its community of life are untrammeled by humans, where humans are visitors and do not remain;
- The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation;
- The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable;
- The area is protected and managed so as to preserve its natural conditions; and
- The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.

6.2.1.2 Additional Considerations in Determining Suitability

In addition to the primary suitability criteria, there are other considerations that should be taken into account in determining suitability:

- A wilderness area may contain significant ecological, geological, or other features of scientific, educational, scenic, or historical value, although it does not need these things to be considered suitable for wilderness designation.
- Lands that have been logged, farmed, grazed, mined, or @@otherwise utilized in ways not involving extensive development or alteration of the landscape may also be considered suitable for wilderness designation if, at the time of assessment, the effects of these activities are substantially unnoticeable or their wilderness character could be maintained or restored through appropriate management actions.
- An area will not be excluded from a determination of wilderness suitability solely because established or proposed management practices require the use of tools, equipment, or structures, if those practices are necessary to meet minimum requirements for the administration of the area as wilderness.
- In the process of determining wilderness suitability, lands will not be excluded solely because of existing rights or privileges (e.g., mineral exploration and development, commercial operations, agricultural development, grazing, or stock driveways). If the National Park Service determines that these lands possess wilderness character, they may be included in the suitability determination so that they can be considered for designation as wilderness or potential wilderness.
- Lands containing aboveground utility lines will normally not be considered as suitable for wilderness designation, but they can be considered as suitable for "potential" wilderness designation if there is a long-term intent to remove the lines. Although relocation outside wilderness is preferable, areas containing underground utility lines may be included if the area otherwise qualifies as wilderness and the maintenance of the utility line, including use of mechanized and motorized equipment, is administered under minimum requirement procedures identified in the park's wilderness management plan. No new utility lines may be installed in wilderness, and existing utility lines may not be extended or enlarged except as may be allowed pursuant to section 1106 of ANILCA (16 USC 1133(c)).

- Historic features that are primary attractions for park visitors will generally not be recommended as suitable for wilderness designation. However, an area that attracts visitors primarily for the enjoyment of solitude and unconfined recreation in a primitive setting may also contain cultural resource features and still be included in wilderness. Historic trails may serve and be maintained as part of the wilderness trail system, as identified and coordinated within an approved wilderness management plan and the park's cultural resource plan. Structures of historical significance need not be deleted from wilderness area proposals. A recommendation may be made to include a historic structure in wilderness if (1) the structure would be only a minor feature of the total wilderness proposal; and (2) the structure will remain in its historic state, without development.
- Overflights do not make an area unsuitable for wilderness designation. The nature and extent of any overflight impacts, and the extent to which the impacts can be mitigated, would need to be addressed in subsequent wilderness studies.

6.2.1.3 The Assessment Process

The Service will involve the public in the wilderness suitability assessment process through notification of its intentions to conduct the assessment and publication of its determination, either as "suitable" or as "nonsuitable" for further wilderness study. Notification will include the issuance of news releases to local and regional newspapers, and the publication of a final suitability determination in the Federal Register. The final determination of an area's suitability, or nonsuitability, as wilderness must be approved by the Director before publication of the final suitability determination in the Federal Register. For areas determined to be non-suitable for wilderness designation, the wilderness preservation provisions in the National Park Service Management Policies are no longer applicable.

6.2.2 Wilderness Studies

Lands and waters found to possess the characteristics and values of wilderness, as defined in the Wilderness Act and determined suitable pursuant to the wilderness suitability assessment, will be formally studied to develop the recommendation to Congress for wilderness designation. The National Park Service will continue to undertake wilderness studies of all lands that have been determined to be suitable as a result of the wilderness suitability assessment. Also, studies will be made of lands for which subsequent legislation directs that wilderness studies be completed.

Wilderness studies will be supported by appropriate documentation of compliance with NEPA and NHPA. The Council on Environmental Quality requires environmental impact statements for wilderness studies that will result in recommendations for designations (i.e., proposals for legislation to designate as wilderness).

6.2.2.1 Potential Wilderness

A wilderness study may identify lands that are surrounded by or adjacent to lands proposed for wilderness designation but that do not themselves qualify for immediate designation due to temporary, non-conforming, or incompatible conditions. The wilderness recommendation forwarded to the Congress by the President may identify these lands as "potential" wilderness for future designation as wilderness when the non-conforming use has been removed or eliminated. If so authorized by Congress, these potential wilderness areas will become designated wilderness upon the Secretary's determination, published in the Federal Register, that they have finally met the qualifications for designation by the cessation or termination of the non-conforming use.

6.2.2.2 Proposed Wilderness

The findings and conclusions of a formal wilderness study will be forwarded from the Director to the Department of the Interior (Assistant Secretary's Office) as "proposed" wilderness. The proposed wilderness recommendation will identify park lands that are being recommended for immediate wilderness designation, as well as any other lands identified as "potential" wilderness.

6.2.3 Recommended Wilderness

The Secretary of the Interior is responsible for recommending to the President those lands under his/her jurisdiction that qualify for inclusion within the national wilderness preservation system. The Secretary performs this function through the Assistant Secretary's Office by reviewing NPS proposed wilderness and either approving or revising the proposal. The final result is forwarded by the Secretary of the Interior to the President for his consideration. The President is then responsible for transmitting to both houses of Congress his recommendations with respect to wilderness designation. These recommendations must be accompanied by maps and boundary descriptions. The National Park Service will track the status in Congress of the wilderness designation process.

6.2.4 Designated Wilderness

After the President's formal transmittal of the Secretary's wilderness recommendation to the Congress, Congress considers the President's recommendation, and may subsequently enact the legislation needed to include the area within the national wilderness preservation system as "designated" and/or "potential" Wilderness. The National Park Service will assist the Department and Congress in this process as requested.

6.3 Wilderness Resource Management

6.3.1 General Policy

For the purposes of applying these policies, the term "wilderness" will include the categories of suitable, study, proposed, recommended, and designated wilderness. Potential wilderness may be a subset of any of these five categories. The policies apply regardless of category.

In addition to managing these areas for the preservation of the physical wilderness resources, planning for these areas must ensure that the wilderness character is likewise preserved. This policy will be applied to all planning documents affecting wilderness.

The National Park Service will take no action that would diminish the wilderness suitability of an area possessing wilderness characteristics until the legislative process of wilderness designation has been completed. Until that time, management decisions pertaining to lands qualifying as wilderness will be made in expectation of eventual wilderness designation. This policy also applies to potential wilderness, requiring it to be

managed as wilderness to the extent that existing non-conforming conditions allow. The National Park Service will seek to remove from potential wilderness the temporary, non-conforming conditions that preclude wilderness designation. All management decisions affecting wilderness will further apply the concepts of "minimum requirements" for the administration of the area regardless of wilderness category.

6.3.2 Responsibility

National Park Service responsibility for carrying out wilderness preservation mandates will be shared by the Director, regional directors, and superintendents of parks with suitable, study area, proposed, recommended, and designated wilderness. Interagency cooperation and coordination and training responsibilities will also be carried out at the Washington, D.C., region, and park levels. Specific wilderness management responsibilities will be assigned at each of these administrative levels to carry out these responsibilities effectively and to facilitate efforts establishing agency and interagency consistency in wilderness management techniques.

Superintendents will provide the information needed to prepare an annual wilderness report to Congress and to report to the Director on the status of wilderness management in the national park system. Based on this information, the Associate Director for Operations and Education will provide the Directorate with recommendations and advice to permanently establish a system of accountability, consistency, and continuity for National Park Service wilderness management.

6.3.3 Consistency

The National Park Service will seek to achieve consistency in wilderness management objectives, techniques, and practices on both an agency and an interagency basis. Accordingly, the National Park Service will seek to maintain effective intra-agency and interagency communications, and will encourage, sponsor, and participate in intra-agency and inter-agency training and workshops designed to promote the sharing of ideas, concerns, and techniques related to wilderness management. However, the need for interagency consistency will in no way diminish any established National Park Service wilderness standards and values.

6.3.4 Wilderness-related Planning and Environmental Compliance

Policies on wilderness planning and compliance include the following:

6.3.4.1 Zoning for Wilderness

When necessary, all categories of wilderness may be zoned for visitor experiences and resource conditions consistent with their wilderness values within the established management zoning system for each park. However, management zoning or other land use classifications cannot, and will not, diminish or reduce the maximum protection to be afforded lands with wilderness values. Transition zones adjacent to wilderness may be identified to help protect wilderness values, but no transitional or "buffer" zones are appropriate within wilderness boundaries.

6.3.4.2 Wilderness Management Planning

The superintendent of each park containing wilderness resources will develop and maintain a wilderness management plan or equivalent planning document to guide the preservation, management, and use of these resources. The wilderness management plan will identify desired future conditions, as well as establish indicators, standards, conditions, and thresholds beyond which management actions will be taken to reduce human impacts to wilderness resources.

The park's wilderness management plan may be developed as a separate document or as an action component of another planning document. Wilderness management plans will be supported by appropriate documentation of compliance with NEPA and NHPA. The plan will be developed with public involvement, and will contain specific, measurable management objectives that address the preservation and management of natural and cultural resources within wilderness as appropriate to achieve the purposes of the Wilderness Act and other legislative requirements.

(See Carrying Capacity 8.2.1)

6.3.4.3 Environmental Compliance

Proposals having the potential to impact wilderness resources will be evaluated in accordance with National Park Service procedures for implementing NEPA. Those procedures include the use of categorical exclusions, environmental assessments (EAs), and/or environmental impact statements (EISs). Administrative actions impacting wilderness must be addressed in either the EA or EIS accompanying the approved wilderness management plan, or as a separate environmental compliance document.

Managers contemplating the use of aircraft or other motorized equipment or mechanical transportation within wilderness must consider impacts to the character, esthetics, and traditions of wilderness before considering the costs and efficiency of the equipment.

In evaluating environmental impacts, the National Park Service will take into account wilderness characteristics and values, including the primeval character and influence of the wilderness; the preservation of natural conditions (including the lack of man-made noise); and assurances that there will be outstanding opportunities for solitude, that the public will be provided with a primitive and unconfined type of recreational experience, and that wilderness will be preserved and used in an unimpaired condition. Managers will be expected to appropriately address cultural resources management considerations in the development and review of environmental compliance documents impacting wilderness resources.

(Also see Director's Order #12: Conservation Planning and Environmental Impact Analysis)

6.3.5 Minimum Requirement

All management decisions affecting wilderness must be consistent with the minimum requirement concept. This concept is a documented process used to determine whether administrative activities affecting wilderness resources or the visitor experience are necessary, and how to minimize impacts. The minimum requirement concept will be applied as a two-step process that determines:

STAR, HARRIS, DON H. CLAUSEN, and SEIBERLING.

GENERAL LEAVE

Mr. WRIGHT. Mr. Speaker, I ask unanimous consent that all Members may have 5 legislative days in which to revise and extend their remarks in the RECORD on the bill just passed.

The SPEAKER. Is there objection to the request of the gentleman from Texas?

There was no objection.

ERECTION OF AMERICAN LEGION'S FREEDOM BELL

Mr. TAYLOR of North Carolina. Mr. Speaker, I ask unanimous consent for the immediate consideration of the Senate joint resolution (S.J. Res. 181) to authorize the erection of the American Legion's Freedom Bell on lands of the park system of the District of Columbia, and for other purposes.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

There was no objection.

The Clerk read the Senate joint resolution, as follows:

S.J. RES. 181

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the American Legion is authorized to erect on lands of the park system of the District of Columbia and its environs on lands owned by the United States and to present to the Congress of the United States on behalf of the children of America, the American Legion's Freedom Bell, in honor of the Bicentennial celebration of the signing of the Declaration of Independence.

SEC. 2. All plans for the choice of the site and the placement of the freedom bell pursuant to the first section of this bill are subject to (1) the approval of the Secretary of the Interior, the Commission on Fine Arts, and the National Capital Planning Commission, and (2) the placement of the bell is begun within five years after the date of enactment of this Act.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

Mr. SEBELIUS. Mr. Speaker, reserving the right to object, will the gentleman tell us how this differs from House Joint Resolution 915 which was passed on this subject on September 20?

Mr. TAYLOR of North Carolina. If the gentleman will yield, the House and Senate joint resolutions are similar in intent. There is a slight wording difference in the two measures. The Senate resolution would provide that the bell would be placed on park system lands in the District of Columbia or its environs. The House-passed measure would have authorized the consideration of its placement on any federally owned lands in this same area. We have consulted with the officials of the American Legion who have offered to donate this bell to the United States and they concur that the Senate resolution would still permit the Secretary and the American Legion to find a suitable place in or near the Nation's Capitol for the placement of this bell.

Mr. SEBELIUS. I thank the gentleman.

I withdraw my reservation of objection.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

There was no objection.

The Senate joint resolution was ordered to be read a third time, was read the third time, and passed.

A motion to reconsider was laid on the table.

DESIGNATING CERTAIN LANDS IN POINT REYES NATIONAL SEASHORE AS WILDERNESS

Mr. TAYLOR of North Carolina. Mr. Speaker, I ask unanimous consent for the immediate consideration of the bill (H.R. 8002) to designate certain lands in the Point Reyes National Seashore, Calif., as wilderness, to designate Point Reyes National Seashore as a natural area of the national park system, and for other purposes.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

Mr. SEBELIUS. Mr. Speaker, reserving the right to object, I just would like to ask the gentleman from North Carolina to give us the details in this bill.

Mr. TAYLOR of North Carolina. Mr. Speaker, will the gentleman yield?

Mr. SEBELIUS. I yield to the gentleman from North Carolina.

Mr. TAYLOR of North Carolina. Mr. Speaker, this bill, H.R. 8002, would designate some 25,370 acres of federally owned land within this national seashore as wilderness. An additional 8,003 acres would be classified as potential wilderness additions. This is a wilderness designation which has been recommended by the President to the Congress and which has the support of a wide variety of local and national organizations.

Mr. Speaker, I want to commend the gentleman from California (Mr. JOHN L. BURTON) who represents the area and has done an outstanding job in bringing the various groups together and getting a compromise bill which has almost unanimous support.

Mr. Speaker, the bill does two other things. It names the Environmental Education Center within the seashore after the late Congressman Clem Miller, who was instrumental in establishing this unit of the national park system. The bill also contains additional strengthening language to the original act to insure that the continued management of this national seashore will continue to fully protect its natural and scenic values.

Mr. SEBELIUS. Mr. Speaker, further reserving the right to object, I would like to ask the gentleman from North Carolina, what is the cost of this measure?

Mr. TAYLOR of North Carolina. Mr. Speaker, if the gentleman will yield further, this is already federally owned land. There is no cost.

Mr. SEBELIUS. Mr. Speaker, I support this bill which will designate certain lands as wilderness in the Point Reyes National Seashore in California. This bill represents basic agreement by all parties, including conservation organizations and the administration. It is a great asset to be able to have a wilderness area of this size and purity so close to San Francisco and the very highly developed bay area. This contrast provides all the more reason to assure that this wilderness is protected and managed in as pure a condition as possible—completely free from the evidences of any works or mechanisms of civilization. The National Park Service has assured us that the area to be designated as wilderness is now completely free of any development or manmade facilities. Enactment of this legislation will assure the retention of that condition. It will also probably soon become a challenge to the National Park Service, in its management of this area under terms of the Wilderness Act, to assure the retention of solitude within the wilderness. This might soon necessarily lead to some form of rationing of use.

For those who desire an outdoor experience of less primitive nature, there remains the balance of the Point Reyes National Seashore, and the adjacent Golden Gate National Recreation Area, the latter of which is somewhat toward the farther end of the spectrum in design for providing a more development-assisted form of outdoor recreation.

In recognition of this broad spectrum of outdoor recreation opportunities in this local area, this legislation also amends the 1962 authorizing legislation for Point Reyes by reinforcing a commitment to the preservation of natural values. As a consequence of this change, the National Park Service administrative management categorization of this area as a "recreational" area is expected to change to "natural" area. With that type of adjustment, along with the somewhat more recreational orientation of the nearby Golden Gate National Recreational Area, and at the other extreme the wilderness designation of part of Point Reyes itself, a wide spectrum of differing types of outdoor recreation use opportunities will be provided. This is a most desirable end product, as nearly every reasonable degree of outdoor recreation pursuit can likely be accommodated within these National Park Service managed areas.

Mr. Speaker, I believe this is a good bill which should be adopted by this body, and I urge my colleagues to vote for it.

Mr. DON H. CLAUSEN. Mr. Speaker, will the gentleman yield?

Mr. SEBELIUS. I yield to the gentleman from California (Mr. DON H. CLAUSEN).

Mr. DON H. CLAUSEN. Mr. Speaker, I rise in support of the legislation and to convey to the committee my appreciation for their efforts in bringing this bill out.

I have had a chance to work with the gentleman from California (Mr. JOHN L. BURTON) who provided the work on this legislation. It used to be that I had Marin County and Point Reyes Seashore in my

district. I think we have the kind of bill that is acceptable to all.

Mr. JOHN L. BURTON. Mr. Speaker, will the gentleman yield?

Mr. SEBELIUS. I yield to the gentleman from California (Mr. JOHN L. BURTON).

Mr. JOHN L. BURTON. Mr. Speaker, I rise in strong support of this measure.

Mr. Speaker, I wish to thank the gentleman from North Carolina (Mr. TAYLOR) and the other members of the committee for their handling of this bill in a manner that is responsive both to the interests of the people of the country and to the concerns of the residents of the local communities in my district who are the immediate neighbors of Point Reyes National Seashore.

The local people agree that the lands and waters which this bill would designate as wilderness be so protected, and thus remain roadless. At the same time they want assurance that wilderness designation will not prevent the use of such mechanized equipment as may be necessary from time to time to maintain the fire trails so that they are passable for fire-fighting equipment as required in the event of fire.

Fire can be a danger at Point Reyes during certain months and is a cause of special concern this year. There has already been one fire there this year when there is a drought in this part of the west coast.

The committee also has properly made clear, and it is my understanding, that mechanized equipment is to be used on these designated fire trails only as absolutely required as the "minimum tool" that is available to the National Park Service management.

Again, I thank the chairman and the members of the committee.

Mr. SEBELIUS. Mr. Speaker, I withdraw my reservation of objection.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

There was no objection.

The SPEAKER. The Clerk will report the committee amendment.

The Clerk read as follows:

Committee amendments: Page 1, beginning on line 3, strike out all after the enacting clause and insert in lieu thereof the following:

That, in furtherance of the purposes of the Point Reyes National Seashore Act (76 Stat. 538; 16 U.S.C. 459c), and of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1131-36), and in accordance with section 3(c) of the Wilderness Act, the following lands within the Point Reyes National Seashore are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act: those lands comprising twenty-five thousand three hundred and seventy acres, and potential wilderness additions comprising eight thousand and three acres, depicted on a map entitled "Wilderness Plan, Point Reyes National Seashore", numbered 612-90,000-2 and dated September 1978 to be known as the Point Reyes wilderness.

SEC. 2. As soon as practicable after this Act takes effect, the Secretary of the Interior shall file a map of the wilderness area and a description of its boundaries with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such map and descriptions shall have the same force and effect as if included in this Act: *Provided, however,* That correction of clerical and typographical errors in such map and descriptions may be made.

SEC. 3. The area designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture, shall be deemed to be a reference to the Secretary of the Interior.

SEC. 4. (a) Amend the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), as follows:

In section 6(a) insert immediately after the words "shall be administered by the Secretary" the words "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration and preservation of the natural environment within the area.".

(b) Add the following new section 7 and redesignate the existing section 7 as section 8:

SEC. 7. The Secretary shall designate the principal environmental education center within the Seashore as "The Clem Miller Environmental Education Center," in commemoration of the vision and leadership which the late Representative Clem Miller gave to the creation and protection of Point Reyes National Seashore.

Mr. TAYLOR of North Carolina (during the reading). Mr. Speaker, I ask unanimous consent that the committee amendment be considered as read and printed in the RECORD.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

There was no objection.

The committee amendment was agreed to.

The bill was ordered to be engrossed and read a third time, was read the third time, and passed.

The title was amended so as to read: "A bill to designate certain lands in the Point Reyes National Seashore, California, as wilderness, amending the act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), and for other purposes.".

A motion to reconsider was laid on the table.

PROVIDING FOR INCREASES IN APPROPRIATION CEILINGS AND BOUNDARY CHANGES IN CERTAIN UNITS OF THE NATIONAL PARK SYSTEM

Mr. TAYLOR of North Carolina. Mr. Speaker, I ask unanimous consent to take from the Speaker's table the bill (H.R. 13713) to provide for increases in appropriation ceilings and boundary changes in certain units of the national park system, and for other purposes, with Senate amendments thereto, and consider the Senate amendments in the House.

The Clerk read the title of the bill.

The Clerk read the Senate amendments, as follows:

(1) Page 2, line 16, strike out "$3,120,000" and insert: "$3,462,000"

(2) Page 3, line 13, strike out "$145,000" and insert: "$165,000";

(3) Page 3, after line 15, insert:

(12) Canyonlands National Park, Utah: section 8 of the Act of September 12, 1964 (78 Stat. 934) as amended (85 Stat. 421) is further amended by changing $16,000 to $104,500; and

(4) Page 3, after line 13, insert:

(13) Padre Island National Seashore, Texas: section 8 of the Act of September 28, 1962 (76 Stat. 650) is amended by changing $5,000,000 to $5,350,000.

(5) Page 4, line 18, strike out "and".

(6) Page 4, line 21, strike out "$3,850,000" and insert: "$3,950,000";

(7) Page 4, after line 21, insert:

(9) Channel Islands National Monument, California: paragraph (1) of section 201 of the Act of October 26, 1974 (88 Stat. 1445, 1446), is amended by changing "$2,930,000" to "$5,452,000"; and

(8) Page 4, after line 21, insert:

(10) Nez Perce National Historical Park, Idaho: section 7 of the Act of May 15, 1965 (79 Stat. 119) is amended by changing "$1,237,000" to "$4,100,000".

(9) Page 4, strike out all after line 22 over to and including line 19 on part 6 and insert:

SEC. 201. The Act of September 21, 1965 (79 Stat. 824), as amended, providing for the establishment of the Assateague Island National Seashore in the States of Maryland and Virginia, is further amended—

(a) by deleting section 7 in its entirety and substituting in lieu thereof the following:

"SEC. 7. The Secretary is authorized to undertake, in consultation with other interested Federal, State, local, and private agencies and interests, the development of a comprehensive plan for the lands and waters adjacent or related to the seashore, the use of which could reasonably be expected to influence the administration, use, and environmental quality of the seashore. Such plan shall set forth the most feasible and prudent methods for providing solid waste disposal, wetlands management, development of visitor facilities, and other land uses all in a manner compatible with the preservation of the seashore. The Secretary may revise the plan from time to time, and he shall encourage Federal, State, local, and private agencies and interests to be guided thereby. Notwithstanding any other provision of law, no Federal loan, grant license, or other form of assistance for any project which, in the opinion of the Secretary, would significantly affect the administration, use, and environmental quality of the seashore shall be made, issued, or approved by the head of any Federal agency without the concurrence of the Secretary unless such project is consistent with the plan developed pursuant to this section.";

(b) by deleting section 9 in its entirety and by renumbering accordingly.

(10) Page 8, line 6, strike out "151-91,001-B, and dated May 1978," and insert: "151-91,001-C, and dated July 1978,".

(11) Page 9, after line 19, insert:

SEC. 308. (a) The Appomattox Court House National Historical Park shall hereafter comprise the area depicted on the map entitled "Boundary Map, Appomattox Court House National Historical Park", numbered 340-20,000, and dated November 1973, which is on file and available for public inspection in the offices of the National Park Service, Department of the Interior. The Secretary of the Interior (hereinafter referred to as the "Secretary") may revise the boundaries of the park from time to time by publication of a revised map or other bound

velopment. Determined to make the most of this opportunity and to search for common ground, the United States outlined a broad program of practical initiatives which would be of benefit to both developing and developed countries. The participants in this historic meeting responded positively to the U.S. approach, adopting a consensus resolution which embraced most of our proposals. This session demonstrated that the UN can help to advance America's fundamental interests when we exercise leadership in the organization.

An international conference of great importance to the United States was the World Conference of the International Women's Year in Mexico City. This meeting, which grew out of a 1974 U.S. initiative, marked the first time that the problems of women had been the subject of such a major international conference. With some exceptions the conference recorded a number of major achievements. The United States made significant contributions to the World Plan of Action which was adopted at the conference, thus setting in motion a program that will gradually help the world to realize the full rights and potential of half of its people.

At my direction in November 1975, Secretary of State Kissinger sent a letter to the Director General of the International Labor Organization announcing our intention to withdraw from that organization in 1977 unless reforms are made before then. We cited four special areas of concern: erosion of tripartite representation; selective concern for human rights; disregard of due process; and increasing politicization of a technical agency. We took this step only after the most careful deliberation and, as we have stated, we will make every effort to promote conditions that could permit us to continue to participate in the organization.

The 30th session of the General Assembly was marked both by cooperation and contention. Many economic and social issues were debated, resulting in resolutions adopted by consensus. But political differences arose among the members over such issues as Korea, the Middle East, human rights and decolonization. Among other actions, a resolution equating Zionism with Racism was adopted over strong United States opposition. We view this resolution as a fundamental distortion of the truth and, as a result of its adoption, announced that we would not participate in the activities of the Decade for Action to Combat Racism and Racial Discrimination.

These are but a few of the important events in the United Nations during the past year. Much of the work of the United Nations is unknown because it is not regularly reported through the news media. The economic, social and technical coordination work of the United Nations, which account for more than 90 percent of its total resources, include such important activities as:

—Maintaining international aviation safety standards;
—Helping to prevent the spread of nuclear weapons;
—Working to combat illicit drug production and trafficking;
—Improving health conditions and standards worldwide and combating disease and plague;
—Setting improved international standards for the environment;
—Improving international food standards and preventing plant and animal disease from crossing borders;
—Providing economic development and technical assistance to the poorer nations of the world; and
—Providing food assistance and disaster relief.

As the world's strongest economic power with the greatest global reach, the United States derives many tangible benefits from these United Nations activities, many of which resulted from American initiative and leadership.

Despite difficulties inherent in working within an organization of so many sovereign states having differing interests and backgrounds, I believe that we are making progress in achieving our purposes in the United Nations. The United States is working actively to defend its interests, to oppose irresponsible actions and to promote cooperation among UN members in fulfillment of the great purposes of the Charter which we helped to frame.

As the world grows increasingly complex and interdependent, I conclude that United States leadership and participation in the United Nations serves our interests and hopes for realizing mankind's aspirations for a world of peace, economic progress and social justice.

GERALD R. FORD.

THE WHITE HOUSE, October 1, 1976.

THIRTY-THREE NEW DEFERRALS—MESSAGE FROM THE PRESIDENT

The PRESIDING OFFICER laid before the Senate the following message from the President of the United States, which was referred jointly, pursuant to the order of January 30, 1975, to the Committees on Appropriations, the Budget, Agriculture and Forestry, Commerce, Armed Services, Labor and Public Welfare, Finance, the Judiciary, Interior and Insular Affairs, and Government Operations:

To the Congress of the United States:

In accordance with the Impoundment Control Act of 1974, I herewith report 33 deferrals of funds totalling $751.7 million. The deferrals are primarily routine in nature and do not, for the most part, affect program levels. The details of each deferral are contained in the attached reports.

GERALD R. FORD.

THE WHITE HOUSE, October 1, 1976.

ELIZABETH KEE FEDERAL BUILDING

Mr. ROBERT C. BYRD. Mr. President, I ask that the Chair lay before the Senate a message from the House of Representatives on H.R. 15552.

The PRESIDING OFFICER laid before the Senate H.R. 15552, an act to name the Federal office building in Bluefield, W. V00033002 NPS-PWR-B04-00005-000001 Page 13 of 166 Va., as the "Elizabeth Kee Federal Building," which was read twice by its title.

The PRESIDING OFFICER. Without objection, the Senate will proceed to its consideration.

There being no objection, the Senate proceeded to consider the bill.

The bill was considered, ordered to a third reading, read the third time, and passed.

SENATOR DENNIS CHAVEZ FEDERAL BUILDING

Mr. ROBERT C. BYRD. Mr. President, I ask unanimous consent that the Chair lay before the Senate a message from the House of Representatives on H.R. 4206.

The PRESIDING OFFICER laid before the Senate H.R. 4206, an act to designate the new Federal building in Albuquerque, N. Mex., as the "Senator Dennis Chavez Federal Building," which was read twice by its title.

The PRESIDING OFFICER. Without objection, the Senate will proceed to its consideration.

The bill was considered, ordered to a third reading, read the third time, and passed.

POINT REYES NATIONAL SEASHORE, CALIF.

Mr. ROBERT C. BYRD. Mr. President, I ask that the Chair lay before the Senate a message from the House of Representatives on H.R. 8002.

The PRESIDING OFFICER laid before the Senate H.R. 8002, an act to designate certain lands in the Point Reyes National Seashore, Calif., as wilderness, amending the act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), and for other purposes, which was read twice by its title.

The PRESIDING OFFICER. Without objection, the Senate will proceed to its consideration.

The bill was considered, ordered to a third reading, read the third time, and passed.

UNANIMOUS-CONSENT REQUEST—NOMINATION

Mr. ROBERT C. BYRD. Mr. President, I ask unanimous consent that the Senate go into executive session to consider the nomination of Richard M. Bilby of Arizona to be U.S. circuit judge for the ninth circuit.

Mr. DURKIN. I object.

The PRESIDING OFFICER. Objection is heard.

Several Senators addressed the Chair.

Mr. LONG. Mr. President, I ask if we could clear Calendar No. 408, which is H.R. 9401, to continue the temporary suspension of duty on certain horses.

Mr. ROBERT C. BYRD. Mr. President, I ask unanimous consent that the Chair protect my rights to the floor while the Senator proceeds.

The PRESIDING OFFICER. Without objection, the Senator's rights are protected.

The Senator from Louisiana may proceed.

H.R. 15136. An act to authorize appropriations for construction of facilities on Guam, and for other purposes.

H.R. 15276. An act to amend the District of Columbia Police and Firemen's Salary Act of 1958 to provide for the same cost-of-living adjustments in the basic compensation of officers and members of the United States Park Police force as are given to Federal employees under the General Schedule and to require submittal of a report on the feasibility and desirability of codifying the laws relating to the United States Park Police force.

H.R. 15445. An act to study and provide enhanced protection for whales, and for other purposes.

H.R. 15546. An act to designate the "Ray J. Madden Post Office Building".

H.R. 15582. An act to name the Federal office building in Bluefield, West Virginia, the "Elizabeth Kee Federal Building".

H.R. 15813. An act to amend the Act of June 3, 1976, relating to the Commission on Security and Cooperation in Europe.

H.J. Res. 1008. Joint resolution authorizing the President to proclaim the week beginning October 3, 1976, and ending October 9, 1976, as "National Volunteer Firemen Week".

H.J. Res. 1105. Joint resolution making continuing appropriations for the fiscal year 1977, and for other purposes.

H.J. Res. 1118. Joint resolution to provide that qualified individuals may hear and determine claims for benefits under title IV of the Federal Coal Mine Health and Safety Act of 1969, and to provide for appeal to superior agency authority from any such determination.

The enrolled bills and joint resolutions were signed on October 6, 1976, by the Acting President pro tempore (Mr. METCALF).

On October 7, 1976, a message stating that the Speaker had signed the following enrolled bills and joint resolutions:

S. 22. An act for the general revision of the Copyright Law, title 17 of the United States Code, and for other purposes.

S. 85. An act to provide for the recognition of the States of Alaska and Hawaii at the Lincoln National Memorial, and for other purposes.

S. 400. An act to authorize the study of certain areas by the Secretaries of Agriculture and the Interior.

S. 720. An act to direct the Secretary of the Interior to convey for fair market value, certain lands to Valley County, Idaho.

S. 865. An act to amend the Public Buildings Act of 1959 in order to preserve buildings of historical or architectural significance through their use for Federal public building purposes, and to amend the act of August 12, 1968, relating to the accessibility of certain buildings to the physically handicapped.

S. 909. An act to designate the Federal office building located in Dover, Del., as the "J. Allen Frear Building".

S. 1026. An act to designate certain lands as wilderness.

S. 1365. An act to authorize the Secretary of the Interior to convey to the city of Haines, Alaska, interests of the United States in certain lands.

S. 1660. An act to provide for the disposition of funds appropriated to pay a judgment in favor of the Grand River Band of Ottawa Indians in Indian Claims Commission docket numbered 40-K, and for other purposes.

S. 2081. An act to provide for furthering the conservation, protection, and enhancement of the Nation's agricultural resources for sustained use, and for other purposes.

S. 2112. An act to amend the National Trails Systems Act (82 Stat. 919), and for other purposes.

S. 2278. An act The Civil Rights Attorney's Fees Awards Act of 1976.

S. 2398. An act to authorize the establishment of the Eugene O'Neill National Historic Site, to provide for a cooperative agreement in the operation of the Cherokee Strip Living Museum and for other purposes.

S. 2798. An act to eliminate a restriction on use of certain lands conveyed to the city of Yakutat, Alaska.

S. 2923. An act to amend title 28 of the United States Code to provide that full-time United States magistrates shall receive the same compensation as full-time referees in bankruptcy and to adjust the salary of part-time magistrates.

S. 3131. An act to amend the Rail Passenger Service Act to provide financing for the National Railroad Passenger Corporation, to amend the Regional Rail Reorganization Act of 1973 to increase the amount of loan authority under section 211(h)(1) of such Act, and for other purposes.

S. 3441. An act to authorize the Architect of the Capitol to perform certain work on and maintain the historical sections of the Congressional Cemetery and to study and formulate proposals for renovation and permanent maintenance of such sections by the United States.

S. 3556. An act for the relief of Marciano Santiago and his wife Eleanor L. Santiago.

S. 3557. An act to authorize the obligation and expenditure of funds to implement for fiscal year 1977 the provisions of the Treaty of Friendship and Cooperation between the United States and Spain, signed at Madrid on January 24, 1976, and for other purposes.

S. 3621. An act to amend the International Claims Settlement Act of 1949 to provide for the determination of the validity and amounts of claims of nationals of the United States against the German Democratic Republic.

S. 3667. An act for the relief of Song Chan Ki.

S. 3682. An act for the relief of Doctor Oscar J. Briseno.

S. 3783. An act for the relief of Doctor Juan Bautista Lopez Ruiz.

S. 3894. An act to amend the Federal Water Pollution Control Act, as amended.

H.R. 1142. An act to amend the Internal Revenue Code of 1954 to provide for a distribution deduction for certain cemetery perpetual care funds, to modify the effective dates of certain provisions of the Tax Reform Act of 1976, and for other purposes.

H.R. 1144. An act to amend the Internal Revenue Code of 1954 with respect to the tax treatment of social clubs and certain other membership organizations, to provide for a study of tax incentives for recycling, and for other purposes.

H.R. 5682. An act to extend the boundary of the Tinicum National Environmental Center, and for other purposes.

H.R. 7228. An act to amend the Internal Revenue Code of 1954 to permit the authorization of means other than stamp on containers of distilled spirits as evidence of tax payment, to provide an extension of certain provisions relating to members of the Armed Forces missing in action, and for other purposes.

H.R. 9719. An act to provide for certain payments to be made to local governments by the Secretary of the Interior based upon the amount of certain public lands within the boundaries of such locality.

H.R. 10101. An act to amend the Internal Revenue Code of 1954 to exempt certain aircraft museums from Federal fuel taxes and the Federal tax on the use of civil aircraft, and for other purposes.

H.R. 10[illegible] An act [illegible] the position of Under Secretary of Agriculture to Deputy Secretary of Agriculture; to provide for an additional Assistant Secretary of Agriculture; to increase the compensation of certain officials of the Department of Agriculture; to provide for an additional member of the Board of Directors, Commodity Credit Corporation; and for other purposes.

H.R. 10710. An act to require States to extend unemployment compensation coverage to certain previously uncovered workers; to increase the amount of the wages subject to the Federal unemployment tax; to increase the rate of such tax; and for other purposes.

H.R. 11303. An act to designate the "Herman T. Schneebeli Federal Building."

H.R. 12033. An act to continue until the close of June 30, 1979, the existing suspension of duties on manganese ore (including ferruginous ore) and related products.

H.R. 12207. An act to amend the Rural Electrification Act of 1936, as amended, to correct unintended inequities in the interest rate criteria for borrowers from the Rural Electrification Administration, and to make other technical amendments.

H.R. 12930. An act to amend certain laws affecting personnel of the Coast Guard, and for other purposes.

H.R. 12961. An act to amend the Social Security Act to repeal the requirement that a State plan for medical assistance under title XIX of such act include a provision giving consent of the State to certain suits brought with respect to payment for inpatient hospital services.

H.R. 13160. An act to designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes.

H.R. 13367. An act to extend and amend the State and Local Fiscal Assistance Act of 1972, and for other purposes.

H.R. 13955. An act to provide for amendment of the Bretton Woods Agreements Act, and for other purposes.

H.R. 14041. An act to amend the Railroad Retirement Act of 1974 with respect to the computation of annuity amounts in certain cases, and for other purposes.

H.R. 14227. An act to direct the Secretary of Agriculture to release a condition with respect to certain real property conveyed by the United States to the board of regents of the universities and State colleges of Arizona for the use of the University of Arizona.

H.R. 14535. An act to amend the Immigration and Nationality Act, and for other purposes.

H.R. 14956. An act to designate the "Joe Evins Post Office and Federal Building."

H.R. 15531. An act to p[illegible] the use [illegible] unsworn declaration under [illegible] jury as evidence in Federal [illegible]

H.R. 15571. An act to amend [illegible] of the Internal Revenue Code [illegible] title II of the Social Security Act [illegible] that the payment of social se[illegible] by a nonprofit organization with [illegible] its employees shall constitute (for [illegible] and benefit purposes) a construc[illegible] by such organization of the certific[illegible] wise required to provide social secur[illegible] erage for such employees if it has [illegible] ceived a refund or credit of such taxe[illegible] to require the filing of such a certific[illegible] any nonprofit organization which paid taxes but received a refund or credit [illegible] it had not previously filed such certi[illegible]

H.J. Res. 957. Joint Resolution [illegible] ing the acceptance of the Joint Com[illegible] on the Library on behalf of [illegible] from the U.S. Capitol Historical Soci[illegible] preliminary design sketches and [illegible] murals, in the first floor corridors House wing of the Capitol, and for purposes.

H.J. Res. 1107. Joint Resolution to [illegible]

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that committee on the following dates had examined and found truly enrolled bills and joint resolutions of the House of the following titles, which were thereupon signed by the Speaker:

On October 5, 1976:

H.R. 1073. An act to extend the provisions of title XII of the Merchant Marine Act, 1936, relating to war risk insurance, for an additional 3 years, ending September 7, 1979;

H.R. 1244. An act to establish procedures and regulations for certain protective services provided by the United States Secret Service;

H.R. 1607. An act to amend title 18 and title 39 of the United States Code to make parallel the exemption from lottery prohibitions granted to newspapers and to radio and television;

H.R. 2177. An act to exempt from duty certain aircraft components and materials installed in aircraft previously exported from the United States where the aircraft is returned without having been advanced in value or improved in condition while abroad;

H.R. 2749. An act to name a portion of the site of the Anthony J. Celebrezze Federal Building in Cleveland, Ohio, the "George Washington Square";

H.R. 3377. An act for the relief of Mrs. Helen Wolski, Michael Wolski, and Steven Wolski;

H.R. 3605. An act to amend section 5051 of the Internal Revenue Code of 1954 (relating to the Federal excise tax on beer);

H.R. 4206. An act to designate the new Federal building in Albuquerque, N. Mex., as the "Senator Dennis Chavez Federal Building";

H.R. 7929. An act relating to the deduction of interest on certain corporate indebtedness to acquire stock or assets of another corporation;

H.R. 8002. An act to designate certain lands in the Point Reyes National Seashore, California, as wilderness, amending the act of September 13, 1963 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), and for other purposes;

H.R. 8027. An act for the relief of Comdr. Stanley W. Birch, Jr.;

H.R. 9543. An act for the relief of Rupert Anthony Grant;

H.R. 10073. An act to provide for the mandatory inspection of domesticated rabbits slaughtered for human food, and for other purposes;

H.R. 10826. An act to amend the act establishing a code of law for the District of Columbia to prohibit the unauthorized use of a motor vehicle obtained under a written rental or other agreement;

H.R. 11337. An act to amend title 13, United States Code, to provide for a mid-decade census of population, and for other purposes;

H.R. 11347. An act to authorize conveyance of the interest of the United States in certain lands in Salt Lake County, Utah, to Shriners' Hospitals for Crippled Children, a Colorado corporation;

H.R. 11458. An act to amend the act establishing the Indiana Dunes National Lakeshore to provide for the expansion of the lakeshore, and for other purposes;

H.R. 11809. An act for the relief of Ljudevit Previc;

H.R. 11991. An act to authorize the establishment of the Congaree Swamp National Monument in the State of South Carolina, and for other purposes.

H.R. 12797. An act for the relief of Barry Ray Leftwich Diblin;

H.R. 12927. An act to designate a Federal building and U.S. post office in Jasper Ga., as the "Phil M. Landrum Federal Building and Post Office"

H.R. 13218. An act to permit the steam-

H.R. 13326. An act to extend until November 1, 1983, the existing exemption of the steamship *Delta Queen* from certain vessel laws;

H.R. 13417. An act for the relief of Dae Ho Park and Maria Park;

H.R. 13585. An act to amend the Federal Boat Safety Act of 1971;

H.R. 13615. An act to amend the Central Intelligence Agency Retirement Act of 1964 for Certain Employees, as amended, and for other purposes;

H.R. 13904. An act for the relief of Jeanette Green, as mother of the minor child, Ricky Baker, deceased, and as widow and administratrix of the estate of Enoch Odell Baker, deceased; and for the relief of Mary Jane Baker Nolan, individually, and as widow and administratrix, of the estate of John William Baker, deceased;

H.R. 14451. An act to amend the Federal Property and Administrative Services Act of 1949 to permit the donation of Federal surplus personal property to the States and local organizations for public purposes, and for other purposes;

H.R. 14470. An act for the relief of Raul Eduardo Ringle;

H.R. 14503. An act to name the new post office in Youngstown, Ohio, the "Michael J. Kirwan Post Office";

H.R. 14773. An act to amend title 10, United States Code, to make certain changes in the Survivor Benefit Plan provided for under subchapter II of chapter 73 of title 10, United States Code, and for other purposes;

H.R. 14886. An act to revise the appropriation authorization for the Presidential Transition Act of 1963, and for other purposes;

H.R. 14977. An act to name the Federal office building in Athens, Georgia, the "Robert O. Stephens, Jr. Federal Building";

H.R. 15059. An act to amend the Emergency Livestock Credit Act of 1974;

H.R. 15130. An act to authorize appropriations for construction of facilities on Guam, and for other purposes;

H.R. 15276. An act to amend the District of Columbia Police and Firemen's Salary Act of 1958 to provide for the same cost-of-living adjustments in the basic compensation of officers and members of the United States Park police force as are given to Federal employees under the General Schedule and to require submittal of a report on the feasibility and desirability of codifying the laws relating to the United States Park Police force;

H.R. 15445. An act to study and provide enhanced protection for whales, and for other purposes;

H.R. 15546. An act to designate the "Ray J. Madden Post Office Building";

H.R. 15582. An act to name the Federal office building in Bluefield, W. Va., the "Elizabeth Kee Federal Building";

H.R. 15813. An act to amend the Act of June 3, 1976, relating to the Commission on Security and Cooperation in Europe;

H.J. Res. 1003. Joint resolution authorizing the President to proclaim the week beginning October 3, 1976, and ending October 9, 1976, as "National Volunteer Firemen Week";

H.J. Res. 1105. Joint resolution making continuing appropriations for the fiscal year 1977, and for other purposes; and

H.J. Res. 1118. Joint resolution to provide that qualified individuals may hear and determine claims for benefits under title IV of the Federal Coal Mine Health and Safety Act of 1969, and to provide for appeal to superior agency authority from any such determination.

On October 6, 1976:

H.R. 1142. An act to amend the Internal Revenue Code of 1954 to provide for a distribution deduction for certain cemetery perpetual care funds, to modify the effective dates of certain provision of the Tax Reform Act of 1976, and for other purposes;

tax treatment of social clubs and certain other membership organizations, to provide for a study of tax incentives for recycling, and for other purposes;

H.R. 9719. An act to provide for certain payments to be made to local governments by the Secretary of the Interior based upon the amount of certain public lands within the boundaries of such locality;

H.R. 10133. An act to upgrade the position of Under Secretary of Agriculture to Deputy Secretary of Agriculture; to provide for an additional Assistant Secretary of Agriculture; to increase the compensation of certain officials of the Department of Agriculture; to provide for an additional member of the Board of Directors, Commodity Credit Corporation; and for other purposes;

H.R. 11309. An act to designate the "Herman T. Schneebeli Federal Building";

H.R. 12093. An act to continue until the close of June 30 1979, the existing suspension of duties on manganese ore (including ferruginous ore) and related products;

H.R. 12207. An act to amend the Rural Electrification Act of 1936, as amended, to correct unintended inequities in the interest rate criteria for borrowers from the Rural Electrification Administration, and to make other technical amendments;

H.R. 12939. An act to amend certain laws affecting personnel of the Coast Guard, and for other purposes;

H.R. 12961. An act to amend the Social Security Act to repeal the requirement that a State's plan for medical assistance under title XIX of such act include a provision giving consent of the State to certain suits brought with respect to payment for inpatient hospital services;

H.R. 13935. An act to provide for amendment of the Bretton Woods Agreements Act, and for other purposes;

H.R. 14041. An act to amend the Railroad Retirement Act of 1974 with respect to the computation of annuity amounts in certain cases, and for other purposes;

H.R. 14227. An act to direct the Secretary of Agriculture to release a condition with respect to certain real property conveyed by the United States to the board of regents of the universities and State colleges of Arizona for the use of the University of Arizona;

H.R. 14356. An act to designate the "Joe L. Evins Post Office and Federal Building;

H.R. 15531. An act to permit the use of unsworn declaration under penalty of perjury as evidence in Federal proceedings;

H.J. Res. 967. Joint resolution authorizing the acceptance of the Joint Committee on the Library on behalf of the Congress, from the United States Capitol Historical Society of preliminary design sketches and funds for murals, in the first floor corridors in the House wing of the Capitol, and for other purposes;

H.J. Res. 1107. Joint resolution to provide for the printing and distribution of the Precedents of the House of Representatives compiled and prepared by Lewis Deschler and

H.J. Res. 1119. Joint resolution to provide for the convening of the first session of the 95th Congress.

On October 7, 1976:

H.R. 5682. An act to extend the boundaries of the Tinicum National Environmental Center, and for other purposes;

H.R. 7228. An act to amend the Internal Revenue Code of 1954 to permit the authorization of means other than stamp on containers of distilled spirits as evidence of payment, to provide an extension of certain provisions relating to members of the Armed Forces missing in action, and for other purposes;

H.R. 10101. An act to amend the Internal Revenue Code of 1954 to exempt certain

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the Federal tax on the use of civil aircraft, and for other purposes;

H.R. 10210. An act to require States to extend unemployment compensation coverage to certain previously uncovered workers; to increase the amount of the wages subject to the Federal unemployment tax; to increase the rate of such tax; and for other purposes;

H.R. 13160. An act to designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes,

H.R. 13367. An act to extend and amend the State and Local Fiscal Assistance Act of 1972, and for other purposes,

H.R. 14535 An act to amend the Immigration and Nationality Act, and for other purposes and

H.R. 15571. An Act to amend chapter 21 of the Internal Revenue Code of 1954 and title II of the Social Security Act to provide that the payment of social security taxes by a nonprofit organization with respect to its employees shall constitute (for both tax and benefit purposes) a constructive filing by such organization of the certificate otherwise required to provide social security coverage for such employees if it has not received a refund or credit of such taxes, and to require the filing of such a certificate by any nonprofit organization which paid such taxes but received a refund or credit because it had not previously filed such certificate

On October 8, 1976:

H.R. 71. An act to amend title 38, United States Code, to provide hospital and medical care to certain members of the armed forces of nations allied or associated with the United States in World War I or World War II;

H.R. 2735. An act to amend title 38, United States Code, to improve the quality of hospital care, medical services, and nursing home care in Veterans' Administration health care facilities; to make certain technical and conforming amendments, and for other purposes;

H.R. 9460. An act to provide for the establishment of constitutions for the Virgin Islands and Guam:

H.R. 10187. An act to amend title 14, United States Code, to provide for the nondiscriminatory appointment of cadets to the United States Coast Guard Academy;

H.R. 11315. An act to define the jurisdiction of U.S. courts in suits against foreign states, the circumstances in which foreign states are immune from suit and in which execution may not be levied on their property, and for other purposes;

H.R. 12572. An act to amend the U.S. Grain Standards Act to improve the grain inspection and weighing system, and for other purposes;

H.R. 13500. An act to amend the Social Security Act with respect to food stamp purchases by welfare recipients.

H.R. 13713. An act to provide for increases in appropriation ceilings and boundary changes in certain units of the National Park System, and for other purposes;

H.R. 13828. An act to amend title 44, United States Code, to strengthen the authority of the Administrator of General Services with respect to records management by Federal agencies, and for other purposes, and

H.R. 15363. An act to amend the Act of July 9, 1963 (79 Stat. 213, 16 U.S.C. 4601-17(c)), and for other purposes.

BILLS AND JOINT RESOLUTIONS PRESENTED TO THE PRESIDENT AFTER SINE DIE ADJOURNMENT

Mr. THOMPSON, from the Committee on House Administration, reported that that committee did on the following dates present to the President, for his approval, bills and joint resolutions of the House of the following titles:

On October 1976:

H.R. 7108. An act to authorize appropriations for environmental research, development, and demonstration,

H.R. 5546. An act to amend the Public Health Service Act to revise and extend the programs of assistance under title VII for training in the health and allied health professions, to revise the National Health Service Corps program and the National Health Service Corps scholarship training program, and for other purposes,

H.R. 4654. An act for the relief of Day's Sportswear, Inc.;

H.R. 12118. An act to amend the Independent Safety Board Act of 1974 to authorize additional appropriations and for other purposes; and

H.R. 15248. An act to amend the Service Contract Act of 1965 to provide that all employees, other than bona fide executive, administrative, or professional employees, shall be considered to be service employees for purposes of such Act, and for other purposes.

On October 8, 1976:

H.R. 1073. An act to extend the provisions of title XII of the Merchant Marine Act, 1936, relating to war risk insurance, for an additional 3 years, ending September 7, 1978;

H.R. 1244. An act to establish procedures and regulations for certain protective services provided by the U.S. Secret Service;

H.R. 1607. An act to amend title 18 and title 39 of the United States Code to make parallel the exemption from lottery prohibitions granted to newspapers and to radio and television;

H.R. 2177. An act to exempt from duty certain aircraft components and materials installed in aircraft previously exported from the United States where the aircraft is returned without having been advanced in value or improved in condition while abroad.

H.R. 2749. An act to name a portion of the site of the Anthony J. Celebrezze Federal Building in Cleveland, Ohio, the "George Washington Square";

H.R. 3377. An act for the relief of Mrs. Helen Wolski, Michael Wolski, and Steven Wolski;

H.R. 3605 An act to amend section 5051 of the Internal Revenue Code of 1954 (relating to the Federal excise tax on beer);

H.R. 4206. An act to designate the new Federal building in Albuquerque, New Mexico, as the "Senator Dennis Chavez Federal Building";

H.R. 7929. An act relating to the deduction of interest on certain corporate indebtedness to acquire stock or assets of another corporation;

H.R. 8002 An act to designate certain lands in the Point Reyes National Seashore, California, as wilderness, amending the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), and for other purposes;

H.R. 8027 An act for the relief of Commander Stanley W. Birch, Jr.;

H.R. 9543. An act for the relief of Rupert Anthony Grant;

H.R. 10073 An act to provide for the mandatory inspection of domesticated rabbits slaughtered for human food, and for other purposes;

H.R. 10328. An act to amend the Act establishing a code of law for the District of Columbia to prohibit the unauthorized use of a motor vehicle obtained under a written rental or other agreement;

H.R. 11337. An act to amend title 13, United States Code, to provide for a mid-decade census of population, and for other purposes;

H.R. 11347. An act to authorize conveyance of the interest of the United States in certain lands in Salt Lake County, Utah, to Shriners' Hospitals for Crippled Children, a Colorado corporation;

H.R. 11455. An act to amend the Act establishing the Indian Dunes National Lakeshore to provide for the expansion of the lakeshore and for other purposes.

H.R. 11809. An act for the relief of Ljudevit Previc;

H.R. 11891. An act to authorize the establishment of the Congaree Swamp National Monument in the State of South Carolina, and for other purposes.

H.R. 12707. An act for the relief of Harry Ray Leftwich Dibling;

H.R. 12827 An act to designate a Federal building and U.S. Post Office in Jasper, Ga., as the "Phil M. Landrum Federal Building and Post Office";

H.R. 13218 An act to permit the steamship *United States* to be used as a floating hotel and for other purposes;

H.R. 13326. An act to extend until November 1, 1983, the existing exemption of the steamboat *Delta Queen* from certain vessel laws;

H.R. 13417. An act for the relief of Dae Ho Park and Maria Park;

H.R. 13585. An act to amend the Federal Boat Safety Act of 1971;

H.R. 13615. An act to amend the Central Intelligence Agency Retirement Act of 1964 for Certain Employees, as amended, and for other purposes;

H.R. 13964. An act for the relief of Jeanette Green, as mother of the minor child, Ricky Baker, deceased, and as widow and administratrix of the estate of Enoch Odell Baker, deceased; and for the relief of Mary Jane Baker Nolan, individually, and as widow and administratrix, of the estate of John William Baker, deceased;

H.R. 14451. An act to amend the Federal Property and Administrative Services Act of 1949 to permit the donation of Federal surplus personal property to the States and local organizations for public purposes, and for other purposes;

H.R. 14470. An act for the relief of Raul Eduardo Ringle;

H.R. 14503. An act to name the new post office in Youngstown, Ohio, the "Michael J. Kirwan Post Office";

H.R. 14773. An act to amend title 10, United States Code, to make certain changes in the survivor benefit plan provided for under subchapter II of chapter 73 of title 10, United States Code, and for other purposes;

H.R. 14886 An act to revise the appropriations authorization for the Presidential Transition Act of 1963, and for other purposes;

H.R. 14977. An act to name the Federal office building in Athens, Ga., the "Robert G. Stephens, Jr. Federal Building";

H.R. 15050 An act to amend the Emergency Livestock Credit Act of 1974;

H.R. 15136. An act to authorize appropriations for construction of facilities on Guam and for other purposes;

H.R. 15276. An act to amend the District of Columbia Police and Firemen's Salary Act of 1958 to provide for the same cost-of-living adjustments in the basic compensation of officers and members of the United States Park Police force as are given to Federal employees under the General Schedule and to require submittal of a report on the feasibility and desirability of codifying the law relating to the U.S. Park Police force;

H.R. 15445. An act to study and provide enhanced protection for whales, and for other purposes.

H.R. 15546. An act to designate the "Ray Madden Post Office Building";

H.R. 15592. An act to name the Federal office building in Bluefield, W. Va., the Elizabeth Kee Federal Building";

H.R. 15813. An act to amend the act of June 3, 1976, relating to the Commission on Security and Cooperation in Europe.

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for Certain Employees, as amended, and for other purposes;

H R 13964 An act for the relief of Jeanette Green, as mother of the minor child, Ricky Baker, deceased, and as widow and administratrix of the estate of Enoch Odell Baker, deceased; and for the relief of Mary Jane Baker Nolan, individually, and as widow and administratrix, of the estate of John William Baker, deceased;

H R 14227 An act to direct the Secretary of Agriculture to release a condition with respect to certain real property conveyed by the United States to the board of regents of the universities and State colleges of Arizona for the use of the University of Arizona;

H.R 14451. An act to amend the Federal Property and Administrative Services Act of 1949 to permit the donation of Federal surplus personal property to the States and local organizations for public purposes, and for other purposes;

H R 15276. An act to amend the District of Columbia Police and Firemen's Salary Act of 1953 to provide for the same cost-of-living adjustments in the basic compensation of officers and members of the U.S. Park Police force as are given to Federal employees under the General Schedule and to require submittal of a report on the feasibility and desirability of codifying the laws relating to the U.S Park Police force;

H.R. 15445 An act to study and provide enhanced protection for whales, and for other purposes; and

H.R. 15813. An act to amend the Act of June 3, 1976, relating to the Commission on Security and Cooperation in Europe.

On October 18, 1976:

H J. Res. 1107. Joint resolution to provide for the printing and distribution of the Precedents of the House of Representatives compiled and prepared by Lewis Deschler.

H.R. 5682. An act to extend the boundary of the Tinicum National Environmental Center, and for other purposes;

H.R. 8002. An act to designate certain lands in the Point Reyes National Seashore Calif., as wilderness, amending the Act of September 13, 1962 (76 Stat. 538), as amended (16 U S.C. 459c-6a), and for other purposes.

H R 13455. An act to amend the act establishing the Indiana Dunes National Lakeshore to provide for the expansion of the lakeshore, and for other purposes;

H.R. 11891. An act to authorize the establishment of the Congaree Swamp National Monument in the State of South Carolina, and for other purposes;

H R. 12939. An act to amend certain laws affecting personnel of the Coast Guard, and for other purposes;

H R. 12961. An act to amend the Social Security Act to repeal the requirement that a State's plan for medical assistance under title XIX of such act include a provision giving consent of the State to certain suits brought with respect to payment for inpatient hospital services;

H.R. 14041. An act to amend the Railroad Retirement Act of 1974 with respect to the computation of annuity amounts in certain cases, and for other purposes; and

H R. 15531. An act to permit the use of unsworn declarations under penalty of perjury as evidence in Federal proceedings.

On October 19, 1976:

H R. 10133. An act to upgrade the position of Under Secretary of Agriculture to Deputy Secretary of Agriculture; to provide for an additional Assistant Secretary of Agriculture; to increase the compensation of certain officials of the Department of Agriculture; to provide for an additional member of the Board of Directors, Commodity Credit Corporation; and for other purposes;

H R 12032 An act to continue until the close of June 30, 1979, the existing suspension of duties on manganese ore (including ment of the Bretton Woods Agreements Act, and for other purposes; and

H R. 15571. An act to amend chapter 21 of the Internal Revenue Code of 1954 and title II of the Social Security Act to provide that the payment of social security taxes by a nonprofit organization with respect to its employees shall constitute (for both tax and benefit purposes) a constructive filing by such organization of the certificate otherwise required to provide social security coverage for such employees if it has not received a refund or credit of such taxes, and to require the filing of such a certificate by any nonprofit organization which paid such taxes but received a refund or credit because it had not previously filed such certificate.

On October 20, 1976:

H.R. 1144. An act to amend the Internal Revenue Code of 1954 with respect to the tax treatment of social clubs and certain other membership organizations, to provide for a study of tax incentives for recycling, and for other purposes;

H.R. 7228. An act to amend the Internal Revenue Code of 1954 to permit the authorization of means other than stamp on containers of distilled spirits as evidence of tax payment, to provide an extension of certain provisions relating to members of the Armed Forces missing in action, and for other purposes;

H.R. 9719. An act to provide for certain payments to be made to local governments by the Secretary of the Interior based upon the amount of certain public lands within the boundaries of such locality;

H.R. 10210. An act to require States to extend unemployment compensation coverage to certain previously uncovered workers; to increase the amount of the wages subject to the Federal unemployment tax; to increase the rate of such tax; and for other purposes;

H.R. 12207. An act to amend the Rural Electrification Act of 1936, as amended, to correct unintended inequities in the interest rate criteria for borrowers from the Rural Electrification Administration, and to make other technical amendments;

H.R. 13160. An act to designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes, and

H.R. 14535. An act to amend the Immigration and Nationality Act, and for other purposes.

On October 21, 1976:

H.R. 2736. An act to amend title 38, United States Code, to improve the quality of hospital care, medical services, and nursing home care in Veterans' Administration health care facilities, to make certain technical and conforming amendments; and for other purposes;

H.R. 9460. An act to provide for the establishment of constitutions for the Virgin Islands and Guam;

H R. 10192. An act to amend title 14, United States Code, to provide for the nondiscriminatory appointment of cadets to the United States Coast Guard Academy;

H.R. 11315. An act to define the jurisdiction of United States courts in suits against foreign states, the circumstances in which foreign states are immune from suit and in which execution may not be levied on their property, and for other purposes;

H.R. 12572. An act to amend the United States Grain Standards Act to improve the grain inspection and weighing system, and for other purposes;

H.R. 13500. An act to amend the Social Security Act with respect to food stamp purchases by welfare recipients;

H R. 13713. An act to provide for increases in appropriations for [illegible] of the National

H.R. 13828. An act to amend title 44, United States Code, to strengthen the authority of the Administrator of General Services with respect to records management by Federal agencies, and for other purposes; and

H R 15563. An act to amend the act of July 9, 1965 (79 Stat. 213; 16 U.S.C. 4601-17 (c)), and for other purposes.

BILLS DISAPPROVED AFTER SINE DIE ADJOURNMENT

The President announced his disapproval of the following bills with memorandums of disapproval as follows:

H.R. 4654

MEMORANDUM OF DISAPPROVAL

I have withheld my approval from H.R. 4654, a bill "For the relief of Day Sportswear, Incorporated."

H.R. 4654 appears to relate to the same claim as presented in *B. A. McKenzie and Co., Inc.* v. *United States*, United States Customs Court #74-8-01520. Another known similar claim on behalf of another importer is pending in the case of *George S Bush and Co., Inc.* v. *United States*, United States Customs Court #73-9-02693.

The United States Government presently defending these two cases are the United States Customs Court is expected to rule. Briefly, the litigation involves the applicability of certain customs duties.

I believe that the courts should be permitted to rule in these cases in due course. I am also concerned that my approval of H.R. 4654 could inappropriately predispose the court's ruling. Further, H.R. 4654 would constitute preferred treatment of one importer against others having similar claims against the Government.

Finally, I believe that private relief legislation is appropriate only after other avenues of available administrative and legal recourse have been pursued.

For these reasons, I have withheld approval from H.R. 4654.

H.R. 5446

MEMORANDUM OF DISAPPROVAL

I am today withholding my signature from H.R. 5446, a bill to implement the United States obligations under the Convention on the International Regulations for Preventing Collisions at Sea, 197

The bill includes a provision which I believe to be unconstitutional. It would empower either the House of Representatives or the Senate to block amendments to the Convention's regulations merely by passing a resolution of disapproval.

This provision is incompatible with the express provision in the Constitution that a resolution having the force and effect of law must be presented to the President and, if disapproved, repassed by a two-thirds majority in the Senate and the House of Representatives. It extends the Congress the power to prohibit specific transactions authorized by law without changing the law—and without following the constitutional process that such a change would require. Moreover, it would involve the Congress directly in the performance of Executive functions in violation of the fundamental principle

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H.R. 8002—To designate certain lands in the Point Reyes National Seashore, Calif., as wilderness, to designate Point Reyes National Seashore as a natural area of the National Park System, and for other purposes.

Committee on Interior and Insular Affairs. Reported with amendment (H. Rept. 94-1680), 32703.—Amended and passed House. Title amended, 33621.—Passed Senate, 34576.—Examined and signed, 35079, 35379.—Presented to the President, 35380.—Approved [Public Law 94-544], 35383.

H.R. 8027—For the relief of Comdr. Stanley W. Birch, Jr.

Committee on the Judiciary. Reported (S. Rept. 94-1361), 33331.—Passed Senate, 34446.—Examined and signed, 35079, 35379.—Presented to the President, 35380.—Approved [Private Law 94-121], 35382.

H.R. 8046—To amend the Internal Revenue Code of 1954 to provide that the rental value of a parsonage furnished to the surviving spouse of a minister shall be excluded from gross income.

Committee on Ways and Means. Reported with amendment (H. Rept. 94-1358), 23549.—Debated, 27450.—Rules suspended. Amended and passed House, 27492.—Referred to Committee on Finance, 27590.—Reported with amendment (S. Rept. 94-1320), 33007.

H.R. 8065—For the relief of Carmela Scudieri.

Committee on the Judiciary. Reported with amendment (H. Rept. 94-906), 6563.—Passed over, 9523.—Passed House, 12311.—Referred to Committee on the Judiciary, 12682.

H.R. 8069—Making appropriations for the Departments of Labor, and Health, Education, and Welfare, and related agencies, for the fiscal year ending June 30, 1976 and the period ending September 30, 1976, and for other purposes.

House overrode Presidential veto, 1025, 1026.—Senate overrode Presidential veto, 1315, 1318.

H.R. 8089—To amend section 404(d) of title 37, United States Code, relating to per diem expenses of members of the uniformed services traveling on official business.

Committee on Armed Services. Reported with amendment (S. Rept. 94-715), 8336.—Amended and passed Senate, 8747.—House concurs in Senate Amendment, 14272.—Examined and signed, 14457, 14544.—Presented to the President, 14554.—Approved [Public Law 94-298], 16197.

H.R. 8092—To extend the authorization for appropriations to carry out the Endangered Species Act of 1973.

Committee on Merchant Marine and Fisheries. Reported with amendment (H. Rept. 94-837), 6170.—Rules suspended. Amended and passed House, 6400.—Referred to Committee on Commerce, 8568.

H.R. 8115—For the relief of Chin-Ho An.

Committee on the Judiciary. Reported (H. Rept. 94-1522), 31422.—Passed House, 33014.—Referred to Committee on the Judiciary, 33273.

H.R. 8119—For the relief of Fernando Alves Macos.

Committee on the Judiciary. Reported with amendment (H. Rept. 94-907), 6563.—Amended and passed House, 9524.—Referred to Committee on the Judiciary, 9733.—Reported with amendment (S. Rept. 94-1291), 31781.—Amended and passed Senate, 32366.—House concurs in Senate amendments, 33017.—Examined and signed, 33293, 33760.—Presented to the President, 33760.—Approved [Private Law 94-121], 35382.

H.R. 8125—To amend section 5701(a)(2) of the Internal Revenue Code of 1954 so as to change the bracket tax on cigars to an ad valorem tax.

Committee on Ways and Means. Reported with amendment (H. Rept. 94-1262), 17809.—Debated, 19668.—Failed of passage under suspension of the rules, 19707.

H.R. 8228—To amend the Federal Aviation Act of 1958 relating to emergency locator transmitters, and for other purposes.

Committee on Public Works and Transportation. Reported with amendment (H. Rept. 94-820), 3068.—Rules suspended. Amended and passed House, 3279.—Referred to Committee on Commerce, 3494.—Passed Senate. Title amended (in lieu of S. 910), 30429.—House concurred in Senate amendment with an amendment, 34222.—Senate concurs in House amendment with an amendment, 34593.

H.R. 8235—To authorize appropriations for the construction of certain highways in accordance with title 23 of the United States Code, and for other purposes.

Amended and passed Senate (in lieu of S. 2711), 4.—Senate insisted on its amendments and asked for a conference. Conferees appointed, 4.—House disagreed to Senate amendment and agreed to a conference. Conferees appointed, 286.—Conference report (H. Rept. 94-1017) submitted in House and agreed to, 9943, 10611.—Conference report (H. Rept. 94-741) submitted in Senate and agreed to, 10023, 10742.—Made special order (H. Res. 1141), 10573.—Examined and signed, 11115, 11132.—Presented to the President, 11115.—Approved [Public Law 94-280], 13362.

H.R. 8283—To amend the Internal Revenue Code of 1954 with respect to the type of flavors which may be used on bonded wine cellar premises in the production of special natural wines.

Committee on Ways and Means. Reported with amendment (H. Rept. 94-1072), 11943.—Amended and passed House, 13753.—Referred to Committee on Finance, 14123.—Reported (S. Rept. 94-1182), 23092.

H.R. 8401—To authorize cooperative arrangements with private enterprise for the provision of facilities for the production and enrichment of uranium enriched in the isotope 235, to provide for authorization of contract authority therefor, and for other purposes.

Reported with amendment (H. Rept. 94-1151), 14032.—Made special order H. Res. 1242, 18265.—Debated, 24341, 24750, 25423.—Amended and passed House. Title amended, 25425.—Ordered placed on the calendar, 26007.—Placed under Subjects on the Table, 33221.—Motion to consider bill tabled, 33315, 33227.

H.R. 8410—To amend the Packers and Stockyards Act of 1921, as amended, and for other purposes.

Committee on Agriculture. Reported with amendment (H. Rept. 94-1043), 10912.—Made special order (H. Res. 1165), 11634.—Debated, 12241.—Amended and passed House, 12885.—Referred to Committee on Agriculture and Forestry, 13139.—Reported with amendment (S. Rept. 94-932), [illegible]

Amended and passed Senate, 18833.—House disagreed to Senate amendments and asked for a conference. Conferees appointed, 23508.—Senate insisted on its amendments and agreed to a conference. Conferees appointed, 23804.—Change of conferee, 24179.—Conference report (H. Rept. 94-1397) submitted in the House and agreed to, 25480, 25312.—Conference report (S. Rept. 94-1065) submitted in the Senate and agreed to, 25658.—Examined and signed, 28531, 28617.—Presented to the President, 29021.—Approved [Public Law 94-410], 30313.

H.R. 8451—For the relief of Jung Shin Yang.

Committee on the Judiciary. Reported (S. Rept. 94-613), 1728.—Passed Senate, 1919.—Examined and signed, 2022, 2037.—Presented to the President, 2404.—Approved [Private Law 94-251], 3240.

H.R. 8471—To authorize the President to prescribe regulations relating to the purchase, possession, consumption, use, and transportation of alcoholic beverages in the Canal Zone.

Committee on Merchant Marine and Fisheries. Reported with amendment (H. Rept. 94-1140), 14092.—Rules suspended. Amended and passed House, 14272.—Ordered held at desk, 14690.—Passed Senate, 20160.—Examined and signed, 20628, 20725.—Presented to the President, 21199.—Approved [Public Law 94-345], 22854.

H.R. 8507—To revise the per diem allowance authorized for members of the American Battle Monuments Commission when in a travel status.

Committee discharged. Referred to Committee on Veterans' Affairs, 4556.—Reported with amendment (S. Rept. 94-695), 5262.—Passed Senate. Amended, 6452.—House concurs in Senate amendment, 7023.—Examined and signed, 7513, 7716.—Presented to the President, 8017.—Approved [Public Law 94-255], 9412.

H.R. 8508—To authorize the Secretary of Transportation to release restrictions on the use of certain property conveyed to the city of Camden, Arkansas, for airport purposes.

Committee on Public Works and Transportation. Reported with amendment (H. Rept. 94-[illegible]), 1463.—Rules suspended. Amended and passed House, 1726.—Ordered held at the desk, 2462.—Passed Senate, 5613.—Examined and signed, 5682, 5934.—Presented to the President, 6199.—Approved [Public Law 94-239], 7052.

H.R. 8529—To establish improved programs for the benefit of producers and consumers of rice.

Debated, 1326, 1327, 1328, 1342, 1559, 1564, 1756, 1761, 1762, 1907, 1910, 1911, 2112, 2114, 2172, 2123, 3123.—Amended and passed Senate, 2129.—Examined and signed, 2404, 2563.—Presented to the President, 2606.—Approved [Public Law 94-214], 2641.

H.R. 8532—To amend the Clayton Act to permit State attorneys general to bring certain antitrust actions, and for other purposes.

Made special order H. Res. [illegible]—Debated, 7025.—Amended and passed House, [illegible]032.—Ordered held at the desk, 7291.—Debated, 15304, 15316, 15321, 15453, 15524, 15869, 15820, 15909, [illegible], 16134, 16470-16472, 16475, 16479, [illegible], [illegible], 16824, 16911, [illegible]

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PUBLIC LAW 94–567 [H.R. 13160]; Oct. 20, 1976

NATIONAL PARK SYSTEM—WILDERNESS DESIGNATED

An Act to designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes.

Wilderness areas. Designation. 16 USC 1132 note.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in accordance with section 3(c) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132(c)), the following lands are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act:

Bandelier National Monument, N. Mex.

(a) Bandelier National Monument, New Mexico, wilderness comprising twenty-three thousand two hundred and sixty-seven acres, depicted on a map entitled "Wilderness Plan, Bandelier National Monument, New Mexico", numbered 315–20,014–B and dated May 1976, to be know as the Bandelier Wilderness.

Gunnison National Monument, Colo.

(b) Black Canyon of the Gunnison National Monument, Colorado, wilderness comprising eleven thousand one hundred and eighty acres, depicted on a map entitled "Wilderness Plan, Black Canyon of the Gunnison National Monument, Colorado", numbered 144–20,017 and dated May 1973, to be known as the Black Canyon of the Gunnison Wilderness.

Chiricahua National Monument, Ariz.

(c) Chiricahua National Monument, Arizona, wilderness comprising nine thousand four hundred and forty acres, and potential wilderness additions comprising two acres, depicted on a map entitled "Wilderness Plan, Chiricahua National Monument, Arizona", numbered 145–20,007–A and dated September 1973, to be known as the Chiricahua National Monument Wilderness.

Great Sand Dunes National Monument, Colo.

(d) Great Sand Dunes National Monument, Colorado, wilderness comprising thirty-three thousand four hundred and fifty acres, and potential wilderness additions comprising six hundred and seventy acres, depicted on a map entitled "Wilderness Plan, Great Sand Dunes National Monument, Colorado", numbered 140–20,006–C and dated February 1976, to be known as the Great Sand Dunes Wilderness.

Haleakala National Park, Hawaii.

(e) Haleakala National Park, Hawaii, wilderness comprising nineteen thousand two hundred and seventy acres, and potential wilderness additions comprising five thousand five hundred acres, depicted on a map entitled "Wilderness Plan, Haleakala National Park, Hawaii", numbered 162–20,006–A and dated July 1972, to be known as the Haleakala Wilderness.

Isle Royale National Park, Mich.

(f) Isle Royale National Park, Michigan, wilderness comprising one hundred and thirty-one thousand eight hundred and eighty acres, and potential wilderness additions comprising two hundred and thirty-one acres, depicted on a map entitled "Wilderness Plan, Isle Royale National Park, Michigan", numbered 139–20,004 and dated December 1974, to be known as the Isle Royale Wilderness.

Joshua Tree National Monument, Calif.

(g) Joshua Tree National Monument, California, wilderness comprising four hundred and twenty-nine thousand six hundred and ninety acres, and potential wilderness additions comprising thirty-seven thousand five hundred and fifty acres, depicted on a map entitled

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"Wilderness Plan, Joshua Tree National Monument, California", numbered 156-20,003-D and dated May 1976, to be known as the Joshua Tree Wilderness.

(h) Mesa Verde National Park, Colorado, wilderness comprising eight thousand one hundred acres, depicted on a map entitled "Wilderness Plan, Mesa Verde National Park, Colorado", numbered 307-20,007-A and dated September 1972, to be known as the Mesa Verde Wilderness. Mesa Verde National Park, Colo.

(i) Pinnacles National Monument, California, wilderness comprising twelve thousand nine hundred and fifty-two acres, and potential wilderness additions comprising nine hundred and ninety acres, depicted on a map entitled "Wilderness Plan, Pinnacles National Monument, California", numbered 114-20,010-D and dated September 1975, to be known as the Pinnacles Wilderness. Pinnacles National Monument, Calif.

(j) Saguaro National Monument, Arizona, wilderness comprising seventy-one thousand four hundred acres, depicted on a map entitled "Wilderness Plan, Saguaro National Mounment, Arizona", numbered 151-20,003-D and dated May 1976, to be known as the Saguaro Wilderness. Saguaro National Monument, Ariz.

(k) Point Reyes National Seashore, California, wilderness comprising twenty-five thousand three hundred and seventy acres, and potential wilderness additions comprising eight thousand and three acres, depicted on a map entitled "Wilderness Plan, Point Reyes National Seashore", numbered 612-90,000-B and dated September 1976, to be known as the Point Reyes Wilderness. Point Reyes National Seashore, Calif.

(l) Badlands National Monument, South Dakota, wilderness comprising sixty-four thousand two hundred and fifty acres, depicted on a map entitled "Wilderness Plan, Badlands National Monument, South Dakota", numbered 137-29,010-B and dated May 1976, to be known as the Badlands Wilderness. Badlands National Monument, S. Dak.

(m) Shenandoah National Park, Virginia, wilderness comprising seventy-nine thousand and nineteen acres, and potential wilderness additions comprising five hundred and sixty acres, depicted on a map entitled "Wilderness Plan, Shenandoah National Park, Virginia", numbered 134-90,001 and dated June 1975, to be known as the Shenandoah Wilderness. Shenandoah National Park, Va.

SEC. 2. A map and description of the boundaries of the areas designated in this Act shall be on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior, and in the office of the Superintendent of each area designated in the Act. As soon as practicable after this Act takes effect, maps of the wilderness areas and descriptions of their boundaries shall be filed with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such maps and descriptions shall have the same force and effect as if included in this Act: *Provided*, That correction of clerical and typographical errors in such maps and descriptions may be made. Map and description, public inspection.

SEC. 3. All lands which represent potential wilderness additions, upon publication in the Federal Register of a notice by the Secretary of the Interior that all uses thereon prohibited by the Wilderness Act have ceased, shall thereby be designated wilderness. Publication in Federal Register. 16 USC 1131 note.

SEC. 4. The boundaries of the following areas are hereby revised, and those lands depicted on the respective maps as wilderness or as potential wilderness addition are hereby so designated at such time and in such manner as provided for by this Act: Boundary revision.

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Isle Royale National Park, Mich.

(a) Isle Royale National Park, Michigan:

The Act of March 6, 1942 (56 Stat. 138; 16 U.S.C. 408e–408h), as amended, is further amended as follows:

(1) Insert the letter "(a)" before the second paragraph of the first section, redesignate subparagraphs (a), (b), and (c) of that paragraph as "(1)", "(2)", "(3)", respectively, and add to that section the following new paragraph:

"(b) Gull Islands, containing approximately six acres, located in section 19, township 68 north, range 31 west, in Keweenaw County, Michigan.".

16 USC 408g.

(2) Amend section 3 to read as follows:

"SEC. 3. The boundaries of the Isle Royale National Park are hereby extended to include any submerged lands within the territorial jurisdiction of the United States within four and one-half miles of the shoreline of Isle Royale and the surrounding islands, including Passage Island and the Gull Islands, and the Secretary of the Interior is hereby authorized, in his discretion, to acquire title by donation to any such lands not now owned by the United States, the title to be satisfactory to him.".

Pinnacles National Monument, Calif.

(b) Pinnacles National Monument, California:

(1) The boundary is hereby revised by adding the following described lands, totaling approximately one thousand seven hundred and seventeen and nine-tenths acres:

(a) Mount Diablo meridian, township 17 south, range 7 east: Section 1, east half east half, southwest quarter northeast quarter, and northwest quarter southeast quarter; section 12, east half northeast quarter, and northeast quarter southeast quarter; section 13, east half northeast quarter and northeast quarter southeast quarter.

(b) Township 16 south, range 7 east: Section 32, east half.

(c) Township 17 south, range 7 east: Section 4, west half; section 5, east half.

(d) Township 17 south, range 7 east: Section 6, southwest quarter southwest quarter; section 7, northwest quarter north half southwest quarter.

Publication in Federal Register.

(2) The Secretary of the Interior may make minor revisions in the monument boundary from time to time by publication in the Federal Register of a map or other boundary description, but the total area within the monument may not exceed sixteen thousand five hundred acres: *Provided, however*, That lands designated as wilderness pursuant to this Act may not be excluded from the monument. The monument shall hereafter be administered in accordance with the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1 et seq.), as amended and supplemented.

(3) In order to effectuate the purposes of this subsection, the Secretary of the Interior is authorized to acquire by donation, purchase, transfer from any other Federal agency or exchange, lands and interests therein within the area hereafter encompassed by the monument boundary, except that property owned by the State of California or any political subdivision thereof may be acquired only by donation.

Appropriation authorization.

(4) There are authorized to be appropriated, in addition to such sums as may heretofore have been appropriated, not to exceed $955,000 for the acquisition of lands or interests in lands authorized by this subsection. No funds authorized to be appropriated pursuant to this Act shall be available prior to October 1, 1977.

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SEC. 5. (a) The Secretary of Agriculture shall, within two years after the date of enactment of this Act, review, as to its suitability or nonsuitability for preservation as wilderness, the area comprising approximately sixty-two thousand nine hundred and thirty acres located in the Coronado National Forest adjacent to Saguaro National Monument, Arizona, and identified on the map referred to in section 1(j) of this Act as the "Rincon Wilderness Study Area," and shall report his findings to the President. The Secretary of Agriculture shall conduct his review in accordance with the provisions of subsections 3(b) and 3(d) of the Wilderness Act, except that any reference in such subsections to areas in the national forests classified as "primitive" on the effective date of that Act shall be deemed to be a reference to the wilderness study area designated by this Act and except that the President shall advise the Congress of his recommendations with respect to this area within two years after the date of enactment of this Act.

Rincon Wilderness Study Area, suitability review.
16 USC 1132 note.

Report to President.
16 USC 1132.

(b) The Secretary of Agriculture shall give at least sixty days' advance public notice of any hearing or other public meeting relating to the review provided for by this section.

Hearings, notice.

SEC. 6. The areas designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture shall be deemed to be a reference to the Secretary of the Interior.

Administration.

SEC. 7. (a) Section 6(a) of the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a) is amended by inserting "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration and preservation of the natural environment with the area" immediately after "shall be administered by the Secretary".

16 USC 459c-6.

(b) Add the following new section 7 and redesignate the existing section 7 as section 8:

16 USC 459c-7.

"SEC. 7. The Secretary shall designate the principal environmental education center within the Seashore as 'The Clem Miller Environmental Education Center,' in commemoration of the vision and leadership which the late Representative Clem Miller gave to the creation and protection of Point Reyes National Seashore.".

The Clem Miller Environmental Education Center, designation.

SEC. 8. Notwithstanding any other provision of law, any designation of the lands in the Shoshone National Forest, Wyoming, known as the Whiskey Mountain Area, comprising approximately six thousand four hundred and ninety-seven acres and depicted as the "Whiskey Mountain Area—Glacier Primitive Area" on a map entitled "Proposed Glacier Wilderness and Glacier Primitive Area", dated September 23, 1976, on file in the Office of the Chief, Forest Service, Department of Agriculture, shall be classified as a primitive area until the Secretary of Agriculture or his designee determines otherwise pursuant to classification procedures for national forest primitive areas. Provisions of any other Act designating the Fitspatrick Wil-

16 USC 459c-6a.
Whiskey Mountain Area, classification as a primitive area.

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derness in said Forest shall continue to be effective only for the approximately one hundred and ninety-one thousand one hundred and three acres depicted as the "Proposed Glacier Wilderness" on said map.

Approved October 20, 1976.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 94–1427 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 94–1357 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 122 (1976):
Sept. 22, considered and passed House.
Oct. 1, considered and passed Senate, amended; House agreed to Senate amendments.

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AREA: PO[illegible]ES NATIONAL SEASHORE

AUTHORIZA[illegible]

Act of September 13, 1962 (76 Stat. 538).

*ACQUISITION AUTHORITY

Act of September 13, 1962 (76 Stat. 538) authorizes acquisition by appropriated funds, donation, purchase with donated funds, transfer, exchange or otherwise.

Act of March 5, 1980, (94 Stat. 67), authorizes the Secretary to accept any lands and improvements within or adjacent to the seashore which are donated by the State of California or its political subdivisions.

ESTABLISHED

September 13, 1962.

*BOUNDARY REVISIONS

Act of December 26, 1974 (88 Stat. 1744) authorized addition of lands as described.

Act of November 10, 1978 (92 Stat. 3486) provides that Point Reyes National Seashore shall consist of lands, waters, and submerged lands generally depicted on map entitled "Boundary Map Point Reyes National Seashore," numbered 612-80,008-E, May 1978.

Act of March 5, 1980, (94 Stat. 67), the Seashore shall consist of lands, waters and submerged lands generally depicted on the map, entitled "Boundary Map Point Reyes National Seashore, Marin County, California", numbered 612-80,008-E, May 1978, plus those areas depicted on the map entitled "Point Reyes and GGNRA Amendments", dated October 25, 1979. Note: This adds approximately 2,133 acres; the land is from private and State lands in the Fish Hatch Creek area, and lands owned by the North Marin Water District and the Nature Conservancy.

ACREAGE LIMITATIONS

Act of September 13, 1962 (76 Stat. 538) describes the lands and cites map number NS-PR 7001 dated June 1, 1960.

Act of December 26, 1974 (88 Stat. 1744) amends the Act of September 13, 1962 (76 Stat. 538) by deleting description reference to map and inserting area as reflected on map entitled "Boundary Map, Point Reyes National Seashore, Marin County, California," numbered 612-80,008-B, dated August 1974.

* Act of March 5, 1980 (94 Stat. 67) refers to map entitled "Point Reyes and GGNRA Amendments, dated October 25, 1979."

Act of November 10, 1978 (92 Stat. 3486) refers to map entitled "Boundary Map, Point Reyes National Seashore, #612-80, 008-E, May 1978.

*STATUTORY CEILING FOR LAND ACQUISITION

Act of September 13, 1962 (76 Stat. 538) authorizes an appropriation of $14,000,000.

Act of October 15, 1966 (80 Stat. 919) increased appropriation to $19,135,000.

Act of April 3, 1970 (84 Stat. 90) authorizes an increased appropriation to $57,500,000.

Act of March 5, 1980 (94 Stat. 67) raises the ceiling to $62,500,000, by increasing the appropriation authorization by $5,000,000.

REMARKS

Act of November 10, 1978 (92 Stat. 3487) provides authorization to defer payments or schedule payments over a period of 10 years only for lands acquired under the provisions of this Act, with the consent of the landowner, and pay interest on the unpaid balance at rates paid by the Treasury of the United States for borrowing purposes.

AREA NUMBER

PFM-8530
MIS-8530

*Denotes section revised. 9/21/82

POINT REYES NATIONAL SEASHORE ACT

For Legislative History of Act, see p. 5593

An Act to designate certain lands in the Point Reyes National Seashore, California, as wilderness, amending the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), and for other purposes.

Point Reyes National Seashore, Calif. Certain lands designated as wilderness areas. 16 USC 1132 note. 16 USC 1132. 16 USC 1131 note.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in furtherance of the purposes of the Point Reyes National Seashore Act (76 Stat. 538; 16 U.S.C. 459c), and of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1131-36), and in accordance with section 3(c) of the Wilderness Act, the following lands within the Point Reyes National Seashore are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act: those lands comprising twenty-five thousand three hundred and seventy acres, and potential wilderness additions comprising eight thousand and three acres, depicted on a map entitled "Wilderness Plan. Point Reyes National Seashore", numbered 612-90,000-B and dated September 1976, to be known as the Point Reyes Wilderness.

Map and description, filing with congressional committees.

SEC. 2. As soon as practicable after this Act takes effect, the Secretary of the Interior shall file a map of the wilderness area and a description of its boundaries with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such map and descriptions shall have the same force and effect as if included in this Act: *Provided, however*, That correction of clerical and typographical errors in such map and descriptions may be made.

Administration.

SEC. 3. The area designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture, shall be deemed to be a reference to the Secretary of the Interior.

16 USC 459c-6.

SEC. 4. (a) Amend the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), as follows:

In section 6(a) insert immediately after the words "shall be administered by the Secretary," the words "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area,".

16 USC 459c-7.

(b) Add the following new section 7 and redesignate the existing section 7 as section 8:

The Clem Miller Environmental Education Center, designation. 16 USC 459c-6a.

"SEC. 7. The Secretary shall designate the principal environmental education center within the seashore as 'The Clem Miller Environ-

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mental Education Center', in commemoration of the vision and leadership which the late Representative Clem Miller gave to the creation and protection of Point Reyes National Seashore.".

Approved October 18, 1976.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 94–1680 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 122 (1976):
Sept. 29, considered and passed House.
Oct. 1, considered and passed Senate.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 12, No. 43:
Oct. 19, Presidential statement.

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and property and financial questions. The Department of State has been preparing for those negotiations, and the claims program provided for in the proposed legislation is an essential component of the completion of such negotiations. We shall not be in the best position to conclude a claims settlement agreement with the German Democratic Republic until the claims have been adjudicated and the total amount of the claims is known.

The Department has discussed the claims with representatives of the German Democratic Republic. Included within those discussions was the question of compensation to the victims of Nazism, a question referred to in the agreement on establishment of diplomatic relations. The World Conference on Jewish Material Claims is dealing with this question on an ethnic rather than a national basis. At our meeting with the German Democratic representatives we called for meaningful discussions with the World Conference.

The claimants have for a lengthy period remained uncompensated for their losses. We believe that it is now feasible to move ahead in our efforts to obtain adequate and effective compensation. The Department of State accordingly strongly favors the adoption of S. 3621

POINT REYES NATIONAL SEASHORE ACT

P.L. 94-544, see page 90 Stat. 2515

House Report (Interior and Insular Affairs Committee) No. 94-1680, Sept. 24, 1976 [To accompany H.R. 8002]

Cong. Record Vol. 122 (1976)

DATES OF CONSIDERATION AND PASSAGE

House September 24, 1976

Senate October 1, 1976

No Senate Report was submitted with this legislation.

HOUSE REPORT NO. 94-1680

[page 1]

The Committee on Interior and Insular Affairs, to whom was referred the bill (H.R. 8002) to designate certain lands in the Point Reyes National Seashore, California, as wilderness, to designate Point Reyes National Seashore as a natural area of the National Park System, and for other purposes, having considered the same, reports favorably thereon with amendments and recommend that the bill as amended do pass.

* * * * * * * * * *

[page 2]

PURPOSE

H.R. 8802,[1] as amended by the Committee on Interior and Insular Affairs, provides for the designation of certain lands as wilderness at Point Reyes National Seashore, Calif., clarifies the basic manage-

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ment objectives for the area, and directs the specific naming of an environmental education center at the Seashore.

Background and Need for Legislation

Point Reyes National Seashore was authorized by Act of Congress in 1962 to preserve a portion of the rapidly diminishing undeveloped coastal shoreline of the United States. Located along the Pacific Ocean coast north of San Francisco, Point Reyes National Seashore extends some distance up the coastline and inland, embracing fine beaches, estuarine areas, coastal grasslands, brush covered headlands and steep forested slopes. The area's pastoral appearance constitutes a major contrast to the developed landscape of the San Francisco bay region.

In conformance with the Wilderness Act of 1964, Point Reyes National Seashore, among other areas, was studied by the National Park Service to determine the suitability of designating any of its lands as wilderness. In late 1973 the report of this study was transmitted to the Congress with recommendations for wilderness designation for parts of the Seashore. Action by the Congress to statutorily

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[1] H.R. 8002 was introduced by Representative John Burton and cosponsored by Representatives Miller of California, Risenhoover, Leggett, Edwards of California, Van Deerlin, Rees, McCloskey, Anderson of California, and Stark. Similar bills before the Committee related to the same subject matter were: H.R. 8003 by Representative John Burton and cosponsored by Representatives Haley, Taylor of North Carolina, Johnson of California, Udall, Phillip Burton, Kastenmeier, Mrs. Mink, Meeds, Kazen, Vigorito, Melcher, Roncalio, Bingham, Selberling, Runnels, Won Pat, de Lugo, Eckhardt, Byron, Benitez, Howe, Weaver, Carr, and Don H. Clausen; H.R. 7198 by Representative Sebelius; and H.R. 5823 by Representative Selberling.

[page 3]

designate some of these lands as wilderness will have the effect of ensuring a higher level of protection and preservation for these lands by reserving them for all time from development or the direct influence of man's technology and civilization.

Legislative History

In September 1976, the Subcommittee on National Parks and Recreation conducted hearings on several bills whose principal purpose was to provide for the designation of certain lands as wilderness within the Point Reyes National Seashore. Later that month further action was taken by the Subcommittee and the Full Committee, and the bill was reported for the consideration of the House.

Section-by-Section Anaylsis

Section 1 provides for the designation of 25,370 acres of the Seashore as wilderness, and 8,003 acres as potential wilderness addition, all of which are depicted on a specifically referenced map. The lands so designated are to be known as the Point Reyes Wilderness and are to be administered under the applicable provisions of the Wilderness Act.

The committee concurred with the proposal to include several isolated and rather narrow lengths of beachfront along the coastline within wilderness in order to assure the continued preservation and use of those areas in their current primitive condition. It is thereby understood that administrative access and travel within those

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areas is to be under such conditions as to be in conformance with the full retention of wilderness values, and that any variance with that would be strictly for emergency purposes only. In like manner, vehicle use could be made as required of previously existing fire trails in time of emergency only, such as for suppression of fire to prevent its spread beyond the boundaries of the seashore.

As is well established, it is the intention that those lands and waters designated as potential wilderness additions will be essentially managed as wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these lands and waters to wilderness status. The committee specifically noted that the utility lines, easements and rights-of-way through the Muddy Hollow Corridor should be eliminated as promptly as possible.

Section 2 is standard language providing for the filing of a final map and boundary description with the Committees on Interior and Insular Affairs of the Congress.

Section 3 is standard language which provides that this wilderness is to be administered in accordance with the appropriate and applicable provisions of the Wilderness Act.

Section 4 amends the enabling act authorizing the Point Reyes National Seashore as follows:

Subsection (a) inserts additional phrasing in section 6(a) which underscores the intention that the Seashore is to be managed for the protection of its natural environment and values. The bill was amended to delete language which would have required by law that

the area be managed under the policies for the "natural" area management category, as administratively defined by the National Park Service, and thereby remove the area from the "recreational" area management category under which it is currently placed by the Service. The committee's action thus has the effect of intending this administrative recategorization, without going so far as to recognize or sanction by statute, the existence or propriety of this administrative policy categorization system.

Subsection (b) adds a new section 7 which requires the Secretary to designate the principal environmental education center within the Seashore as the "Clem Miller Environmental Education Center", to commemorate the vision and leadership of the late congressman in the establishment of the Point Reyes National Seashore. The committee felt this would be a most suitable approach for recognizing the contributions of this individual, and would be consistent with both the committee's and the National Park Service's policies with regard to the application of names of persons to and within units of the National Park System.

Cost

There is no cost entailed with this legislation.

Budget Act Compliance

There are no budgetary implications associated with this legislation.

Inflationary Impact

There is no inflationary impact associated with this legislation.

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OVERSIGHT STATEMENT

There were no activities or discussions relating to oversight matters relating to this legislation. No recommendations were submitted to the committee pursuant to rule X, clause 2(b)(2).

COMMITTEE AMENDMENTS

The committee adopted amendments relating to (1) the acreage to be designated as wilderness and potential wilderness addition, (2) the general direction of management for the Seashore, and (3) the dedication of an environmental education center within the Seashore.

COMMITTEE RECOMMENDATIONS

On September 16, 1976, the Committee on Interior and Insular Affairs, meeting in open session, reported H.R. 8002, by voice vote, and recommends that the bill as amended be enacted.

DEPARTMENTAL REPORT

The report of the Department of the Interior is here printed in full as follows:

[page 5]

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., September 8, 1976.

Hon. JAMES A. HALEY,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This responds to the request of your committee for the views of this Department on H.R. 7198, a bill "To designate certain lands in the Point Reyes National Seashore, California, as wilderness; to designate Point Reyes National Seashore as a natural area of the National Park System, and for other purposes," and similar bills H.R. 8002 and H.R. 8003.

We recommend the enactment of H.R. 7198, if amended as described herein.

H.R. 7198 would designate approximately 10,600 acres of the Point Reyes National Seashore as wilderness and 20 acres of the Seashore as a potential wilderness addition. H.R. 7198 is consistent with the President's earlier wilderness proposal in the 93rd Congress on Point Reyes.

On March 2, 1976, this Department testified before the Subcommittee on Parks and Recreation of the Senate Committee on Interior and Insular Affairs recommending that the Administration's proposal be expanded to designate 25,480 acres as wilderness and 20 acres as a potential wilderness addition. At the March hearings, this Department concurred in the view that the Limantour Estero of about 550 acres and Abotts Lagoon of about 200 acres should be designated as potential wilderness additions instead of wilderness, because both are subject to mineral and fishing rights owned by the State of California. With this modification, the Administration proposal consists of 24,730 acres for immediate wilderness designation and potential wilderness

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additions of 770 acres (Limantour Estero, Abotts Lagoon and the 20 acre private parcel). We recommend that H.R. 7198 be amended to effect this modification and that it be enacted.

H.R. 8002 and the companion bill, H.R. 8003, would (1) designate approximately 38,700 acres as wilderness within Point Reyes National Seashore, (2) designate that wilderness, consisting of three units, as the Point Reyes Miwok Wilderness, the Point Reyes Esteros Wilderness, and the Point Reyes Clem Miller Wilderness, and (3) amend subsection 6(a) of the Point Reyes Act of September 13, 1962 (76 Stat. 541; 16 U.S.C. 459–c6(a)), as amended, to provide for administration of the national seashore "as a natural area of the National Park System. . . ." The reference to subsection 6(a) appears to be a technical error; we believe it should be 7(a).

H.R. 8002 and H.R. 8003 would designate as wilderness approximately 38,700 acres, or approximately 13,200 acres more than the Administration's proposal. We do not recommend the inclusion of this additional acreage (which includes the following major components) for wilderness designation for the following reasons:

(1) Tidelands extending ¼ mile offshore. The State of California retains mineral and fishing rights over the submerged lands. The reservation of such rights is inconsistent with wilderness.

[page 6]

(2) Drakes Estero. Commercial oyster farming operations take place in this estuary and the reserved rights by the State on tidelands in this area make this acreage inconsistent with wilderness.

(3) Certain portions of the seashore's former "pastoral zone." The "pastoral zone" was established pursuant to section 4 of the 1962 Act (76 Stat. 540; 16 U.S.C. 459c–3), which was repealed by subsection 2(b) of the Act of April 3, 1970 (84 Stat. 90)). The portions of the former "pastoral zone" included as wilderness in S. 2472 are now in Federal ownership but are subject to a special use permit which permits the use of roads, mechanical equipment, fences, water impoundments, and corrals, as well as the use of pesticides and herbicides. These uses would continue in wilderness under S. 2472. While it is expected that these uses will terminate in about 30 years, the land has been managed for grazing for at lease three generations and does not appear to be in a wilderness condition.

(4) Muddy Hollow Road corridor. A portion of the area included as wilderness in H.R. 8002 and H.R. 8003 consists of a road and overhead electric power and telephone lines. While the National Park Service plans to remove and relocate the power and telephone lines eventually, there are no plans to do so in the near future. Designation of this corridor as wilderness now would be inconsistent with the definition of wilderness in the Wilderness Act, inasmuch as the facilities are works of man which are quite noticeable. We recommend that the corridor not be designated wilderness, but if the Committee wishes to designate it as potential wilderness we would have no objection.

H.R. 8002 and H.R. 8003 would designate, as a wilderness, three units which would be given separate wilderness names. We believe that it is unnecessary and confusing to have separate names for various wilderness units within National Park System areas, and we recommend that the entire wilderness area carry only the name of the park and

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be called the Point Reyes Wilderness. Use of the park name would be consistent with all National Park System wilderness names previously designated by the Congress as well as others pending before the Congress.

The effect of section 4 of H.R. 8002 and H.R. 8003 would be to change an administratively established management classification for the Point Reyes National Seashore from a "recreational area" to a "natural area." Lands within units of the National Park System are not arbitrarily managed according to such classifications as "recreational area," "historical area" or "natural area," but are managed according to a single system of *land classification* under which lands are classified as: natural zone; historic zone: development zone: or special use zone. Regardless of administrative designation of natural, historical, or recreational areas, land management is based on the inherent nature of the park resources and the suitability of the land for the proposed uses. We believe that under this classification system the natural values as well as other features are appropriately recognized and managed.

[page 7]

The Office of Management and Budget has advised that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely yours,

JOHN KYL,
Assistant Secretary of the Interior.

* * * * * * * * * * *

COAST GUARD—PERSONNEL

P.L. 94-546, see page 90 Stat. 2519

House Report (Merchant Marine and Fisheries Committee) No. 94-1337, July 2, 1976 [To accompany H.R. 12939]

Senate Report (Commerce Committee) No. 94-1333, Sept. 28, 1976 [To accompany H.R. 12939]

Cong. Record Vol. 122 (1976)

DATES OF CONSIDERATION AND PASSAGE

House July 19, October 1, 1976

Senate September 28, 1976

The Senate Report is set out.

SENATE REPORT NO. 94-1333

[page 1]

The Committee on Commerce. to which was referred the act (H.R. 12939) to amend certain laws affecting personnel of the Coast Guard, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the act, as amended, do pass.

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CALIFORNIA LEGISLATURE—1965 REGULAR (GENERAL) SESSION

ASSEMBLY BILL No. 1024

Introduced by Assemblyman Bagley

February 9, 1965

Compliments of
WILLIAM T. BAGLEY
Sonoma-Marin Assemblyman

REFERRED TO COMMITTEE ON PUBLIC UTILITIES AND CORPORATIONS

An act to convey certain tide and submerged lands to the United States in furtherance of the Point Reyes National Seashore.

The people of the State of California do enact as follows:

SECTION 1. There is hereby granted to the United States, subject to the limitations which are described in Section 2 of this act, all of the right, title, and interest of the State of California, held by the state by virtue of its sovereignty in and to all of the tide and submerged lands or other lands beneath navigable waters situated within the boundaries of the Point Reyes National Seashore which the Secretary of the Interior is authorized to establish by authority of Public Law 87-657, 76 Stat. 538.

SEC. 2. There is hereby excepted and reserved to the State of California and its assigns, the absolute right to fish upon, and all oil, gas, and other hydrocarbons in the lands described in Section 1 of this act, together with the right to explore or prospect for the same, but any rights exercised hereunder shall be exercised in such manner as to cause no unnecessary pollution of the coastal waters, as may be determined by the Secretary of the Interior or his duly authorized representative. No well or drilling operations of any kind shall be conducted upon the surface of such lands. There is also reserved in the people of the State of California the absolute right to fish in the waters overlying the lands described in Section 1, with the right to convenient access to said waters over said lands for said purpose.

LEGISLATIVE COUNSEL'S DIGEST

AB 1024, as introduced, Bagley (P.U. & C.). Point Reyes National Seashore.

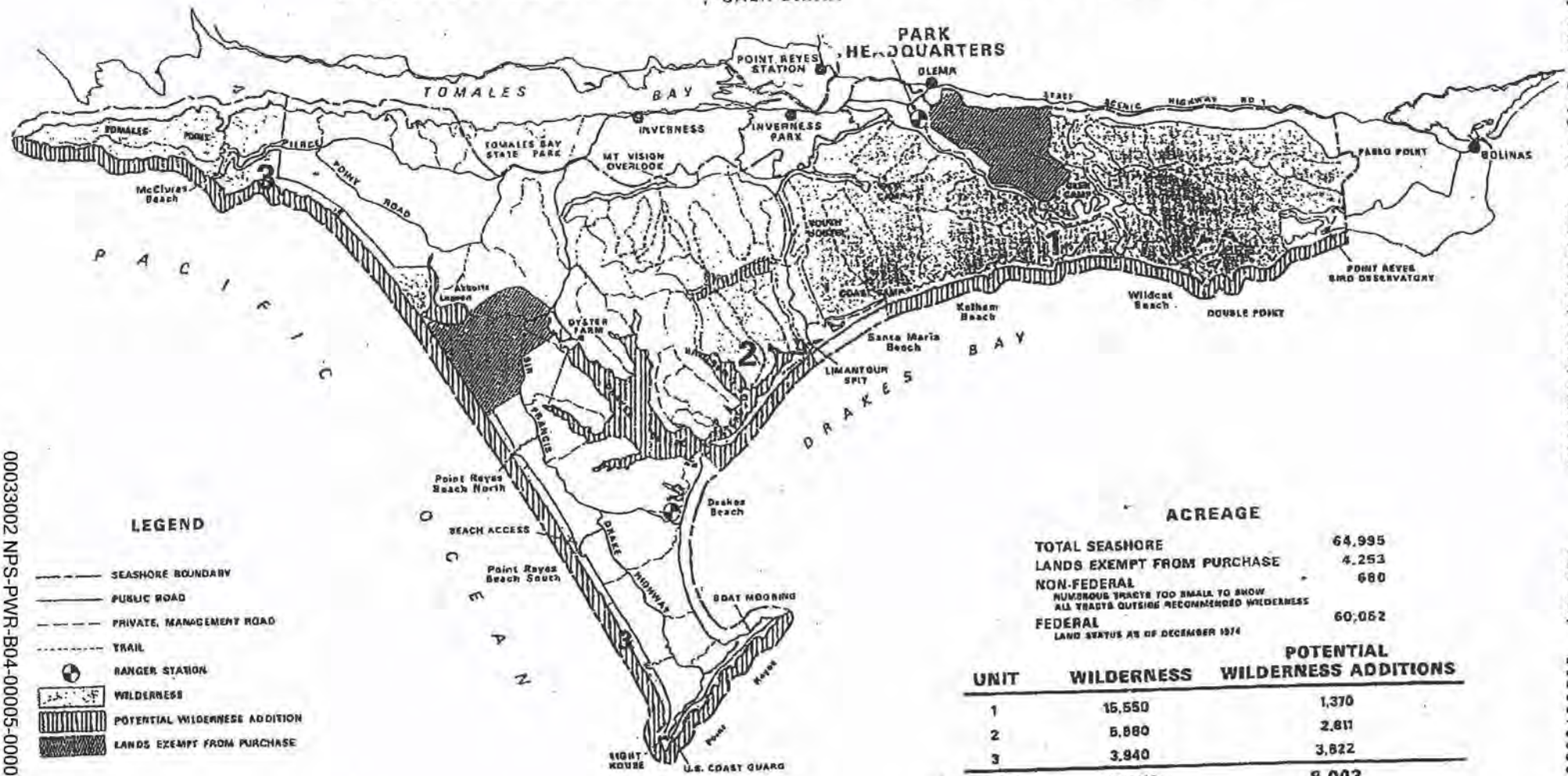
New act.

Grants certain tide and submerged lands to federal government to further development of the Point Reyes Seashore.

O

PASSED
July 9, 1965

WILDERNESS PLAN
POINT REYES NATIONAL SEASHORE
: CALIFORNIA



LEGEND

- SEASHORE BOUNDARY
- PUBLIC ROAD
- PRIVATE, MANAGEMENT ROAD
- TRAIL
- RANGER STATION
- WILDERNESS
- POTENTIAL WILDERNESS ADDITION
- LANDS EXEMPT FROM PURCHASE

ACREAGE

TOTAL SEASHORE	64,995
LANDS EXEMPT FROM PURCHASE	4,253
NON-FEDERAL NUMEROUS TRACTS TOO SMALL TO SHOW ALL TRACTS OUTSIDE RECOMMENDED WILDERNESS	680
FEDERAL LAND STATUS AS OF DECEMBER 1974	60,062

UNIT	WILDERNESS	POTENTIAL WILDERNESS ADDITIONS
1	15,550	1,370
2	5,880	2,811
3	3,940	3,822
TOTAL	25,370	8,003

REDUCED SIZE REPRODUCTION

612 | 80,000B
Sept 76 | WASO

JAN-23-04 FRI 3:13 PM NATIO. NAL. PARK. SERVICE FAX NO. 3039876658 P. 2
00033002 NPS-PWR-B04-00005-000001 Page 35 of 166

WILDERNESS
POTENTIAL WILDERNESS ADDITION
UNIT WILDERNESS POTENTIAL WILDERNESS ADDITION
1 18,030 1,680
2 3,260 2,860
3 3,900 4,010
TOTAL 24,200 8,530
PACIFIC
BEARES
POINT REYES WILDERNESS
AS DESIGNATED BY PUBLIC LAW 94-567 DATED OCTOBER 20, 1976
POINT REYES NATIONAL SEASHORE
CALIFORNIA

L1425
02-106

March 14, 2005

Robert Treanor, Executive Director
State of California
Fish and Game Commission
1416 Ninth Street
Sacramento, CA 95814

Re: Consent Item, Request of Tom Johnson, Johnson Oyster Company (JOC), Inc. to Transfer State Water Bottom Lease Agreements for M-438-01 and M-438-02, Drakes Bay, Marin County.

Dear Mr. Treanor and Commission Members:

Although we support the transfer of the California Department of Fish and Game lease agreements to Kevin Lunny, we do want to state for the administrative record that the current National Park Service (NPS) Reservation of Use and Occupancy agreement for 1.43 acres on park land expires in 2012. Because the waters in Drakes Bay were designated potential wilderness by Congress in 1976, we do not plan to extend the shoreline area lease beyond that date.

In addition, because the 1.43 acre reserved area does not include any of the shoreline area of Drakes Estero, the implementation of the above lease will require a special use permit from the NPS to access the oyster lease areas. Currently, because of past problems with the Johnson Oyster Company, the NPS has not granted a permit for use of the shoreline area since 1997.

We, however, do plan to work closely with the Lunny's now that we have received correspondence from JOC that authorizes us to discuss a future permit with them (refer to attached letter dated January 23, 2005, and received by NPS on March 7, 2005). The permit for use of park lands will include conditions and mitigation measures that provide protection for the marine and land resources of the area.

We appreciate being able to comment on this issue.

Sincerely,

Don L. Neubacher
Superintendent

DLNeubacher:an 03/14/05

L1425
02-106

June 18, 2004

Robert Treanor, Executive Director
State of California
Fish and Game Commission
1416 Ninth Street
Sacramento, CA 95814

Re: Consent Item #32, Request of Tom Johnson, Johnson Oyster Company (JOC), Inc. For Lease Renewal of State Water Bottom Lease Agreements for M-438-01 and M-438-02, Drakes Bay, Marin County, June 24, 2004 Fish and Game Commission Meeting.

Dear Mr. Treanor and Commission Members:

We want to express our concerns regarding Consent Item #32, Request of Tom Johnson, Johnson Oyster Company (JOC), Inc. for 25 Year Lease Renewal of State Water Bottom Lease Agreements for M-438-01 and M-438-02, Drakes Bay, Marin County. The JOC operates under a Use and Occupancy Agreement with the National Park Service (NPS) that allows use of 1.47 acres for aquaculture facilities until the year 2012. This NPS Agreement requires JOC to meet all local, state and federal regulations and laws.

For background, the submerged leased lands proposed for renewal are within the boundaries of Point Reyes National Seashore (the submerged lands were ceded to the federal government in 1967), and Drakes Estero is a major natural resource of the national park. The Estero is also Congressionally-designated potential Wilderness and will convert to full Wilderness status in 2012.

For more than ten years, the National Park Service, the California Coastal Commission, and the County of Marin have worked with JOC to bring JOC into compliance with appropriate laws and regulations. Most of this effort has resulted in limited progress. The final result was a Stipulated Order (165361: 1997) from the Superior Court of California for Marin County requiring JOC to obtain all required permits, build proper septic systems, meet appropriate health and safety codes, and remove illegal structures. Under the Order, permitting by the Coastal Commission was required. If JOC did not

meet the conditions of the Order within 24 months, JOC was required to remove all illegal structures and cease operation. To-date, JOC has not completed most of the requirements of the Stipulated Order.

In December 2003, JOC was placed under a clean-up and abatement order from the California Coastal Commission (Cease and Desist Order No. CCC-03-CD-12) for unpermitted development and coastal impacts. JOC submitted a Removal and Restoration Plan to the Coastal Commission for approval in early June, but the plan has not been approved, and is, in our opinion, deficient in detail and timelines for removal. In addition, the removal of illegal buildings has not been completed.

The NPS notified JOC of our intention to cancel all use permits for the premises unless JOC meets the conditions of the Stipulated Order and the California Coastal Commission Cease and Desist Order.

In addition, the NPS conducted a site visit to the leased area in Drakes Estero on June 18, 2004. During the site visit, we observed the following: 1) approximately 30% of the oyster racks in the estuary were in dilapidated shape; 2) oyster bags strewn in the tide line area (one 100-yard stretch of shoreline had 23 unused 2' x 3' bags, equaling @ 25% of all bags present), 3) plastic and metal debris discarded in place and embedded in substrate; and 4) abandoned marine grade treated wood from oyster racks on the park's shoreline. See the attached photographs from the site visit. We believe a clean-up should occur and an assessment of the oysters be conducted before the lease is renewed for 25 years.

At this time, it seems prudent and in the best interest of the public to not undertake a renewal of any submerged lands until the current deficiencies are rectified with the California Coastal Commission, the County of Marin and the National Park Service. Therefore, we urge that a temporary extension be issued to JOC to resolve legal issues and ensure proper protections are in the new lease agreement. A temporary extension of six months to a year would give JOC time to show progress in meeting the conditions of the Court Order and the Coastal Commission Cease and Desist Order.

We ask that any interim agreement issued to JOC contain a clause that JOC meet the conditions of the Superior Court Stipulated Order and conditions set by the Coastal Commission in their Cease and Desist Order, and meet the site clean-up requirements of the National Park Service.

The Commission previously gave an extension to allow the Department of Fish and Game and other agencies to work towards a solution. We believe more time would ensure that all concerns by all parties are reduced or eliminated.

As we have discussed with representatives from the Department of Fish and Game, the NPS still believes that any activity in the Estero must also be permitted by the NPS. We have also requested clarification on how CEQA requirements are being met by the Department.

We appreciate being able to comment on this issue. We are also eager to work with the Department to come to a viable and collaborative solution. To that end, we would propose to meet with you to discuss the issue at any time.

Sincerely,

Don L. Neubacher
Superintendent

Enclosures:
Cease and Desist Order, Coastal Commission, April 2004
Marin County Superior Court Stipulated Order, March 1997
Photos of Site Visit on Jun 18, 2004

cc:
County Counsel, Marin County
California Coastal Commission

DLNeubacher:an 06/17/04

STATE OF CALIFORNIA – THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, GOVERNOR

CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105- 2219
VOICE AND TDD (415) 904- 5200
FAX (415) 904- 5400

RECEIVED
Point Reyes
National Seashore
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SUPT.
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SPEC. PR.
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INTERP.
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CONTRACTING
PERSONNEL
BUDGET

April 28, 2004

Mr. Tom Johnson
Johnson Oyster Company
P.O. Box 68
Inverness, CA 94937

Re: Cease and Desist Order No. CCC-03-CD-12

Dear Mr. Johnson:

On March 3, 2004 I sent a letter to Carol Whitmire, which responded to her verbal request for an extension of the deadline for submittal of the Removal and Restoration plan required by the Cease and Desist Order. In the letter, the Executive Director agreed to extend the deadline until June 8, 2004, with the condition that you continue to make progress towards cleaning up the plant site.

The Cease and Desist order required Johnson to immediately remove the debris and equipment from the water and the shoreline that could pose a threat to the water quality of Drakes Estero, including the milk crates, piles of metal hangers with plastic tubing, the refuse pile, and the oil drums. Earlier this spring, I visited the site and confirmed that you were making progress in cleaning up the debris and the refuse pile. Recently, however, I was disappointed to hear that the cleanup has slowed or been halted altogether.

Although, the Removal and Restoration Plan has not yet been submitted and approved, we have discussed with you the items of unpermitted development at the site that we would like the plan to address and encouraged you to continue making progress in cleaning up the site. It is important that you continue cleaning up the site. There are several fairly simple actions you could be taking that do not require a permit from the Marin County Community Development Agency such as: continuing to clean up the buried debris on the beach and in the tidal zone, removing the diesel tank, removing the unused PVC water tank, removing the unoccupied mobile home, removing the refrigerator trailers, and moving the oyster shell mounds landward.

There is no reason why you cannot make further progress in cleaning up the site while the Removal and Restoration plan is being prepared by Ms. Whitmire and the building and demolition permits are being processed by the County. In writing, please confirm that you are continuing to clean up the site and describe what actions will be taken in the short-term to clean up the site.

Please be advised that Section 30820(a) of the Coastal Act authorizes the Commission to seek civil fines and penalties for violating the Coastal Act. In addition, Section 30821.6(a) provides that the Commission may seek a monetary penalty for violating a cease and desist order issued by the Commission. The penalty for intentionally or negligently violating a cease and desist order can be as much as $6,000 per day for as long as the violation persists.

If you have any questions regarding this letter, please contact me at 415-904-5220.

Sincerely,

Chris Darnell
Headquarters Enforcement Specialist

cc: Lisa Haage, Chief of Enforcement
Tom Luster, Coastal Program Analyst
Carol Whitmire, Consultant
Bob Oliker, Attorney
Don Neubacher, Superintendant, Point Reyes National Seashore
Curtis Havel, Marin County Community Development Agency

2-02-106 — JOHNSON OYSTER CO.

STATE OF CALIFORNIA–THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, GOVERNOR

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200
FAX (415) 904-5400

(024

RECEIVED
Point Reyes
National Seashore
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SPEC. PK. USES
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RES./SCIENCE
RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
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BUDGET
CENTRAL FILES

Th-16a

Staff Report: November 26, 2003
Hearing Date: December 11, 2003
Staff: CLD-SF

STAFF REPORT FOR COMMISSION CEASE AND DESIST ORDER

CEASE AND DESIST ORDER: CCC-03-CD-12

RELATED VIOLATION FILE: V-7-03-04

PROPERTY LOCATION: Drakes Estero, Point Reyes National Seashore. The property is approximately 0.5 miles south of Sir Francis Drakes Boulevard

PROPERTY DESCRIPTION: Johnson Oyster Company, Inc. holds a lease from the National Park Service, owner of the Point Reyes National Seashore, for a five-acre area at the northern terminus of Schooner Bay in Drakes Estero. Development at the site consists of facilities related to the commercial aquaculture business, residential buildings, and a horse paddock.

PROPERTY OWNER: National Park Service, U.S. Department of the Interior

CURRENT LESSEE AND ENTITY SUBJECT TO THIS ORDER: Johnson Oyster Company, Inc.

VIOLATION DESCRIPTION: Failure to obtain a coastal development permit from the Commission for: (1) construction of several commercial buildings, additions to pre-Coastal Act buildings, and a horse paddock; (2) permanent placement at the site of a mobile home, three metal storage/ refrigeration containers, and an above-ground diesel fuel tank and a concrete containment structure; (3)

drainage of wastewater from a commercial aquaculture operation onto land and into the estuary: and (4) storage of oyster cultivation equipment and disposal of refuse in the estuary and along the shore where it has the potential to impair the water quality and biological health of the estuary.

SUBSTANTIVE DOCUMENTS: Commission Notice of Intent to issue a Cease and Desist Order dated October 23, 2003 (EXHIBIT A); Commission Consistency Certification No. CC-34-84 (EXHIBIT B); Stipulated Agreement Between Parties and Order in County of Marin v. Johnson Oyster Company, Inc., Superior Court Case No. 165361 (EXHIBIT C), Exhibits A-F.

CEQA STATUS: Exempt (CEQA Guidelines (GC) §§ 15060(c)(2) and (3)) and Categorically Exempt (CG §§ 15061(b)(2) and (3), 15307, 15308 and 15321).

I. SUMMARY

The Johnson Oyster Company, Inc. (JOC) operates a commercial aquaculture business on land that it has leased from the National Park Service (NPS) since 1972.[1] The long-term lease is scheduled to expire in 2012. Drakes Estero, including the area that JOC is leasing, has been designated by Congress as a potential wilderness area pursuant to the Wilderness Act of 1964.[2] NPS has informed Staff that it cannot, under this Act, extend or renew JOC's lease when it expires in 2012 because the estuary and surrounding land will convert to wilderness, and the continued operation of a commercial aquaculture facility is inconsistent with the wilderness designation. This Cease and Desist Order (CDO) does not address this issue.

JOC's Coastal Act violation is the failure to obtain a coastal development permit (CDP) to authorize: (1) construction of several commercial buildings, additions to pre-Coastal Act structures[3], and a horse paddock; and (2) permanent placement of a mobile home, three metal storage/refrigeration containers, and an above-ground diesel fuel tank and a concrete containment structure; (3) drainage of waste water from the shucking room and retail building onto the ground and into

[1] NPS purchased the property from JOC in 1972 as part of the land acquisition for the Point Reyes National Seashore.
[2] P.L. 88-577, 78 Stat. 890 as amended 16 U.S.C. 1131 (note), 1131-1136).
[3] The structures that pre-date the Coastal Act include the building that currently houses the shucking room and retail counter, the two houses, and two of the four mobile homes.

the estuary; and (4) storage of oyster cultivation equipment and disposal of refuse in the estuary and along the shore where it has the potential to impair the water quality and biological health of the estuary. The precise dates that the development was performed are unknown but all the development that is the subject of this CDO was performed after the Coastal Act was enacted. (Photographs of the site taken by Staff showing some of the unpermitted development are attached as EXHIBIT D).

Some portions of the unpermitted development, namely the storage of the oyster cultivation equipment and disposal of refuse in the estuary and along the shore, and the drainage of the waste water onto the ground and into the estuary have the potential to impair the water quality and biological health of the estuary and need to be addressed immediately.

In addition, Staff is coordinating with the County of Marin (County) and NPS to resolve the Coastal Act violations at the site. Staff recommends the Commission issue this CDO pursuant to the authority of Section 30810 of the Coastal Act. This Order would require JOC to: (1) cease and desist from maintaining unpermitted development at the site, (2) address the unpermitted development at the site that poses an immediate threat to the water quality and biological health of the estuary, (3) submit for approval of the Executive Director a plan to remove the unpermitted development at the site that the Commission would be unlikely to find consistent with Coastal Act policies, remediate coastal resource impacts and restore the site, (4) submit an application for a CDP to authorize after-the-fact the unpermitted development that occurred after 1976, which the Commission may find to be consistent with Coastal Act policies,[4] and (5) fully implement the approved removal and restoration plan.

II. HEARING PROCEDURES

The procedures for a hearing on a proposed CDO are outlined in Section 13185 of the California Code of Regulations (CCR), Title 14, Division 5.5, Chapter 5, Subchapter 8. The CDO hearing procedure is similar in most respects to the procedures the Commission utilizes for permit and LCP matters.

For a CDO hearing, the Chair shall announce the matter and request that all parties or their representatives present at the hearing identify themselves for the record, indicate what matters are already part of the record, and announce the rules of the proceeding including time limits for presentations. The Chair shall also announce the right of any speaker to propose to the Commission, before the close of the hearing, any question(s) for any Commissioner, at his or her discretion, to ask of any other party. Staff shall then present the report and

[4] The unpermitted development that occurred at the site after 1976 and may be found to be consistent with Coastal Act policies includes one mobile home, some of the oyster cultivation equipment and materials in use in the estuary, and the recently constructed horse paddock

recommendation to the Commission, after which the alleged violator(s) or their representative(s) may present their position(s) with particular attention to those areas where an actual controversy exists. The Chair may then recognize other interested persons after which staff typically responds to the testimony and to any new evidence introduced.

The Commission will receive, consider, and evaluate evidence in accordance with the same standards it uses in its other quasi-judicial proceedings, as specified in CCR Section 13186, incorporating by reference Section 13065. The Chair will close the public hearing after the presentations are completed. The Commissioners may ask questions to any speaker at any time during the hearing or deliberations, including, if any Commissioner chooses, any questions proposed by any speaker in the manner noted above. Finally, the Commission shall determine, by a majority vote of those present and voting, whether to issue this CDO, either in the form recommended by the Executive Director, or as amended by the Commission. Passage of a motion, per staff recommendation or as amended by the Commission, will result in issuance of this CDO.

III. MOTION

MOTION 1: I move that the Commission issue Cease and Desist Order No. CCC-03-CD-12 pursuant to the Staff recommendation and Findings.

Staff Recommendation of Approval:

Commission staff recommends a **YES** vote. Passage of the motion results in adoption of the following resolution and findings and the issuance of Cease and Desist Order No. CCC-03-CD-12. The motion passes only by an affirmative vote of a majority of Commissioners present.

Resolution to issue Cease and Desist Order:

The Commission hereby issues Cease and Desist Order No. CCC-03-CD-12 set forth below and adopts the proposed findings set forth below on the grounds that JOC has conducted development without a coastal development permit and in so doing has violated the Coastal Act.

IV. PROPOSED FINDINGS

A. Coastal Act Authority

This CDO is being issued pursuant to Section 30810 of the Coastal Act, which provides in relevant part:

> *(a) If the Commission, after public hearing, determines that any person... has undertaken, or is threatening to undertake, any activity that (1) requires a permit from the commission without securing the permit...*
>
> *(b) The cease and desist order may be subject to such terms and conditions as the commission may determine are necessary to ensure compliance with this division, including immediate removal of any development or material or the setting of a schedule within which steps shall be taken to obtain a permit pursuant to this division.*

The Coastal Act defines "person" as "any individual, organization, partnership, limited liability company, or other business association or corporation, including any utility, and any federal, state, local government, or special district or an agency thereof."

B. Unpermitted Development

Coastal Act Section 30600(a) requires that any person wishing to undertake development in the coastal zone shall obtain a coastal development permit from the Commission or the local government (in addition to any other permit required by law). Development is defined in Section 30106 of the Coastal Act as "on land, in or under water, the placement or erection of any solid material or structure;" and "construction, reconstruction, demolition, or alteration of the size of any structure."

Under the Coastal Act, coastal development permits are required for all new "development." The unpermitted development by JOC that has occurred or is occurring consists of failure to obtain a CDP for: (1) construction of several commercial buildings and storage sheds, a horse paddock, and modifications to buildings that pre-date the Coastal Act,[5] (2) placement at the site of a mobile home, three storage/refrigeration containers, and an above-ground diesel tank with a concrete containment structure, (3) drainage of wastewater from the shucking room and retail building onto land and into the estuary; and (4) storage of oyster cultivation equipment and disposal of refuse (i.e. unused racks, piles of wire hangers with rubber tubing, nylon mesh bags, plastic milk crates, nylon rope, etc.) in the estuary and along the shore. These instances of unpermitted development are inconsistent with the requirements of Sections 30231 and 30250 of the Coastal Act.

[5] The structures that pre-date the Coastal Act consist of the building that currently houses the shucking room and retail counter, the two houses, and two of the four mobile homes at the site. In 1984, the Commission authorized an additional mobile home at the site through Consistency Certification No. CC-34-84. The unpermitted modifications to the structures that pre-date the Coastal Act are subject to the terms of the Consent Order.

Notwithstanding federal ownership of the land and the estuary, development at the site, including demolition, modification, removal or retention of any of the existing structures, and/or construction of any new structures requires Commission authorization. Moreover, the cleanup of the waterfront, including removal of the oyster cultivation equipment and refuse may involve activities which are development under the Coastal Act, and therefore also require Commission authorization. The Commission can authorize development through a CDP, or authorize removal of development through a CDO or a restoration order. Any new development not authorized under this CDO or the plan submitted by JOC pursuant to this CDO and approved by the Executive Director, or retention of any existing development constructed after the Coast Act, will require JOC to submit an application to the Commission for CDP. Nothing in this CDO shall be interpreted or construed to represent Commission approval any new or existing development that may be proposed in the plan that JOC is required to submit pursuant to this Order.

C. Coastal Resource Impacts[6]

Section 30231 provides:

> *The biological productivity and the quality of coastal waters, stream, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of wastewater discharges...*

Section 30250 provides:

> *(a) New residential, commercial, or industrial development... shall be located ... where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.*

The unpermitted development has the potential to adversely affect the water quality and biological health of the estuary. For example, in one of the storage sheds with an earthen floor near the estuary, drums of used motor oil and/or gasoline are being improperly stored and it appears that some oil has overflowed onto the earthen floor. This oil may either be carried into the estuary by surface runoff or seep into the estuary and contaminate the water quality and impair the biological health of the estuary. In addition, the building that contains the shucking room and the retail counter lacks an adequate septic system and therefore, the wastewater from the floor and the sinks drains directly onto the ground and into the estuary.

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[6] We note that a cease and desist order under Coastal Act §30810 can be issued for unauthorized development and does not require a showing of resource damages, but we provide this information for background purposes

As previously mentioned, there is an unpermitted above ground storage tank in a compromised concrete containment structure. The storage tank was used for diesel gas but is no longer in use. It is unknown whether the storage tank still contains fuel. A wooden pole penetrates the floor of one of the compartments and appears to compromise the structural integrity of the container. Thus, if there were to be a leak, the fuel would seep directly into the soil around the tank. This fuel could either be carried into the estuary by surface runoff or seep into the estuary and contaminate the water quality and impair the biological health of the estuary.

Although construction of a horse paddock does not necessarily create a problem for water quality, confined animal facilities should be sited and designed to manage, contain, and dispose of animal waste using best management practices (BMPS) to insure that waste is not introduced to water bodies, surface runoff or groundwater. Although the subject paddock is not directly adjacent to the estuary, unless BMPs are used, animal waste may be carried into the estuary or a tributary of the estuary by surface runoff and contaminate the water quality and impair the biological health of the estuary. During a site visit, Staff observed no evidence of any such BMPs in use.

Unused oyster cultivation equipment and refuse including racks, piles of wire hangers with rubber hose, nylon mesh bags, nylon rope, and plastic milk crates are being stored or have been disposed of in the estuary and along the shore. This equipment and refuse appears to be trapping eelgrass, which would otherwise be carried away by the tide. The accumulation of this debris along the shore has degraded the near shore habitat for infauna biota.

The wastewater, spilled motor oil, animal waste, deterioration and decay of the unused aquaculture equipment and refuse, and accumulation of debris on the shoreline has the potential to impair the water quality and impair biological health of the estuary.

D. Background

The enforcement of JOC's Coastal Act violations is being coordinated with the County and NPS, which are attempting to bring JOC into compliance with County zoning ordinances and the terms of the tenancy agreement with NPS.

On October 6, 2003, Commission staff accompanied NPS staff on a site visit to Johnson's facility at Drakes Estero. During that visit, Staff observed: several commercial structures that were constructed without a CDP; unpermitted modifications to buildings that pre-date the Coastal Act; structures that have been permanently placed at the site without a CDP; and potential impacts to the water quality of the estuary from waste water draining from the shucking room and retail building onto the ground and into the estuary, spilled motor oil, and

storage and/or disposal of oyster cultivation equipment and refuse (i.e. racks, piles of wire hangers with rubber tubing, nylon mesh bags, nylon rope, and plastic milk crates) in the estuary and along the shore.

The County has been attempting to resolve numerous zoning, building and health code violations at the site since the late 1980s. In September 1995, the County filed a complaint for injunctive relief to enjoin JOC from continuing to violate County codes and require JOC to remedy the violations. In January 1997, the County and JOC entered into a stipulated agreement to resolve the litigation. The Agreement required JOC to submit plans and obtain permits for improvements at the site to resolve the various violations, including construction of a new processing plant, removal of all but four mobile homes and two houses[7], installation of a residential septic system to service the houses and the mobile homes. The Agreement also required JOC to obtain permits to drill a well and operate a retail food establishment, and for all the development that has occurred at the site without a CDP or a building permit. With the exception of the septic system installation, JOC has failed to comply with the terms of the Agreement.

In October, 2003, JOC proposed a conceptual plan to the Commission and NPS that would allow them to continue cultivating oysters in the estuary but would relocate the processing facility off-site and remove a "significant portion of the structures" and the illegal modifications to the legal structures (EXHIBIT E). JOC proposes to retain at the site an existing dock to load and unload oysters, a building to house the tanks for seeding the oysters and a room to string and bay the seeded shells, and the residential structures with the septic system. JOC also proposes to continue to operate a small retail business, which is currently being run out of a building that pre-dates the Coastal Act. JOC is hoping that the proposed changes would eliminate the need for a commercial wastewater treatment system, however, the County has indicated that the applicable zoning code requires that retail food establishments have running water and bathrooms.

On November 21, 2003, Johnson's attorney, Robert Oliker, submitted a Statement of Defense on behalf of JOC (EXHIBIT F) and declined to agree to a consent cease and desist order to resolve the violations. Mr. Oliker indicated to Staff that JOC could not agree to a consent order that would require it to remove the unpermitted development and restore the site before JOC has an opportunity to receive feedback from the County and NPS regarding its conceptual plan and alternative options that would allow JOC to continue operating at the site.

Staff believes issuance of this CDO would provide a means to address the immediate threats to the water quality and biological health of the estuary, and

[7] The houses and two of the mobile homes existed at the site prior to the Coastal Act. In 1984, the Commission authorized one additional mobile home at the site through Consistency Certification No. CC-34-84.

provide a framework to bring the JOC and the site into compliance with Coastal Act policies. Staff plans to work with the County and NPS toward that end.

E. Allegations

(1) JOC failed to obtain a CDP to construct several commercial buildings, additions to buildings that pre-date the Coastal Act, and a horse paddock. (Not admitted)

(2) JOC failed to obtain a CDP to authorize the permanent placement at the site of a mobile home, three large refrigeration/ storage containers and an above ground diesel tank with a concrete storage container. (Not admitted)

(3) JOC is draining wastewater from the shucking room and the retail building directly onto the ground and into the estuary. (Not admitted)

(4) JOC is storing oyster cultivation equipment and has disposed of refuse in the estuary and along the shoreline that may be impairing the water quality and biological health of the estuary through deterioration and decay, and by trapping eel grass. (Not admitted)

F. Statement of Defense

(1) *Johnson does not admit any of the allegations as set forth in the October 23, 2003 Notice of Intent to Commence Cease and Desist Order. Johnson denies all allegations as set forth in the October 23, 2003 Notice of Intent to Commence Cease and Desist Order.*

Commission Response:

Despite these denials, the fact remains that JOC has been the only lessee of the property where the unpermitted development occurred since NPS acquired the property in 1972. In addition, NPS has confirmed that JOC is responsible for the unpermitted development at the site and JOC has been using the unpermitted development continuously since it occurred. JOC does not claim that the Commission has authorized the development addressed in this CDO and no application seeking Commission approval for the unpermitted development was ever received from JOC, nor was this development ever authorized through a CDP or Consistency Certification.

(2) *Johnson's was of the belief that they were in compliance with existing law, or had extensions to do so.*

Commission Response:

The "extensions" cited by JOC appear to refer to the work that was required under the Stipulated Agreement, executed by JOC and Marin County on January 9, 1997. Despite any extensions that the County or NPS may have granted, JOC nevertheless failed to obtain the permits that it was required to seek under the Agreement, including the necessary CDPs. Moreover, much of the unpermitted development that is the subject of this CDO pre-dates the Stipulated Agreement, so the fact that extensions may have been granted to bring the site into compliance is not relevant.

JOC was aware of the requirement to obtain a CDP for the unpermitted development at the site. In 1984, JOC sought and obtained a Consistency Certification for an additional mobile home at the site (EXHIBIT B).[8] In 1997, JOC submitted two applications for CDPs to the Commission for construction of a new processing facility and installation of a new septic system. Johnson's submittal of applications for the consistency certification and the CDPs demonstrates that JOC was aware of the requirement to obtain Commission authorization for new development at the site.

JOC also asserts that it relied on its attorney's representation that it was in compliance with applicable laws. While this is a factor that a court might consider in assessing civil penalties and punitive damages, it is not relevant to the determination of whether JOC conducted unpermitted development that violated the Coastal Act. Nor is it relevant to whether JOC should be ordered to cease conducting unpermitted development that violates the Coastal Act and to remove such development. This CDO is appropriate to respond to the violations that already occurred, regardless of Johnson's intent.

(3) *To the extent there has been delay in securing compliance, much of that delay was caused by governmental entities who failed to timely issue permits.*

Commission Response:

Although the Commission has no first-hand knowledge of any such delays, Staff would note that it has been six years since the Stipulated Agreement and JOC has still not fully complied with the terms of the Agreement. As previously stated, much of the unpermitted development at the site pre-dates the Stipulated Agreement, so any delays caused by other agencies in complying with the terms of the Agreement are not relevant. We also note that although not required by the Coastal Act, Staff is working with the County and NPS to resolve the violations at the site.

[8] Consistency Certification No. CC-34-84, approved December 12, 1984.

Some portions of the unpermitted development such as construction of the office, the horse paddock, and storage of the oyster cultivation equipment and disposal of refuse in the estuary and along the shore were not addressed in the Stipulated Agreement and occurred since the Stipulated Agreement. As noted above, JOC was aware of the permit requirements of the Coastal Act. Moreover, JOC has not submitted an application to the Commission seeking approval for the development addressed in this CDO, so failure to obtain a CDP from the Commission cannot be attributed to governmental delay.

G. CEQA

The Commission finds that issuing an order to: cease and desist from maintaining unpermitted development in violation of the Coastal Act, submit a plan to remove the unpermitted development, and restore the site is consistent with the requirements of the California Environmental Quality Act (CEQA) of 1970 and will have no significant adverse effects on the environment, within the meaning of CEQA. This CDO is exempt from the requirements for the preparation of an environmental impact report based upon Sections 15060(c)(2), and (3), 15061(b)(2) and (3), 15307, 15308 and 15321 of CEQA Guidelines.

ALIFORNIA COASTAL COMMISSION
FREMONT, SUITE 2000
N FRANCISCO, CA 94105-2219
ICE AND TDD (415) 904-5200
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COMMISSION CEASE AND DESIST ORDER NO. CCC-03-CD-12

1.0 REQUIRED-AUTHORIZED ACTIONS

Pursuant to authority provided in Public Resources Code Section 30810, the California Coastal Commission hereby orders and authorizes Johnson Oyster Company, Inc. (JOC), doing business in Point Reyes National Seashore under a lease agreement with the National Park Service (NPS) to:

(a) Cease and desist from maintaining unpermitted development at the site, and refrain from performing future development at the site not specifically authorized by a coastal development permit or a Consistency Certification.

(b) Within 60 days of the issuance of this Cease and Desist Order (hereinafter "Order"), address the unpermitted development that the Executive Director determines has the potential to impair the water quality and biological health of the estuary, including but not limited to the storage of oyster cultivation equipment and disposal of refuse in the estuary and along the shore, drainage of wastewater onto the ground and into the estuary, and improper storage of used motor oil.

(c) Within 90 days of the issuance of this Order, submit for the approval of the Executive Director, a plan prepared by a qualified land use planner and a certified engineer for the complete removal of all of the unpermitted development constructed or brought to the site after the Coastal Act of 1976,[1] remediation of coastal resource impacts, and restoration of the site. The development that must be addressed in the removal and restoration plan consists of several commercial buildings, modifications to buildings that pre-date the Coastal Act, three storage/refrigeration containers, an above-ground diesel tank with a concrete containment structure, and a mobile home and submerged oyster cultivation equipment and materials in the estuary.[2] The plan must also characterize any impacts to coastal resources from the unpermitted development onshore and in the estuary and provide for remediation of those impacts, including but not limited to restorative grading and soil remediation and the use of best management

[1] The buildings that pre-date the Coastal Act include the building that houses the shucking room and the retail counter, the two houses, and two of the four mobile homes. In 1984, the Commission authorized a third mobile home at the site through Consistency Certification No. CC-34-84.

[2] JOC may apply to the Commission for a coastal development permit to retain the unpermitted mobile home and oyster cultivation equipment in the estuary pursuant to Section 1.0(d).

practices to protect the water quality of the estuary.[3] Should the plan call for the removal of oyster cultivation equipment and materials in the estuary, the plan must provide measures to minimize negative impacts to coastal resources from the removal.

(d) Within 60 days of the issuance of this Order, submit a complete application for a coastal development permit to authorize after-the-fact the unpermitted mobile home and any oyster cultivation equipment or materials in the estuary that were installed after the Coastal Act, and the recently constructed horse paddock.

(e) Complete implementation of the removal and restoration plan within 90 days of its approval by the Executive Director.

2.0 IDENTIFICATION OF THE PROPERTY

The property that is the subject of this Order is located at the northern terminus of Schooner Bay in Drakes Estero, Point Reyes National Seashore, Marin County, Assessor's Parcel No. 109-130-17 (hereinafter "Subject Property").

3.0 PERSONS SUBJECT TO THIS ORDER

The entity subject to this Order is the Johnson Oyster Company, Inc., its officers, employees, agents, and anyone acting in concert with the foregoing.

4.0 DESCRIPTION OF COASTAL ACT VIOLATION

JOC's Coastal Act violation is its failure to obtain a coastal development permit or a consistency certification to authorize: (1) construction of several commercial buildings, additions to buildings that pre-date Proposition 20, and a horse paddock; (2) placement of a mobile home, three metal refrigeration containers and an above-ground diesel fuel tank with a concrete containment structure; (3) drainage of waste water from the shucking room and retail building onto the ground and into the estuary; and (4) storage of oyster cultivation equipment and disposal of debris in the estuary and along the shore. The precise dates that the development was performed are unknown but all of the development subject to this order occurred after the date of the Coastal Act.

5.0 COMMISSION AUTHORITY TO ACT

The Commission is issuing this Order pursuant its authority under Section 30810 of the Public Resources Code.

---

[3] Nothing in this Order shall be interpreted or construed to represent Commission approval of any new or existing development that may be proposed in the removal and restoration plan JOC is required to submit pursuant to this Order.

6.0 FINDINGS

This Order is being issued on the basis of the findings adopted by the Commission on December 11, 2003, as set forth in the attached document entitled Staff Report for Cease and Desist Order No. CCC-03-CD-12

7.0 EFFECTIVE DATE

This Order shall become effective as of the date of issuance by the Commission and shall remain in effect permanently unless and until rescinded by the Commission.

8.0 COMPLIANCE OBLIGATION

Strict compliance with the terms and conditions of this Order is required. If JOC fails to comply with the requirements of Section 1.0 of this Order, including any deadline contained therein, it will constitute a violation of this Order and may result in the imposition of civil penalties of up to six thousand dollars ($6,000) per day for each day in which compliance failure persists.

9.0 EXTENSIONS OF DEADLINES

Notwithstanding Section 10.0, if JOC is unable to comply with the deadlines contained in Section 1.0 of this Order, JOC may request from the Executive Director in writing an extension of said deadlines. If the Executive Director determines that JOC has made a showing of good cause, he/she shall grant extensions of the deadlines. Any extension requests must be made in writing to the Executive Director and received by the Commission staff at least 10 days prior to the expiration of the subject deadline.

10.0 SITE ACCESS

JOC agrees to provide full access to the Subject Property at all reasonable times to Commission staff, and employees of the County of Marin and National Park Service for the purpose of inspecting the progress of work being carried in compliance with the terms of this Order.

11.0 APPEALS AND STAY RESOLUTION

Pursuant to Public Resources Code Section 30803(b), Respondents against whom this Order is issued may file a petition with the Superior Court for a stay of the Order.

12.0 GOVERNMENT LIABILITY

The State of California shall not be liable for injuries or damages to persons or property resulting from acts or omissions by JOC in carrying out activities authorized under this Order, nor shall the State of California be held as a party to any contract entered into by JOC or their agents in carrying out activities pursuant to this Order.

13.0 GOVERNING LAW

This Order shall be interpreted, construed, governed and enforced under and pursuant to the laws of the State of California, which apply in all respects.

14.0 NO LIMITATION OF AUTHORITY

Except as expressly provided herein, nothing herein shall limit or restrict the exercise of the Commission's enforcement authority pursuant to Chapter 9 of the Coastal Act, including the authority to require and enforce compliance with this Order.

Issued this 11th day of December, 2003

Peter M. Douglas, Executive Director
California Coastal Commission

Date

COPY

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FILED

MAR 21 1997

JOHN P. MONTGOMERY,
Court Executive Officer
MARIN COUNTY COURTS
By: C. Baker, Deputy

SUPERIOR COURT OF CALIFORNIA
FOR MARIN COUNTY

PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the COUNTY OF MARIN, Plaintiffs, vs. JOHNSON OYSTER COMPANY, INCORPORATED, TOM JOHNSON AND DOES 1-20 INCLUSIVE Defendants. ALICIA FLORES, et al. Intervenors.	NO. 165361 STIPULATED AGREEMENT BETWEEN THE PARTIES AND ORDER

This stipulation is entered into this 9th day of January, 1997 by and between the parties. For the purposes of this Agreement, all time frames shall run from the date that the Judge of the Superior Court signs this Agreement, unless otherwise specified.

1. The parties hereto agree that a design review application with a site plan showing the proposed improvements locate don the subject property at 17171 Sir Francis Drake Boulevard, Inverness, AP # 109-130-17), will be prepared by JOHNSON OYSTER COMPANY, INC. (hereinafter JOC) and submitted to Community Development Agency,Planning Division, within 45 days from the date of this agreement.

2. The parties and the U.S. Park Service have agreed that no more than four

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mobile homes and two residences may remain on the subject property after September 30, 1996. To accommodate this agreement, five intervenors, namely Juan-Jose Pelayo, Alicia Flores, Aida Pelayo, Manuel R. Pelayo and Marin Pelayo ("the Relocated Intervenors") and their families reached a seperate agreement with JOC under the terms of which those families timely relocated. JOC and the Relocated Intervenors agree to work in good faith to formalize that seperate agreement within 15 days.

3. A septic system that meets current standards shall be designed and all necessary permits and approvals from Environmental Health Services Division of the Community Development Agency shall be obtained within 30 days of the date submitted. This system shall be constructed within six weeks of approval of septic system permit and coastal permit. This system shall have adequate capacity to process the waste that is produced form the uses and operations specifically allowed under this agreement. Unit such time as this septic system is approved, built and fully functioning, defendants shall pump the failed septic system tank and provide to Environment heal Services receipts for such pumping on a weekly basis. For good cause,including but not limited to, inclement weather, an extension of time to construct the approved system may be granted in writing by Environmental Health Services after written request for such extension by JOC.

4. A permit to drill a well shall be obtained from the Environmental Health Services Division of the Community Development Agency within 90 days of the date of this agreement.

5. A retail food establishment permit shall be obtained from the Environmental Health Services Division of the Community Development Agency within 90 days of the date of this agreement.

6. A Coastal Permit shall be obtained from the California Coastal Commission within 120 days of the date of this agreement.

7. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for all work completed without building permits and building permits shall be obtained for any work requiring such permits prior to

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commencement of work.

8. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the structures adjacent and appurtenant to the remaining trailers.

9. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the addition to the house.

10. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the wiring, plumbing, propane tanks, the well house, and any new improvements. JOC will either obtain a permit for the retail sales office expansion, the second story addition, the three sided structure used for stringing of the oyster shells and the containers used for storage and refrigeration OR submit a permit application for replacement structures to serve the same use as that of commercial oyster production.

11. JOC may continue operation of the processing plant, algae shed, the growing shed, the retail sales office, the second story addition and the three-sided stringing shed and the containers used for storage and refrigeration if the design review and required permits are submitted in a timely basis as required by paragraph 10. JOC may continue the above operations in their present locations until construction is completed on the replacement structures. Construction under the permits will commence upon issuance and continue in a timely fashion to be completed within 24 (twenty four) months. If any of the operations and structures above have not obtained required building or replacement permits, or if the permit applications are denied, withdrawn or if construction is not completed within 24 months of obtaining the permit then operations shall cease and the structures shall be removed.

12. Any use, operation or structure for which all required permits have not been obtained within the time deadlines of this agreement shall be immediately terminated and removed from the property. This includes all uses, operations and structures whether they be residential, commercial or agricultural.

13. All permits required by this agreement shall be obtained within 90 days of this agreement unless otherwise specified. Extensions of time to obtain permits or complete

construction may only be granted by the issuing agency in writing after written request for such extension by JOC.

14. Staff members of all divisions of the Marin County Community Development Agency shall upon 48 hours notice, be granted entry onto the property to ensure compliance with this agreement.

15. The Court shall retain jurisdiction for the purposes of enforcement of this Stipulated Agreement and of the agreement between JOC and the Relocated Intervenors.

16. The County shall dismiss their action for injunctive relief within 30 days of the date of this agreement.

17. Plaintiff reserves the right to obtain a judgment pursuant to CCP 664.6

FOR THE PLAINTIFFS:

COUNTY OF MARIN

By _____ Date 3/5/97
HAROLD C. BROWN JR.
CHAIRMAN, BOARD OF SUPERVISORS

By _____ Date 1/10/97
ALEXIS J. McBRIDE
Attorney for Plaintiffs

FOR THE DEFENDANTS:

JOHNSON OYSTER COMPANY, INC. and
TOM JOHNSON

By _____ Date 1/10/97
TOM JOHNSON

By _____ Date 1/10/97
F. ROBERT STUDDERT
Attorney for Defendants
Tom Johnson and Johnson Oyster Company, Inc.

00033002 NPS-PWR-B04-00005-000001 Page 61 of 166

FOR THE INTERVENORS:

LEGAL AID OF MARIN

By _____ Date 1/10/97
RICHARD MARCANTONIO
Attorney for Intervenors

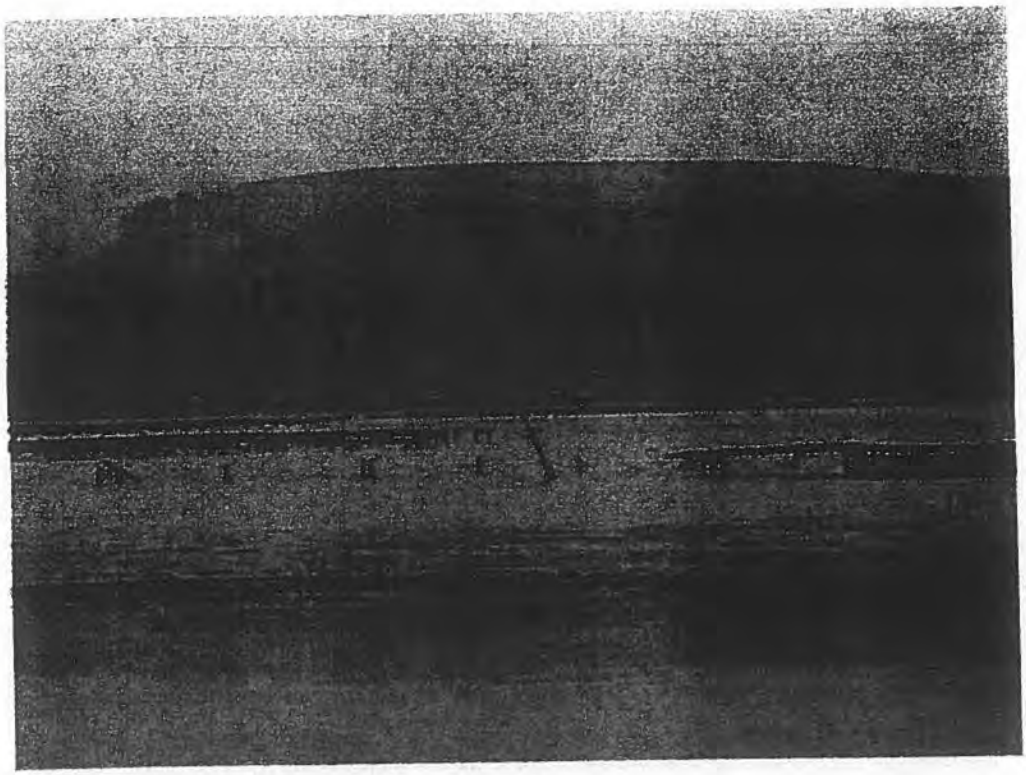
ORDER

This Agreement signed by the parties is hereby made an order of this Court. It is the order of this court that all parties shall bear their own attorney's fees and costs.

Date: 18 Mardi, 1997

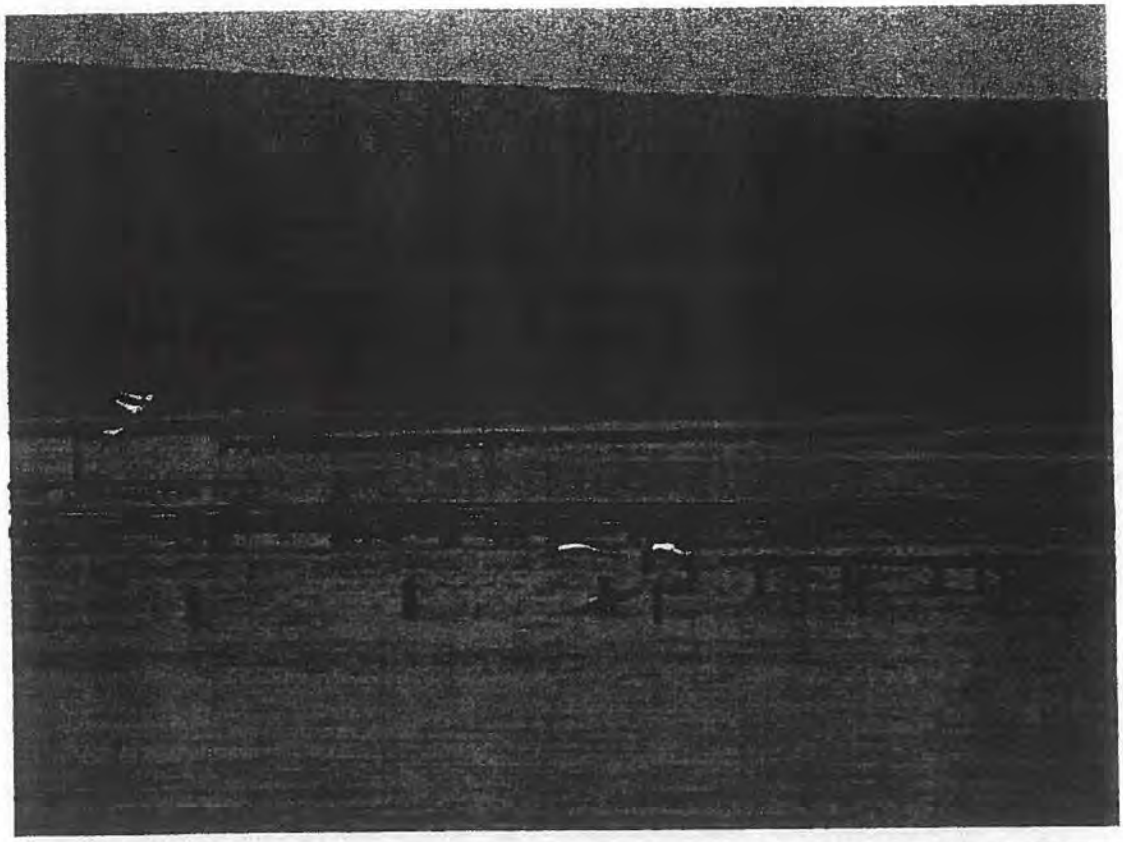
_____
LYNN O'MALLEY TAYLOR
Judge of the Superior Court

g:\lasvs\johnson\joc-stip



Broken oyster racks deteriorating in Drakes Estero.

Broken oyster racks.



Deteriorated Oyster Racks in Estuary with White Pelicans.

Treated Wood debris in Estuary on Shoreline

Oysters Bags in high tide zone with no live oysters.

Abandoned oyster bag with vegetation growing through it.

Don Neubacher
04/30/2007 05:01 PM

To: "Sonke Mastrup" <SMastrup@dfg.ca.gov>
cc:
Subject: Re: Oysters

Sonke, any update on the letter? Thanks for the help.

Don

"Sonke Mastrup" <SMastrup@dfg.ca.gov>

"Sonke Mastrup" <SMastrup@dfg.ca.gov>
02/04/2007 06:36 PM

To: <Don_Neubacher@nps.gov>
cc:
Subject: Re: Oysters

I will ask Joe

-----Original Message-----
From: <Don_Neubacher@nps.gov>
To: Mastrup, Sonke <SMastrup@dfg.ca.gov>
Creation Date: 2/2 3:49 pm
Subject: Oysters

Sonke, I really hate to bother you, but are you still pondering sending us
a letter about the oysters operation in Drakes Estero. We are meeting with the Coastal Commission next week about the operation and they were asking the question about ownership of Drakes Estero. Joe has a draft letter.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Don Neubacher
12/05/2006 10:26 AM

To: "Angela Howe" <AHowe@dfg.ca.gov>
cc:
Subject: Re: Conference Call with NPS

I have the number. Thanks.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
"Angela Howe" <AHowe@dfg.ca.gov>

"Angela Howe" <AHowe@dfg.ca.gov>
12/05/2006 10:04 AM PST

To: <Don_Neubacher@nps.gov>
cc:
Subject: Re: Conference Call with NPS

Hi Don,
the appointment was for 12/12 - I am not sure what happened. Sonke and Joe Milton have it for 12/12 - so disregard the appointment for today and leave it for 12/12 at 10:00. Did you get the call in number? If not, it should be in the attached.

I apologize for any inconvenience and please let me know if you have any other problems.

Angela

>>> <Don_Neubacher@nps.gov> 12/5/2006 9:25 AM >>>
Angela, I saw the conference call date on your note was 12/5 with NPS.
Sonke and I agreed to 12/12. See below.

I don't have Ralph Mihan set up for today.

Don

Don Neubacher

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

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----- Message from "Angela Howe" <AHowe@dfg.ca.gov> on Mon, 04 Dec 2006 11:50:42 -0800 -----

To: "Gary Stacey" <GStacey@dfg.ca.gov>, "Joe Milton" <Jmilton@dfg.ca.gov>, "Sonke Mastrup" <SMastrup@dfg.ca.gov>,<don_neubacher@NPS.gov>

cc: "Angela Howe" <AHowe@dfg.ca.gov>

Subject: Drakes Estero Call

"Angela Howe" has rescheduled this meeting

Begins:	Local Time
Ends:	Local Time
Title:	Drakes Estero Call
Location:	916-274-5714
Chair:	"Angela Howe" <AHowe@dfg.ca.gov>
To (required):	Jmilton@dfg.ca.gov, SMastrup@dfg.ca.gov, GStacey@dfg.ca.gov, Don Neubacher/PORE/NPS
cc (optional):	AHowe@dfg.ca.gov

Description

"Angela Howe" has rescheduled this meeting

Begins:	Local Time
Ends:	Local Time
Title:	Drakes Estero Call
Location:	916-274-5714
Chair:	"Angela Howe" <AHowe@dfg.ca.gov>
To (required):	Jmilton@dfg.ca.gov, SMastrup@dfg.ca.gov, GStacey@dfg.ca.gov, Don Neubacher/PORE/NPS
cc (optional):	AHowe@dfg.ca.gov

Description

Don Neubacher
11/17/2006 08:13 AM

To: "Sonke Mastrup" <smastrup@dfg.ca.gov>
cc:
Subject: Re: Oysters in Drakes Estero

Sonke, any chance to talk this afternoon. I have to go to a long meeting this morning or on Monday or Tuesday.

Thanks. Hope all goes well.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
"Sonke Mastrup" <smastrup@dfg.ca.gov>

"Sonke Mastrup" <smastrup@dfg.ca.gov>
11/01/2006 02:51 PM PST

To: <Don_Neubacher@nps.gov>
cc:
Subject: Re: Oysters in Drakes Estero

ok, I'm on a call right now.

>>> <Don_Neubacher@nps.gov> 11/01/06 12:13 PM >>>
Sonke,

If possible, give me a call about the oyster lease in Drakes Estero.
Jon
Jarvis, my boss, said you had talked.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

Ben Becker
04/12/2007 02:58 PM
PDT

To: Sarah Allen/PORE/NPS@NPS
cc: Don Neubacher/PORE/NPS@NPS
Subject: SF Bay eelgrass report

Report forwarded from Tom Moore....

looks like there is about 2,880 acres of eelgrass in SF Bay, so the ~750 acres we have in Drakes and the ~900 acres in Tomales are a significant proportion of what is left in the state. Also see table 3 on page 35 for a comparison of eelgrass in various estuaries (but Drakes is left out!)

Also, read Tom's note below on increase in eelgrass in Drakes since 1990. I think we would have to look closely at the methodology of the 1990 survey before accepting this premise.

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
ben_becker@nps.gov
www.nps.gov/pore/science.htm

The Pacific Coast Science and Learning Center is one of 17 centers across the country working to increase the effectiveness and communication of research and science results in the national parks through:

- Facilitating the use of parks for scientific inquiry
- Supporting science-informed decision making
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

---- Forwarded by Ben Becker/PORE/NPS on 04/12/2007 02:50 PM ----

"Tom Moore" <tmoore@dfg.ca.gov>
04/11/2007 03:03 PM
MST

To: <Ben_Becker@nps.gov>
cc:
Subject: Re: State eelgrass

Ben,

I have attached a report for SF Bay but it lists other bay and their acreage and percent cover (of bay area). It doesn't include Drakes Estero however.

What is clear from the eelgrass layers you gave me is that eelgrass has greatly increased in area and extent in Drakes Estero from 1991 to 2007 (in other Calif. bays also in late 90s and early 2000). If you look at rack placement in the Estero with respect to eelgrass 1991 distribution you can see that the racks were placed initially outside the eelgrass areas in the Estero. This was planned since there was an eelgrass set aside area in between the two

parcels.

Eelgrass distribution can change quickly. Merkel and Assoc. and also DFG saw large declines in distribution and percent cover (within beds) this year in SF Bay.

Cheers,

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator/
SF Bay Herring Gillnet Fishery Manager
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 875-4269 FAX
tmoore@dfg.ca.gov

>>> <Ben_Becker@nps.gov> 4/11/2007 11:28 AM >>>
Thanks Tom,

As you might have guessed, we are interested in how the are of eelgrass in Tomales and drakes Estero compares to the total eelgrass in california.

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
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- Promoting resource stewardship through partnerships

		"Tom Moore" <tmoore@dfg.ca.gov>
		04/10/2007 05:18

PM MST

To: <Ben_Becker@nps.gov>

cc:

Subject: Re: State eelgrass

Ben,

Yes, I need to dig a bit though for a recent/edited version. My version has some errors for a number of the bays and eelgrass has increased in many locations since late 90s and into 2000s.

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator/
SF Bay Herring Gillnet Fishery Manager
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 875-4269 FAX
tmoore@dfg.ca.gov

>>> <Ben_Becker@nps.gov> 4/10/2007 3:27 PM >>>
Tom,

Have you ever seen an estimate of total eelgrass acreage for the state, northern CA, Bay Area, or anything like that?

thanks,

-Ben

Ben Becker, Ph.D.
Director and Marine Ecologist
Pacific Coast Science and Learning Center
Point Reyes National Seashore
Point Reyes Station, CA 94956

tel: 415-464-5247
fax: 415-868-1202
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- Facilitating the use of parks for scientific inquiry
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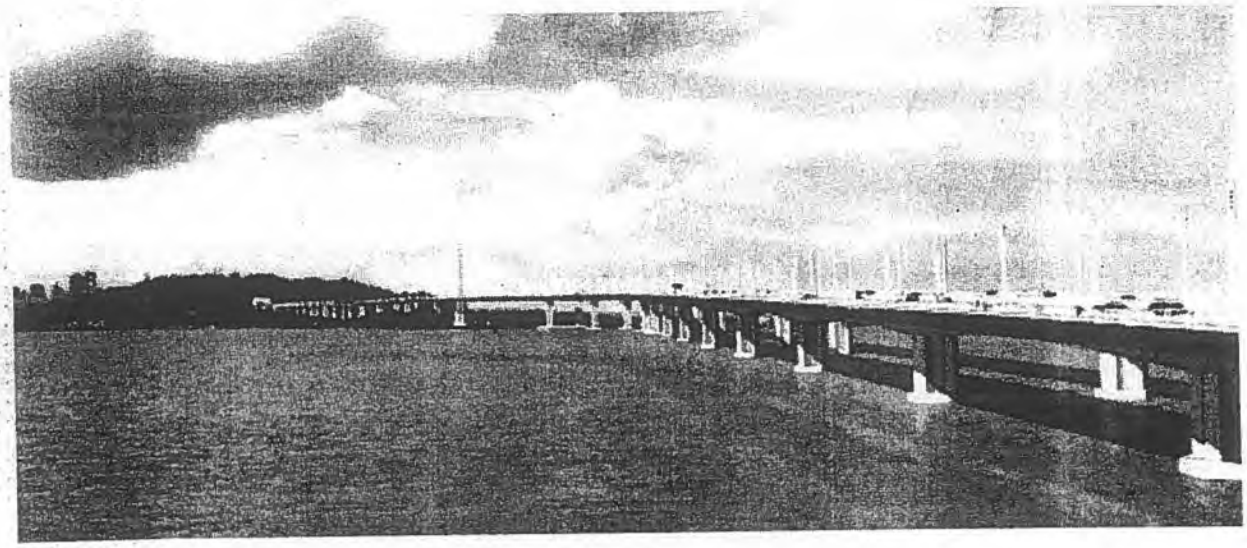
- Communicating relevance and providing access to research knowledge
- Promoting resource stewardship through partnerships

Baywide Survey Report.pdf

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

Baywide Eelgrass (*Zostera marina* L.) Inventory in San Francisco Bay:
Pre-survey Screening Model and Eelgrass Survey Report

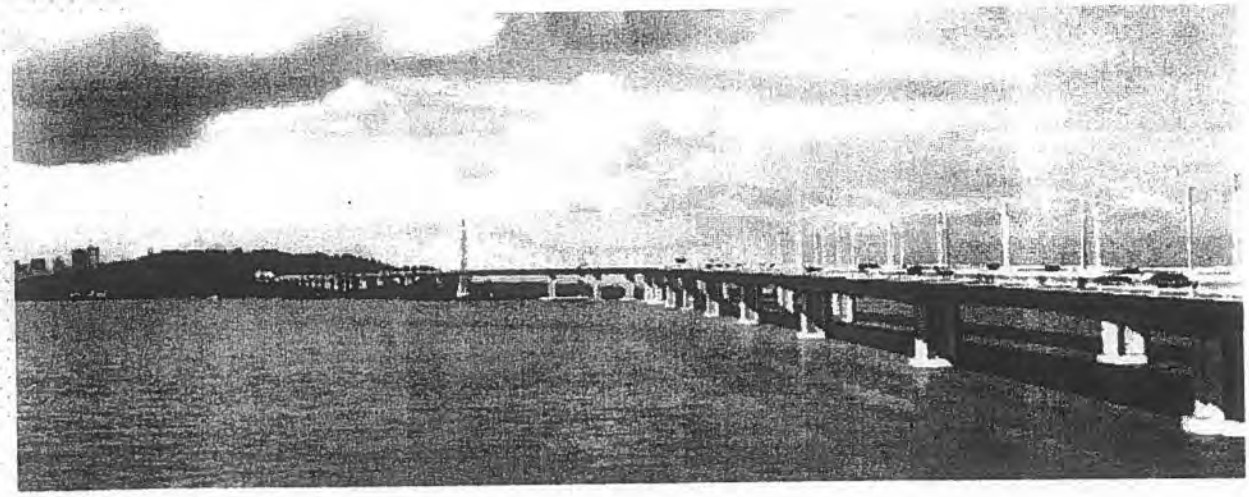
April 2004



EA 012041
04-SF-80 KP 12.2/KP 14.3
04-ALA-80 KP 0.0/KP 2.1

San Francisco – Oakland Bay Bridge
East Span Seismic Safety Project

Baywide Eelgrass (*Zostera marina* L.) Inventory in San Francisco Bay: Pre-survey Screening Model and Eelgrass Survey Report



Prepared by

Keith W. Merkel
Merkel & Associates, Inc.

Reviewed by

Ivy Edmonds-Hess
Parsons Brinckerhoff Quade & Douglas, Inc.

Approved by

Mara Melandry
Caltrans District 4

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BACKGROUND

As an element of the environmental mitigation required to compensate for impacts to eelgrass habitat from the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project), the California Department of Transportation (Caltrans) has committed to funding a Baywide Eelgrass Inventory and Resource Management Research Program (program). Construction activities for the East Span Project will impact eelgrass habitats as a result of both permanent bridge footprint and shading effects as well as temporary construction activities. In order to mitigate these impacts, and to provide the information necessary to manage eelgrass and other subtidal habitats throughout San Francisco Bay (Bay), Caltrans has been required to undertake a multi-element mitigation program that includes habitat restoration on-site and off-site as well as a commitment to fund the present $1 million eelgrass inventory and resource management research effort. Caltrans and the National Oceanic and Atmospheric Administration (NOAA) Fisheries jointly hold the management responsibility over the inventory and research program.

This program is intended to identify and map existing eelgrass beds and identify conditions under which eelgrass can occur throughout the Bay. In addition, the program is designed to document eelgrass resource benefits, identify current eelgrass stressors, and outline opportunities for enhancement of eelgrass communities within the Estuary. The results of the program will facilitate management of eelgrass habitat resources in the Bay by providing additional information on the status, distribution, growth limiting factors, and ecological benefits of eelgrass within this highly dynamic ecosystem.

This program will add to the resource management goals that were developed for the San Francisco Bay Area Wetlands Ecosystem Goals Project. The Goals Project (1999) was created by scientists and resource managers as a guide for restoring and improving the habitats in San Francisco Bay (for the purposes of the current report, the term "Bay" has been used to describe the entire Estuary). While the Goals Project was a major advancement in developing a cohesive strategy for sustaining diverse and healthy ecosystems in the Bay, it focused principally on "baylands" (lands within boundaries of the tides) and not subtidal marine habitats. In fact, eelgrass beds were the only subtidal habitat for which any management recommendations were made in the Goals Project. While the Goals Project provided general management goals for eelgrass, these were not developed to the extent that goals were developed for baylands. Due to a lack of well-defined goals for subtidal habitats, NOAA Fisheries along with other resource and regulatory agency partners are developing the subtidal habitat goals for the Estuary that will complement the baylands Goals Project. The present eelgrass program is anticipated to substantially support the subtidal habitat goals effort either as a critical reference, or a major component of the work.

Some of the major challenges facing the development of subtidal habitat goals for the San Francisco Estuary include the general lack of information on the extent, distribution, persistence and even the values of the Bay's subtidal habitats over spatial and temporal scales. Absent an understanding of the habitat resources to be managed, it is not possible to effectively implement management measures that result in enhancements to the ecosystem. Although the Goals Project identified approximately 8,100 hectares (20,000 acres) of deep and shallow bay habitats that have been lost since the 1800's as a result of bay fill and sediment deposition, the relationship of these losses to eelgrass habitat remains largely unknown.

A large-scale survey of eelgrass in San Francisco Bay was completed over 15 years ago in 1987 (Wyllie-Echeverria and Rutten 1989) and, due to the advances in survey technology over the past decade, more accurate surveys and mapping are now possible. In addition, while previous studies have addressed environmental factors such as light on the growth of eelgrass in the Estuary

(Zimmerman et al 1991 and 1995), the multiple and complex environmental factors that influence eelgrass distribution are not well documented. For these reasons, a Baywide survey of eelgrass will fill in the information gap much-needed to preserve this critical biological resource.

EELGRASS INVENTORY AND PREDICTIVE HABITAT MODELING GOALS

The goals of this program element are to conduct a comprehensive baywide eelgrass survey, to classify existing beds by environmental characteristics, and to provide a model of predictive physical environmental characteristics for eelgrass in the Bay. In order to accomplish these goals, the following major tasks will be completed: 1) perform pre-survey screening of San Francisco Bay; 2) collect data on the distribution and physical parameters of existing eelgrass beds using aerial and acoustic survey techniques, and; 3) analyze and model the physical environmental characteristics governing eelgrass bed distribution throughout the Bay. This report documents the development and application of a pre-survey screening model to identify areas within which eelgrass surveys are required. In addition, this report documents the results of eelgrass surveys completed during the summer and early fall of 2003. In order to complete a predictive eelgrass model for San Francisco Bay, the results of the 2003 eelgrass survey will be applied to the pre-survey screening model and existing eelgrass habitats will be classified based on their environmental conditions.

EELGRASS RESOURCES

Eelgrass (*Zostera marina* L.) is the most widely distributed marine angiosperm in the Northern Hemisphere (den Hartog 1970). It is a native plant indigenous to the soft-bottom bays and estuaries of the Northern Hemisphere and occurs along the Pacific coast of North America from the Bering Straits down to lower Baja California. Eelgrass is considered to be a habitat forming species that creates unique biological environments when it occurs in the forms of submerged or intertidal aquatic beds or larger meadows. As submerged aquatic beds, eelgrass is given special status under the Clean Water Act, 1972 (as amended), Section 404(b)(1), "Guidelines for Specification of Disposal Sites for Dredged or Fill Material," Subpart E, "Potential Impacts on Special Aquatic Sites."

Eelgrass beds are important ecological communities of shallow bays and estuaries because of the multiple biological values that they provide. Eelgrass is a major source of primary production in nearshore marine systems, supplying the base of detrital-based food webs. In addition, several organisms directly graze upon it, thus contributing to the system at multiple trophic levels. For example, eelgrass is particularly important to certain waterbirds that feed directly on the plants, as well as a number of species that make a diet of both the eelgrass plants and the epiphytic growth that occurs on the leaf tissues. Black brandt, a migratory bird species that frequents the Bay, is almost exclusively dependent upon eelgrass as a food resource. Eelgrass beds are also a source of secondary production and can have up to 15% greater secondary production (Heck *et al.* 1995) and greater species richness (Orth *et al.* 1984, Zieman and Zieman 1989) than mudflats, sandflats, and marshes. They function as habitat and nursery areas for commercially and recreationally important open ocean marine fish and invertebrates, and provide critical structural environments for resident bay and estuarine species (Hoffman 1986). Eelgrass beds provide habitat for juvenile fish (Boström and Bonsdorff 2000), including juvenile salmon in the Pacific Northwest (Simenstad 1994). In addition to habitat and resource provisions, eelgrass also traps and removes suspended particulates, improving water clarity, tends to reduce erosion by stabilizing the sediment (Ward *et al.* 1984), cycles nutrients, and generates oxygen during daylight hours.

Not only does eelgrass provide high intrinsic values as a habitat but also it can be an indicator of estuarine health because it responds to environmental factors by changing in distribution and abundance (Thom *et al.* 1998, Hovel 2003, Merkel 1992, 1997, 2000, 2003a and 2003b). Eelgrass is

adapted to a wide range of tolerances and is capable of "averaging" exposure conditions including temperature, turbidity, seasonal light levels, sedimentation rates, etc., to result in either positive growth or a gradual decline in the resource.

There are a number of factors that can influence the distribution of eelgrass, including light regime, substrate type, water temperature, and hydrodynamics of the environment (Biebl and McRoy 1971, Backman and Barilotti 1976, Williams and McRoy 1982, Fonseca *et al.* 1983, Phillips and Backman 1983, Phillips 1984, Dennison and Alberte 1985, Marsh *et al.* 1986, Bulthuis 1987, Dennison 1987, Fonseca and Kenworthy 1987, Thom and Albright 1990, Zimmerman *et al.* 1990, 1994, Moore *et al.* 1993, Masini *et al.* 1995, Merkel 2000, 2003, Koch 2001). The availability of light constrains eelgrass at the lower depth limits (Heminga and Duarte 2000, Krause-Jensen *et al.* 2000), whereas the upper limits of eelgrass distribution are mostly constrained by wave action (Krause-Jensen *et al.* 2000) and desiccation stress at low tides (Phillips 1984). In addition, it has been demonstrated that biological controls including epiphytic growth, spatial competitors such as benthic algae, and bioturbation can also have a substantial effect on the growth and distribution of eelgrass (Merkel 1990, Sand-Jensen 1977).

Eelgrass abundance has declined worldwide over the past 20 to 30 years due to increased anthropogenic effects (Short and Wyllie-Echeverria 1996). However, it is unclear whether this trend has occurred in San Francisco Bay. In the late 1920s, eelgrass was reported as an abundant species along the shores of the Bay (Setchell 1929). In 1987, about 60 years later, a survey of the Bay revealed only 128 hectares (316 acres) (0.1 percent total bay bottom coverage) of eelgrass throughout the Bay, with much of the existing habitat exhibiting conditions of environmental stress (Wyllie-Echeverria and Rutten 1989, Wyllie-Echeverria 1990). However, most of the regions specifically identified by Setchell as supporting eelgrass continue to support eelgrass today and what was meant by "abundant" in the late 1920's remains unclear.

Notwithstanding the inability to document changes in eelgrass through recent history, there is reason to believe that existing eelgrass beds may be much reduced from its historical distribution range. Most of the documented Bay loss has occurred within the shallow bay fringes to which eelgrass is restricted. Further, watershed sediment loading from the Delta as well as bay dredging have taken their toll on eelgrass resources of the Bay. As a result of activities such as these, light attenuation through San Francisco Bay waters is extremely high relative to most other bay and estuarine systems of California. Because eelgrass distribution in the Bay is controlled by light availability more so than in other known systems (Zimmerman *et al* 1990, 1994), light limitation is likely the primary limiting factor for eelgrass within the Bay.

Although eelgrass coverage in the Bay may be reduced from historic levels, conditions may not be as bleak as thought after the completion of the 1987 eelgrass inventory (Wyllie-Echeverria 1990, Wyllie-Echeverria and Rutten 1989). In October 1996, eelgrass surveys using sonagraphic techniques from Richmond Harbor to just north of Point San Pablo for two separate U.S. Army Corps of Engineers project studies were conducted (SAIC and Merkel 1997a, 1997b). In these surveys, 195.5 hectares (483 acres) of eelgrass were identified over this short stretch of shoreline alone. Additionally, subsequent surveys have identified eelgrass in numerous locations where it has not previously been known to occur, including along the Oakland and Alameda waterfronts, along portions of the Marin Peninsula, within San Leandro Bay, and at other smaller locations (Merkel 1999, 2000, 2003, and unpublished data). These data suggest either that a significant expansion of eelgrass habitat has occurred since 1987 or that improved survey techniques are allowing for greater detection and improved mapping than was possible using prior techniques. An earlier analysis of these data suggests that it is likely that both changes in eelgrass beds and improvements in survey

techniques are a factor in the differences between the 1987 and 1996 surveys (Thompson *et al.* 1997).

In addition to a general paucity of eelgrass, the beds that do exist in San Francisco Bay are extremely dynamic. In repeated surveys of eelgrass beds at Point Molate, the Richmond Harbor training wall, and the Emeryville Flats, eelgrass density and abundance was noted to fluctuate significantly from year to year (Merkel 1997a, 2001). This annual variability in eelgrass appears to be related to Bay turbidity levels or even average climatic conditions within marginally suited environments. While there has not been a significant amount of rigorous monitoring of eelgrass in the Bay, at least some of the high variability appears to be related to large-scale episodic events that influence the distribution of freshwater and sediments in the Bay (Merkel 2001 and additional unpublished data). Recent studies have demonstrated that dynamism in eelgrass beds is common in many areas. For example, eelgrass above-ground biomass and shoot density can vary by as much as 500% over two years at the same site in Willapa Bay, Washington as a result of environmental fluctuations and human disturbance (Thom *et al.* 2003). In Southern California, the onsets of El Niño Southern Oscillations (ENSO) result in substantial declines in eelgrass with recovery of beds occurring under subsequent La Niña periods (Merkel 2000).

PRE-SURVEY SCREENING

San Francisco Bay consists of approximately 100,000 hectares (250,000 acres) of subtidal and intertidal habitat. The intent of the current program was to provide a complete inventory of all eelgrass resources within the Bay. Thus, the entire area of the Bay was considered and analyzed for the potential to support eelgrass habitat. In order to survey all of the Bay for eelgrass using acoustic survey techniques, over three years of fieldwork would be required along with a survey budget that vastly exceeds available resources. However, much of the area of the Bay is not suitable for eelgrass growth and by eliminating regions based on an initial analysis of suitable water depth ranges the area of potential eelgrass habitat was reduced to approximately 24,000 hectares (60,000 acres). Because the duration of work to survey this amount of area would still be prohibitively expensive and would extend through multiple seasons, an effort was made to further reduce the survey area. In order to use available resources most efficiently, a pre-survey screening model was developed for the Bay to exclude areas from survey that lack suitable conditions to support eelgrass. This model-based screening effort reduced the survey area to that area which was considered to potentially support eelgrass. The resulting survey area could be surveyed within the summer/early fall period of peak eelgrass abundance and reduced the cost of the field surveys to a manageable budget amount.

The pre-survey screening made use of existing physical data in a multiple ecological limits model in order to determine the suitable areas for eelgrass growth within the Bay. In order to capture all areas of suitable environments for eelgrass growth within the study area and avoid an inadvertent discard of potentially suitable areas, the pre-survey screening model used broadly defined limits for included physical parameters. Modeling methodology is discussed in more detail in a following section of this document.

STUDY AREA

The San Francisco Bay-Delta Estuary, which includes the waters of San Francisco Bay, San Pablo Bay, Suisun Bay and the Sacramento-San Joaquin River Delta, is located in the Oregonian zoogeographical province of California (McGowan 1971, Briggs 1974) and is the largest estuarine system on the West Coast of North and South America (Figure 1). The Bay can be divided into four subregions: Suisun Bay, North Bay, Central Bay, and South Bay. The study area for the program consists of 100,000 hectares (250,000 acres) of aquatic habitat and includes the waters of the Suisun subregion of the Sacramento-San Joaquin River Delta.

According to the Goals Project (1999), eelgrass exists at the intersection of baylands and the shallow waters of the Bay. Baylands are defined as those areas that exist between Mean Lower Low Water (MLLW) and the highest observed tide and shallow Bay exists between –5.5 meters (–18 feet) MLLW and MLLW. Eelgrass spans a narrow range of intertidal and subtidal that straddles the defined boundaries of these classifications. The defined survey area did not include a restriction on the lower depth limits; however, the upper limit was restricted at mean sea level (MSL), an elevation well above the natural limit where eelgrass is restricted by desiccation stress.

ENVIRONMENTAL PARAMETERS

Although there are several environmental parameters that affect the distribution of eelgrass beds, modeling for the pre-survey screening focused on a small set of parameters. The environmental parameters that were used to construct the pre-survey screening model were bathymetry, wind/wave-generated bottom shear, current speed, and water residence time (i.e., the time it takes for water to pass through the Bay) (Table 1). While a number of additional data sources were investigated, none of these data provided sufficient detail to add constituent parameters to the model at a pre-survey screening level. Although factors such as water temperature, salinity, nutrient levels, sediment grain size, pollutant levels and biological constraints could affect the growth and abundance of eelgrass, the hydrodynamic features used in the modeling served as helpful proxies for the physiological factors that affect eelgrass growth. In addition, the hydrodynamic data were readily modeled to provide high-quality spatial data with capacity for future model extension. Bottom shear, current speed, residence time, and bathymetry directly and indirectly control the location of eelgrass beds within the Bay. These four parameters primarily affect eelgrass distribution because they affect light availability, which is believed to be the major controlling factor of eelgrass distribution.

Table 1. Data sources and potential model parameters investigated for the pre-survey screening model

Data Type	Source	Used?
Bathymetry	NOAA/Merkel & Associates	Yes
30-day net current speed	Coast and Harbors Engineering (this study)	Yes
Wind/wave bottom shear	Coast and Harbors Engineering (this study)	Yes
Residence time	Coast and Harbors Engineering (this study)	Yes
Existing eelgrass beds	Merkel & Associates (1997, 1999a, 1999b, 2001, 2003)	Yes
	SAIC and Merkel & Associates (1997a, 1997b)	Yes
	NOAA/Wyllie-Echeverria and Rutten (1989)	Yes
Salinity	San Francisco Estuary Institute	No
	Conomos 1979	No

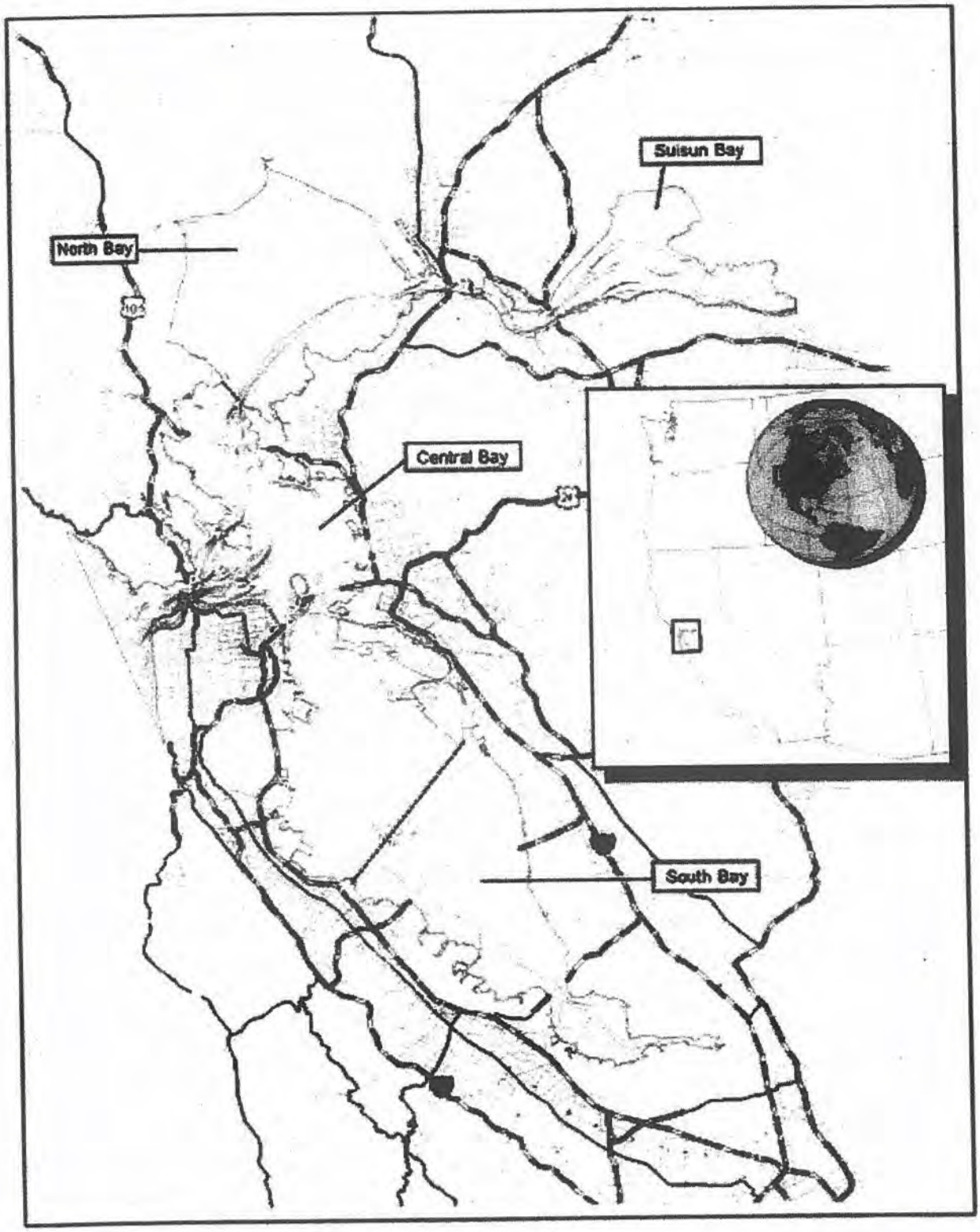

Figure 1. San Francisco Bay study area locator map showing regions adapted from the Goals Project (1999)

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MODEL FRAMEWORK

The modeling framework used for the pre-survey screening was the Ecological Limits, Viability, and Sustainability (ELVS) model. The ELVS model is a grid-based constituent factors habitat evolution model that was originally developed by Merkel & Associates, Inc. in order to make eelgrass habitat suitability predictions from bathymetric, hydrodynamic, and atmospheric data (Merkel & Associates 2000). The model uses a series of spatially-based mathematical models based on the coincidence of environmental tolerance ranges across multiple parameters to define environmental suitability for various habitats. The data layers for the model are managed through ESRI ArcView-Model Builder™ and Spatial Analyst™.

The current application of the ELVS model utilized bathymetry, wind/wave-generated bottom shear, current speed, and fluvial influence to populate input variables. These spatially explicit themes were then used to depict the range of environmental parameters affecting eelgrass distribution throughout the Bay.

Utilizing a coarse-grained model for the pre-survey screening ensured that all known eelgrass in the Bay would occur within areas to be surveyed. Environmental tolerance limits employed under the ELVS model were broad in order to account for uncertainties in input data and uncertainties with respect to San Francisco Bay eelgrass. An advantage of the ELVS modeling process is that model outputs can be re-inserted into the model to regenerate additional outputs. After field surveys have been completed, current eelgrass distribution and ranges of occurrence across environmental parameter gradients can be incorporated into the model to tighten the predictive range of the model.

All hydrodynamic data used in the current ELVS model were derived through modeling performed by Coast & Harbors Engineering. Baywide wind-wave growth and transformation modeling was performed on three independent domains covering San Francisco Bay: South, Central and North Bay domains. The three domains were built using the same set of composite bathymetry data compiled from various sources (NOAA 1930-1999, Merkel & Associates, Inc., U.S. Army Corps of Engineers). In order to calculate wave-influenced hydrodynamics, wind data were input to an STWAVE model (Smith et al., 2001), a steady-state, 2-dimensional spectral wind-wave growth and transformation model. The STWAVE model considers a range of periods and directions in order to simulate depth-induced wave refraction and shoaling, current-induced refraction and shoaling, depth- and steepness-induced wave breaking, diffraction, wind-wave growth, and wave-wave interaction and whitecapping (Smith et al 2001). STWAVE model output includes significant wave height, peak period, and peak direction.

MODEL PARAMETERS

Shoreline

In order to construct the framework of the ELVS model, a data layer of the shoreline of San Francisco Bay (UTM Zone 10 NAD 83 reprojected to State Plane Zone 3) was collected from the San Francisco Bay Estuary Institute (www.sfei.org). These data were developed through the Coastal Protection & Restoration Division (CPRD) database mapping project for the San Francisco Bay watershed and mapping project. These shoreline data were slightly modified for use in the pre-survey screening model by aligning the data with existing bathymetric contours and using recent registered aerial photographs to correct various shoreline errors.

Bathymetry

Bathymetry (bottom depth) has a direct effect on eelgrass presence because light at the bottom is affected by attenuation through the water column. In addition, bottom sediment resuspension by wave action is related to water depth. The bathymetry data layer used in the current ELVS model was a combination of data collected from NOAA and current survey data collected by Merkel & Associates, Inc. (Figure 2). The bathymetric data were received as point data and in order to be used in the ELVS model were transformed into a triangular irregular network (TIN), which creates a continuous surface. Because the distance between the bathymetric data points varied, data were interpolated between points in order to create a regular 10-meter (33-foot) grid. The bathymetric values included in the model ranged from 5 meters (16 feet) above sea level to –117.5 meters (385.5 feet) MLLW. Values defining the bathymetric range for eelgrass within San Francisco Bay ranged from -2.75 to 0.5 meters (-9 to 1.6 feet) MLLW.

Wind/wave Bottom Shear

Wind/wave bottom shear was included in the model because it is a measure of water movement at the sediment surface, which influences re-suspension of bottom particles and available light levels (Figure 3). In order to calculate wind-generated hydrodynamics, wind records from Alameda Naval Air Station (NAS) from 1998-2002 were evaluated. From these data average daily winds were calculated and used in wind wave modeling. A steady-state wind condition was used for wind-wave growth and transformation modeling. Wind speeds were calculated as an average of 255° to 315°, which represents 40 percent of wind measured at Alameda NAS (1945-1996). Within this data set, winds were from the West (255° to 285°) 23.8 percent of the time and from the Northwest (285° to 315°) 14.2 percent of the time. In order to correct for the differences in wind direction, bottom shear was adjusted by appropriate proportional multipliers (0.238 or 0.142) and then averaged.

Waves were developed using the Wave Parameter Generator (WPG) model. The WPG is a 2-dimensional general post-processor model (Coast & Harbor Engineering) that reads wave fields (height, period, depth, direction) as input and calculates various desired scalar and vector wave parameters. Model output is calculated using linear (Airy) wave theory in the absence of currents and includes wave bottom orbital velocity, wave bottom shear, wave bottom orbital amplitude and wave number. The values of bottom shear included in the model ranged from 0 to 5,152.25 pascals and the bottom shear considered acceptable for eelgrass growth based on existing eelgrass distribution ranged from 0 to 10 pascals.

Current Speed

Current speed influences light availability to eelgrass by affecting sediment resuspension. Low current speeds keep light levels high because sediment particles are not resuspended into the water column and high current speeds keep light levels high by removing resuspended particles. Thirty-day net current speeds (in meters/second) were used as input parameters for the ELVS model (Figure 4) where current speed was calculated as the hypotenuse of the triangle formed between the U (positive east) and V (positive north) vectors (horizontal coordinate CA State Plane NAD 83 Zone 3). The values of current speed included in the model ranged from 0 to 1.449 meters/second and the current speeds considered acceptable for eelgrass growth ranged from 0 to 0.896 meters/second.

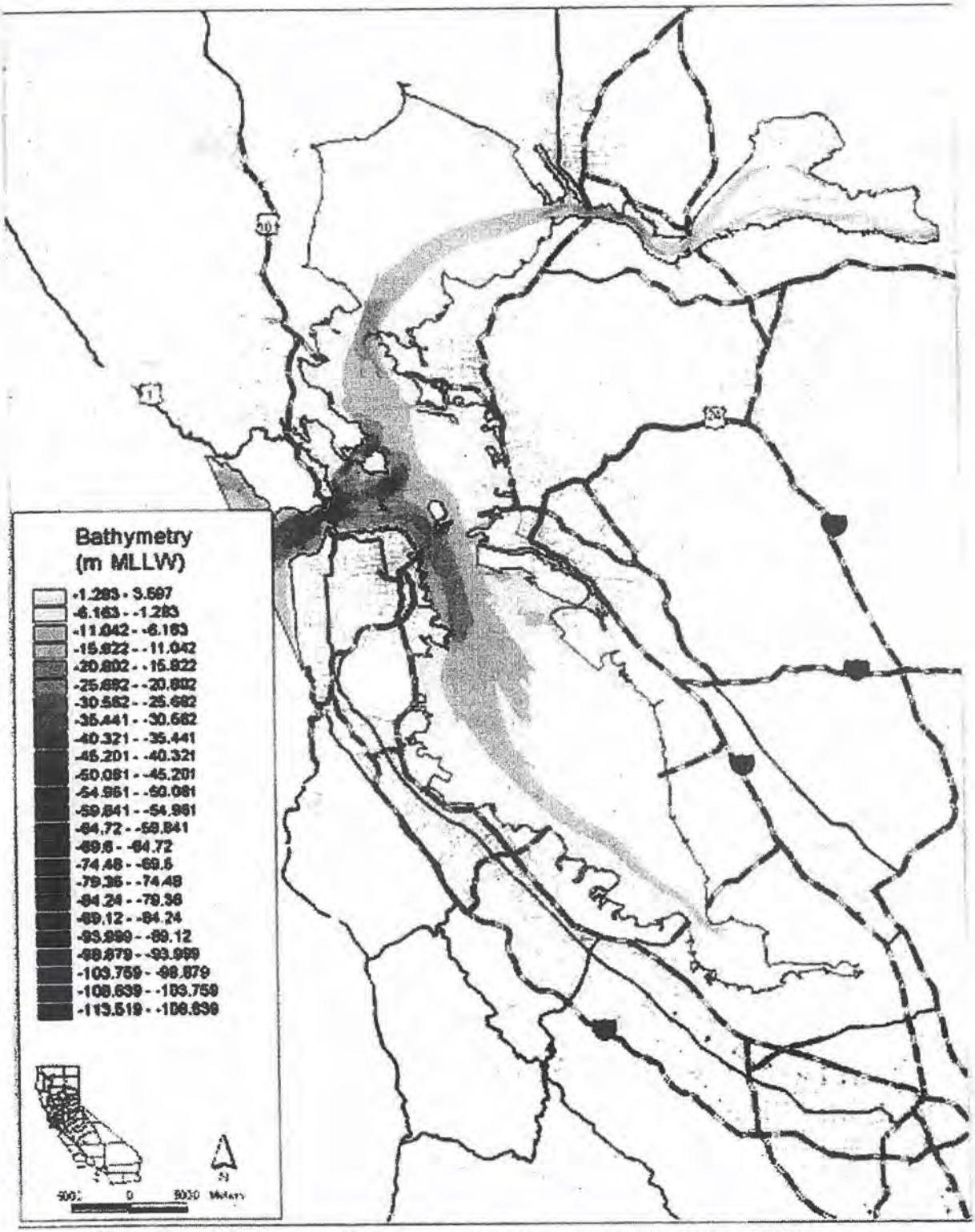

Figure 2. Bathymetry of San Francisco Bay collected from Merkel & Associates, Inc. and NOAA

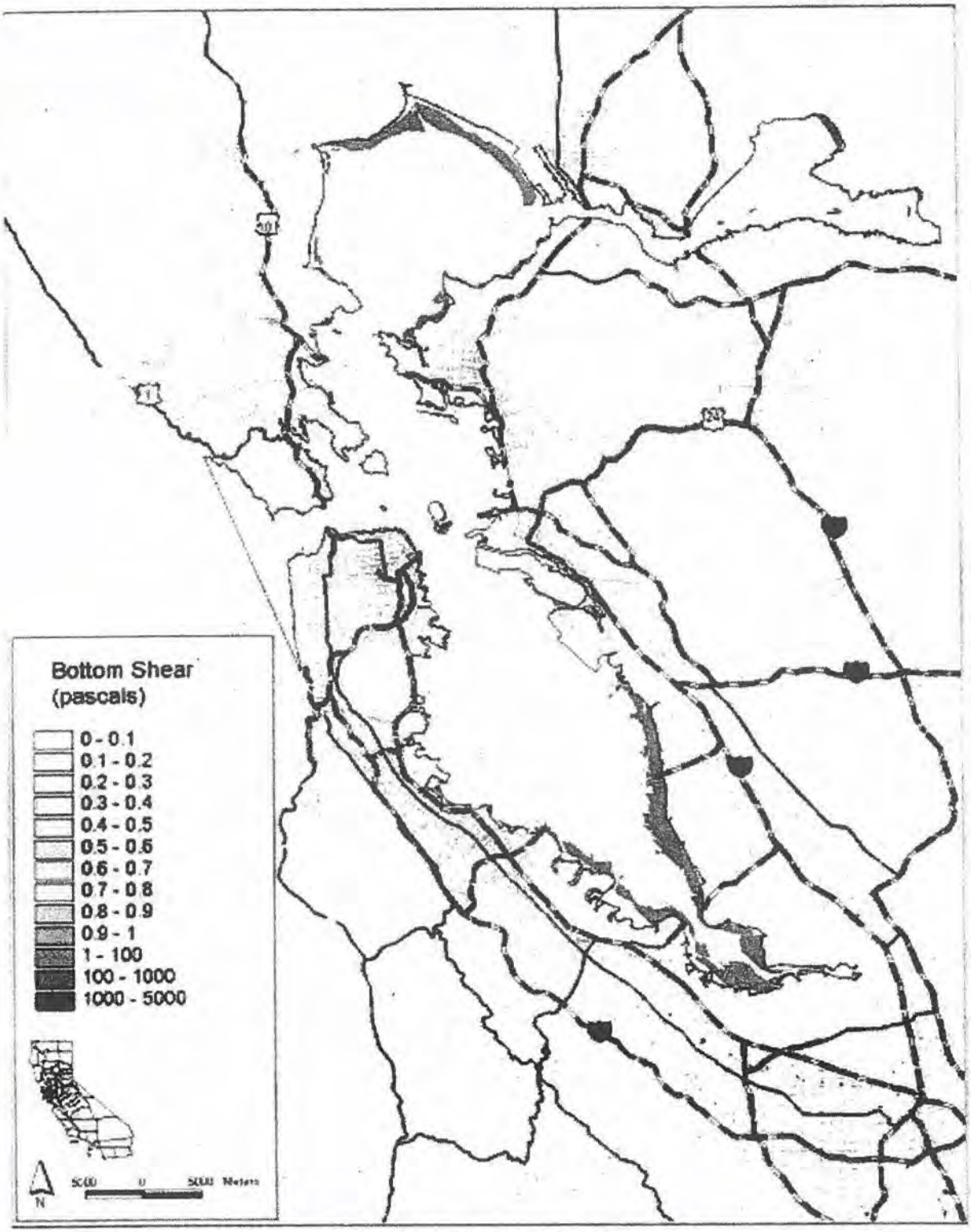

Figure 3. Predicted wind/wave bottom shear in San Francisco Bay.

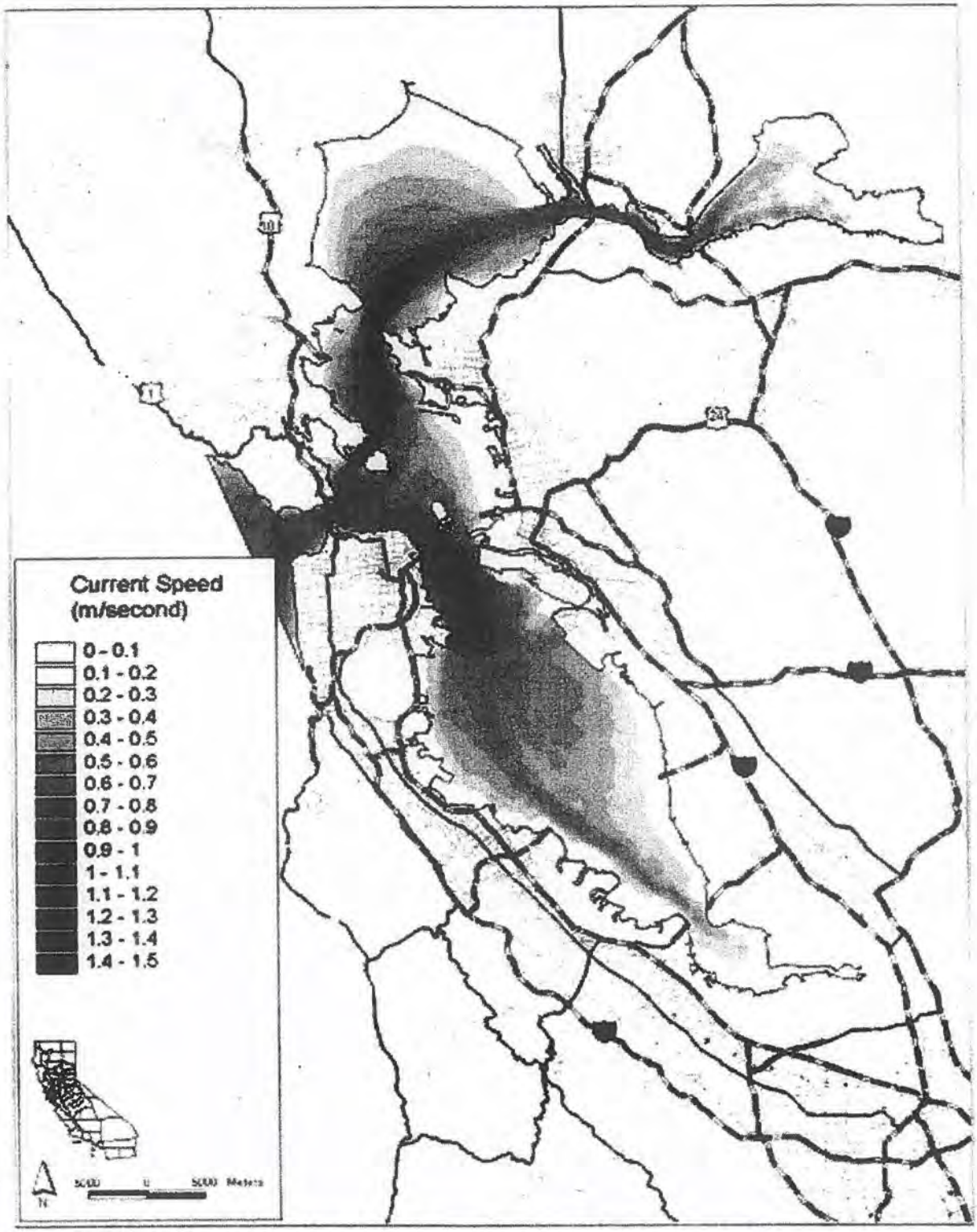

Figure 4. Predicted 30-day net current speed in San Francisco Bay.

Fluvial Influence

Streams and rivers provide for net import of suspendable sediments to the Bay and provide a significant load of suspended sediment to the water column. The concentration of suspended particles that originated from a freshwater source was not known for pre-survey screening modeling; however, an equilibrium concentration gradient was developed throughout the Bay by setting the concentration of river flows equal to one and the concentration of the Pacific Ocean equal to zero and allowing circulation models to run to a state of equilibrium (Figure 5). There were only three freshwater sources used in the fluvial influence model: the Sacramento River, the Napa River, and Coyote Creek. After achieving equilibrium, the concentration of suspended sediment in each grid cell of the model was calculated and regions of the Bay were assigned a value of fluvial influence.

RUNNING THE MODEL

In order to process the raw bathymetry, current speed, bottom shear, and fluvial influence data each of these parameters was processed into a TIN and then a grid yielding a continuous queriable surface of 10-meter (33-foot) grid cells using ESRI's ArcView 3.x-Spatial Analyst™ extension. Every cell within the resulting grid had a value, which was the product of the input parameters.

Existing Eelgrass Beds

Adjustments to the model were made to ensure good predictive capacity relative to known conditions by calibrating it against the known distribution of eelgrass throughout the Bay. The most conservative tolerance limits for eelgrass were employed in the ELVS model in order to ensure that all eelgrass present in the Bay was included within proposed survey areas. In order to ascertain the values of each environmental parameter that characterized eelgrass beds throughout the Bay, a map of existing eelgrass beds was used as a base layer of the model (Figure 6). This map of the distribution of known existing eelgrass beds throughout the Bay was compiled from SAIC and Merkel & Associates (1997a and 1997b), Merkel & Associates (1999a), and NOAA (Wyllie-Echeverria and Rutten 1989). Hydrodynamic parameters were overlaid onto the eelgrass map in order to calculate the values of the parameters that occurred within known eelgrass beds. These values provided boundaries for determining where eelgrass was expected to occur (Figures 9, 10, 11, and 12).

Parameter Suitability Index

In order to combine the different units of bathymetry, current speed, bottom shear, and fluvial influence, these parameters were combined into submodels (Figure 7). However, before these parameters were combined, values outside the acceptable range of eelgrass occurrence were removed. Bottom shear and current speed were combined to form a submodel termed "turbidity" and bathymetry and fluvial influence were combined to form "residence time". Parameter normalization of the submodels was accomplished by calculating a Parameter Suitability Index (PSI). The PSI was calculated by breaking each parameter into 64 equal range classes (the maximum available in ArcView-Spatial Analyst™) and then calculating the percent of known eelgrass captured by each class. For example, if a range class captured 23% of existing eelgrass, the PSI for this class was 0.23 and the sum of all PSI in each parameter was 1.0. The PSI submodels, along with bathymetry, were overlaid on a map of known eelgrass beds in order to calculate the probability of eelgrass occurrence within a cell of known environmental conditions.

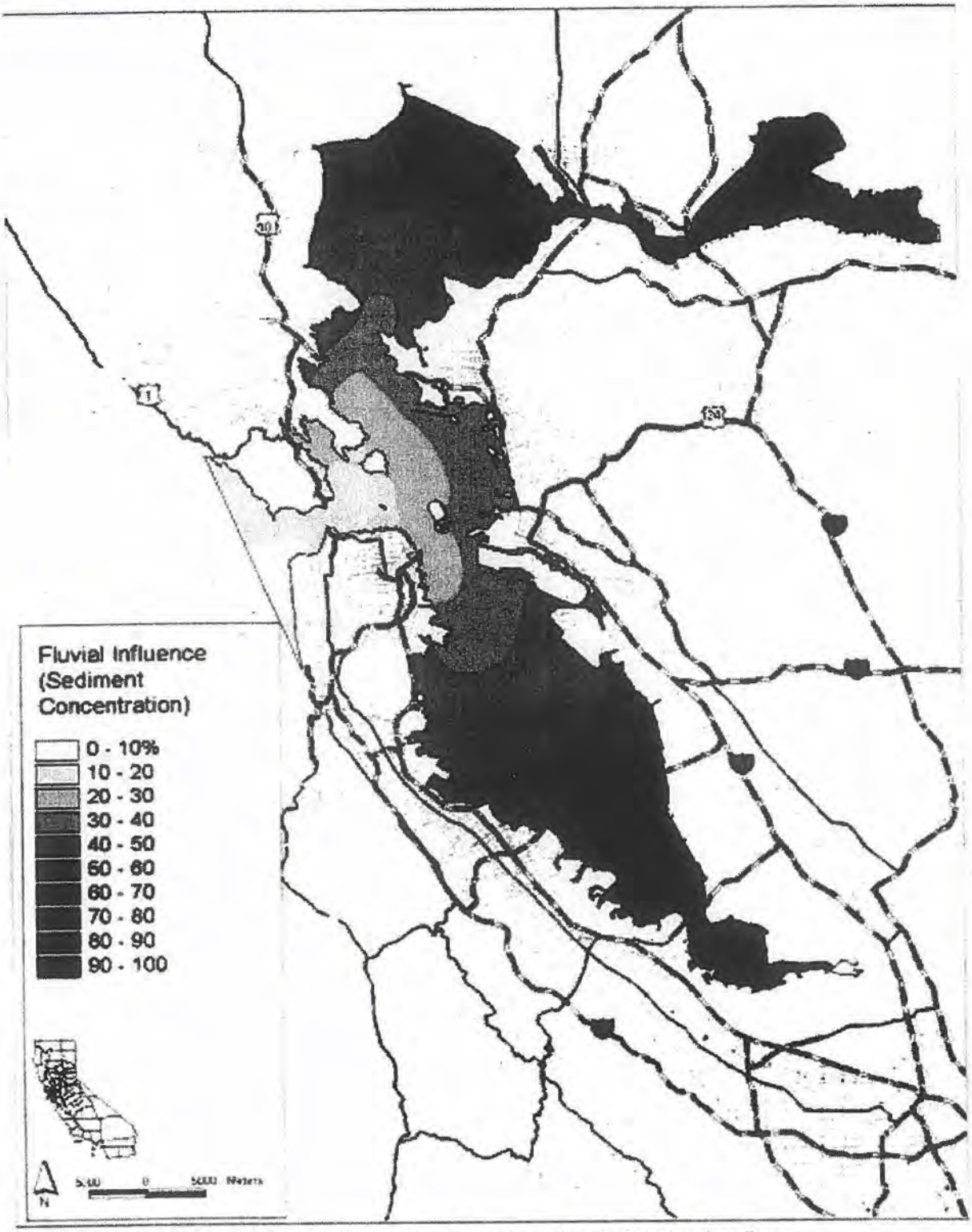

Figure 5. Predicted relative fluvial influence (sediment concentration) in San Francisco Bay.

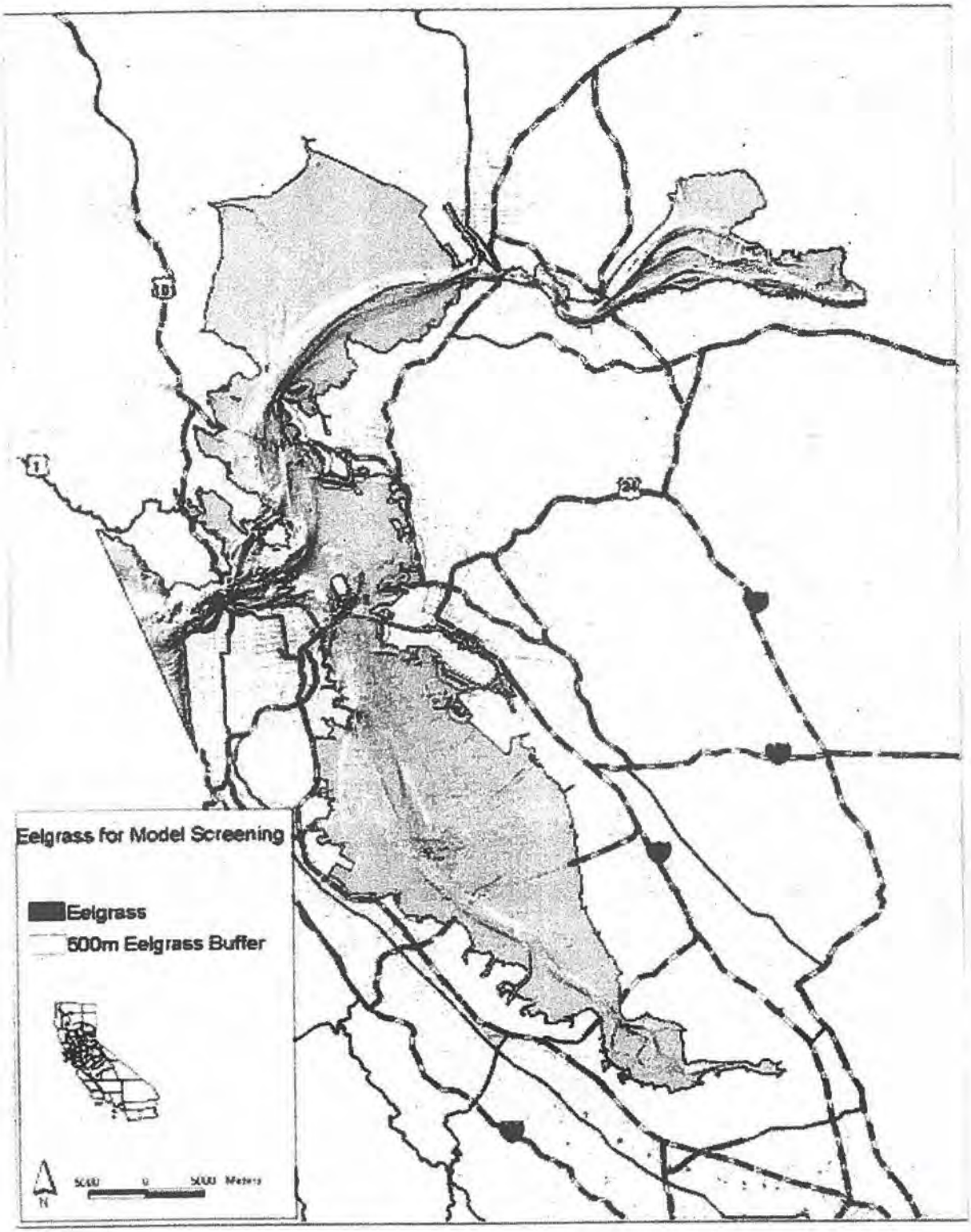

Figure 6. Known existing eelgrass distribution in San Francisco Bay prior to 2003 survey

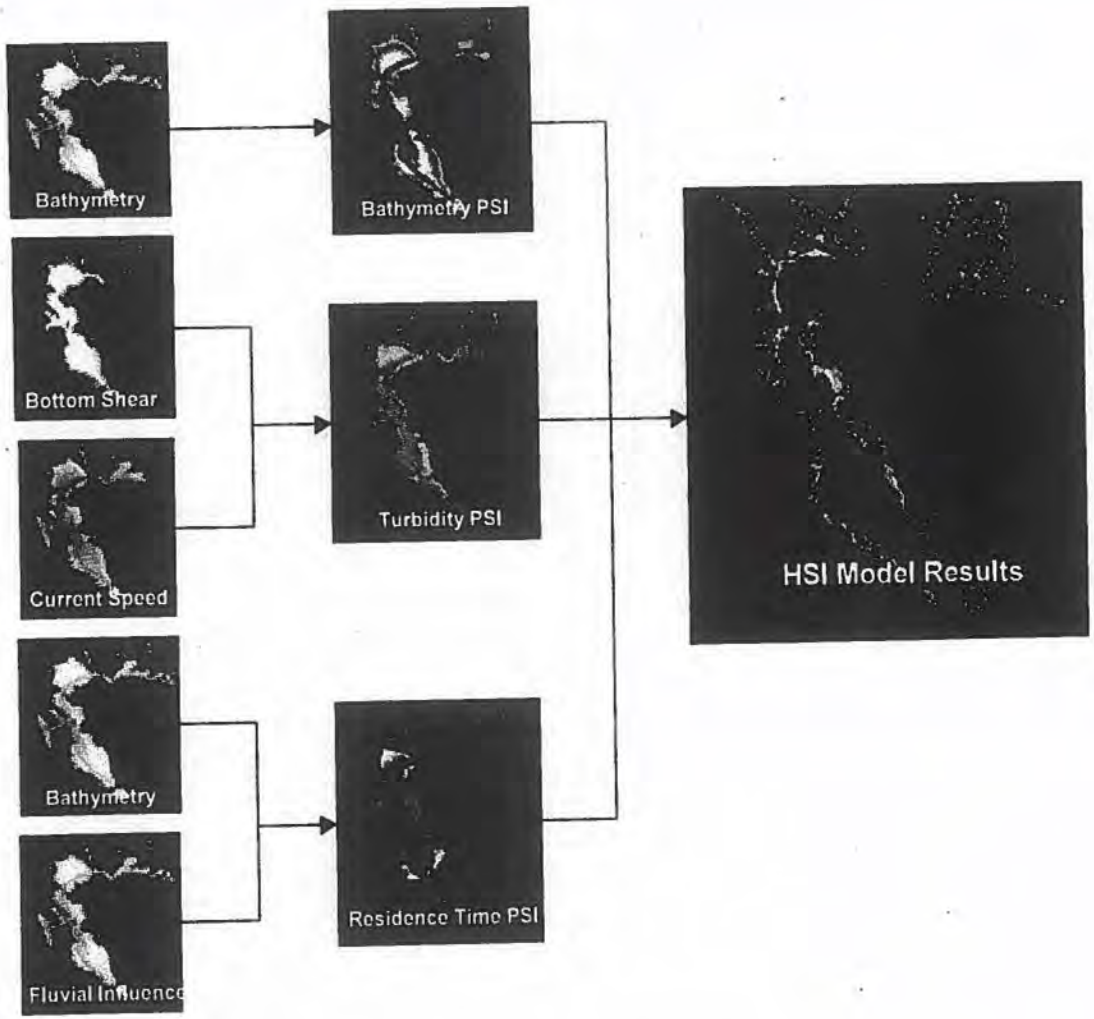

Figure 7. Schematic representation of Ecological Limits, Viability, and Sustainability (ELVS) model assembly.

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Habitat Suitability Index

The probability of eelgrass occurrence within a cell in the pre-survey screening model was calculated as the Habitat Suitability Index (HSI). The HSI is the product of the PSI for bathymetry, turbidity, and residence time and represents the suitability of each grid cell for supporting eelgrass growth. There were 62 possible values of HSI, ranging from least suitable to most suitable to support eelgrass habitat and the combination of all HSI classes resulted in the total potential eelgrass habitat within the Bay. The values of HSI were the final results of the pre-survey screening model (Figures 8a, 8b, and 8c).

PRE-SURVEY SCREENING RESULTS

The pre-survey screening model identified approximately 13,585 hectares (33,569 acres) of potential habitat within San Francisco Bay (Figures 8a, 8b, and 8c). The results of the pre-survey screening were used to guide efficient field survey strategies and prioritize survey areas and grid cells with highest the HSI were identified as the highest priority areas for the eelgrass survey. Within the total potential habitat area, 694 hectares (1,716 acres) occurred within the highest HSI category.

Results of the pre-survey screening model provided insight into the expected characteristics of bathymetry, current speed, bottom shear, and fluvial influence within eelgrass beds in the Bay. For example, the greatest percentage of predicted eelgrass (about 25%) occurred at approximately –0.5 meters (-1.6 feet) MLLW and there was also a small peak of abundance (about 8%) at –1.0 meter (3.3 feet) MLLW (Figure 9). The deepest depth at which eelgrass was predicted was –5.4 meters (-17.7 feet) MLLW and the shallowest was 0.3 meters (1 foot) MLLW. There were two peaks in predicted eelgrass abundance in relation to current speed, one occurred at approximately 0.15 meters/second and another at 0.39 meters/second (Figure 10). This relationship predicts that eelgrass will exist in either high-current areas where the water clarity is maintained by transport of suspended particles or low-current environments where sediment resuspension is minimal. Within San Francisco Bay, eelgrass beds at Bayfarm Island and in Clipper Cove typify these current extremes. Predicted eelgrass occurrence had a negative relationship with bottom shear and the majority of eelgrass was predicted to occur in areas with 0.25 pascals of shear or less, the lowest bottom shear category (Figure 11). The predicted levels of fluvial influence tended to be lower in eelgrass beds than the baywide conditions (Figure 12). Most eelgrass was predicted to occur between 15 and 55% suspended fluvial sediment, whereas the baywide range was between 5 and 95%. Eelgrass is more likely to occur in areas with less fluvial influence, which is also likely to correspond to higher water clarity.

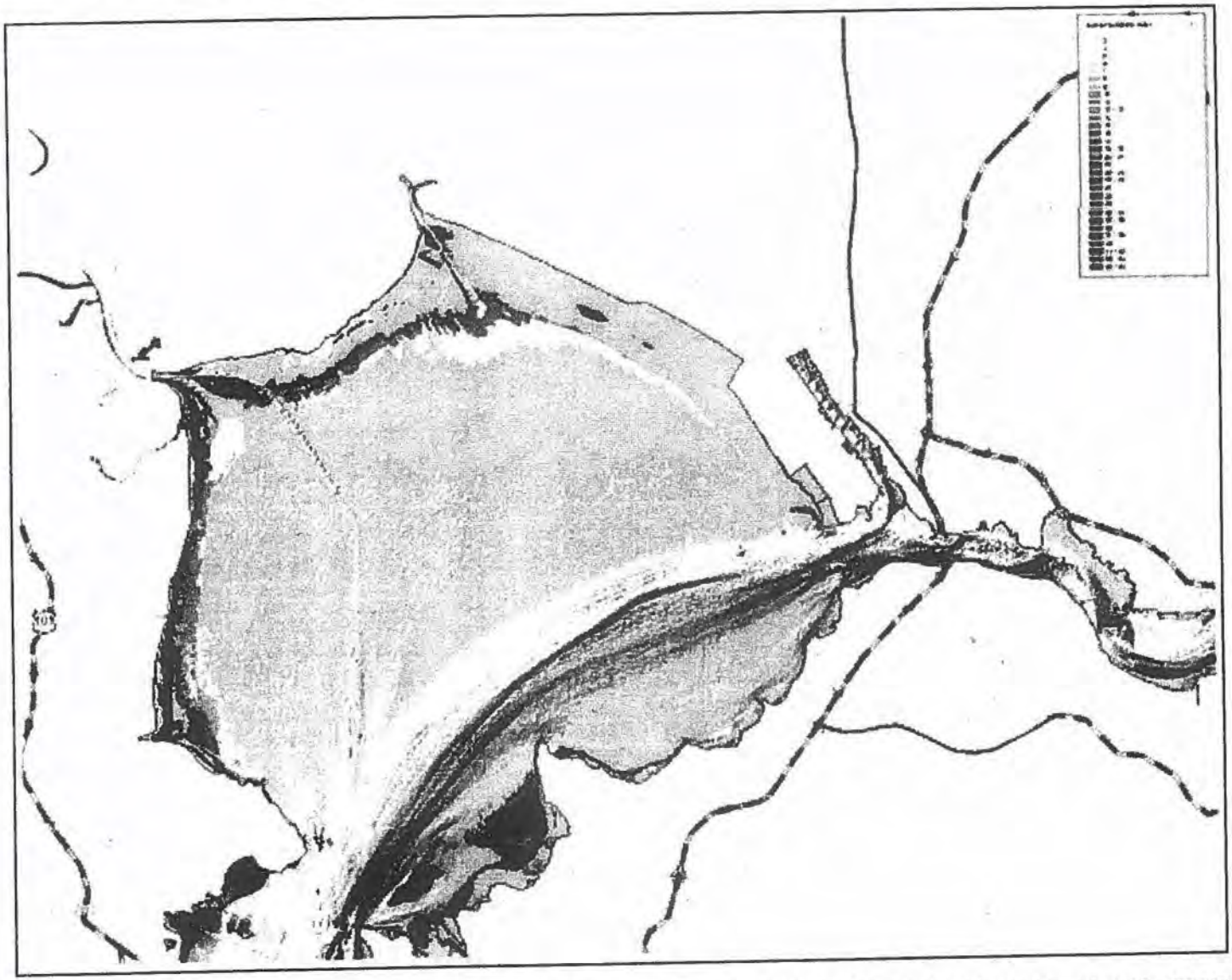

Figure 8a. Predicted suitable eelgrass distribution in north San Francisco Bay resulting from the Ecological Limits, Viability, and Sustainability (ELVS) model.

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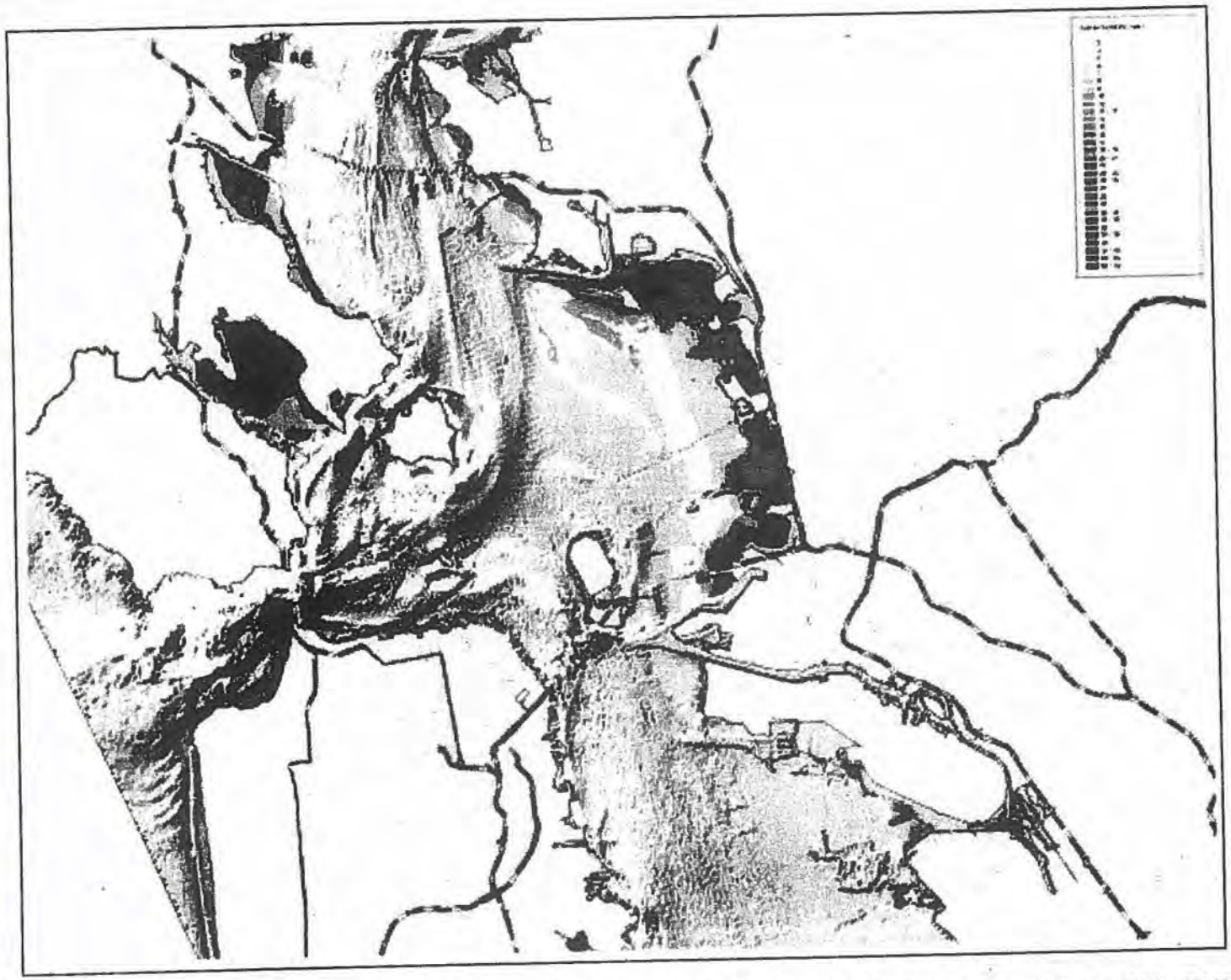

Figure 8b. Predicted suitable eelgrass distribution in central San Francisco Bay resulting from the Ecological Limits, Viability, and Sustainability (ELVS) model.

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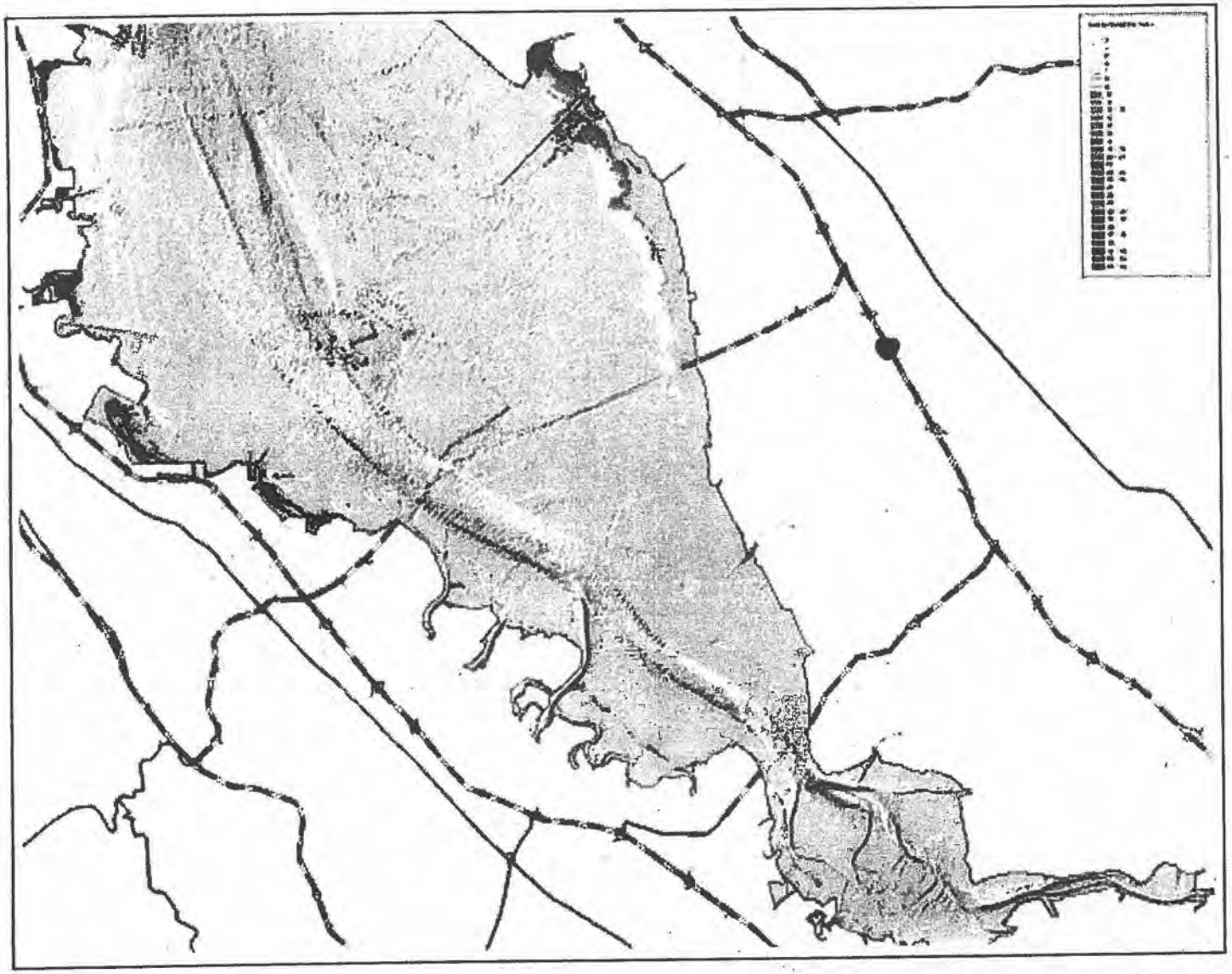

Figure 8c. Predicted suitable eelgrass distribution in south San Francisco Bay resulting from the Ecological Limits, Viability, and Sustainability (ELVS) model.

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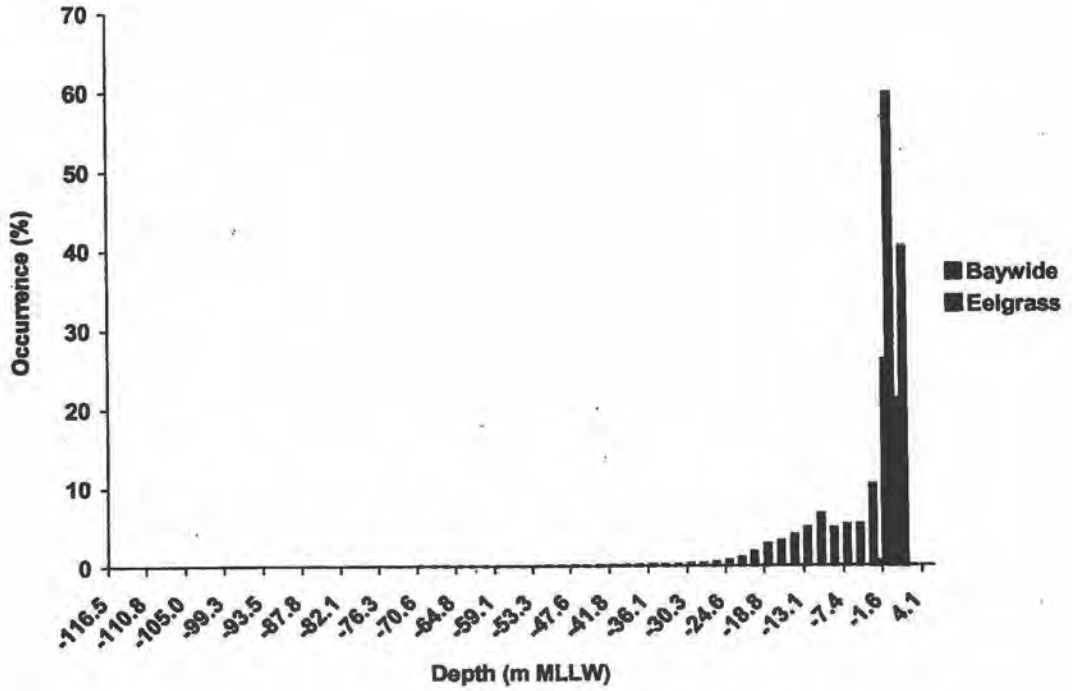

Figure 9. Predicted bathymetry within eelgrass beds and throughout San Francisco Bay.

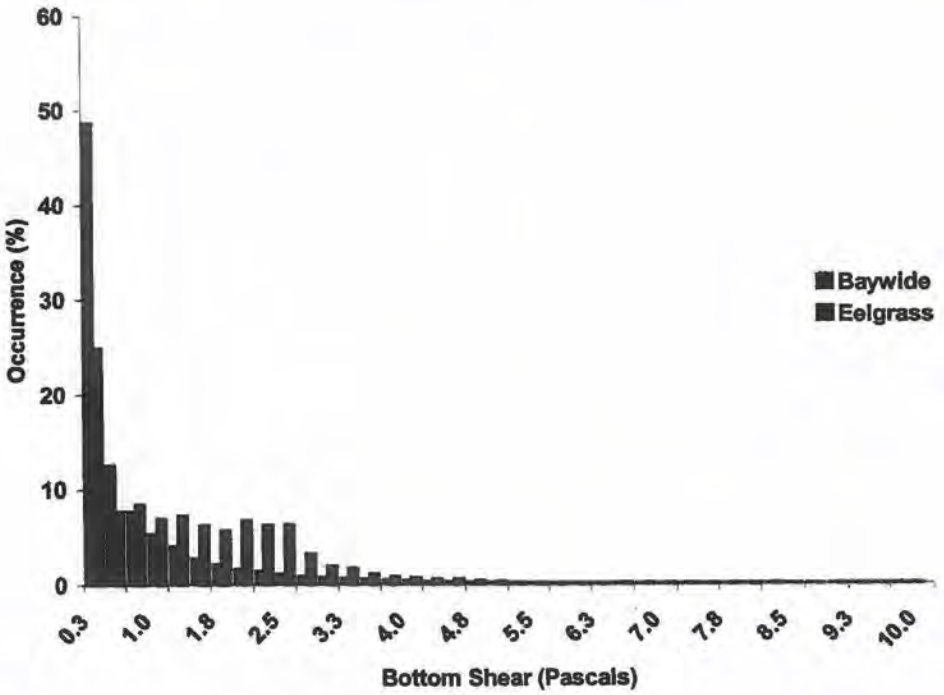

Figure 10. Predicted bottom shear within eelgrass beds and throughout San Francisco Bay

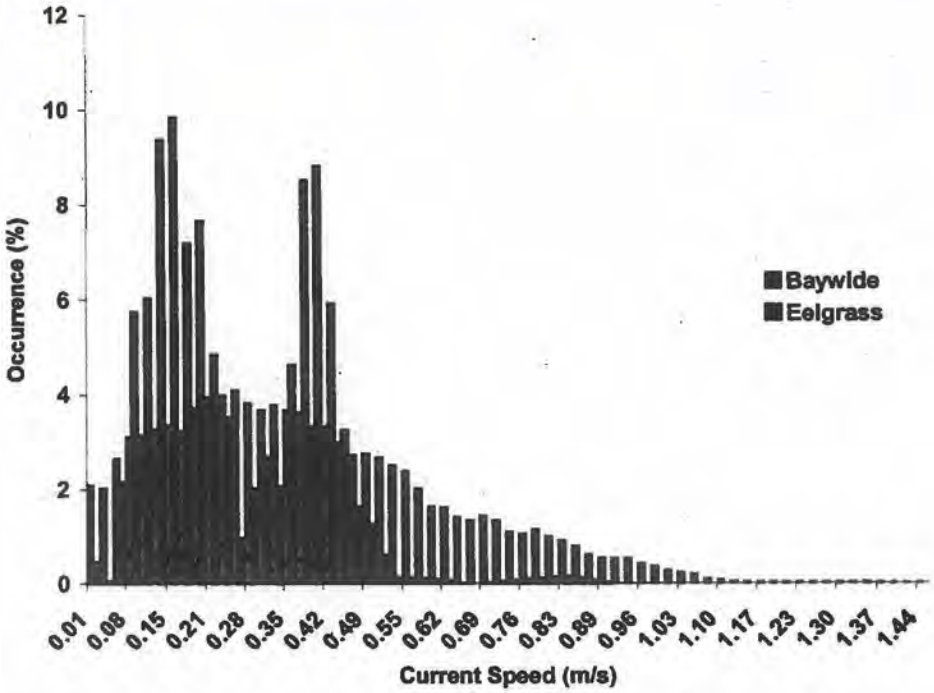

Figure 11. Predicted current speeds within eelgrass beds and throughout San Francisco Bay

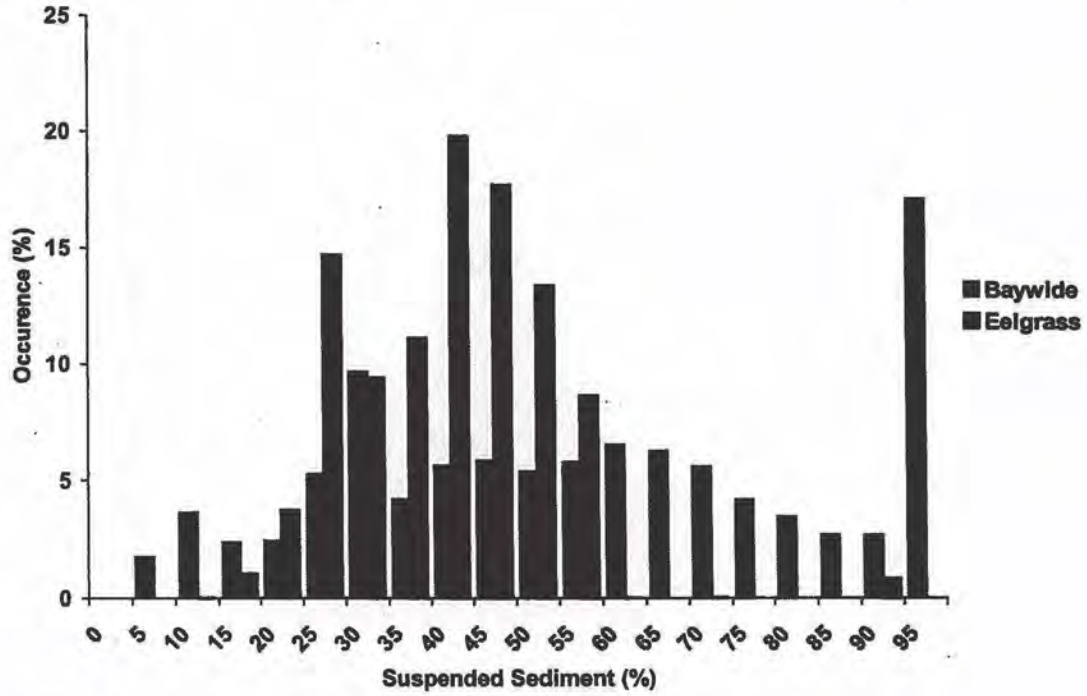

Figure 12. Predicted fluvial influence within eelgrass beds and throughout San Francisco Bay

and were flown as low as 6 meters (20 feet) in order to distinguish eelgrass from widgeon grass (*Ruppia maritima*) in Suisun Bay. Three days of aerial surveys were completed before the in-water surveys were initiated to eliminate large areas of the Bay from the in-water eelgrass surveys and to review and document navigation hazards in the shallow waters surveyed at high tides.

Diver Ground-truthing

Acoustic records of eelgrass beds were ground-truthed by SCUBA divers who confirmed the presence of eelgrass in mapped beds. Diver ground-truthing was conducted at Bayfarm Island, Emeryville Flats, Crown Beach, Oakland Middle Harbor, Clipper Cove, Richmond Training Wall, Pt. Molate, Pt, San Pablo, Pt. San Quentin, Angel Island, Keil Cove, Coyote Point, and Richardson Bay (Figure 13).

BATHYMETRY

Bathymetric data were collected using a Furuno FCV-600L single-beam fathometer operating at a frequency of 200 kHz with the 15% beam width. The echo-sounder was mounted on the stern of the vessel and the transducer was located approximately 0.15 meters (0.5 feet) below the water surface. Fathometer data were recorded with the side-scan data and stored with time and xyz coordinate data.

SURVEY DATA INTERPRETATION AND EELGRASS MAPPING

Digital maps of the distribution of eelgrass throughout the Bay were created from the 2003 side-scan survey data. Following completion of the surveys, sonar traces were downloaded, processed, and geographically registered using ArcView Version 3.2a©. All plots were generated based on California State Plane Zone 3 (NAD 83). Two themes were created in the ArcView program – eelgrass habitat from the 2003 survey, and a "maximum documented eelgrass extents" layer that combined data from all spatially documented sources including such sources as Wyllie-Echeverria and Rutten (1989), SAIC & Merkel (1997a and b), Merkel & Associates (1997, 1999, 2001, 2003b, unpublished data), and Kitting (1993, 1998). In order to present these results on a scale that would be useful to resource managers, the San Francisco Bay Eelgrass Atlas was created (Merkel and Associates for Caltrans 2004). Each page of this atlas presents a 25-square kilometer (9.7-square mile) section of the Bay at a scale of 1:36,000. Bathymetry is presented in feet below MLLW.

Mapping techniques and areal coverage determination made use of a mix of analytical techniques (SAIC and Merkel & Associates 1997a and 1997b, Merkel 1988, 1992, 2003a and 2003b, U.S. Navy SWDIV 1994, 2000). Eelgrass beds in San Francisco Bay generally consist of clustered patches of eelgrass as opposed to continuous carpets, such as those observed in most other west coast bays and estuaries. For the purpose of this survey, a given eelgrass bed included many clustered eelgrass patches and the edges were determined by locating the greatest extent of the eelgrass patches within the survey area. Within the boundaries of the bed, eelgrass was subdivided into four cover categories defined by the percentage of total bottom coverage within the mapped bed. The cover classes used were less than 5%, 5%-20%, 20%-40%, and greater than 40% cover (Figure 14). Where individual plants were too far apart to be aggregated into beds, the individual plants were considered to define the boundaries of discrete beds. These patches, like many of the patches that occurred within the beds, were typically comprised of single plants with only a few turions.

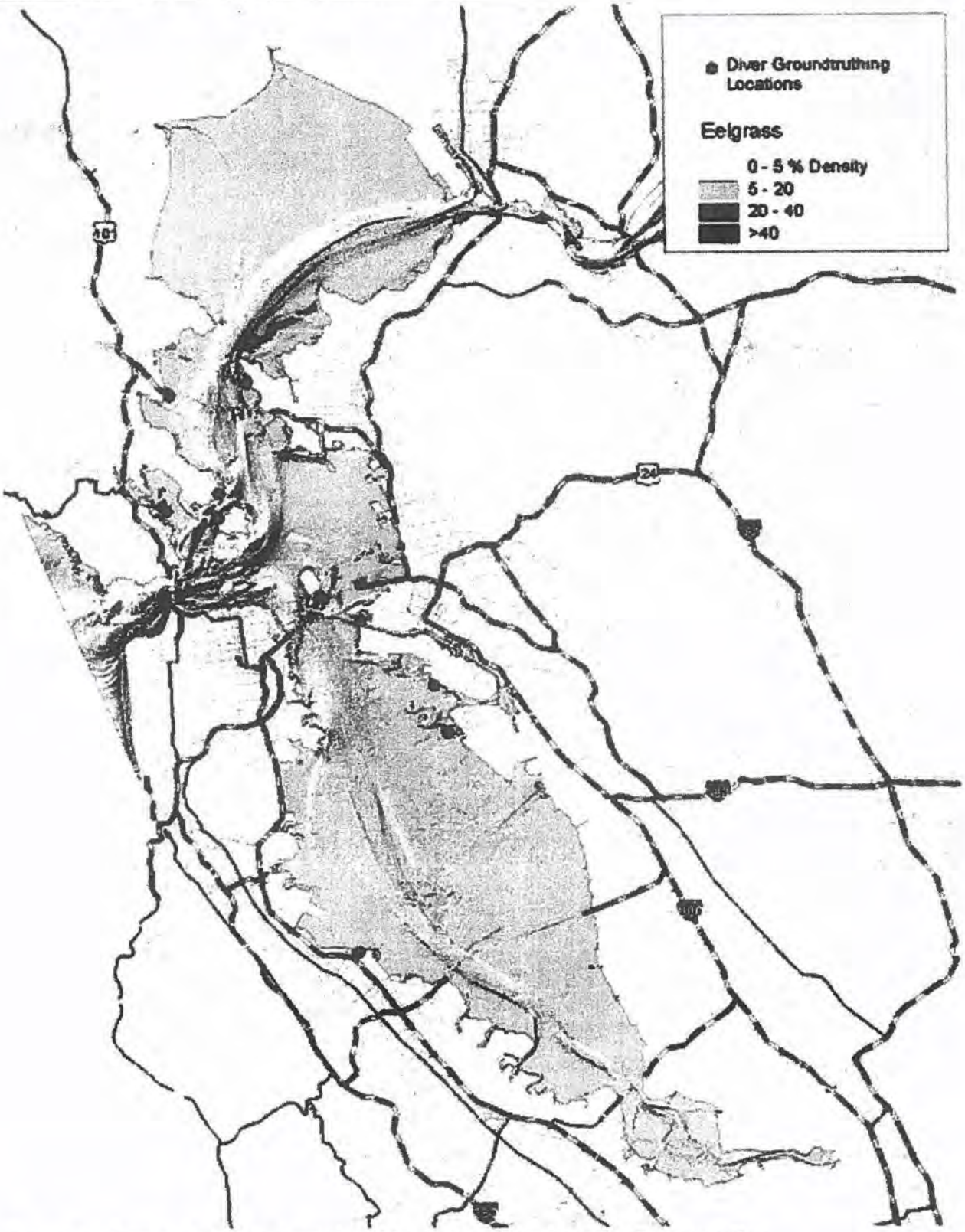

Figure 13. Location of diver ground-truthing points throughout San Francisco Bay.

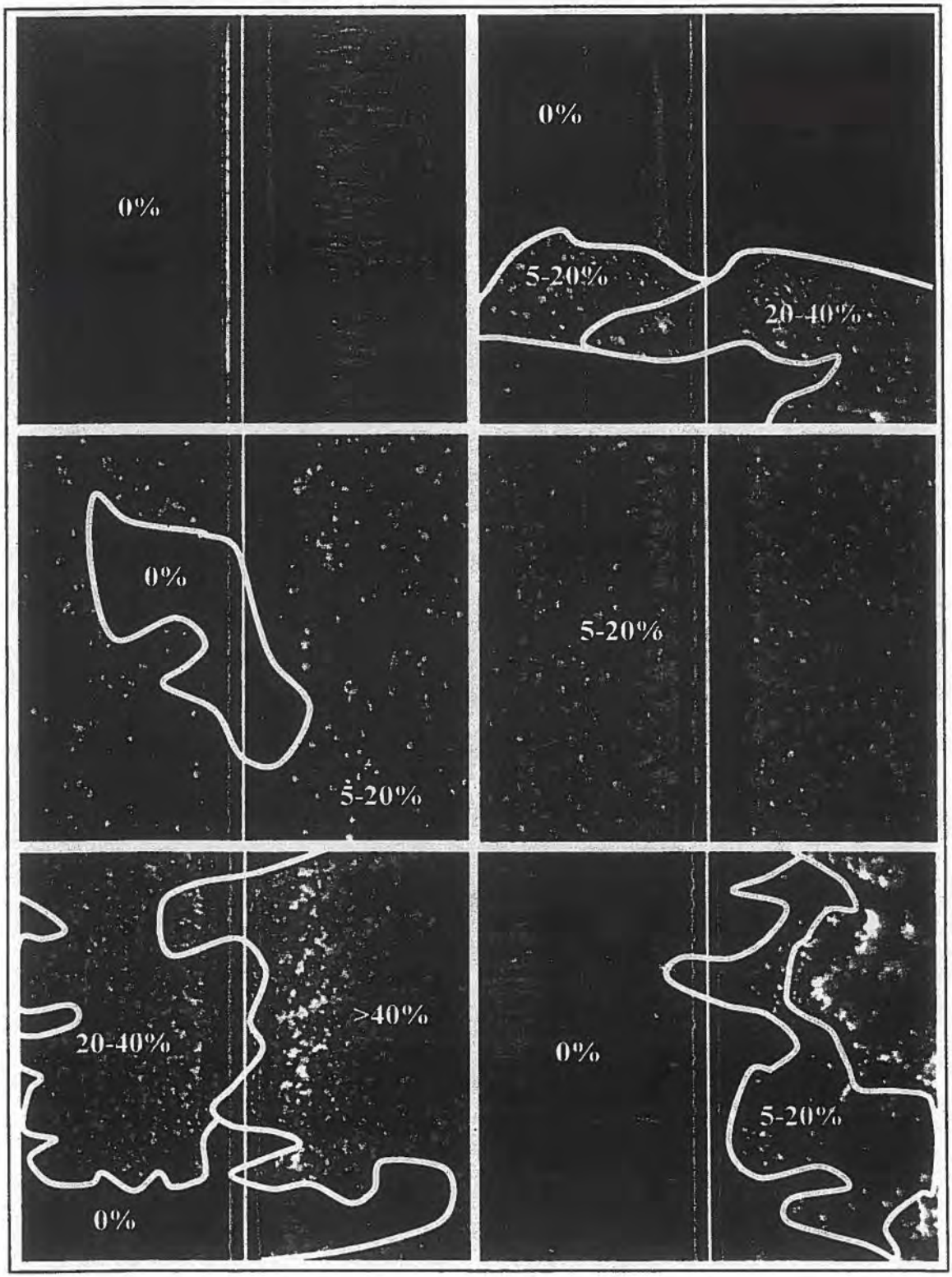

Figure 14. Categories of eelgrass percent coverage for map creation protocol

SURVEY RESULTS

CURRENT EELGRASS DISTRIBUTION

The Baywide Eelgrass Inventory mapped 1,165.7 hectares (2,880.5 acres) of eelgrass within San Francisco Bay during the summer of 2003 (Figures 15a 15b, and 15c). The coverage of eelgrass observed during the current survey was approximately 900% greater than the 128 hectares (316 acres) mapped during the previous baywide eelgrass survey (Wyllie-Echeverria and Rutten 1989). This major increase in eelgrass coverage is attributed at least in part to an increase in eelgrass coverage and in part to recent advances in mapping technology. In order to compare mapping technologies between the two surveys, it is helpful to compare eelgrass coverage between the same beds. Twenty-two eelgrass beds were mapped in 1987, and all of these were located and mapped during the current survey (Table 2). In addition to those beds mapped in 1987, eight major beds (e.g., Emeryville Flats) and several smaller eelgrass patches and individual plants were mapped during the current survey. The total coverage of the major beds (Table 2) was 1,129.2 hectares (2,790.3 acres) and the coverage of additional small eelgrass patches was 36.5 hectares (90.2 acres). Both the increased coverage of the major beds and the addition of the smaller patches contributed to the increased coverage during the 2003 survey.

The majority of the eelgrass in the Bay was located on the east shoreline between Point Pinole and Bayfarm Island (Table 2). A few solitary plants were recorded north of Point Pinole near Wilson Point and several individual plants and two small patches were observed south of the San Mateo Bridge along the Alameda shoreline. On the west shoreline, eelgrass was mapped from Point San Quentin in Marin County to Coyote Point south of the San Francisco Airport, but eelgrass was primarily located along the Marin County shoreline. On the western shoreline, the range of eelgrass distribution during the current survey was similar to the 1987 survey.

By far the largest eelgrass bed in the Bay is the Point San Pablo bed, which was located between Point Pinole and Point San Pablo north of the Richmond-San Rafael Bridge (Figure 15a, Merkel and Associates for Caltrans 2004, sheets 21 and 34). This bed was approximately 608.9 hectares (1,504.5 acres), which was 52.2% of the eelgrass coverage in the entire Bay. The Point San Pablo eelgrass bed occurs on a shallow shoal (approximately –1.5 to –0.5 meters [-4.9 to -1.6 feet] MLLW). The Point San Pablo eelgrass bed was also mapped as the largest bed in the Bay during the 1987 survey, although it was mapped as an order of magnitude smaller than during the current surveys (Wyllie-Echeverria and Rutten 1986).

The second largest eelgrass bed in the Bay was found in Richardson Bay near Sausalito in Marin County (Figure 15b, Merkel and Associates for Caltrans 2004, sheets 6 and 14). This bed was approximately 176.7 hectares (436.7 acres), the densest part of which was located among the boat moorings and near the marinas on the western side of the Bay. Eelgrass in Richardson Bay occurred between –3.0 and –0.5 meters (-9.8 and -1.6 feet) MLLW.

Table 2. Location and acreage of major eelgrass beds in San Francisco Bay during the 1989 (Wyllie-Echeverria and Rutten) and current 2003 surveys.

LOCATION	1987		2003		ATLAS PAGE
	(ha.)	(ac.)	(ha.)	(ac.)	
San Pablo Bay	50.2	124	608.9	1,504.5	21, 34
Point Orient	1.2	3	0.9	2.3	21
Naval Supply Depot	4.9	12	31.2	77.0	21
Point Molate Beach	10.5	26	13	32.0	22
Toll Plaza West	0.2	0.5	0	0.0	22
Toll Plaza East	0.2	0.5	1	2.5	22
Point Richmond, North	2.8	7	9.7	24.0	22
Point Richmond, South	1.6	4	26.5	65.6	22
Richmond Breakwater, North	7.3	18	7.7	19.0	22, 35
Richmond Breakwater, South	2.8	7	35	86.3	23, 36
Brickyard Cove	-	-	7.2	17.7	22
Emeryville (breakwater)	5.3	13	11.6	28.7	47
Emeryville Flats	-	-	8.7	21.6	37
Yerba Buena Island	-	-	0.7	1.7	37
Treasure Island	-	-	2.1	5.1	37
Alameda	22.3	55	109	269.9	49, 56
Bayfarm, North	0.8	2	1.8	4.4	49, 56
Bayfarm, South	1.6	4	51.8	127.9	49, 56
Coyote Point	0.4	1	0.2	0.6	42
Richardson Bay	5.3	13	176.7	436.7	6, 14
Angel Island West	1.2	3	0.6	1.6	14
Angel Island South	-	-	0.3	0.7	15, 24
Angel Island East	-	-	1.1	2.8	23
Belvedere Cove	2.0	5	8.8	21.8	14
Point Tiburon	0.4	1	0.1	0.2	14
Keil Cove	4.0	10	8.3	20.4	14
Paradise Cove, North	1.6	4	5.3	13.0	13
Paradise Cove, South	1.2	3	0.1	0.2	14
Pt. San Quentin	-	-	0.2	0.5	13
Pt. San Pedro	-	-	0.6	1.6	12
Minor Beds and Patches	-	-	36.5	90.2	various
TOTAL	127.9	316	1,165.7	2,880.5	

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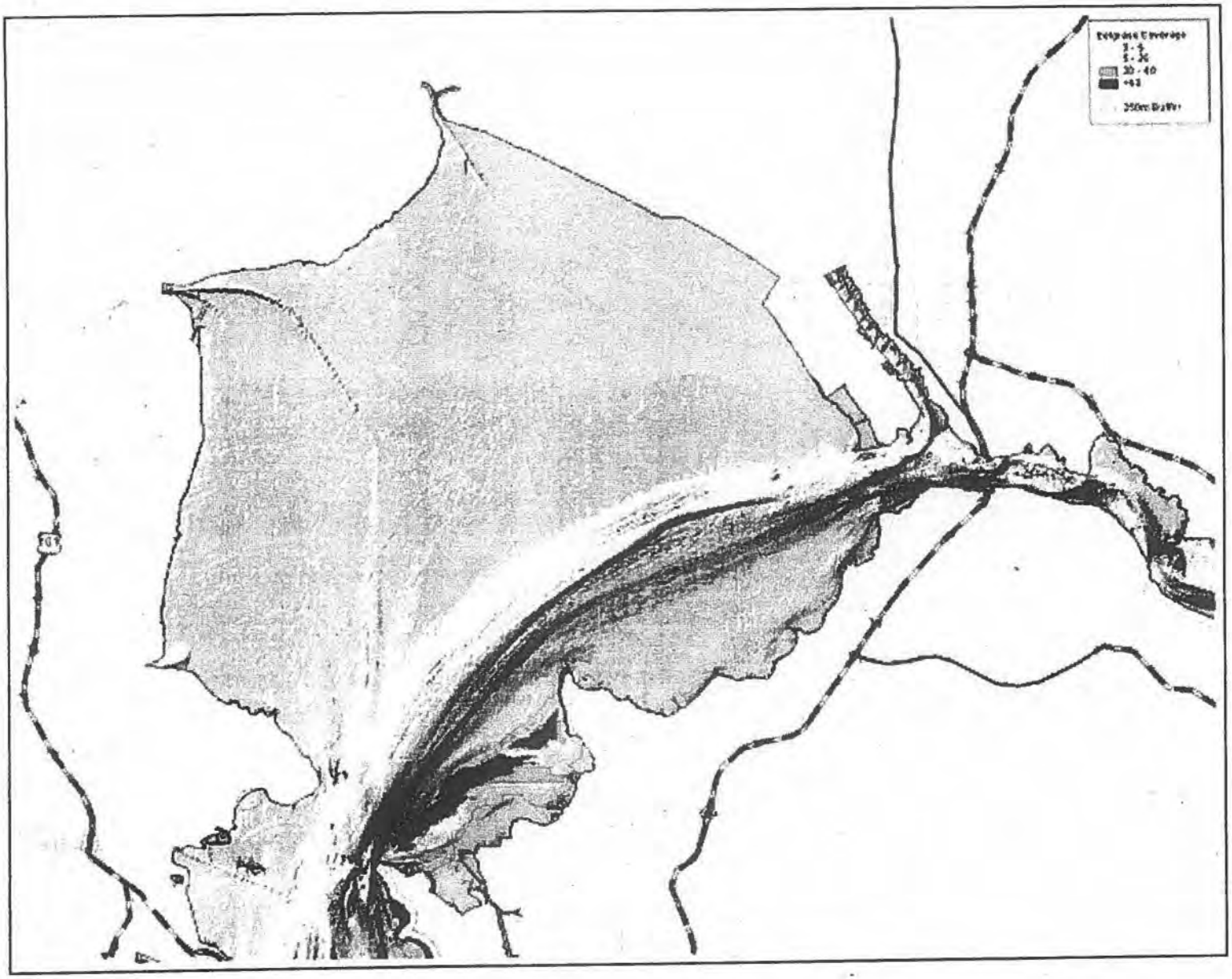

Figure 15a. Northern San Francisco Bay eelgrass distribution

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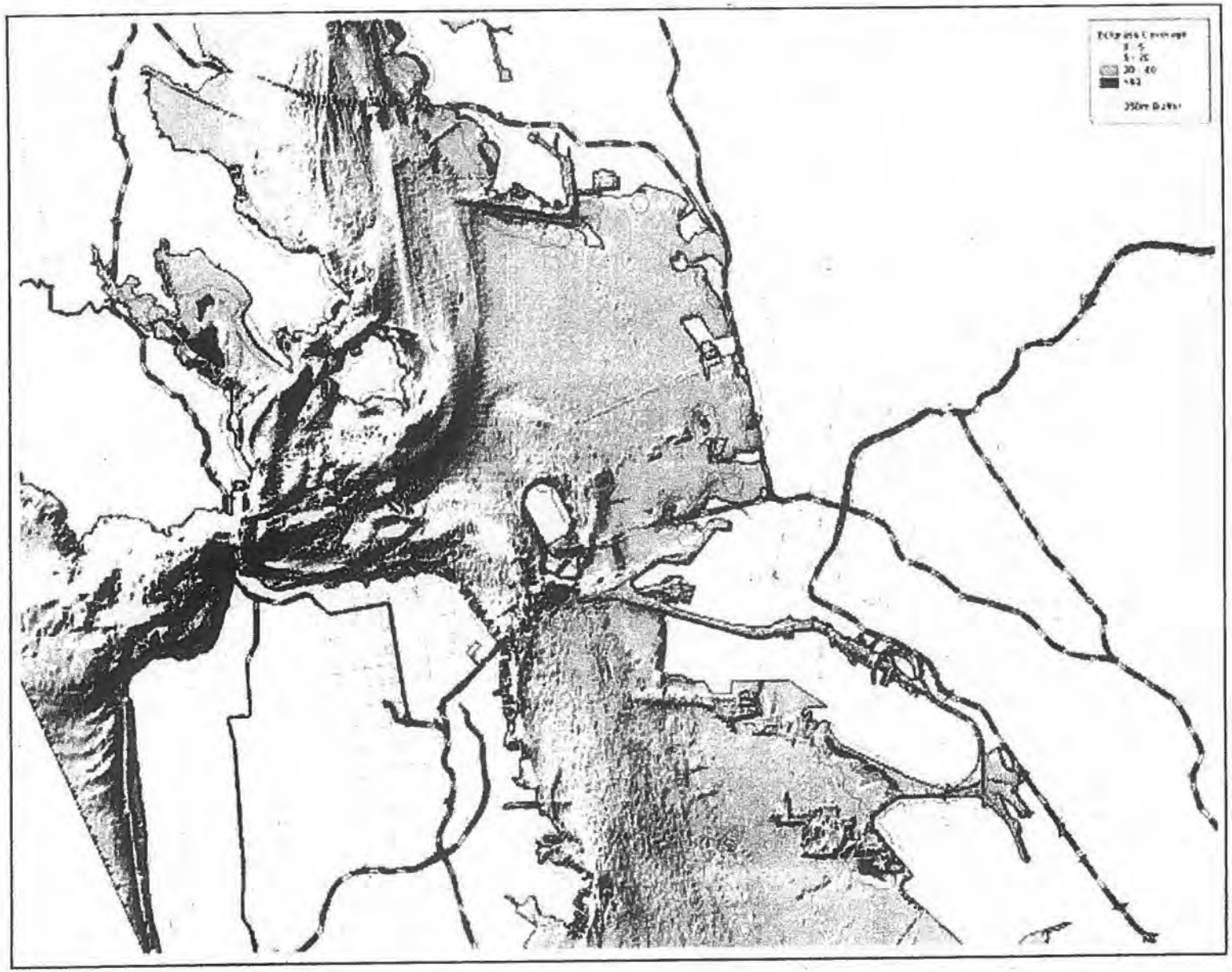

Figure 15b. Central San Francisco Bay eelgrass distribution

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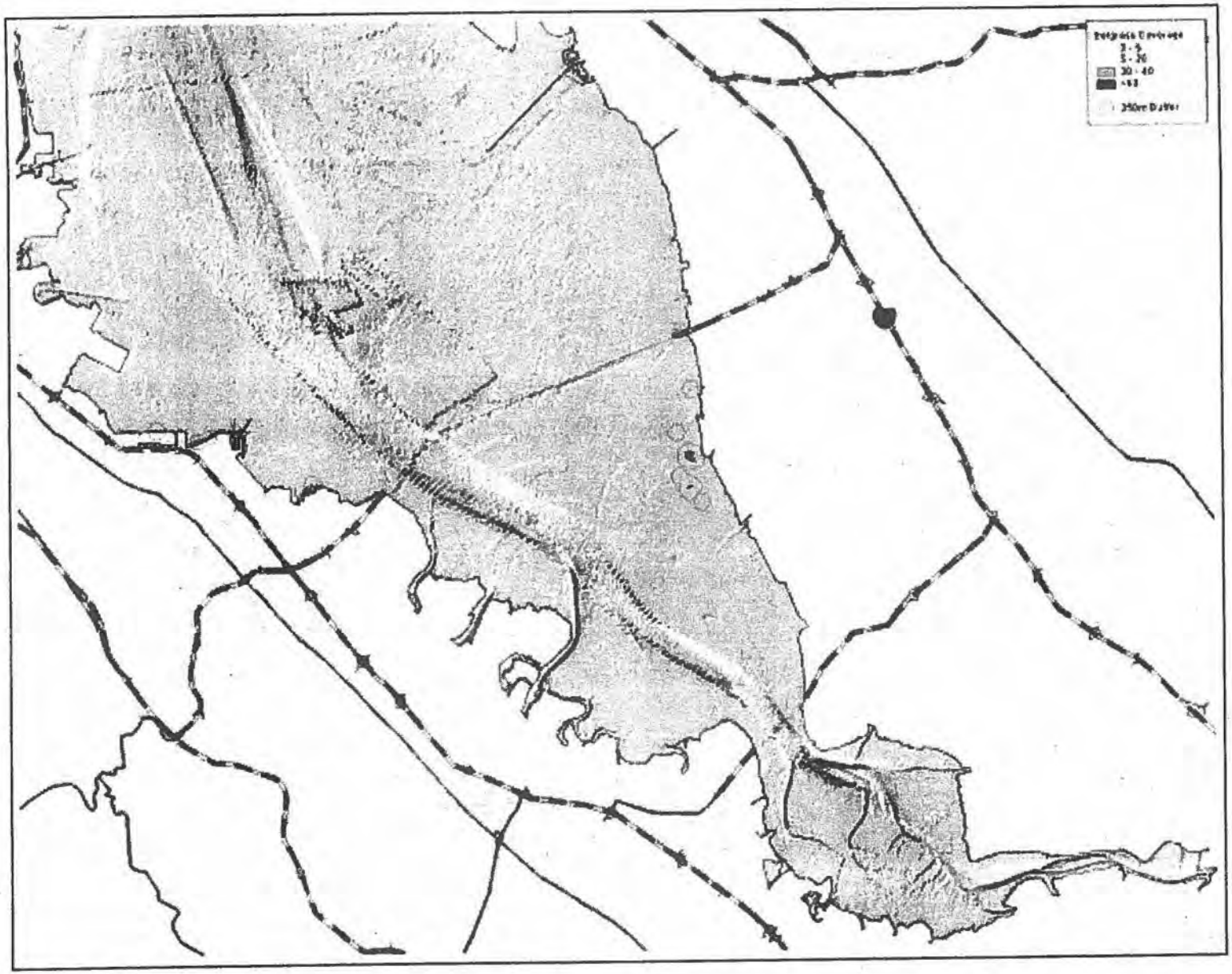

Figure 15c. Southern San Francisco Bay eelgrass distribution

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HISTORICAL DISTRIBUTION RANGE

Eelgrass coverage within San Francisco Bay is in a constant state of flux. Thus, understanding the potential eelgrass habitat areas in addition to the beds that were mapped during the 2003 survey is crucial to determining the extent and distribution of areas within the Bay that are potentially suited to supporting eelgrass under various conditions. While it is not possible to exclude many shallow areas of the Bay as unsuited to support eelgrass, many areas that did not support eelgrass during the present survey have been previously documented to support eelgrass. For this reason a map layer has been prepared of the maximum documented extent of eelgrass (Merkel and Associates for Caltrans 2004). This has been done in anticipation of future updates as additional survey data becomes available in future years. The maximum documented eelgrass extent is a combination of all known eelgrass surveys in the Bay where credible and accurate spatial data exist. At the time this map was produced, the maximum historical extent of eelgrass was documented to be 1,392.4 hectares (3,440.6 acres).

BATHYMETRY

Bathymetry for the Bay has been derived from numerous survey sources that date over extended periods. In most instances, the bathymetry has been collected on larger survey vessels that have avoided the extreme shallows of the Bay margins. As a result, bathymetric survey data are sparse in the shallowest areas that support eelgrass beds. To improve upon this condition, bathymetric data from the present survey has been used to supplement prior survey data and provide a more accurate bathymetry range for eelgrass.

Using the bathymetric data, it has been possible to determine the elevation range distribution of eelgrass within the Bay (Figure 16). The depth distribution of eelgrass is extremely narrow and is indicative of the turbid nature of the Bay. A full 98.8% of eelgrass mapped during the 2003 surveys occurred within a depth range from –1.77 to 0.40 meters (-5.8 to 1.3 feet) MLLW. Perhaps even more remarkable is the fact that 94.0% of all mapped eelgrass occurred within a 1.6-meter (5.2-foot) range between –1.6 and 0.0 meter (-5.2 and 0.0 feet) MLLW.

REGIONAL COMPARISON

Existing eelgrass beds cover approximately 1% of San Francisco Bay, which is at least an order of magnitude less than other large California estuarine systems (Table 3). However, due to the large size of the Bay, even a minor proportional representation amounts to substantial eelgrass resources on a statewide basis and the importance of this resource should not be undervalued in resource management decisions. While San Francisco Bay eelgrass resources accounted for only a small portion of the total Bay habitat area, the eelgrass beds of the Bay rank second only to Humboldt Bay in gross eelgrass area. Further, given the highly dynamic nature of San Francisco Bay eelgrass beds and the extensive areas of the Bay that are considered to be marginal for eelgrass, only minor variations in physical environmental parameters such as river flows, sediment loads, or sea level could significantly alter the extent of eelgrass coverage.

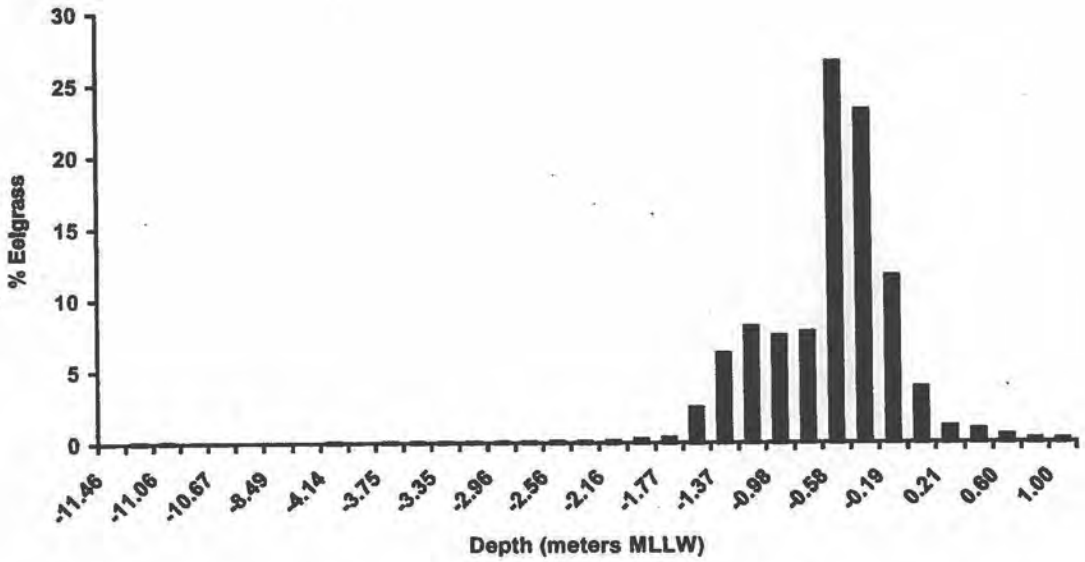

Figure 16. Depth distribution of eelgrass within mapped beds in San Francisco Bay

Table 3. Comparison of eelgrass coverage in estuarine systems on the West Coast of North America.

System	Eelgrass Coverage (acres)	Percent Coverage
Mission Bay[1]	1,210	54%
San Diego Bay[2]	1,626	14%
Humboldt Bay[3]	4,821	10%
Tomales Bay[4]	965	13%
San Francisco Bay	2,881	1%

[1]Merkel & Associates 2003
[2]U.S. Navy 2000
[3]McBride et al., unpublished data
[4]Spratt as reported in Wyllie-Echeverria 1990

The most likely factor limiting eelgrass coverage in the Bay is the low-light levels available to eelgrass in the North and South Bay regions. More than 4.5 million cubic meters (6 million cubic yards) of sediment enter the Estuary per year from approximately 20 major freshwater streams and rivers (Goals Project 1999). In addition to the sources of sedimentation from freshwater flows, there is additional suspended sediment resulting from tidal currents and wind-driven waves. The Central Bay region has the clearest water, followed by the South Bay and North Bay, and lastly Suisun Bay. The Suisun and North Bay regions are by far the most turbid of any area in the Estuary due to freshwater input of the Delta. In addition to presence of a substantial amount of sedimentation in the Bay, the sediment is also retained within the regions of the Estuary that are far from the mouth of the Bay where it is constantly put into or kept in suspension by chronic wind-waves.

Although the San Pablo eelgrass bed is technically in the North Bay region, this area of North Bay is well flushed by clearer waters of the deep channel around Point San Pablo. Conversely, the western portions of San Pablo Bay receive little ocean water influence and while these areas support salinities levels that could support eelgrass, the sediment-laden surface waters in this region probably restrict adequate light levels.

FUTURE WORK

The completion of the 2003 eelgrass inventory provides considerable insight into the extent and distribution of eelgrass within San Francisco Bay. However, it is as much a beginning as an endpoint to understanding this resource within the Bay. Research has already been undertaken to understand the similarities and differences between San Francisco Bay and other areas where more extensive work has been performed. Presently, additional resource characterization is underway as elements of the current study. This work is outlined below.

CLASSIFY EELGRASS BEDS

Data collected during the field surveys will be used to provide a description of the environmental characteristics that typify eelgrass beds within the Bay. Environmental descriptions of eelgrass beds will include water temperature, light availability, and sediment grain size. In addition, the genetic relationships of eelgrass from sampled beds will be analyzed using the genetic markers, microsatellite loci. These data will be integrated into the final analysis of distribution and dynamics of eelgrass populations within San Francisco Bay.

It is recognized that a one-time survey will not adequately capture the high degree of variability exhibited in eelgrass coverage within the Bay over the course of a year or many years. As a result, all analyses are limited to the description of static conditions at the time of the survey. However, as

part of the current program, a refined eelgrass model that incorporates the eelgrass maps for the current survey and data on environmental parameters will be published, which will provide a prediction of the maximum extent of suitable eelgrass habitat within the Bay.

REFINE PREDICTIVE EELGRASS MODEL

During the 2003 field surveys, 8.6% of the area that was identified by the pre-survey screening model as being suitable for eelgrass actually supported eelgrass and examining the maximum documented extents, as much as 10.2% of this area was found to presently support or have supported eelgrass in the past. While the proportion of occupied habitat derived from the screening model is quite high, the model has also captured considerable area that was not occupied in 2003 and has not been documented to support eelgrass. For example, a large crescent of habitat was predicted to be suitable to support eelgrass in the shallow regions of San Pablo Bay (Figure 12a), but the current survey revealed no eelgrass in these portions of San Pablo Bay. In addition, the model predicted eelgrass along the Alameda shoreline south of the Oakland International Airport and this area was also found to be without eelgrass during the 2003 surveys. These two areas where eelgrass was erroneously predicted by the model have some common environmental conditions. Both areas support shallow mud-bottoms subject to high wave energies, but low circulation relative to other regions of the Bay. The pre-survey screening model predicted significantly more eelgrass than was mapped during 2003 partly because it was constructed using few niche defining parameters over which broad tolerance ranges were used to ensure that the model captured all possible eelgrass habitats; the goal was to ensure no eelgrass would be missed during the comprehensive inventory effort.

Although the pre-survey screening model predicted eelgrass in several areas where it did not occur during the 2003 survey, a more refined predictive eelgrass model is being developed to provide a more narrowly defined predictor of habitat suitability for eelgrass throughout the Bay. Due to the dynamic nature of eelgrass coverage in the Bay, a robust predictive model of suitable eelgrass habitat, in addition to the mapped extent of eelgrass, will provide resource managers better capabilities to detect and track changes in eelgrass resources within the Bay. Potential eelgrass habitat may not currently support eelgrass due to environmental conditions or intermittent local extirpations. However, these areas may support eelgrass under different prevailing environmental regimes, which can fluctuate annually and interannually.

In order to create a refined model that will be predictive of eelgrass habitat in the Bay, the pre-survey screening model is being refined with data gathered during the 2003 surveys. The updated eelgrass distribution and more accurate bathymetry will allow for more accurate characterization of environmental parameters within eelgrass beds, allowing for a more exact model. Subsequent ELVS model runs will be conducted in order to identify the stability of suitable site conditions and areas that may support eelgrass under moderately altered environmental conditions.

CONCLUSIONS

The Baywide Eelgrass Inventory and Resource Management Program will provide a unique tool for developing the subtidal habitat goals for San Francisco Bay. When the predictive eelgrass model is refined and analyzed in conjunction with the results of the 2003 eelgrass survey, resource managers will be able to create an appropriate long-term sampling program that will adequately characterize seasonal and annual variability within the various eelgrass populations. This information will provide a baseline of current eelgrass distribution and potential habitats that will enable realistic and quantified goals to be set for eelgrass management.

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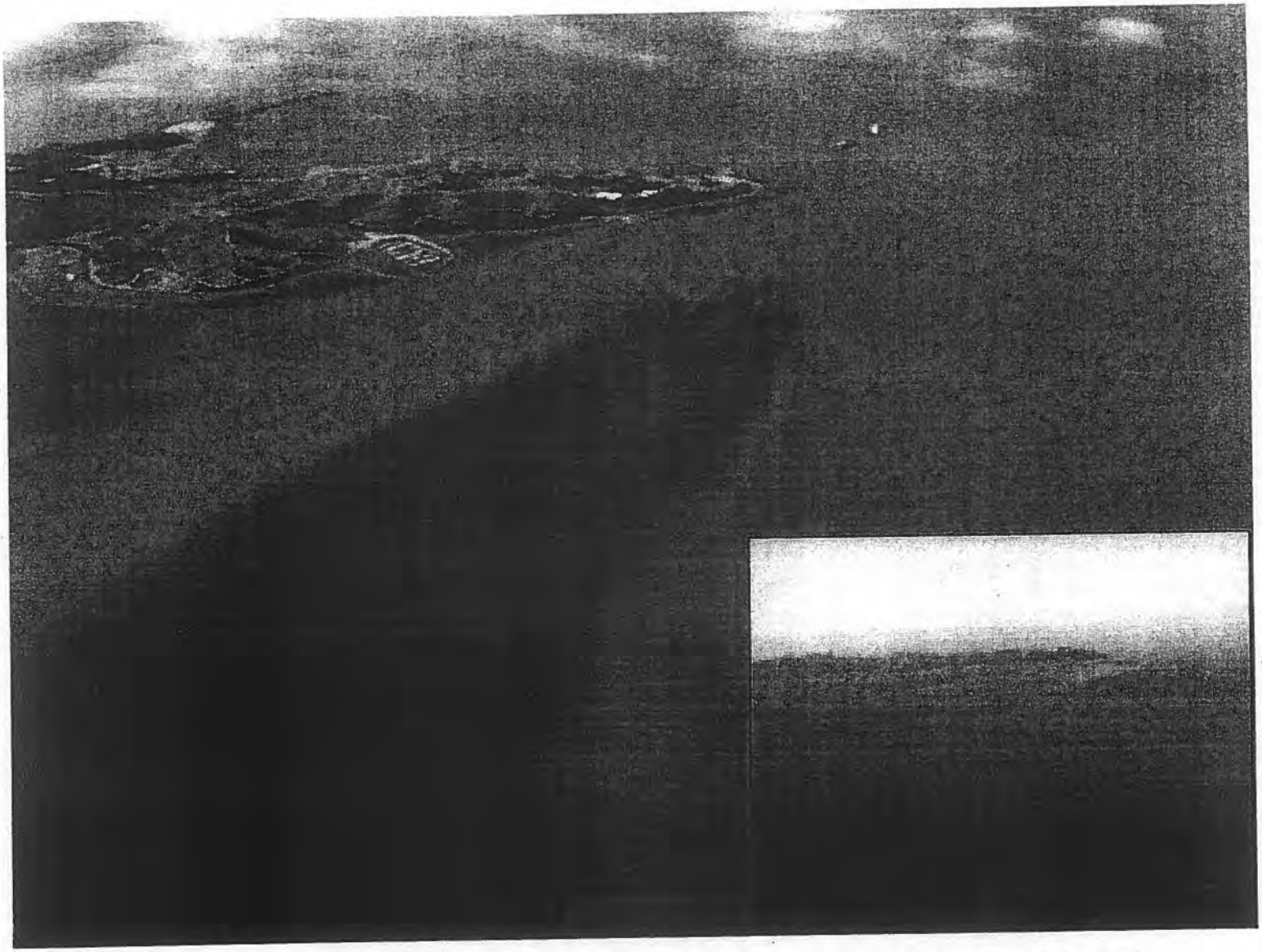
APPENDIX A: PHOTOS OF SAN FRANCISCO BAY EELGRASS

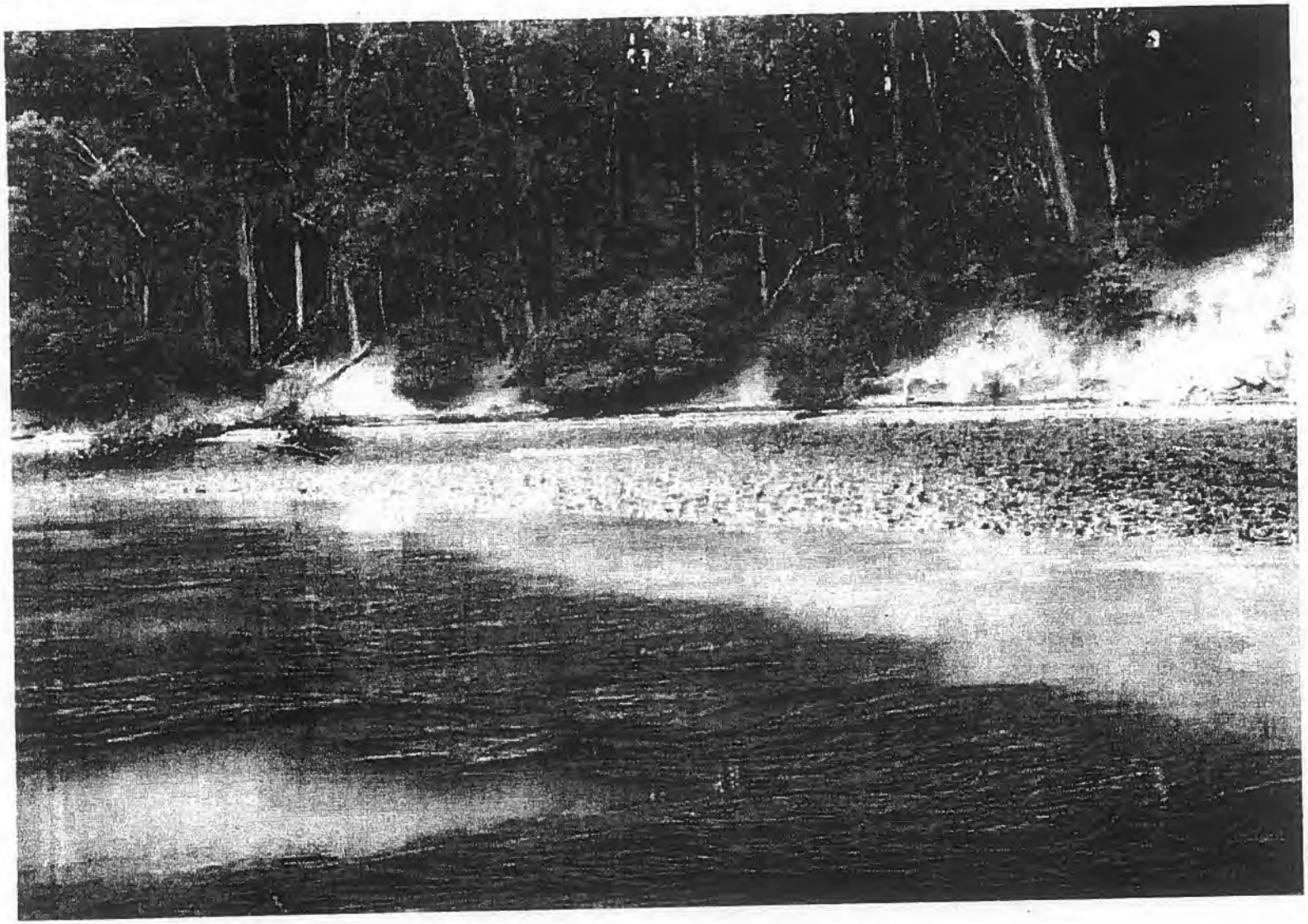


Southern End of Point San Pablo Eelgrass Bed, between Point San Pablo and Point Pinole, Contra Costa County

00033002 NPS-PWR-B04-00005-000001 Page 119 of 166

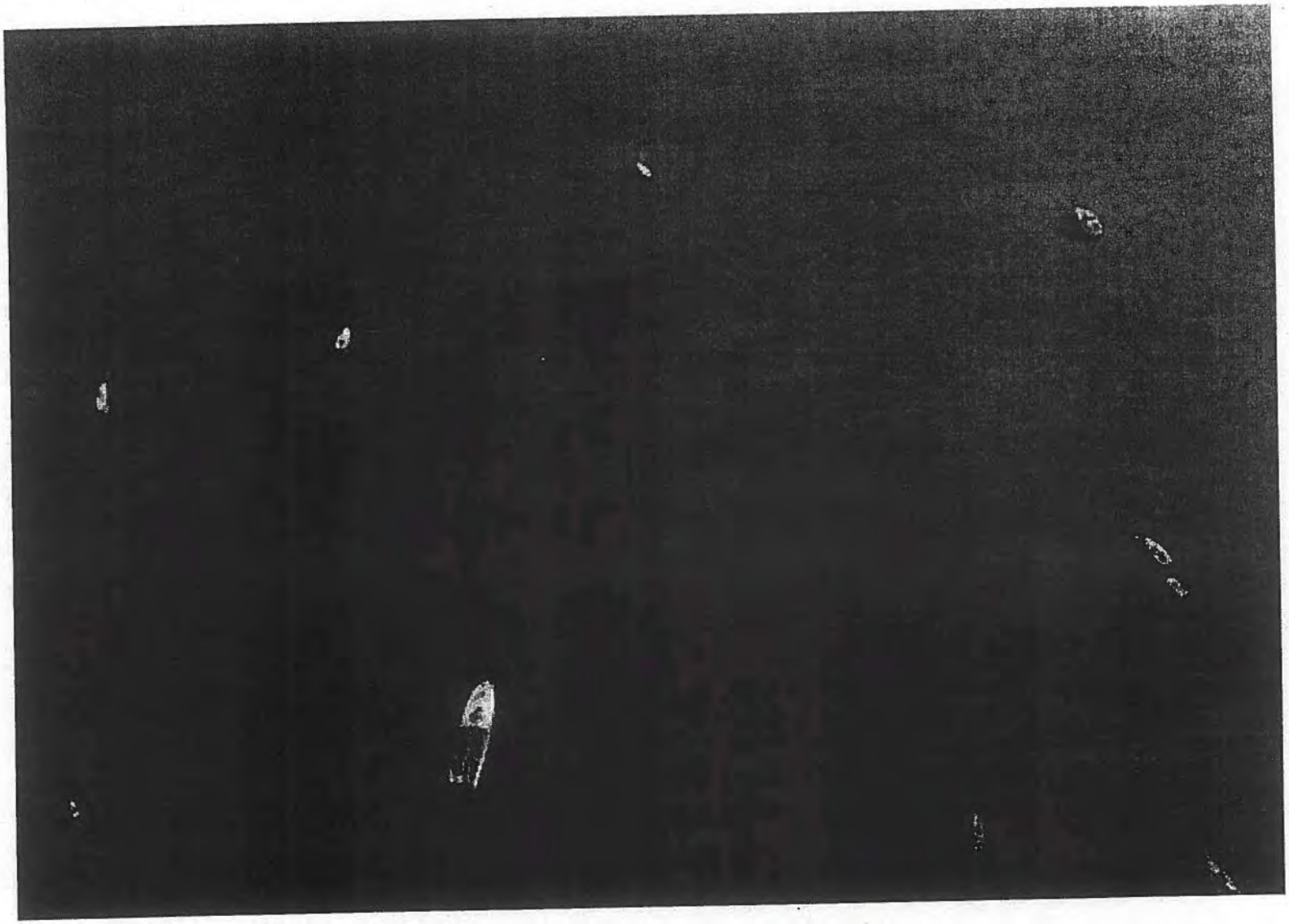
Eelgrass at Point Molate, Contra Costa County

00033002 NPS-PWR-B04-00005-000001 Page 120 of 166



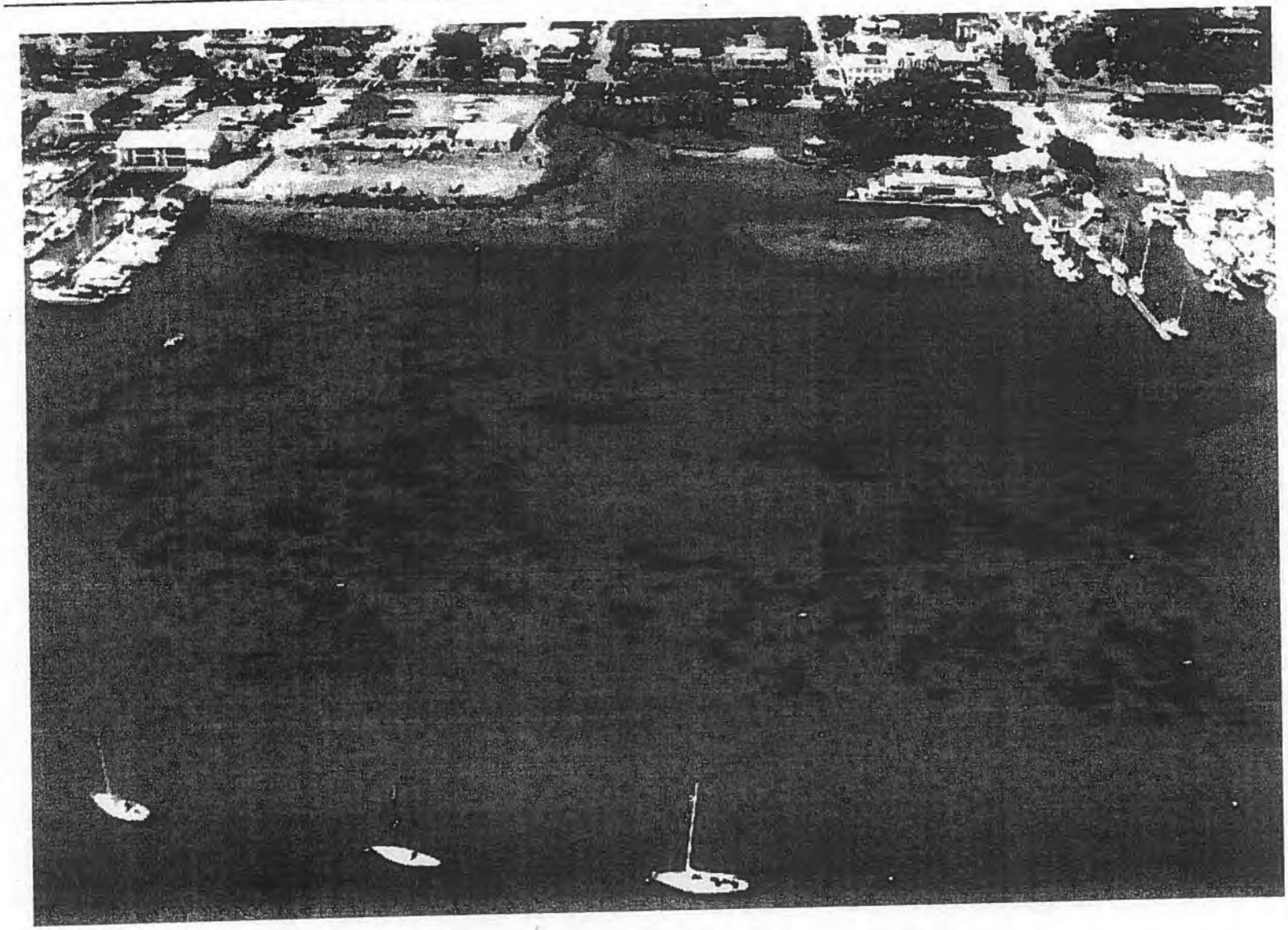
Eelgrass at Keil Cove, Tiburon, Marin County

00033002 NPS-PWR-B04-00005-000001 Page 121 of 166



Eelgrass in Richardson Bay near Sausalito, Marin County

00033002 NPS-PWR-B04-00005-000001 Page 122 of 166

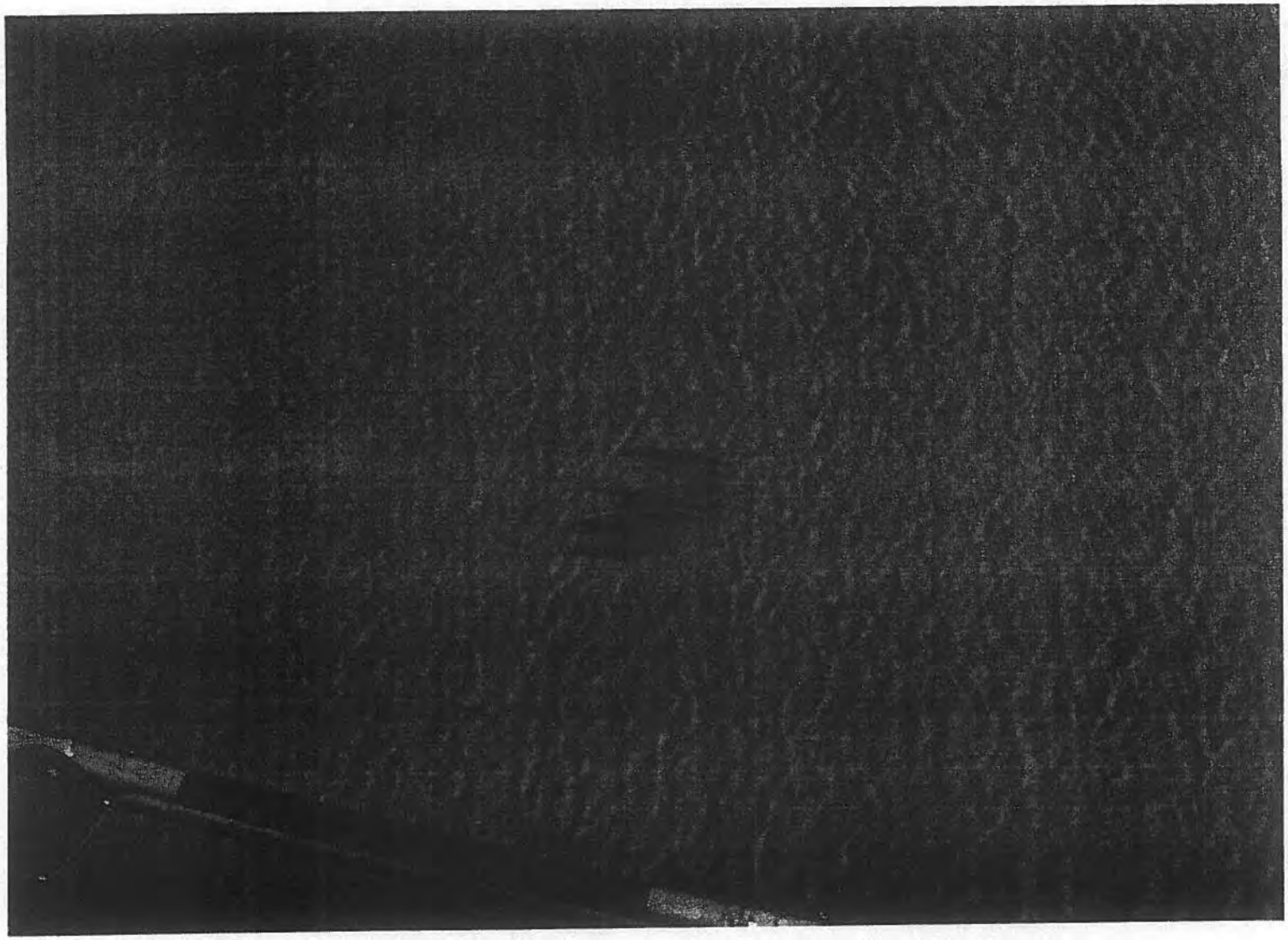


Eelgrass in Richardson Bay near Sausalito, Marin County

00033002 NPS-PWR-B04-00005-000001 Page 123 of 166

Low Tide Eelgrass at Emeryville Shoal, Oakland, Alameda County

00033002 NPS-PWR-B04-00005-000001 Page 124 of 166



Solitary Patch of Eelgrass South of San Mateo Bridge along the Alameda County Shoreline

00033002 NPS-PWR-B04-00005-000001 Page 125 of 166

Natalie Gates
04/06/2007 05:23 PM
PDT

To: Don_Neubacher@nps.gov, Sarah_Allen@nps.gov
cc: Ben_Becker@nps.gov
Subject: Drakes Estero Aquaculture Information

FYI.

N

Natalie B. Gates, D.V.M.
Wildlife Biologist
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5189
FAX: (415) 464-5183

-----Forwarded by Natalie Gates/PORE/NPS on 04/06/2007 05:22PM -----

To: <Natalie_Gates@nps.gov>
From: "Tom Moore" <tmoore@dfg.ca.gov>
Date: 04/04/2007 01:55PM
Subject: Drakes Estero Aquaculture Information

Hi Natalie,

To recap; I have provided you with production figures in pounds and numbers of oysters for the period 1950 to 2006. 1950 is the earliest date I have production numbers for Drakes Estero.

As far as the numbers of racks, I talked with Ben Becker and I believe you have the number and location of all existing racks in Drakes Estero.

M-438-01

The 2006 Proof-of-Use report from Mr. Lunny indicates that in 2006 he planted a total of 1368 bents. A bent being a 12 ft x 12ft space with 6 rails in the racks with 10 strings on each rail, thus a total of 60 strings per bent. Every string represents approximately 120 oysters (average 10 to 11 oysters per mother shell, 14 shells per string). The number of bents per rack structure varies with the length of the rack structure.

Number of strings Planted in 2006: 1368 bents x 60 strings = 82,080 strings

bent

Number of oysters planted (as cultch) in 2006: 82,080 strings x 120 oysters = 9,849,600 oysters

string

The above number of oysters represents 2006 plantings, the actual number of oysters on bents will be higher due to plantings from 2005.

Currently, it takes 16 to 18 months to reach harvestable size in the hanging rack system so some portion of the 2005 plantings may have been harvested already. Mr. Lunny indicates that no new bents have been or will be constructed by DBO.

Number of single oysters planted in 2006: Juvenile oysters are grown in bags and trays while larger oysters are grown in bags placed on the bottom substrate. Eleven sites were used for this type of culture.

Single Pac. oysters planted in 2006 = 4,020,000 oysters

The number of bags was not reported in 2006. Loading densities per bag differs based on oyster size, with initial loading densities for very small oysters at around 1,000 oysters/bag to about 150 or so at final growout for market as oyster bags. Bags are reprieved and sorted as oysters grow and are re-bagged a lower densities, thus the number of bags may increase but the total number of oysters planted has not.

The number of oysters planted does not equal the number of oysters harvested since mortality events occur which reduces the number of oysters eventually harvested.

M-438-02

Mr. Lunny's 2006 POU Report indicated that 1,000,000 single clam seed were planted in bags on the bottom in 2006. Depending on the size of the clams, stocking densities per bag varies.

No clams were harvested from this lease in 2006.

Please let me know if you have any questions or need clarification regarding the above information.

I will be out-of-town starting today and returning on Tuesday April 10, 2007 but will be reachable by cell phone at 707-688-3192.

Tom

Hi Tom,

I talked to the superintendent about the data we need for our environmental
docs. If we could get some production data (#'s of oysters produced, #s of
racks and bags etc), even if it is not current - sooner rather than later
- it would be much appreciated. Do you have 2005 numbers readily available?

Also, if we were able to pull together some comments for your scoping on
the aquaculture PEIR, to whom would we address them and where would we send
them? Any deadline? Unfortunately, no park staff will be able to attend
the meetings.

Thanks very much

Natalie

Natalie B. Gates, D.V.M.
Wildlife Biologist
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Thomas O. Moore
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tmoore@dfg.ca.gov

Natalie Gates
04/06/2007 05:20 PM
PDT

To: Don_Neubacher@nps.gov, Sarah_Allen@nps.gov
cc:
Subject: Re: Fw: questions about aquaculture in Drakes Estero

See below from Tom. Very interesting. I will include in the project review next week.

N

Natalie B. Gates, D.V.M.
Wildlife Biologist
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5189
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-----Forwarded by Natalie Gates/PORE/NPS on 04/06/2007 05:18PM -----

To: <Natalie_Gates@nps.gov>
From: "Tom Moore" <tmoore@dfg.ca.gov>
Date: 04/03/2007 03:47PM
Subject: Re: Fw: questions about aquaculture in Drakes Estero

Hi Natalie,

I have attached two documents; one is a printout of oyster production for Drakes Estero from 1950 (earliest data I have) to 2006. The second doc is a chart showing Drakes Estero production and state-wide production, which includes Drakes Estero in that total. The long-term averages are provided for both data sets.

The 2006 state-wide total is a preliminary estimate since I am still waiting on some 2006 numbers but should be fairly close. I will provide the 2006 final total when I have all the numbers.

The numbers used in the above summaries are in shucked pounds which is the typical reporting unit but I have provided the numbers for that time period. This reporting unit is used because it comes from our tax reports which require gallons to compute the tax owed on oysters and is widely used to report production of oysters. Other shellfish are reported in whole weight (mussels, clams, scallops and abalone).

The conversion is:

(No. of oysters harvested) X 8.5 lbs = shucked weight in pounds
100 gal

For 2006: 3,429,860 oysters were harvested

(3,429,860/100)x(8.5)= 291,538 lbs shucked weight

I will provide rack and bag information after I resolve some questions on reporting.

If you have any questions about the attached data, please let me know.

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator/
SF Bay Herring Gillnet Fishery Manager
P.O. Box 1560
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(707) 875-4261
(707) 875-4269 FAX
tmoore@dfg.ca.gov

>>> <Natalie_Gates@nps.gov> 3/6/2007 12:00 PM >>>
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Thanks very much

Natalie

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----- Forwarded by Natalie Gates/PORE/NPS on 03/06/2007 11:55 AM -----

Natalie Gates

02/28/2007 04:48 PM PST

To: "Tom Moore" <tmoore@dfg.ca.gov>

cc:

Subject: Re: questions about aquaculture in Drakes Estero

Hi Tom,

Thank you for your reply to my many questions. Very helpful. I don't have
a timeline yet from the superintendent regarding the environmental compliance. I suspect it is in the next month.

I appreciate your sending the production info when you get it. And thanks
for the scoping notice for the statewide plan.

Natalie

Natalie B. Gates, D.V.M.
Wildlife Biologist
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-----"Tom Moore" <tmoore@dfg.ca.gov> wrote: -----

To: <Natalie_Gates@nps.gov>
From: "Tom Moore" <tmoore@dfg.ca.gov>
Date: 02/28/2007 03:35PM
Subject: Re: questions about aquaculture in Drakes Estero

Hi Natalie,

I haven't forgotten you. I am waiting to receive the state's annual marine aquaculture Proof-of-Use statements back from State water bottom
lessees. When they send these back I should have information for 2006.

Kevin is in the process of getting his aquaculture operation back into the production mode since when he acquired it, it was pretty much mined-out by the Johnson Oyster Co. as financial woes overtook them. The
oyster operation is in a growth trajectory with large plantings which will translate into larger harvests and hopefully in a couple years maybe even a profit.

I think for your document you will need to look at previous production which reflects a profitable business (which is what the Johnson Oyster Company once was) and assume that Drakes Bay Oyster company will try and
approach those levels with corresponding increases in acreage and growing structures utilized.

I will put together the production history (2005 and earlier) and some relevant statistics on aquaculture production in other locations. Kevin
will provide me the up- to- date information (questions 1-3) when he returns his annual Proof-of-Use Statement to me.

Question 4.-- Aquaculturists are only allowed to import the species listed on the import permit. The oyster seed are produced from selected
brood stock under very controlled conditions in a closed system in a hatchery. They are fed algal diets produced in the hatchery under very strict conditions. See this link
http://marineresearch.oregonstate.edu/Breed%20Seed.pdf to get an idea of the hatchery operations.

Whiskey Creek is part of the Molluscan Broodstock Program and as such the genetic composition of the broodstock is off great importance when trying to produce a pedigreed oyster. There are no "other types" of oysters involved in anyway in this highly controlled situation since the
parentage is paramount.

Growers buy oyster seed at smaller sizes since they are cheaper. Kevin buys eyed-larvae < 1mm in size and remote sets them on oyster shell or calcium carbonate grains at his farm. At the hatcheries as oysters grow
larger they are moved to outdoor tanks but still in a very much controlled situation. Oyster leave the hatchery When a size is reached that small seed can be placed in up-welling growing systems or on nursery growing areas. Even at this size they are kept in fine-mesh bags
to prevent mortality and competition by other organisms. Most seed is sold before it gets much larger than 1/4 inch as separate oysters or on
cultch. This is very clean product which is screened, washed and in most
cases dipped in a chlorine bath to kill any potential external animals prior to shipment.

Question 5- We and the oyster industry share those concerns. Larger oyster seed or cultch which overwinters and is sold the next year has the greatest potential to have epibionts on the shell or living in and amongst the shells. Again, the importation permit only allows the listed
species and all imports/shipments of larger seed are conditioned that an
inspection by CDFG is needed prior to placing in the waters of this state.

Check-out the link below for a good overview of aquaculture in Calif.
http://aqua.ucdavis.edu/dbweb/outreach/aqua/ASAQ-A07.PDF

What is your timeline for getting a draft doc. out? I have been a bit

busy with getting the process for our PEIR for marine aquaculture going.
I have included the notice below.

Tom

Announcement: Aquaculture PEIR Scoping Meetings

The California Department of Fish and Game, on behalf of the California
Fish and Game Commission and in cooperation with the California Ocean Protection Council, will be preparing a Program Environmental Impact Report (PEIR) for the Coastal Marine Aquaculture program. The PEIR will
identify and programmatically evaluate potential environmental impacts of construction and operation of marine aquaculture facilities, and will
discuss thresholds of significance and mitigation measures to reduce these impacts.

The Department will be conducting three public scoping meetings during the week of March 5, 2007 (details below). The scoping meetings will present an opportunity for the Department to introduce the program to the public and to solicit comments from the public and agencies during the early stages of program development. Comments received at the public
scoping meeting will be considered in the PEIR analysis.

The CEQA Notice of Preparation (NOP) will be release shortly. If you have any questions in the mean time, please contact:

Becky Ota

Department of Fish and Game

bota@dfg.ca.gov

or

Christine Blackburn

Ocean Protection Council

cblackburn@scc.ca.gov

Monday, March 5

Santa Monica Main Public Library

Martin Luther King Jr. Auditorium

601 Santa Monica Blvd

Santa Monica, CA

6:30-8:30pm

Tuesday, March 6

Monterey Beach Resort

Bayview Room

2600 Sand Dunes Drive

Monterey, CA

6-8pm

Thursday, March 8

Wharfinger Building/Eureka Public Marina

Great Room

1 Marina Way at Waterfront Drive

Eureka, CA

6-8pm

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_____

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http://lists.ceres.ca.gov/cgi-bin/mailman/listinfo/oceanpublic

>> <Natalie_Gates@nps.gov> 2/5/2007 11:35 AM >>>
Hi Tom,

It was nice talking to you today. I think it was pretty clear, I have a
lot to learn about oysters.

Here are the questions I had on Drakes Oyster Company for the environmental documentation I am working on:

1. What is the yearly production in total numbers, numbers per acre and numbers of acres used?
2. How many of the racks out there are active? (How many total racks are out there?)
3. How many oyster bags are being used? Where are these in the Estero?

And here are 2 questions we didn't discuss today.

4. Is there any screening/quality control of the imported seed stock or larvae from Whiskey Creek? What I mean here is not related to human health in terms of how sanitary the imports are but how does Kevin know he is getting 100% pure Pacific oysters uncontaminated by some other species?

5. Are there ever any concerns about other organisms being carried in with imported oysters (invasive weeds, algae, microorganisms)?

I really appreciate your input on this. As I mentioned, it will certainly speed up my job. If you would rather send me digital (or even paper) copies of documents for me to search for answers on my own, I am happy to do this.

Thanks for your time,

Natalie

Natalie B. Gates, D.V.M.
Wildlife Biologist
Point Reyes National Seashore
Point Reyes, CA 94956
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FAX: (415) 464-5183

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chart Drakes Estero &State Production 1950-06.pdf

Drakes Estero Oyster Production 1950-06.pdf

Drakes Estero Oyster Production 1950 to 2006*

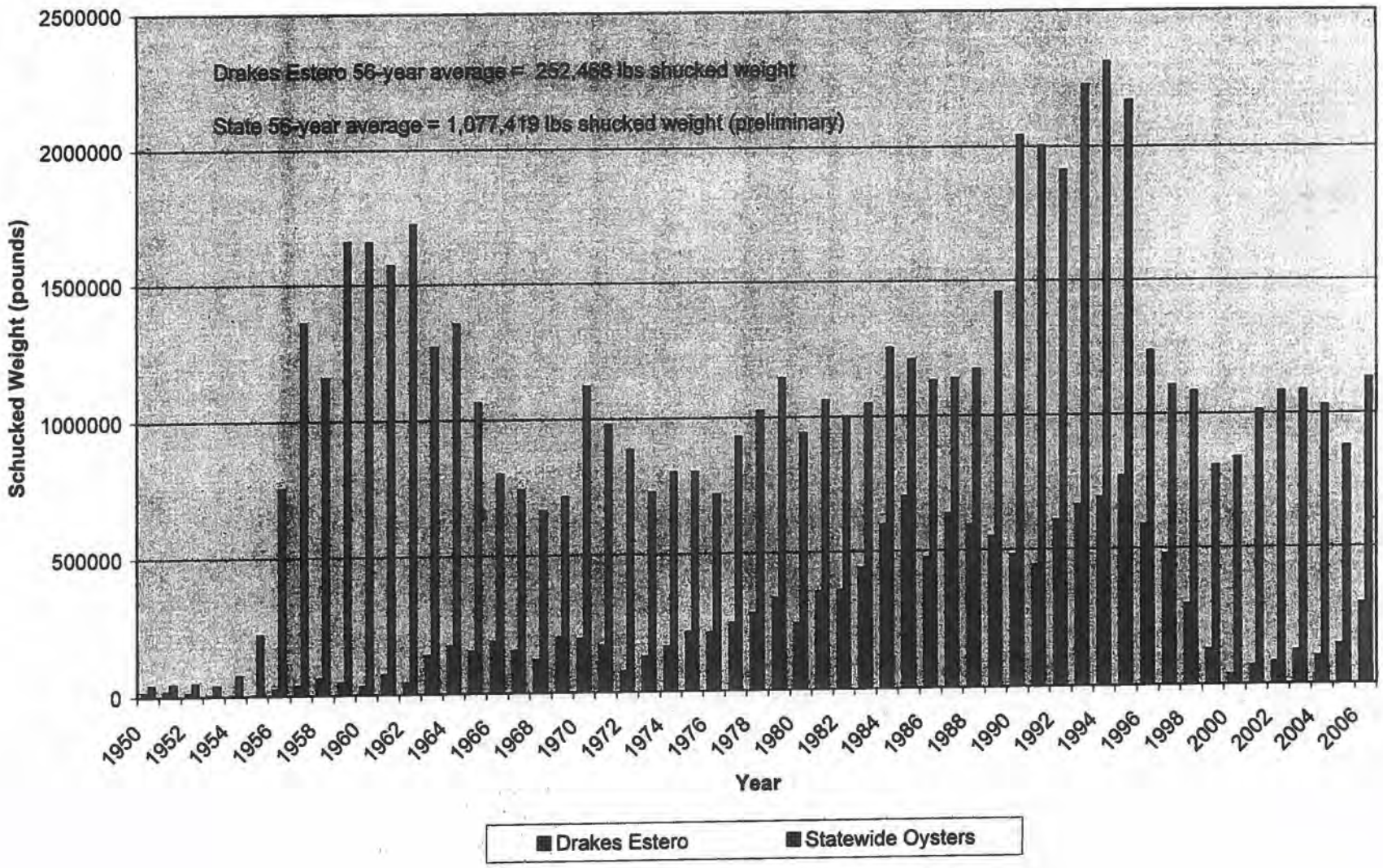
Year	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Pacific Oysters (lbs)	15,355	19,231	10,647	4,493	1,155	1,264	22,112	33,006	80,506	44,812	29,799	70,435	41,004	138,539	172,338	152,117	185,840	152,820	118,272
Pacific Oysters (#)	180,647	226,247	125,259	52,859	13,588	14,871	260,141	388,306	711,835	527,200	350,576	828,647	482,400	1,629,871	2,027,506	1,789,612	2,186,353	1,795,529	1,391,435

Year	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Pacific Oysters (lbs)	198,712	193,160	169,355	74,014	128,035	161,840	213,760	210,544	246,007	281,719	333,836	239,803	357,364	360,004	440,139	598,070	700,092	473,043	634,869
Pacific Oysters (#)	2,337,788	2,272,471	1,992,412	870,753	1,506,294	1,904,000	2,514,824	2,476,988	2,894,200	3,314,341	3,927,482	2,821,212	4,204,282	4,235,341	5,178,106	7,036,118	8,236,376	5,565,212	7,469,047

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	56-year average
Pacific Oysters (lbs)	593,082	549,953	482,084	442,745	806,484	662,388	690,804	769,590	587,172	476,791	292,188	125,749	34,094	65,676	78,064	118,643	96,754	138,958	291,536	252,468
Pacific Oysters (#)	6,977,435	6,470,035	5,671,341	5,208,765	7,135,106	7,792,800	8,127,106	9,054,000	6,907,906	5,609,306	3,437,506	1,479,400	401,106	772,659	918,400	1,395,800	1,138,282	1,634,800	3,429,859	2,970,212

*weight is in shucked pounds
Source CDFG Marine Region Aquaculture Coordinator, March 30, 2007

California and Drakes Estero Oyster Production 1950-2006



Natalie Gates
03/27/2007 02:03 PM PDT

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject: Fw: questions about aquaculture in Drakes Estero-state production 2001-05

Don,

See below statewide production numbers from Tom Moore. DBO - specific production numbers still to come.

The difference between production in both Tomales Bay and Estero from 2003 to 2005 is about $100,000 or 50,000 pounds shucked oysters. I don't know enough about what happened in Tomales Bay during that interval to know if that can all be attributed to Lunny.

Natalie

Natalie B. Gates, D.V.M.
Wildlife Biologist
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5189
FAX: (415) 464-5183

----- Forwarded by Natalie Gates/PORE/NPS on 03/27/2007 01:59 PM -----

"Tom Moore" <tmoore@dfg.ca.gov>
03/27/2007 11:58 AM MST

To: <Natalie_Gates@nps.gov>
cc:
Subject: Re: Fw: questions about aquaculture in Drakes Estero-state production 2001-05

Hi Natalie,

Still working on 2006 numbers. Here is state production ffrom 2001 to 2005. Had to update and add in other production like seed production which was quite valuable.

I will breakout Drakes Estero production and provide this week.

Let me know if you need nay clarification on the production data.

Tom

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator/
SF Bay Herring Gillnet Fishery Manager
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 875-4269 FAX
tmoore@dfg.ca.gov

>>> <Natalie_Gates@nps.gov> 3/6/2007 12:00:30 PM >>>
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----- Forwarded by Natalie Gates/PORE/NPS on 03/06/2007 11:55 AM -----

Natalie Gates

02/28/2007 04:48 PM PST

To: "Tom Moore" <tmoore@dfg.ca.gov>

cc:

Subject: Re: questions about aquaculture in Drakes Estero

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a timeline yet from the superintendent regarding the environmental
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Natalie

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-----"Tom Moore" <tmoore@dfg.ca.gov> wrote: -----

To: <Natalie_Gates@nps.gov>
From: "Tom Moore" <tmoore@dfg.ca.gov>
Date: 02/28/2007 03:35PM
Subject: Re: questions about aquaculture in Drakes Estero

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scoping meeting will be considered in the PEIR analysis.

The CEQA Notice of Preparation (NOP) will be release shortly. If you have any questions in the mean time, please contact:

Becky Ota

Department of Fish and Game

bota@dfg.ca.gov

or

Christine Blackburn

Ocean Protection Council

cblackburn@scc.ca.gov

Monday, March 5

Santa Monica Main Public Library

Martin Luther King Jr. Auditorium

601 Santa Monica Blvd

Santa Monica, CA

6:30-8:30pm

Tuesday, March 6

Monterey Beach Resort

Bayview Room

2600 Sand Dunes Drive

Monterey, CA

6-8pm

Thursday, March 8

Wharfinger Building/Eureka Public Marina

Great Room

1 Marina Way at Waterfront Drive

Eureka, CA

6-8pm

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_____

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>> <Natalie_Gates@nps.gov> 2/5/2007 11:35 AM >>>
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getting 100% pure Pacific oysters uncontaminated by some other

species?

5. Are there ever any concerns about other organisms being carried in with
imported oysters (invasive weeds, algae, microorganisms)?

I really appreciate your input on this. As I mentioned, it will certainly
speed up my job. If you would rather send me digital (or even paper)
copies of documents for me to search for answers on my own, I am happy to
do this.

Thanks for your time,

Natalie

Natalie B. Gates, D.V.M.
Wildlife Biologist
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5189
FAX: (415) 464-5183

Thomas O. Moore
Calif. Dept. Fish and Game
Marine Aquaculture Coordinator/
SF Bay Herring Gillnet Fishery Manager
P.O. Box 1560
Bodega Bay, CA 94923
(707) 875-4261
(707) 875-4269 FAX
tmoore@dfg.ca.gov

2005 California Marine Bivalve Production
March 2007

Production Area	Species	Weight*	Value**
Humboldt Bay	Pacific Oyster***	339,638	$1,677,812
	Kumomoto***	39,900	$1,077,300
Seed Production	Oyster		$1,500,000
	Clam		$380,000
Total		379,538	$4,635,112
Tomales Bay & Drakes Estero	Pacific Oyster***	475,484	$3,566,128
	Eastern	7,511	$41,299
	European	965	$5,306
	Kumomoto	3,579	$96,620
	Manila Clam	7,366	$31,306
	Mussel	9,760	$29,280
Total		504,664	$3,769,938
Southern California	Pacific Oyster***	9,198	$62,347
	Mussel***	501,700	$1,505,100
Total		510,898	$1,567,447
Statewide Totals	Oysters	876,274	$8,026,811
	Oyster Seed		$1,500,000
	Mussels	511,460	$1,534,380
	Clams	7,366	$31,306
	Clam Seed		$380,000
Total	All Shellfish	1,395,100	$11,092,497

*Oyster production- shucked weight in pounds; all others, whole weight in pounds

** Value derived using 2002 information, averaged values by geographic area

*** Estimate

Source- Marine Region Aquaculture Coordinator- CDFG

2004 California Marine Bivalve Production
August 2005

Production Area	Species	Weight*	Value**
Humboldt Bay	Pacific Oyster***	559,505	$2,544,461
	Kumomoto***	41,750	$1,127,250
Seed Production	Oyster		$1,500,000
	Clam		$350,000
Total		601,255	$5,521,711
Tomales Bay & Drakes Estero	Pacific Oyster***	423,833	$3,178,748
	Eastern	4,735	$26,035
	Kumomoto	3,808	$102,816
	Manila Clam	28,799	$122,396
	Mussel	8,416	$25,248
Total		469,591	$3,455,242
Southern California	Pacific Oyster***	5,955	$40,365
	Mussel***	500,000	$1,500,000
Total		505,955	$1,540,365
Statewide Totals	Oysters	1,039,586	$7,019,674
	Mussels	508,416	$1,525,248
	Clams	28,799	$122,396
Total	All Shellfish	1,576,801	$8,667,318

*Oyster production- shucked weight in pounds; all others, whole weight in poun

** Value derived using 2002 information, averaged values by geographic area

*** Estimate

Source- Marine Region Aquaculture Coordinator- CDFG

2003 California Marine Bivalve Production
Revised July 2005

Production Area	Species	Weight*	Value**
Humboldt Bay	Pacific Oyster***	700,000	$3,183,390
	Kumomoto***	20,000	$540,000
Total		720,000	$3,723,390
Tomales Bay & Drakes Estero	Pacific Oyster	514,010	$3,484,988
	Eastern	1,284	$7,060
	Kumomoto	3,808	$102,816
	Manila Clam	29,025	$68,209
	Mussel	6,307	$11,037
Total		554,434	$3,674,110
Southern California	Pacific Oyster	2,955	$20,030
	Mussel***	500,000	$625,000
Total		502,955	$645,030
Statewide Totals	Oysters	1,242,057	$7,338,284
	Mussels	506,307	$636,037
	Clams	29,025	$68,209
Total	All Shellfish	1,777,389	$8,042,530

*Oyster production- shucked weight in pounds; all others, whole weight in pounds

** Value derived using 2002 information, averaged values by geographic area

*** Estimate

Source- Marine Region Aquaculture Coordinator, CDFG

2002 California Marine Bivalve Production

Production Area	Species	Weight*	Value**
Humboldt Bay	Pacific Oyster	687,527	$3,156,710
	Kumomoto	19,260	$520,047
Tomales Bay & Drakes Estero	Pacific Oyster	409,845	$2,778,280
	Eastern	2,640	$14,500
	Kumomoto	5,080	$137,160
	Native	500	$12,500
	Littleneck Clam	22,545	$52,980
	Mussel	6,457	$11,300
Morro Bay	Pacific Oyster	640	$3,200
Santa Barbara	Mussel	230,000***	$250,000
Totals	Oysters	1,125,492	$6,622,397
	Mussels	236,457	$261,300
	Clams	22,545	$52,980
Total	All Shellfish	1,384,494	$6,936,677

*Oyster production- shucked weight in pounds; all others, whole weight in pounds

** Value derived using 2002 information, averaged values by geographic area

*** Estimate

Source- Marine Region Aquaculture Coordinator, CDFG

2001 California Marine Bivalve Production
Revised August 2005

Production Area	Species	Weight*	Value**
Humboldt Bay	Pacific Oyster***	547,851	$2,491,462
	Kumomoto***	19,261	$520,047
Seed Production	Oyster		$1,500,000
	Clam		$350,000
Total		562,500	$4,861,509
Tomales Bay & Drakes Estero	Pacific Oyster***	464,819	$3,486,143
	Eastern	523	$2,876
	European	280	$1,540
	Kumomoto	8,831	$238,437
	Manila Clam	13,825	$58,756
	Mussel	10,079	$30,237
Total		498,357	$3,817,988
Southern California	Pacific Oyster***	3,000	$20,335
	Mussel***	689,000	$2,067,000
Total		692,000	$2,087,335
Statewide Totals	Oysters	1,044,285	$6,759,299
	Mussels	699,079	$2,097,237
	Clams	13,825	$408,756
Total	All Shellfish	1,757,189	$9,265,292

*Oyster production- shucked weight in pounds; all others, whole weight in pounds

** Value derived using 2004 information, averaged values by geographic area

*** Estimate

Source- Marine Region Aquaculture Coordinator- CDFG

Natalie Gates
02/28/2007 04:50 PM
PST

To: Don_Neubacher@nps.gov, Sarah_Allen@nps.gov
cc:
Subject: Re: questions about aquaculture in Drakes Estero

Hi,

From CDFG - see below. More to come on the specifics of production and rack numbers.

Natalie

Natalie B. Gates, D.V.M.
Wildlife Biologist
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5189
FAX: (415) 464-5183

-----Forwarded by Natalie Gates/PORE/NPS on 02/28/2007 04:48PM -----

To: <Natalie_Gates@nps.gov>
From: "Tom Moore" <tmoore@dfg.ca.gov>
Date: 02/28/2007 03:35PM
Subject: Re: questions about aquaculture in Drakes Estero

Hi Natalie,

I haven't forgotten you. I am waiting to receive the state's annual marine aquaculture Proof-of-Use statements back from State water bottom lessees. When they send these back I should have information for 2006.

Kevin is in the process of getting his aquaculture operation back into the production mode since when he acquired it, it was pretty much mined-out by the Johnson Oyster Co. as financial woes overtook them. The oyster operation is in a growth trajectory with large plantings which will translate into larger harvests and hopefully in a couple years maybe even a profit.

I think for your document you will need to look at previous production which reflects a profitable business (which is what the Johnson Oyster Company once was) and assume that Drakes Bay Oyster company will try and approach those levels with corresponding increases in acreage and growing structures utilized.

I will put together the production history (2005 and earlier) and some relevant statistics on aquaculture production in other locations. Kevin will provide me the up- to- date information (questions 1-3) when he returns his annual Proof-of-Use Statement to me.

Question 4.-- Aquaculturists are only allowed to import the species listed on the import permit. The oyster seed are produced from selected brood stock under very controlled conditions in a closed system in a hatchery. They are fed algal diets produced in the hatchery under very strict conditions. See this link

http://marineresearch.oregonstate.edu/Breed%20Seed.pdf to get an idea of the hatchery operations.

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(707) 875-4269 FAX
tmoore@dfg.ca.gov

"Shawn Cubbage" <SCUBBAGE@fgc.ca.gov>
05/31/2007 04:10 PM MST

To: <Don_Neubacher@nps.gov>
cc: "Jon Fischer" <JFischer.PO_HQ.DOM_HQ@fgc.ca.gov>
Subject: Re: Drakes Bay Oyster Co. Letter to Commission

The requested letter is attached. Shawn.

>>> Jon Fischer 5/31/2007 4:00 PM >>>
Shawn,
Please scan/send a copy of the January 22, '07 Drakes Bay letter, to Mr. Don Neubacher with the National Park Service. Thanks. JF

Jon Fischer
Assistant Executive Director
California Fish and Game Commission
1416 Ninth Street, Room 1320
Sacramento, CA 95814
Office Phone: (916) 653-4899
Cell Phone: (916) 799-8865
Fax: (916) 653-5040

Drakes Bay.pdf

Drakes Bay Oyster Company

17171 Sir Francis Drake Boulevard, Inverness, CA 94937

RECEIVED
CALIFORNIA
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COMMISSION
2007 FEB -2 AM 1:52

January 22, 2007

Mr. John Carlson Jr.
Executive Director
California Department of Fish and Game
1416 Ninth Street, Room 1207-5
Sacramento, CA 94244

Re: Lease No. M-438-01, M-438-02

Dear Mr. Carlson,

The Drakes Bay Oyster Company (DBOC) would like to ask the CDFG to clarify a question as to the authority of DBOC to culture Manila clams (*Venerupis phippinarum*) on lease No. M-438-01. Drakes Bay Oyster Company currently has two state water bottom leases in Drakes Estero, M-438-01, which totals 1,059 acres and M-438-02, which is one acre in area.

On August 6, 1993, a written request was made to the CDFG to add Manila clams to this lease. On August 19, 1993, the CDFG responded with a letter indicating a Commission meeting date to address this request. The request was discussed and approved at the October 8, 1993 Commission meeting as identified in a letter written by Mr. Robert Treanor, CDFG, dated October 18, 1993 (see attached copies of these documents). The Commission action inadvertently added the Manila clams to lease No. M-438-02, instead of adding this species to lease No.M-438-01 as requested.

DBOC requests that this oversight be corrected for two reasons: 1. Lease No: M-438-02 is located in deep water making clam culture almost impossible and 2. M-438-02 is only one acre, too small for a viable clam operation in Drakes Estero.

Additionally, DBOC would like to add the following species to the list of approved species for cultivation on lease No. M-438-01:

1. Olympia oyster (*Ostrea conchaphila*)
2. Eastern oyster (*Crassostrea virginica*)
3. Kumamoto oyster (*Crassostrea sikamea*)
4. Suminoe oyster (*Crassostrea ariakensis*)
5. Bay mussels (*Mytilus galloprovincialis*)
6. Purple Hinged Rock Scallops (*Hinnites multirugosus*) The Purple Hinged Rock Scallops are already an approved species on lease No. M-438-02

Currently, Pacific oysters (C. gigas) and European Flat Oysters (Ostrea edulis L.) are approved for cultivation on M-438-01. The net effect of this request will be to add Manila clams plus six new species of bivalve shellfish to lease M-438-01. These new species are important to our business. We are constantly asked about the availability of these additional species and customers constantly ask us to provide them. At present, we consistently send these customers to the shellfish growers in Tomales Bay who already have the authority to grow these species or they purchase them from growers who have shipped the product into our area. We would like to offer this variety to our local community.

No new culturing methods are required to grow these additional shellfish species and all seed stock will be certified by CDFG before planting.

Sincerely,

Kevin Lunny
Drakes Bay Oyster Company

enclosures (3)

F. ROBERT STUDDERT
ATTORNEY AT LAW

RECEIVED
CALIFORNIA
FISH AND GAME
COMMISSION
9 AUG 93 11 50

REPLY TO NORTHGATE OFFICE

August 6, 1993

Robert R. Treanor
CALIFORNIA FISH & GAME
1416 Ninth Street, RM 1207-5
Sacramento, CA 94244

Re: Water Bottom Allotment Lease No. M-438-01
Johnson Oyster Company

Dear Bob:

Johnson Oyster Company would like to start culturing Manila Clams on the captioned lease in Drakes Estero. Accordingly, please consider this a request to add that species, Manila clams *(Venerupis japonica)*, to the other species specified at page 4 of the captioned allotment at the top of the page.

If memory serves correctly, we had been able to change the species cultured on other leases by administrative change rather than having to go to a noticed procedure. I would hope that the foregoing request could be processed in the same manager. Thank you for your usual courtesy and cooperation in this matter.

Very truly yours,

F. Robert Studdert

cc: Tom Johnson,
Johnson Oyster Company
Bob Hulbrock

FRS/lcv
JOC1*1
JOC1/2

NORTHGATE OFFICE: 36 PROFESSIONAL CENTER PARKWAY • SAN RAFAEL, CA 94903 • (415) 499-1155
WEST MARIN OFFICE: P.O. BOX 6 • INVERNESS, CA 94937 • (415) 663-8235
FAX: (415) 479-8416

August 19, 1993

Mr. F. Robert Studdert, Esq.
Northgate Office
36 Professional Center Parkway
San Rafael, CA 94903

Dear Mr. Studdert:

Your request on behalf of your client, Johnson Oyster Company, to add Manila clams (Tapes japonica) to the list of species for mariculture purposes at their Drakes Estero lease has been scheduled for the Commission's October 8, 1993 meeting in San Diego. That meeting will commence at 8:30 a.m. in the State Building, Room B-109, 1350 Front Street. Unless otherwise notified, it will not be necessary for you to attend that meeting. You will be notified of any Commission action shortly after the meeting.

Sincerely,

COPY ORIGINAL SIGNED BY ROBERT R. TREANOR

Robert R. Treanor
Executive Director

cc: Marine Resources Division
Region 3
Fish and Game - Menlo Park and Monterey
Bob Hulbrock, Aquaculture Coordinator

AUG 24 1993

October 18, 1993

Mr. Tom Johnson
Johnson Oyster Company
c/o F. Robert Studdert, Esq.
Northgate Office
36 Professional Center Parkway
San Rafael, CA 94903

Dear Mr. Johnson:

The Commission, at its October 8, 1993 meeting in San Diego, approved your request to add Manila clams (Tapes japonica) to the list of species for mariculture purposes at your Drakes Estero Lease M-438-02. You should be receiving your amended lease from the Department shortly.

Sincerely,

COPY ORIGINAL SIGNED BY ROBERT R. TREANOR

Robert R. Treanor
Executive Director

cc: Marine Resources Division
Region 3
Bob Hulbrock, Aquaculture Coordinator

OCT 19 1993

Don Neubacher
06/01/2007 03:38 PM
PDT

To: fgc@fgc.ca.gov
cc: Ann Nelson/PORE/NPS@NPS
Subject: Letter for June 7-8 FGC Meeting

LetterCDFG Commission 6-2-07.pdf cdfg letter.pdf

Please submit to FGC members.

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

L1425
Tract 02-106 PORE

June 1, 2007

California Fish and Game Commission
1416 Ninth Street
Sacramento, California 95814

Re: Proposed Expansion of Drakes Bay Oyster Company Lease No. M-438-01

Dear Commissioners:

Drakes Bay Oyster Company has proposed to expand the mariculture use in Drakes Estero Lease No. M-438-01 (the "Lease"), as reported on the Consent Calendar Agenda Item No. 23 for June 7, 2007 Meeting of the Fish and Game Commission.

Point Reyes National Seashore, a unit of the National Park Service (NPS) has several concerns regarding the proposed expansion and request that the item be removed from the Consent Calendar. The tide and submerged lands in the Drakes Estero were conveyed to the United States in 1965 by the California legislature. Because of this conveyance, the Point Reyes National Seashore has "primary management authority" over Drakes Estero. However, the NPS has not had the opportunity to fully discuss our concerns regarding the proposed change in the lease agreement with DBOC or the California Department of Fish and Game (CDFG) (attachment of Letter from CDFG to NPS). In fact, the NPS was never notified about the potential changes to the lease agreement with CDFG until it was listed in the June 7-8, 2007 agenda.

Our specific concerns follow:

- Major changes in the current CDFG lease are subject to environmental review and analysis under the National Environmental Policy Act (NEPA), along with the California Environmental Quality Act ("CEQA"). Both the addition of several new species to the lease and the expansion of the area where they can be cultivated are major changes to the current lease and require environmental review. No NEPA has been completed because of lack of information to conduct an environmental analysis. We also believe that consultation regarding this expansion is required with NOAA Fisheries, Army Corps of Engineers, and the US Fish and Wildlife Service.
- Potential introduction of invasive species and pathogens is a major concern. Dr. Edward Grosholz, a national authority on aquatic invasive species, expressed particular concern to us regarding one of the proposed species, Suminoe Oyster, *Crassostrea ariakensis*. In the Chesapeake Bay, this oyster is considered a host for several pathogens (STAC Publication 04-002; Identifying and prioritizing research required to evaluate ecological risks and benefits of introducing Diploid *Crassostrea ariakensis* to restore oysters to Chesapeake Bay). We are alarmed by the potential ecological risks that this species may bring to Drakes Estero and native species there. No risk analysis for any of the species to be introduced has been conducted.
- Changes in methods of cultivation. We do not know what methods of cultivation will be used

with these new species. Purple Hinged Rock Scallops, for example, must be harvested in the water column. Does this mean that DBOC proposes to build new structures in the Estero?

- Changes in the intensity of cultivation. Adding new species to the lease indicates that the DBOC intends to intensify and expand mariculture operations. We are concerned that more intensive and expanded operations have the potential to cause further significant adverse effects to species and habitats within Drakes Estero.
    - Existing adverse affects include 1) damage to sensitive eelgrass beds which are critical to many native species such as salmon, herring and Dungeness crabs, 2) increased sedimentation around bags and racks, 3) introduction and perpetuation of invasive non-native species such as the tunicate, *Didemnum*, 4) disturbance and displacement of native species such as harbor seals, and 5) damage of Essential Fish Habitat for such important species as rockfish, salmon and steelhead, several of which are Federally listed species.
    - Potential adverse effects from increasing species and production levels in the Estero include 1) further disturbance and displacement of shorebirds and waterbirds (Drakes Estero is part of the US FWS Western Hemisphere Shorebird Reserve Network, a site of Regional Importance in the U.S. Shorebird Conservation Plan), 2) competition with native species with increases in the consumption of larvae and planktonic food by oysters and scallops. Of particular concern is competition with Federally listed salmonids, and herring.
- Lack of a finalized CDFG Program EIR on aquaculture operations. The Commission has not completed the EIR, which is still in the scoping process. The purpose of the PEIR is to provide public agencies with the environmental information required to evaluate the proposed Program and to identify methods for reducing adverse environmental impacts. Point Reyes National Seashore submitted comments to the Commission expressing concern regarding the potential introduction of non-native species that can change ecosystem structure, function, species abundance and community composition.

In addition, the current facilities are under a Cease and Desist Order by the California Coastal Commission. We feel this issue should be resolved before any expansion of the existing cultivation is allowed. Also, although the NPS has primary authority, the DBOC does not have a current permit to operate in the estuaries waters from Point Reyes National Seashore.

We request you postpone any action on this issue at this time and we appreciate your attention to these concerns.

Sincerely,

//signed dln

Don L. Neubacher
Superintendent

Attachments

CDFG Letter, May 15, 2007

State of California – The Resources Agency
DEPARTMENT OF FISH AND GAME
OFFICE OF THE GENERAL COUNSEL
1416 Ninth Street
Sacramento, CA 95814
http://www.dfg.ca.gov
(916) 654-3821

RECEIVED
National Seashore
MAY 18 '07
SUPT.
SCIENCE
SPEC. PK. USES
LAW ENFORC.
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ARNOLD SCHWARZENEGGER, Governor

L1425
02-106

May 15, 2007

Mr. Don Neubacher, Superintendent
Point Reyes National Seashore
Point Reyes Station, California 94956

Re: Drake's Bay Oyster Company

Dear Superintendent Neubacher:

The purpose of this letter is to memorialize the position of the Department of Fish and Game (Department) regarding the lease status of the above-referenced mariculture operation at Drakes Estero, within the Point Reyes National Seashore (PRNS). For the reasons discussed below, we conclude that the mariculture operation in question is properly within the primary management authority of the PRNS, not the Department.

By way of review, the leasing of state water bottoms at Drakes Estero dates to at least 1934. In 1965, the California Legislature granted to the United States, subject to certain limitations, "all of the right, title, and interest…to all of the tide and submerged lands or other lands beneath navigable waters" situated within the boundaries of the PRNS (Chapter 983, Statutes of 1965). The tidelands and submerged lands encompassed by this legislative grant include the leased state water bottoms. Consistent with article 1, section 25 of the California Constitution, this conveyance carried a reservation of the right to fish in the waters overlying these lands. Although the right to fish extends to both commercial and sport fishing, it does not extend to aquaculture operations. Regardless of whether its purpose is commercial or recreational, *fishing* involves the take of public trust resources and is therefore distinct from aquaculture, which is an agricultural activity involving the cultivation and harvest of private property (Fish and Game Code §§ 17, 15001, 15002, 15402). In November 1972, the Johnson Oyster Company (Johnson) conveyed its property to the United States, subject to a reservation of occupancy and use in the grant deed, which provided:

> "Upon expiration of the reserved term, a special use permit may be issued for the continued occupancy of the property…provided, however, that such permit will run concurrently with and will terminate upon the expiration of State water bottom allotments assigned to the Vendor. Any permit for continued use will be issued in accordance with National Park Services regulations in effect at the time the reservation expires."

The reservation specifies a 40-year term and additionally requires, among other things, that Johnson comply with all applicable health and safety laws, and all rules and regulations of the National Park Service. This reservation expires in November 2012.

After that time, aquaculture operations must continue subject to a special use permit that would run concurrently with, and would terminate upon, the expiration of the assigned State water bottom allotments. Since such allotments are subject to a maximum lease term of 25 years, both the grantor and grantee apparently contemplated that the state water bottom leases then in effect could be renewed, and this was in fact done in 1979. In June 2004, the Fish and Game Commission (Commission) renewed the state water bottom lease for an additional twenty-five years, contingent on this reservation, and also required Johnson to comply "with all rules and regulations now or hereinafter promulgated by any governmental agency having authority by law..." In March 2005, the Commission authorized the assignment of the state water bottom lease to Johnson's successor, Drakes Bay Oyster Company.

The 2004 lease renewal is expressly contingent upon the aquaculture facility's compliance with the 1972 grant reservation and, after its expiration, with any special use permit that PRNS may issue in its discretion. The reservation requires compliance with all applicable health and safety laws and, specifically, with all rules and regulations of the National Park Service. Conversely, the renewal imposes an additional requirement of compliance with all other applicable laws, which reasonably includes those of the National Park Service and of PRNS in particular. For these reasons, we believe the mariculture operation in Drakes Estero is properly within the primary management authority of the PRNS, not the Department.

Should you or any of your staff require any additional assistance, please contact Senior Staff Counsel Joseph Milton, Office of the General Counsel, at (916) 654-5336 or jmilton@dfg.ca.gov.

Sincerely,

for L. RYAN BRODDRICK
Director

cc: Mr. Ralph Mihan, Office of the Solicitor
U.S. Department of the Interior

Mr. Joseph Milton, Senior Staff Counsel
Department of Fish and Game

"Jon Fischer"
<JFischer@fgc.ca.gov>

06/06/2007 10:36 AM
MST

To: <gbatmuirb@aol.com>, <Don_Neubacher@nps.gov>, <tedgrosholz@ucdavis.edu>
cc: "John Carlson" <JCarlson@fgc.ca.gov>
Subject: Fish and Game Commission Agenda Item: Drakes Bay Oyster Company

This is to advise you that Drakes Bay Oyster Company has requested (by telephone and e-mail) that agenda item #23 regarding their lease be removed entirely from the agenda for the Commission meeting this week. Commission staff will comply with their request, and will announce tomorrow at the beginning of the Commission meeting that this item will be removed.

I have attempted to contact each of you by telephone to advise you of this change. If you have questions or want additional information, you may contact me by return e-mail, or alternatively by telephone at a number listed below.
JF

Jon Fischer
Deputy Executive Director
California Fish and Game Commission
1416 Ninth Street, Room 1320
Sacramento, CA 95814
Office Phone: (916) 653-4899
Cell Phone: (916) 799-8865
Fax: (916) 653-5040

RECEIVED
JUL 19 2007
CALIFORNIA
COASTAL COMMISSION

07/17/07

Peter Douglas
Executive Director
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

Re: Drakes Bay Oyster Farm

Dear Mr. Douglas.

We are in receipt of a letter (dated June 19, 2007) from Don Neubacher, Point Reyes National Seashore Superintendent, requesting a meeting of NPS Western Regional Office, the Solicitor's Office and representatives from the California Coastal Commission.

We responded to Don Neubacher, requesting additional details, the proposed agenda, and the opportunity to review any relevant documents in advance so that we can be fully prepared to discuss them in a meaningful way.

Mr. Neubacher's letter is also deeply disturbing, and highly misleading, on what has been the central issue between PRNS and our family farm permits: Superintendent Neubacher's unrevealed assertion and unrelenting insistence that the oyster farm was not properly on the established PRNS oyster farm "reservation".

This is the primary issue that prevented us from (1) fulfilling the Coastal Commission's requirements on the Cease and Desist Order issued to the previous owners; and (2) obtaining requisite NPS permits to operate our oyster farm.

Let us be very clear about the implications -- the Superintendent functionally blocked the work required to comply with the Cease and Desist Order for the past 18 months. Don Neubacher insisted that the oyster farm, after we purchased it, was not on the PRNS-identified oyster farm reservation. The Superintendent, to date, has given us no choice but to agree to a permit based on a so-called survey that was knowingly inaccurate and that cut the oyster farm in half -- literally. This demand would change the permits and maps that have been in place since the PRNS was established, impose layers of paperwork, require significant uncalled for expenses for both parties and inflict unnecessary restrictions.

Drakes Bay Family Farms

17171 Sir Francis Drake Blvd.
Inverness, California 94937

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w: drakesbayfamilyfarms.com

From early 2005, shortly after we acquired the oyster farm, Superintendent Neubacher insisted that a map – *the Lafranchi map* – prepared for the previous owners to comply with the California Coastal Commission Cease and Desist Order, "controlled" the farm boundaries for NPS permitting purposes for us, the Drakes Bay Oyster Company. The Lafranchi drawing was not a boundary survey. It was not appropriate to use this map for permit purposes.

Mr. Neubacher was fully aware of these errors, and notwithstanding that knowledge, insisted on its use. Moreover, he has been aware of this error throughout this period since our purchase in January 2005 until the present.

The Lafranchi map, prepared by G.J. Hamina, of Steven J. Lafranchi and Associates, was:

- Drawn for CCC CDO purposes. It was NOT a boundary survey.
- Prepared for approximately $1,500, reflecting its purpose at the time – to locate buildings and identify which buildings and additions were in violation of the Coastal Act.
- Its author, G.J. Hamina, when informed that the map was being used for "boundary" determinations by NPS, wrote a letter declaring it was inappropriate for boundary use.
- Superintendent Neubacher, faced with that clarification, insisted that the Lafranchi building location map be used for "boundary" purposes anyway.
- Drakes Bay Oyster Company went to considerable expense ($20,000 plus) to have a proper boundary survey prepared by L.A. Stevens and Associates (finalized and submitted to PRNS in late 2005). Superintendent Neubacher first consulted with BLM staff, and later, proceeded to ask a private title company to "review" the survey and the map. He then reported to others and us that the private firm said there was no difference. We contacted that firm, and the individual involved. He reported to us that the Stevens survey was the only appropriate survey to use, and indicated that is what he reported to the Superintendent.
- The Superintendent rejected the Stevens boundary survey for over a year and a half, only to reverse himself, without explanation, in the June 19 letter.

The Superintendent's actions relating to this single issue have delayed our ability to complete all pending actions on the Cease and Desist Order. He has burdened us with tens of thousands of dollars in needless costs. He has labeled us as being uncooperative. He has repeatedly and publicly declared that we are harming the environment.

When our family purchased the oyster farm, we sought to "do it right." As you know, we willingly accepted all responsibility for the Cease and Desist Order issued against the previous owners. We did not anticipate, however, having to pay for undisclosed requirements, including a boundary survey. We did not anticipate that PRNS would seek to delay permits, interfere with grants to research the native oysters in the Estero, and block high-level environmental certifications – such as Salmon Safe.

The Lunny family – parents Joe and Joan, brothers Joe III and Bob, their wives, and our triplets are all involved in our family oyster farm and family ranch (where we raise Marin County's only certified organic, grass-fed beef) – are committed to "doing it right."

We seek a positive and constructive relationship with the Coastal Commission. We are not "environmental criminals", as we have been labeled, but proud, responsible, fourth-generation stewards of the Lunny Ranch and innovative, sensitive stewards of Drakes Estero.

We are in receipt of your letter dated June 5, 2007. We will respond to your letter, in detail, following the meeting with Senator Feinstein this weekend.

Enclosed is a letter we sent to the Superintendent regarding his request for a meeting. Statements about the survey required confirmation and our letter attempts to provide it. Had Mr. Neubacher not "cut the farm in half" and imposed administrative requirements never imposed on the Johnsons, the Cease and Desist Order would have been fully resolved 16-18 months ago. Our project architect, Bill Kirsch, submitted a permit application, with plans, to the Marin County Building Department, for the repairs to the commercial buildings required by the CDO. Also enclosed is a copy of the Marin County Community Development Agency permit hold, dated 12/08/05. The County permit approval requires NPS written approval, which continues to be withheld.

Thank you for your attention to these important matters,

Kevin Lunny Nancy Lunny

Encls: 2

07/12/07

RECEIVED
JUL 19 2007
CALIFORNIA
COASTAL COMMISSION

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

Dear Mr. Neubacher,

You have requested a meeting with Drakes Bay Oyster Company and advise that representatives of the National Park Service Western Regional Office, the Office of the Solicitor and the California Coastal Commission will participate.

So that we can properly prepare for this meeting, the following is requested:

[1] Please identify each individual that will attend the meeting, and include title, organization and complete contact information (address, telephone and email).

[2] Provide the proposed agenda, with specificity. If you have documents to present or discuss, in draft or otherwise, we request that they be submitted sufficiently in advance so that they can be fully evaluated prior to the meeting.

[3] If you have issued or received directives or guidance for this meeting, please provide copies so they can be fully evaluated prior to the meeting.

[4] With regard to permits or related documents, please highlight any proposed changes, and provide an explanation for each.

[5] Your letter states: *"regarding the Reservation boundary, as we stated previously, we are prepared to apply the conditions in the Reservation to the area located within the Stevens survey."* Please confirm the Reservation now includes all oyster farm buildings, including those near the water.

Mr. Neubacher, for more than two years, you insisted that a drawing, prepared for the Johnson Oyster Company in 2003, that was specifically prepared to meet a condition of the California Coastal Commission Cease and Desist Order – the Lafranchi drawing – controlled all regulatory and permitting issues. You knew that the Lafranchi drawing was not a boundary survey. You knew the Lafranchi drawing was in error. You knew that the Lafranchi drawing was prepared for "appraisal" and not "boundary" purposes. You knew that the Lafranchi drawing chopped the oyster farm in half. And you knew that any map that cut the farm in two made no practical sense. Notwithstanding, you were adamant. The Lafranchi drawing, by your declaration, was controlling.

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That decision on your part, as much as anything else, delayed this permit process, prevented us from resolving the Coastal Commission's Cease and Desist Order issues, interfered with our right to conduct business and cost our family farm significant amounts of time and money. At the May 8 Marin County Board of Supervisor's hearing, you testified that the Coastal Commission, not NPS, was the reason for these delays. Plainly, that was not accurate.

Early on, when you raised this issue, you recognized the limitations of the Lafranchi plans and subsequently agreed to have the NPS prepare a formal boundary survey. Then a short time later, without explanation, you reversed from your own recommendation by saying that you would not spend any more money on this project and that if there was going to be a survey, "Lunny will have to pay for it". We were left with no choice. The Drakes Bay Oyster Company then spent over $20,000 in direct costs and more than that in indirect costs and lost opportunities to have a formal boundary survey prepared. We contracted with L.A. Stevens & Associates, a well-known and highly regarded survey firm in Marin County.

When completed, the boundary survey showed that all oyster farm buildings were on the Reservation and that the Lafranchi plans were not accurate. The survey – the Stevens survey – was submitted to you and your staff. Then, with an official survey in hand, one that showed all the oyster buildings on the Reservation, you rejected the formal boundary survey (Stevens) and instead declared that NPS would rely on the incorrect appraisal drawings (Lafranchi). Moreover, Lafranchi stated, in writing, that these drawings were not prepared for boundary purposes and should not be used for such. Your rejection of the Stevens survey, more than a half year ago, was both arbitrary and punitive.

Today, some seven months later, in your letter of June 19, 2007, without explanation, you abruptly reversed yourself again and admit that the Stevens survey (a survey which is consistent with all prior appraisals, descriptions, maps, drawings and permits prepared for the oyster farm since the creation of the PRNS) is now the basis for NPS permits.

Given this history, and to eliminate any possibility of misinterpretation, we request that you confirm, in writing, that (1) the Lafranchi plan was a drawing, not a property boundary survey, for appraisal purposes and not applicable, suitable or appropriate for boundary purposes; (2) that NPS no longer asserts that Lafranchi plans will be raised or considered in permit discussions; and (3) that the oyster farm buildings are properly within the Reservation.

For two and a half years, since shortly after our family purchased the oyster farm, you have insisted that the boundaries would be determined by the Lafranchi drawing. These delays have served as a functional "surtax" on Drakes Bay Oyster Company that undermined our ability to conduct business.

Thank you for your attention to these matters.

Sincerely,

Kevin Lunny & Nancy Lunny

Trip Report
Drakes Estero
4/26/07
3:45-5:00 PM

Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Thursday during the afternoon low tide to count harbor seals for the peak pupping season count.

I arrived at 3:45 PM and began counting the seals at A and A1 sandbars. At 3:50 PM I noted a white boat (@20 ft long) with outboard motor and two people aboard in the east end of the OB seal haul out site. The boat was fowled in eelgrass and the operators were poling through the eelgrass bed. Once half way along the channel going west, they used the engine again. I did not see the number of seals present before the boat was there; however there were only 5 (2 pups) when I began surveying and I saw seal heads in the water. There were seal drag marks on the sand bar indicating other seals may have been present and several fresh wet seals were hauling out on UEN, an adjacent sand bar. Also on previous day 4/25, a volunteer counted 21 (8 pups) on the OB haul out. When the boat went by the seals at 3:55 PM, all flushed into the water except one lone seal. Seals on UEN raised their heads but I did not see any enter the water. The boat continued west along the channel and flushed around 120 Black Brant that were in the eelgrass beds in the channel.

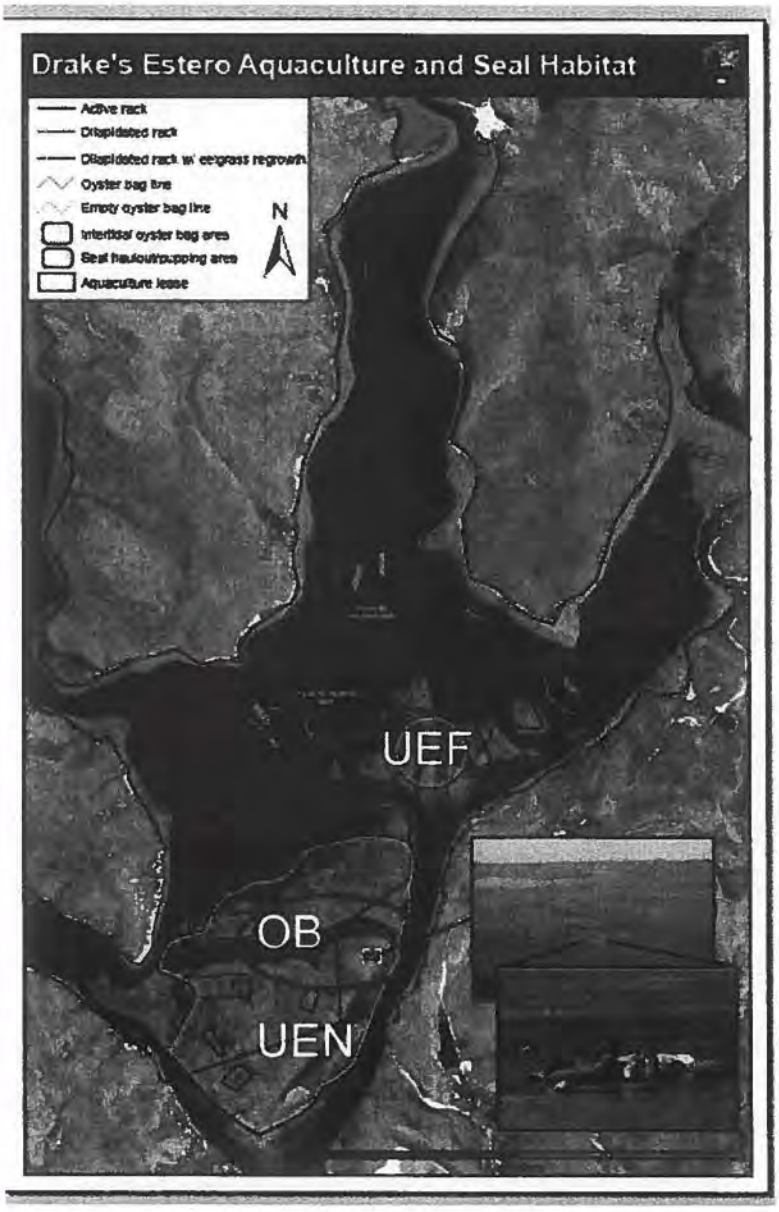
The boat then landed at around 4:10 PM about 2/3 of the way along the channel going west on the OB channel on the north west side where many oyster bags are located. Two men got off the boat, one taller in a green slicker and another in yellow slicker pants. They remained on the site until around 4:38 OM. During this time, they checked bags and added around 30 more bags onto the sandbar on the north west side of the sand bar and closer to the seals. During the interim time, 6 (2) seals hauled out at OB. When the boat proceeded back down the channel going east towards the seals at 4:55 PM, 5 seals flushed into the water included 2 mother-pup pairs at OB, another 3 mother pup pairs flushed at UEN sand bar, and around 75 seals alerted at UEN but did not enter the water. Additionally, around 200 black brant were flushed that were in the eelgrass beds in the channel after previously being flushed by the boat. At 4:58 PM, the boat then proceeded up into Home Bay. I terminated the survey at 5:00 PM.

A total of around 90 seals including around 50 pups were disturbed by the boat, and of these, I observed 14 seals including 7 pups directly flushed into the water. From previous research, we know that females with pups are more disturbed than adult males or immature seals. Additionally, around 320 black brant were flushed while in eelgrass beds.

During surveys of the estero, I again observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because this is the peak pupping season, mothers with pups are hauling out all over UEN, including near where the oyster bags are

located. There also appeared to be more bags on UEN, in addition to the bags added to OB today. Again, the bags were adjacent to and directly on the haul out sites where the seals historically hauled out in the past three decades of surveys that I have conducted.

Map of Drakes Estero – red circle indicates where seals and Black Brant were disturbed.



Trip Report
Drakes Estero
4/13/07
3:45-5:00 PM

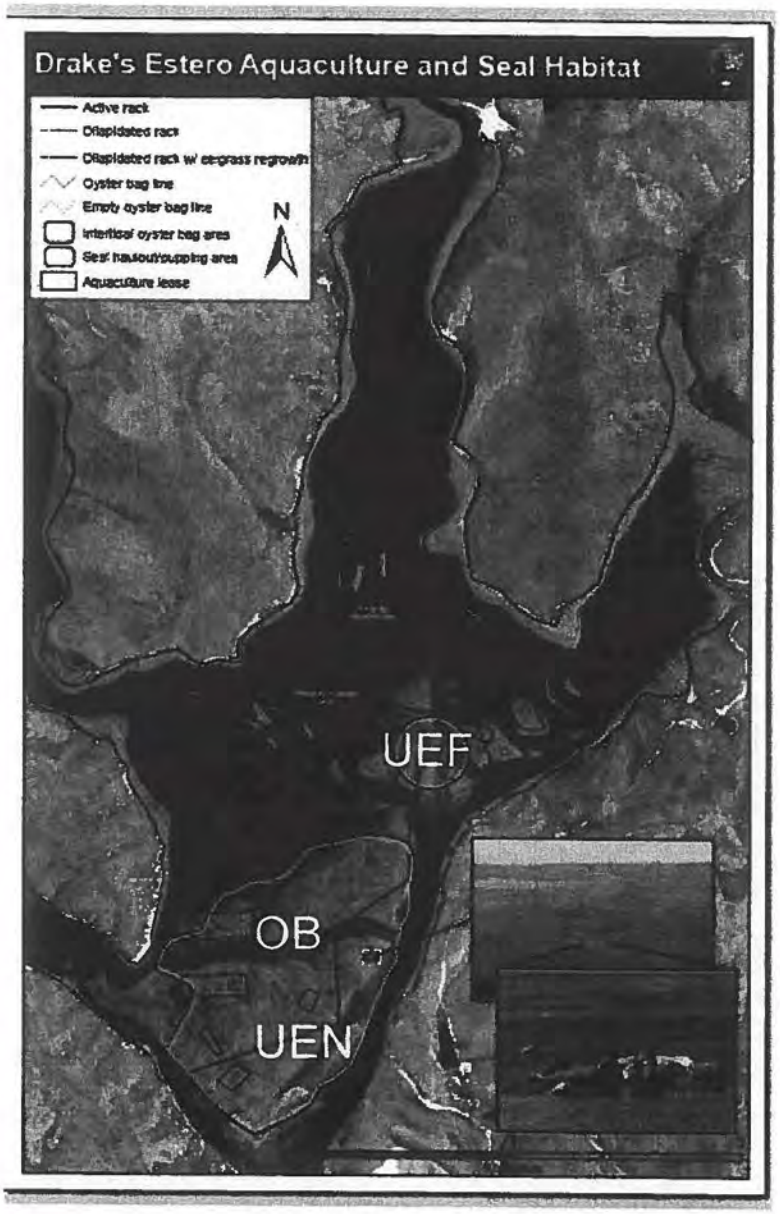
Sarah Allen, Science Advisor

I conducted a field survey of Drakes Estero on Friday during the afternoon low tide to count harbor seals and to determine the distribution and number of oyster bags on the seal haul out sites.

I arrived at 3:40 PM and met a volunteer who surveys harbor seals who had been present since 1:45 PM. She stated that she had observed 2 people in a boat tending oyster bags at the OB sand bar (see map) at around 2:30 PM. There were no seals present on the OB sand bar and the number at UEN was 133 with 21 pups, and the total count for the estero was 525, including 46 pups when she counted the seals at 2:20-30 PM.

When I conducted the survey at 4 PM, there were 10 seals present and 2 pups at the OB sandbar and 117 seals and 54 pups on UEN sand bar, a 157% increase in seals on the UEN sandbar. These two sites have historically had the higher numbers of females with pups likely because the pups are more protected from strong currents and the water is warmer in the middle of the estero. The total count for the estero was 618 including 88 pups, a 120% increase in pups after the boat left, even though it was late in the day. Seal numbers are highest mid day to mid-afternoon, depending on the tide level. The tide was low enough for the seals to haul out at 1:00 PM. For comparison of numbers on OB, in 2005 on April 12, there were 105 seals and 62 pups, and in 2004 on April 11, there were 169 seals and 36 pups.

I observed several rows of bags on both the OB and UEN sandbars where the seals haul out. Because of distance, I could not get an accurate count of bags, but the number of rows was around 20. The bags were adjacent to and directly on the haul out sites where the seals historically have hauled out in the past at OB and UEN (see map).


Drake's Estero Aquaculture and Seal Habitat
Active rack
Dilapidated rack
Dilapidated rack w/ eelgrass regrowth
Oyster bag line
Empty oyster bag line
Intertidal oyster bag area
Seal haulout/sopping area
Aquaculture lease
N
UEF
OB
UEN

Drakes Estero eelgrass, oyster bag, and oyster rack assessment
Trip Report - 3/20/2007

Crew: Don Brown, GIS Specialist, Point Reyes National Seashore
Ben Becker, Marine Ecologist, Point Reyes National Seashore

Equipment: 13 ft Alumicraft skiff with 15 hp 4-stroke outboard motor.
Trimble GeoExplorer3 GPS with real-time differential correction.

03/13/2007
Oyster rack, bag, line and eelgrass assessment

Objectives

1. Map all oyster racks in the estero and categorize as active, inactive or dilapidated. Dilapidated racks were defined as those considered too deteriorated for use.
2. Document any apparently recent repair work done to racks.
3. Map all oyster bags and line systems.
4. Report eelgrass occurrence (dense/patchy/absent) both adjacent and beneath all racks, bags and lines.

Field Methods: We launched from Drakes Bay Oyster Company (DBO) at ~11 AM and a + 3 ft tide, and traveled from North to South visiting all racks in the Estero. At each rack, we recorded whether the rack was surrounded by dense or patchy eelgrass, if eelgrass was present beneath the rack, the percentage of the rack currently occupied with oysters (= percent active), and the percent of the racks dilapidated. We mapped all visible bag systems along the intertidal and investigated all marker poles that are often used to mark where bags are kept. Survey was completed at ~2:45 PM and tide appeared to be about 0 ft.

Summary Results: There are a total of 93 oyster racks in varying states of integrity in Drakes Estero. On 03/13/2007, 63 racks were usable and had some mariculture activity (2 of which were recently repaired), 3 appeared usable but had no mariculture activity on that day, and 27 racks were so dilapidated that they are unlikely to be usable without repair. The unusable racks ranged from frames with no cross members for hanging oysters to merely a set of old posts.

A total of 89 of the 93 racks were in eelgrass beds, but no usable racks and very few dilapidated racks had eelgrass growth underneath. Seven of 27 dilapidated racks had some eelgrass regrowth, likely due to lack of mariculture on the racks. The area of racks within eelgrass beds but no eelgrass growth underneath oyster racks was 8 acres.

There were 12 areas where oyster bags are scattered in intertidal areas covering a total of approximately 10 acres (some site areas estimated from a distance). Since eelgrass does not grow in intertidal areas, these bag sites come up to the edge, but are not within eelgrass areas. There were also many anchored and floating oyster bag lines which were mapped. Two oyster bag arrays (approximately 5 acres) were within a regular harbor

seal haul out site, and one other oyster bag site was within 50 meters of a regular harbor seal haul out site, however, no hauled out seals were sighted on this survey.

In total, all oyster growing activity covers ~18 acres in the estero.

Most of the apparently older and larger oysters growing on racks had extensive non-native, highly invasive tunicates (*Didemnum* Species A) growing on them (See images). This species is an aggressive invader that has had substantial ecosystem and financial impacts in New Zealand, several west coast estuaries and the Grand Banks off Newfoundland. Other fouling organisms (native and non-native sponges, tunicates, bryozoans, and mussels) were observed on both oysters and racks throughout the estuary.

03/20/2007
Eelgrass satellite imagery ground truthing

Objectives

1. Ground truth satellite imagery classification of eelgrass beds.
    - Imagery used for classification was one-meter color digital orthophoto taken August 2005 at low tide classified using Erdas Imagine software.
2. Document any additional racks, bag or line systems not seen on day 1.

Field Methods: Beginning at ~ 10:30AM on 03/20/2007 at about a 0 ft tide, we surveyed the estero to ground truth a draft eelgrass bed map derived from satellite imagery. We traveled the perimeter of the eelgrass beds to verify changes from eelgrass to bare substrate, as well as to verify that eelgrass was dense or patchy within beds. We defined dense as close to 100% cover, patchy was considered down to 40% cover. We also verified that vegetation classified as eelgrass was not *Sargassum muticum* (as happened near the mouth of the estero) or enteromorphic algae (as occurred near some of the seal haul out sand flats in the middle of the estero). We took a total of 243 points throughout the estero noting eelgrass presence/absence/ dense/patchy to reclassify the satellite derived map to reflect actual field conditions. The survey was completed at ~1:30 PM and tide appeared to be about +3 ft.

Summary Results: In the field, the vast majority of satellite derived eelgrass classification appeared correct. Two shortcomings were that (1) channels are too deep to see eelgrass, even at low tide and (2) that during high tide in waters > 4 ft deep with windy conditions, choppy waters, and low sunlight, it was often difficult to see past 3 ft from the surface. In these instances we traveled very slowly until we came to an area shallow or calm enough to see bare bottom or eelgrass.

After analyzing ground truth data, ~ 95% of ground observations appeared to match to satellite image classification. Discrepancies mostly occurred in the southern part of the bay because of misclassification of *Sargassum muticum* and enteromorphic algae, as mentioned previously.

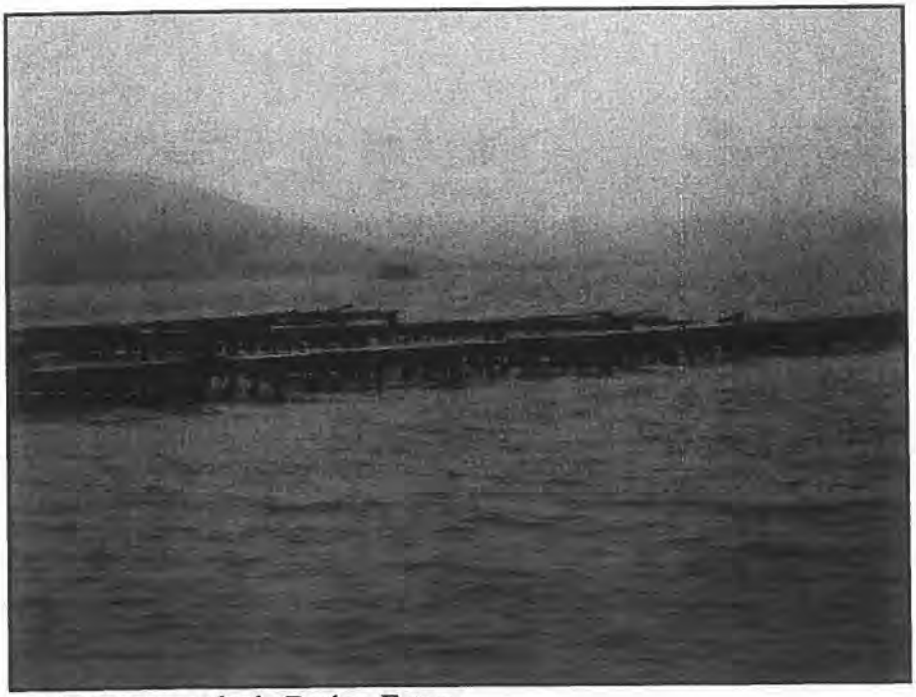
We calculated that 740 acres of the estero are covered by eelgrass, 355 acres dense, and 385 acres patchy. Oyster operations in eelgrass represent ~ 8.5 acres. We calculate that 8 acres (some dilapidated racks have patchy regrowth) of eelgrass beds are lost in Drakes Estero due to mariculture. Another factor affecting eelgrass beds which was noticed was boat propellers. It can be seen from aerial and satellite photos where regular boat paths have cut paths through eelgrass; these calculations do not reflect this factor which will necessitate further study.

We also documented three additional intertidal oyster bag systems not identified during the first survey.

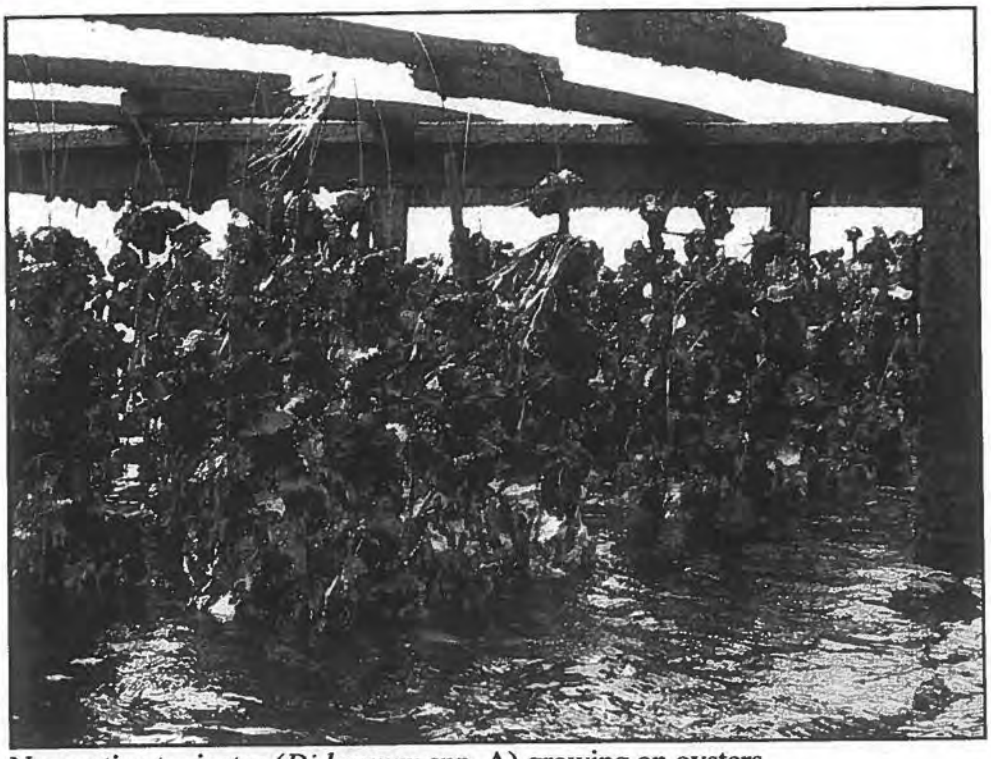
Summary Statistics

Total Oyster Racks	**93**
Usable Oyster Racks	**66**
Dilapidated racks	**27**
Percentage of racks in eelgrass beds	**96% (89 of 93)**
Percentage of usable racks with eelgrass underneath	**0%**
Percentage of dilapidated racks with eelgrass regrowth	**26% (7 of 27)**
Acres of eelgrass lost to racks	**8 acres**
Number of intertidal oyster bag areas	**12**
Acreage of intertidal oyster bag sites	**10 acres**
Total eelgrass acreage in the Estero	**740 acres**

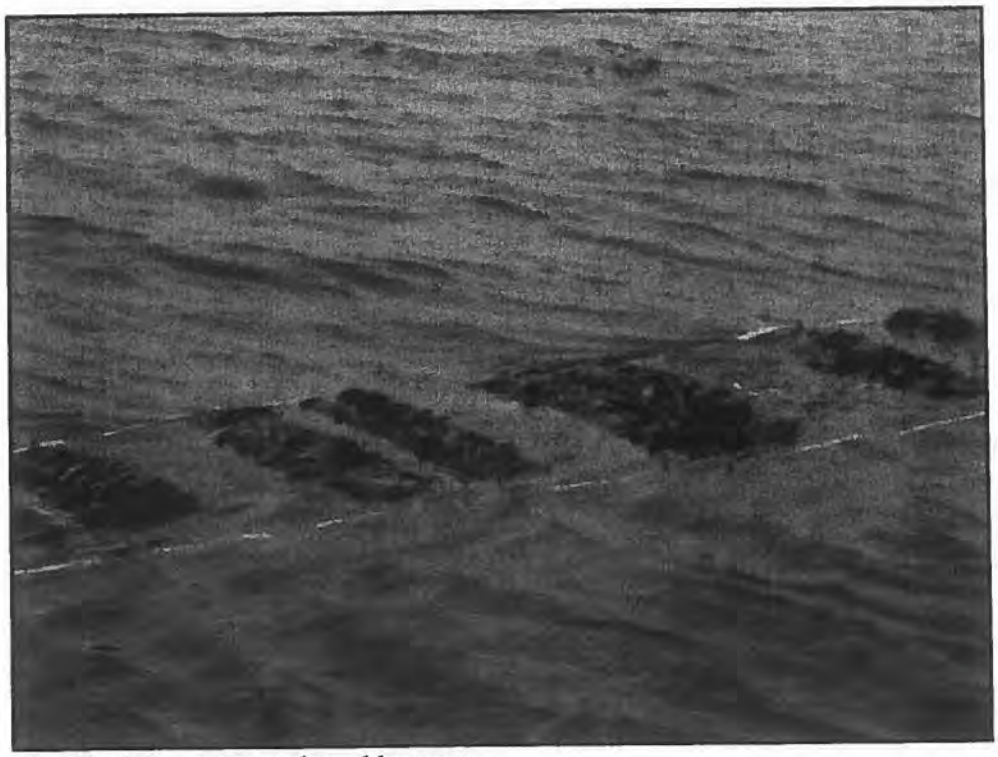
Images



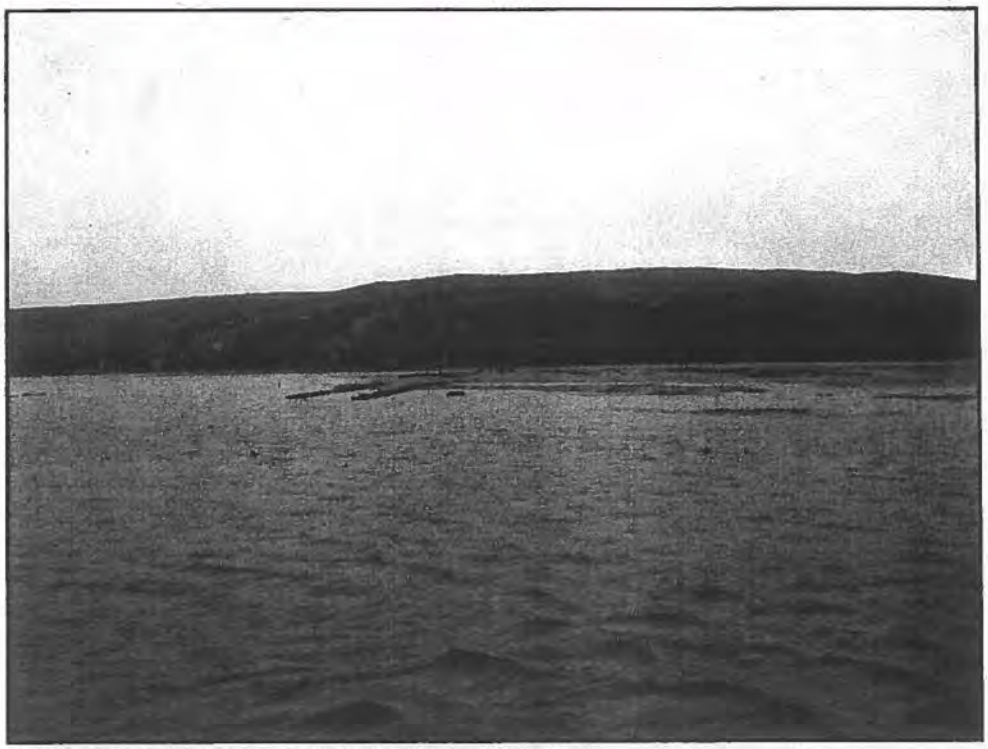
Active oyster racks in Drakes Estero.



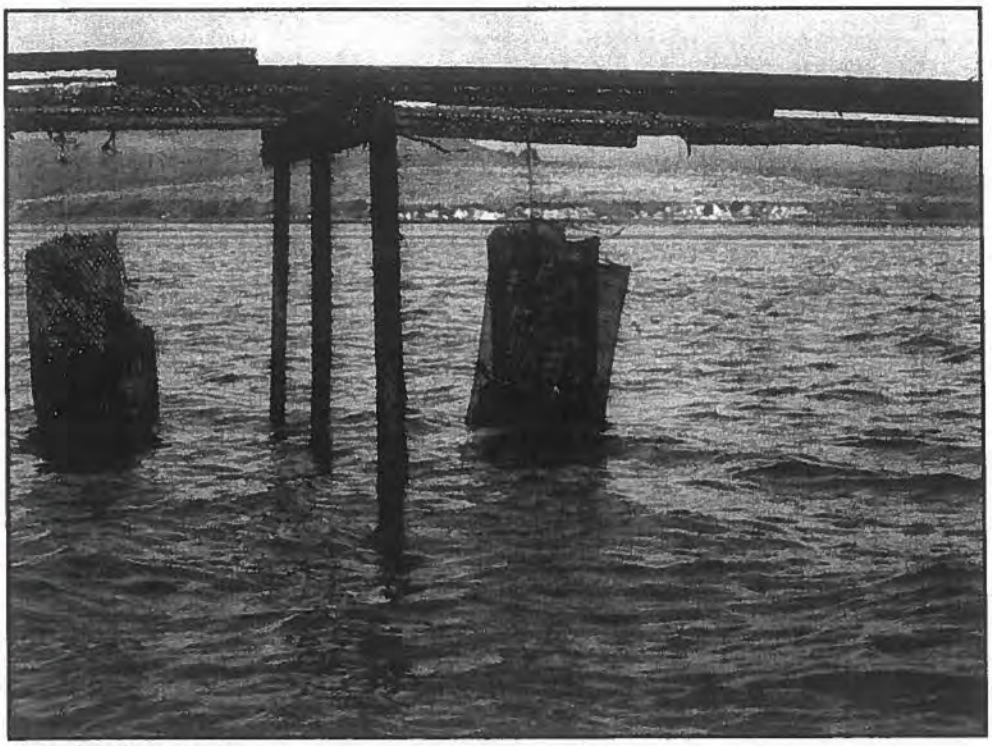
Non-native tunicates (*Didemnum* spp. A) growing on oysters.



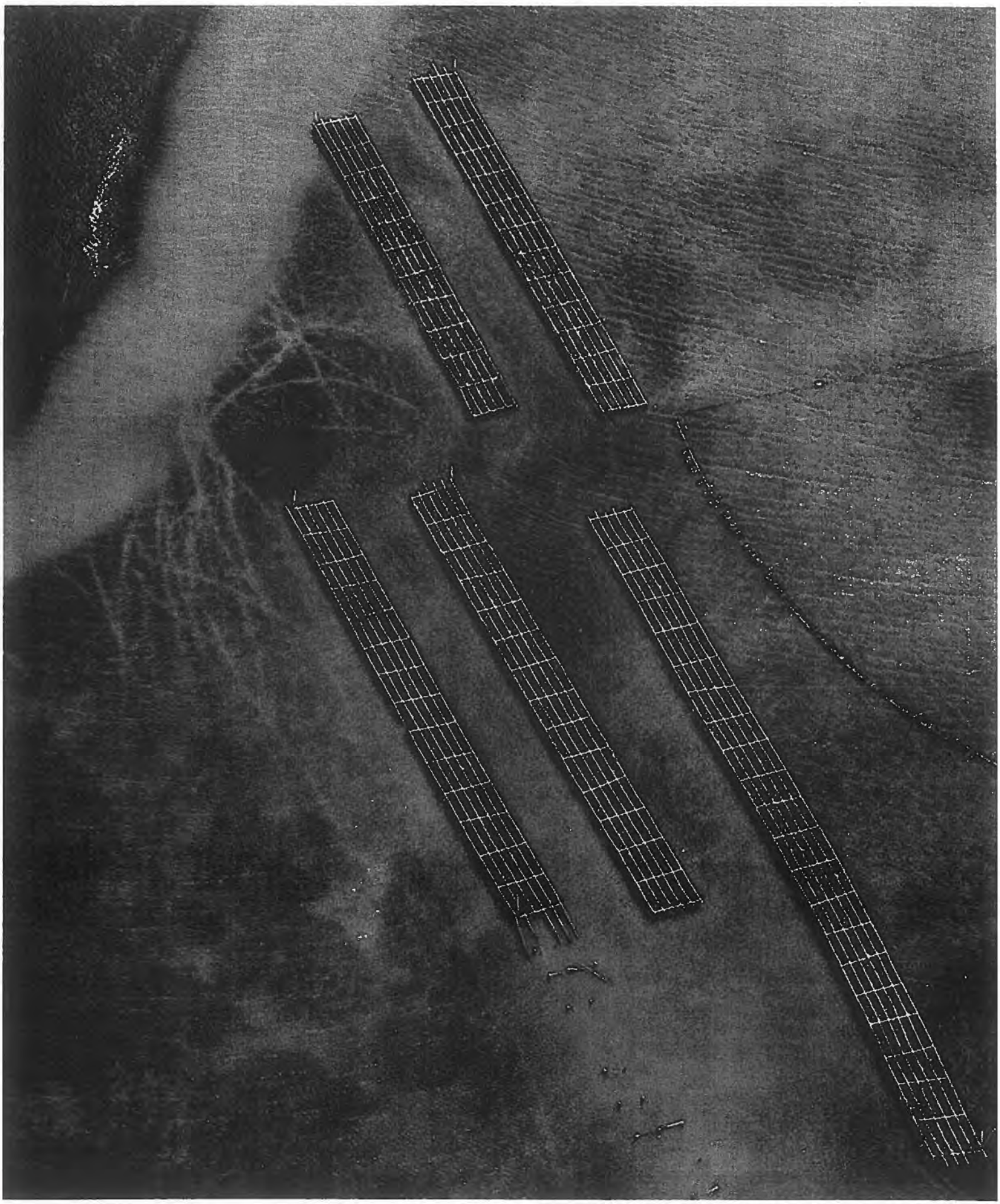
Floating bag system tethered by ropes.



Tethered oyster bags on intertidal sand/mudflats



Hanging bag array



Background: Drakes Bay Oyster Company (formerly Johnson's Oyster Company)

At the time of purchase in 1972, the National Seashore provided a Reservation of Use and Occupancy Agreement to Johnson's Oyster Company (JOC) for 40 years. The agreement allows for use of a park site for oyster processing, but requires compliance with local, state, and federal laws and regulations. The agreement expires in 2012. In 2005, the JOC sold the leasehold interest to the Drakes Bay Oyster Company (DBO). At the time of the sale, the NPS instructed DBO that the lease would expire in 2012.

The waters of Drakes Estero were designated by Congress as potential wilderness by the 1976 Point Reyes Wilderness Act (Public Law 94-544). It designated 25,370 acres as wilderness, and 8,002 acres of potential wilderness. The legislative history (House Report 94-1680) indicates Congressional intent: "it is the intention that those lands and waters designated as potential wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these land and waters to wilderness status." This is the only federal marine coastal wilderness from Washington State to the Mexican Border. Only 10 marine wilderness exist in the US.

The General Management Plan (GMP, 1980) zoning for the estuary use is wilderness where no mechanized equipment or development is to occur.

The Estuary Area (approximately 1,000 acres) used by DBO for oyster cultivation is leased by the California Department of Fish and Game (CDFG). The ocean floor was ceded by the State of California to the National Park Service, except for the "right to fish." The estuary floor is thus owned by Point Reyes National Seashore.

2001 NPS Management Policies direct staff to actively seek to remove from potential wilderness, the temporary, non-conforming conditions that preclude wilderness designation. (6.3.1 Wilderness Resource Management). Moving from Congressionally authorized potential to full wilderness status is an administrative action only requiring publishing in the Federal Register.

Point Reyes legislation also stipulates that "No freehold, leasehold, or lesser interest in any lands hereafter acquired within the boundaries of Point Reyes National Seashore shall be conveyed for residential or commercial purposes except for public accommodations, facilities, and services provided pursuant to the Act of October 9, 1953."

Point Reyes legislation also indicates that natural environment should be the park's first priority.

(a) Protection, restoration, and preservation of natural environment
Except as otherwise provided in sections 459c to 459c-7 of this title, the property acquired by the Secretary under such sections shall be administered by the Secretary without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area, subject to the provisions of sections 1, 2, 3, and 4 of this title, as amended and supplemented, and in accordance with other laws of general application relating to the national park system as defined by sections 1b to 1d of this title, except that authority otherwise available to the Secretary for the conservation and management of natural resources

Drakes Bay Oyster Company
May 2007

Key Points

A. Background

- At the time of purchase in 1972, the National Seashore (PRNS) provided a Reservation of Use and Occupancy Agreement to the oyster producer in Drake's Bay (Johnson's Oyster Company) for 40 years, expiring in 2012. The agreement allows for use of a park site for oyster processing, but requires compliance with local, state, and federal laws and regulations.

- In 2005, the Johnsons sold the leasehold interest to Kevin Lunny, owner of the Drakes Bay Oyster Company (DBO). At the time of the sale, the NPS informed DBO that the oyster farming lease would expire in 2012.

- DBO wants to extend the lease past 2012; NPS has instructed DBO that the issuance of a new lease is unlikely to extend beyond 2012.

- Johnson's Oyster Company had a long history of environmental problems. As a condition of a stipulated agreement, the company was ordered by the Marin Superior Court to complete several items including obtaining building permits and upgrading facilities and septic systems to meet state and county code requirements. These were never completed.

- The eastern portion of the Estero is congressionally designated Wilderness Area and the rest of the estuary is designated potential wilderness and reverts to full wilderness in 2012 (Public Law 94-544). The legislative history (House Report 94-1680) indicates Congressional intent: "it is the intention that those lands and waters designated as potential wilderness, to the extent possible, with efforts to steadily continue to remove all obstacles to the eventual conversion of these land and waters to wilderness status."

- Drakes Estero is the only federal coastal bay wilderness in the western U.S. south of Alaska protected by congressional designation.

- The Estero's estuary area (approximately 1,000 acres), used by DBO for oyster cultivation, is leased by the California Department of Fish and Game. The ocean floor was ceded by the State of California to the National Park Service and therefore, the estuary floor is owned by Point Reyes National Seashore. The Seashore has jurisdiction over the entire water column of the Estero.

- As directed in the GMP, the NPS allows the oyster operation in Drakes Estuary until 2012. In 2012, the DBO operation would cease due to the Point Reyes Wilderness Act, Point Reyes enabling legislation, and the zoning in the GMP.

Drakes Estero, a superlative estuary in Point Reyes National Seashore

Drakes Estero was created as a drowned river valley, submerged by an ancient river on a small block of granitic-based crust of the Pacific Plate. The most recent sea level rise following the Late Pleistocene glacial formed the contemporary estuary 6,000 years ago. The geology of the surrounding watershed is characterized by the late Cenozoic Drakes Bay Formation, which consists mainly of fine-grained siltstone, silty mudstone and greensand over a granitic basement. The sediments near the mouth of the estuary consist of sand deposited by strong longshore currents in Drakes Bay. Muddy sediments characterize the rest of the estuary from runoff of the surrounding watershed. The protected and largely undeveloped lands of the Drakes Estero watershed provide high quality water. Freshwater inputs are largely from the small watersheds surrounding the estuary which encompass an area of 7,847 acres. The estuary proper encompasses around xxx acres.

The eastern portion of the estero (Estero de Limantour) is congressionally designated Wilderness Area and the rest of the estuary reverts to wilderness in 2012. Special designation to Estero de Limantour was given by the California Department of Fish and Game as a state ecological reserve. The US Shorebird Conservation Plan recognizes Drakes/Limantour Esteros as one of the most significant areas to migratory shorebirds and waterfowl of the southern California coastal sub-region.

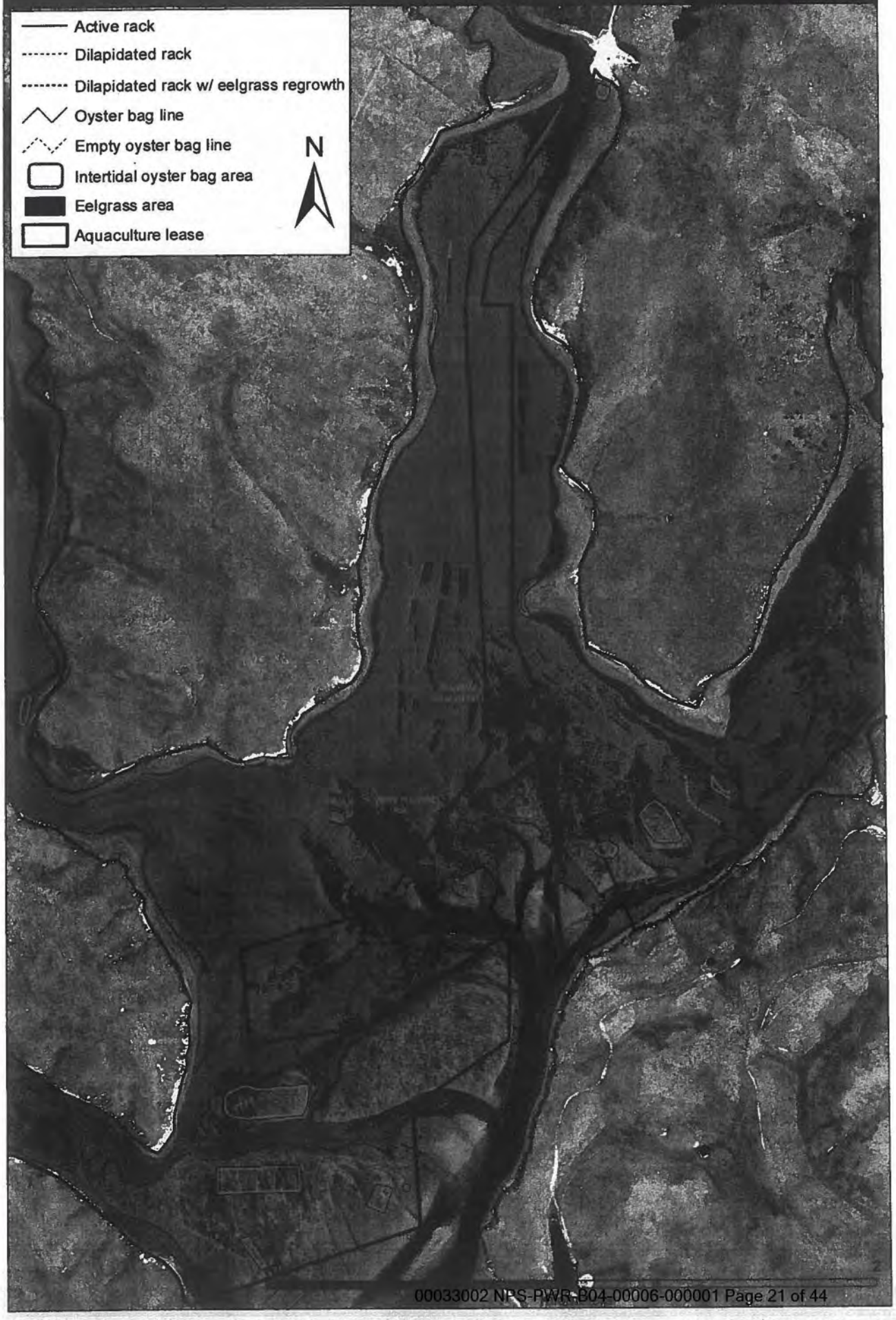
Seagrass beds and tidal mud flats are the most widespread habitat types in the estuary, followed by salt marsh and rocky intertidal areas. The large mudflats and extensive eelgrass beds in Drakes Estero are home to numerous invertebrates and serve as foraging and breeding grounds for many birds, fish, and pinnipeds.

Drakes Estero is one of the most ecologically pristine estuaries in California. Biotically, the estuary is exceptional:

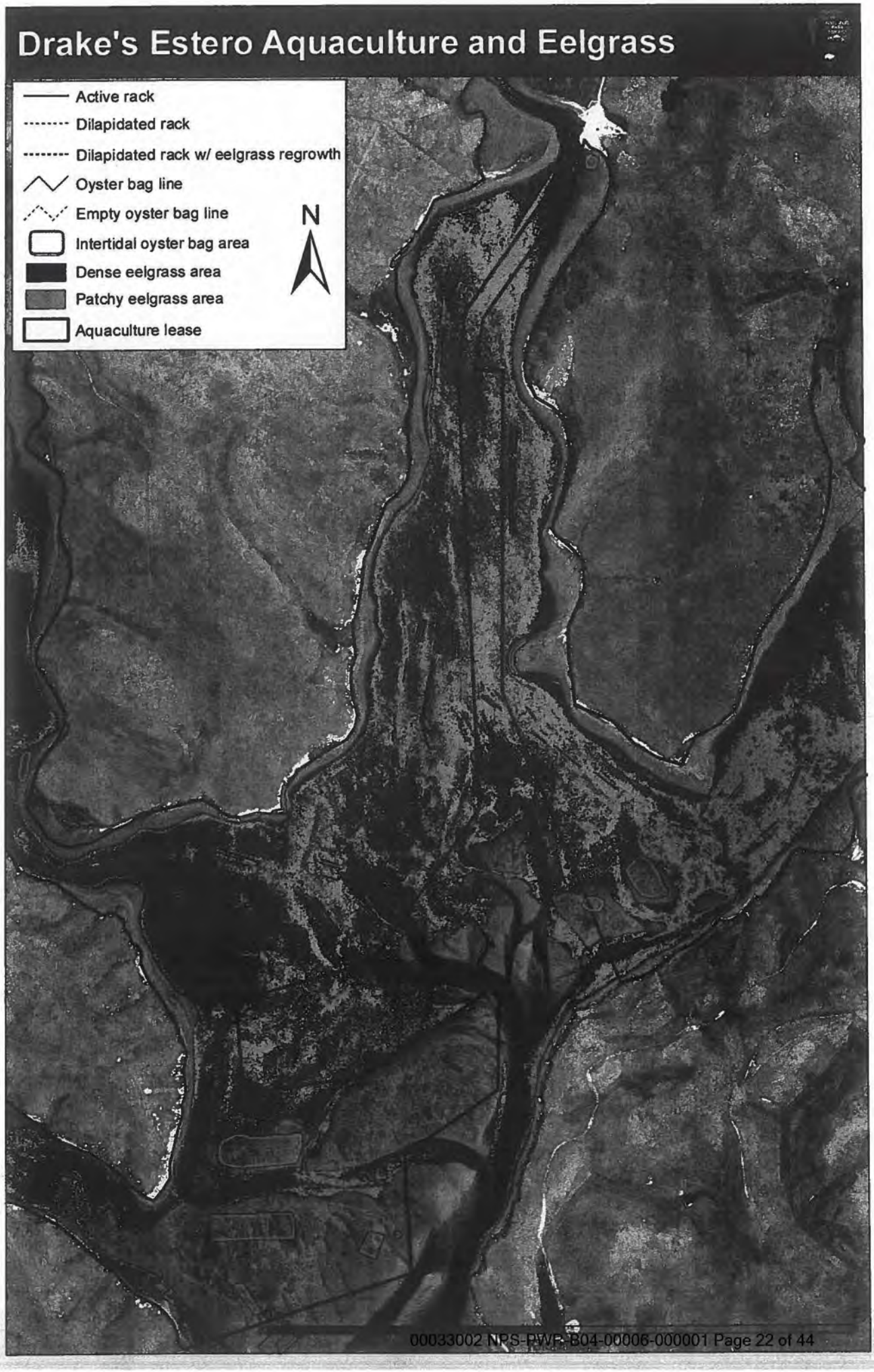
- Extensive eelgrass beds support rare and specially protected species
- Reduced presence of non-native species: recent surveys show that many invasive species are only found where mariculture and oyster racks occur, but not in Limantour Estero.
- One of the largest harbor seal populations in California with numbers surpassing 1800
- Identified as significant area for the US Shorebird Conservation Plan: 86 Species of birds recorded in 2004, including Osprey and Black Brant.
- USFWS recognizes 18 species of concern, including Red-legged frog, Western Snowy Plover, Brown Pelican, Peregrine Falcon, and Marbled Murrelet.
- Recent fish survey identified over 30 species of fish, including rare and endangered species such as coho salmon, steelhead trout and three-spined stickleback.
- Rare plants occur along the shoreline of the estuary, including xxxxx

Drake's Estero Aquaculture and Seal Habitat

Drake's Estero Aquaculture and Eelgrass



Drake's Estero Aquaculture and Eelgrass



Marin County
Community Development Agency
Alex Hinds, Director

RECEIVED
JUL 19 2007
CALIFORNIA COASTAL COMMISSION

Date 12/12/05

Drakes Oyster Kusch

RE: Building Permit at 17171 Sir Francis Drake
Assessor's Parcel # 109-130-17

A building permit application was received for the subject property. Upon customary transmittal of the building permit to the Planning Division, it was determined that your application does not conform to certain zoning and/or subdivision requirements. The item(s) checked below must be corrected before the Planning Division will approve your application and send it back to the Building Inspection Division for their review. If a Planning Division permit is required, please attach a copy of this letter to the application. This letter will assist in coordination of building permit processing following Planning Division review.

- ☐ The plot plan is missing/incorrect/has no scale/otherwise incomplete or unclear (see attached).
- ☐ Front/side/street-side/rear yard setbacks for the house/accessory structure are less than permitted (see attached).
- ☐ House/accessory structure exceeds maximum permitted height/number of stories.
- ☐ Proposed work on the floating home/ark will require approval of an architectural deviation/floating home exception (see attached).
- ☐ Ratio of floor area to lot size (FAR) exceeds maximum permitted (30%).
- ☐ Second units not permitted by the zoning on your property.
- ☐ Existing structure/use is nonconforming and its expansion is restricted (see attached).
- ☐ Due to the location and height of the retaining wall(s), a Design Review is required (see attached).
- ☐ A Master Plan is required.
- ☐ A Coastal Permit is required.
- ☐ A Design Review (minor/exemption) is required.
  - ☐ proposed development is not single family residential.
  - ☐ your property is zoned planned district.
  - ☐ your lot is less than half the size required.
    - ☐ ***Therefore, please submit the attached application(s). $_________ in fees and _____ sets of plans to the Planning Division.***
- ☒ Other: Retail space located within reservation under National Park Service. Please provide written approval from National Park Service (Pt. Reyes)

If we do not receive a response within fifteen days from the date of this letter, your building permit application will be considered withdrawn. If an attachment is included, please read it carefully to determine what is needed for project conformance. Please contact Ted Cam 499 6275 if you have any questions regarding this letter. If you wish to meet with the planner, please call for an appointment. Drop-ins are not advised. Thank you.

/FORMS/ORIGIN/BP-CHECK.DOC
(Rev. 7/6/99)

Don Neubacher
12/29/2005 09:58 AM
PST

To: sryan@coastal.ca.gov
cc: Ed Walls/PORE/NPS@NPS
Subject: Drakes Oysters, formerly Johnson's

Sheila,

I received a complaint about Drakes Oysters (formerly Johnsons) at Drakes Estero within Point Reyes National Seashore. As a result, three park staff inspected the site on December 28, 2005 and we have a couple of concerns.

Drakes Oysters (Kevin [redacted]) now has two large storage containers and a construction trailer on site. He has also excavated the cliff area, without our permission, removing about 25 yards of material and stock piling it on NPS land. I remember you stating he needed a coastal development permit for the storage containers. We are going to meet with him to clear up the matter and I wanted to get your impression of what requirements Kevin has with the Coastal Commission. As you know, the Commission previously had a Cease and Desist Order for this operaton.

Thanks for any help. If you want me to talk to someone else, let me know.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

4425 02.106

California Coastal Commission

45 Fremont, Suite 2000
San Francisco, CA 94105-2219
Voice and TDD (415) 904-5200 CALNET 539-5200

FAX COVER SHEET

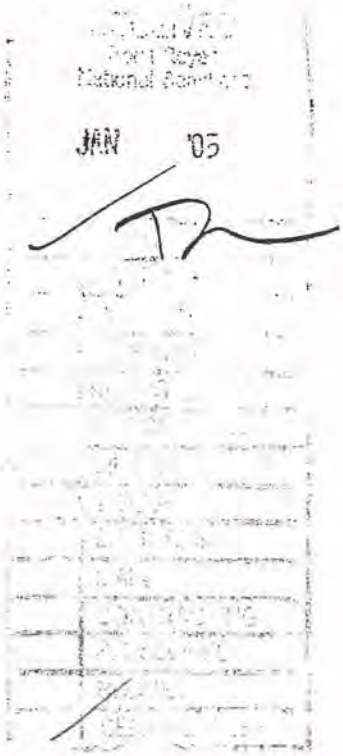
Date: 01.07.05	Time:
To: Don Neubacher	From: Sheila Ryan
Company: Pt. Reyes Nat'l Seashore	Unit: Enforcement
Address:	Telephone Number: 415 904.5220
FAX Number: 663-8132	Direct FAX = (415) 904-5400 CALNET = 539-5400

Number of Pages (Including this cover sheet): 2

Remarks: o Urgent o For your review o Reply ASAP o Please comment o Other

Johnson Oyster Co.

CCC-03-CD-12
V-7-03-004



STATE OF CALIFORNIA—THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, GOVERNOR

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105- 2219
VOICE AND TDD (415) 904- 5200
FAX (415) 904- 5400

VIA TELECOPY AND REGULAR MAIL

January 7, 2005

Kevin Lunny
17300 Sir Francis Drake Blvd.
Inverness, CA, 94937

Subject: **Approval of Johnson's Oyster Company removal and restoration plan**

Violation No.: V-7-03-004; Cease and Desist Order CCC-03-CD-12

Dear Mr. Lunny:

I am in receipt of the revised Removal and Restoration Plan (Plan) dated January 7, 2005. Thank you for incorporating the suggested changes that we discussed yesterday during our conversation with Don Neubacher. We understand that certain aspects of the removal process will require County permits, and that you are working diligently to obtain them. The Plan clearly describes those portions of the removal process that require County permits and those portions that may proceed without County permits, along with your anticipated schedule for completing all removal activities.

This letter constitutes an approval of the Plan, which is required pursuant to the Commission's Cease and Desist Order, with the understanding that all removal work that does not require a County permit shall be completed no later than February 15, 2005.

Thank you for your attention to this matter. Please feel free to call me at 415-597-5894 if you have any questions.

Sincerely,

Sheila Ryan
Headquarters Enforcement Officer

cc: Lisa Haage, chief of enforcement
Don Neubacher, Superintendent, Point Reyes National Seashore

California Coastal Commission

45 Fremont, Suite 2000
San Francisco, CA 94105-2219
Voice and TDD (415) 904-5200 CALNET 539-5200

FAX COVER SHEET

Date: 7-19-07 | Time: 3:40 PM | Number of Pages (including this cover sheet): 7

To: DON NEUBACHER, SUPERINTENDENT | From: CASSIDY TEUFEL

Company: NPS - PT. REYES NATL. SEASHORE | Unit: ENERGY & OCEAN RESOURCES

Address: | Telephone Number: 415 904 5502

FAX Number: 415 663 8137 | Direct FAX = (415) 904-5400 CALNET = 539-5400

Remarks: o Urgent x For your review o Reply ASAP o Please comment o Other

DON -

HERE'S A COPY OF LUNNY'S LETTER TO PETER - AS REQUESTED.

- CASSIDY

JUL-19-2007 15:47 +4159045400 P.01

L1425
02-106

December 7, 2004

Mr. Tom Johnson
Johnson Oyster Company
P. O. Box 69
Inverness, CA 94937

Dear Tom:

As was done during our last meeting, we wanted to clarify our special use permit arrangements with you because of your discussions with others concerning possible sale of the Johnson Oyster Company (JOC).

At present, you have two use permits that require compliance with applicable laws. The permits are leach field permit #MSC 8530-6000-2011, which expires November 30, 2005, and water line permit #MSC 8530-6000-2010,which June 30, 2006. At present, both permits are in jeopardy because of non-compliance with the permit clauses below.

> "Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense."
>
> "Permittee's use of the Premises shall be in accordance with all of the Provisions contained in this Permit and all Applicable Laws."

As stated in the permit documents, these permits cannot be assigned to another permittee and they do not allow any possessory interest.

As we discussed in the meeting on October 15, 2004, the recent land survey also indicates your facilities are not on your leased area and you do not have any authorizing permit for the shoreline area. Based on our review, many of the shoreline structures are now illegally on National Park Service land and are not located on your reservation of use and occupancy parcel. Please refer to the enclosed map. In addition, you have no permitted or legal access to Drakes Estero. The permit (PORE-6000-306) for the shoreline parcel expired on November 15, 1997. For your reference, the previous permit for use of the 2.2 acres included the following conditions:

9. This issuance of this permit does not convey any right, title, interest, or estate in or to the land covered by the permit.

10. Permittee agrees to meet State or County environmental requirements and requirements of the California Coastal Zone Conservation Commission.

This letter serves as notice that you are not authorized to engage in any new activity, including any construction (large or small), on the 2.2 acre parcel that contains the main processing facility.

We must again state, in writing, that you do not have authority or permission to construct any new facilities on the reservation lands, any adjacent lands, or other lands authorized under special use permits.

We also want to state that all items in the enclosed "Requirements and Timelines for Johnson Oyster Farm Operations" must be met and major items are to be accomplished no later than January 17, 2005. Failure to meet these deadlines will subject JOC to immediate citation by the NPS. For the record, we have agreed to delay the deadline for the final inspection of the septic permit by Marin County until January 17, 2005. Marin County has communicated directly to you about what is required to obtain the final operating permit.

We regret that the situation has come to this conclusion; however, we do have the legal obligation to provide safe facilities for the public and your employees and residents and to protect park resources. We strongly believe that we have given you ample time, over ten years, to meet your obligations and we have tried to work with you to resolve the issues. For example, we provided you the necessary land for the septic system that was required.

If you wish to discuss these issues further, please contact us.

Sincerely,

Don L. Neubacher
Superintendent

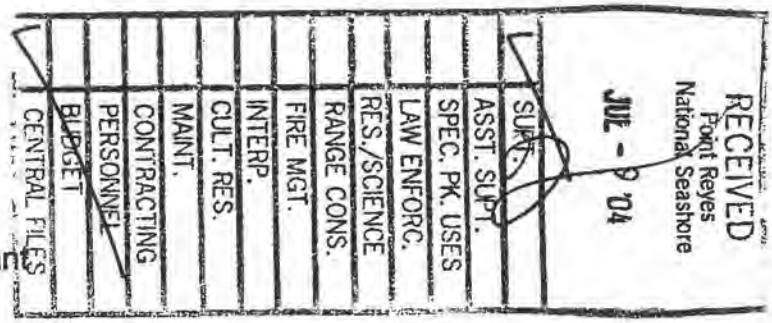
Enclosures

cc:
Nicole Walthall, NPS Field Solicitor's Office
Chris Darnell, California Coastal Commission
Adrian Bradford, Bradford Bros., 740 Bay Street, San Francisco, CA 94109
Kevin Lunny, 17300 Sir Francis Drake Blvd., Inverness, CA 9 4937

DLNeubacher:an 12/07/04

CALIFORNIA COASTAL COMMISSION
45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200
FAX (415) 904-5400

4425
02.106
July 8, 2004



Carol J. Whitmire
Land Use Planning Consultant
P.O. Box 319
Woodacre, CA 94973

Cease and Desist Order No.: CCC-03-CD-12 (Johnson Oyster Company)

Re: Removal and Restoration Plan prepared for Johnson Oyster Company

Dear Carol:

I have reviewed the Draft Removal and Restoration Plan ("Plan") that you prepared for Johnson Oyster Company ("Johnson") in compliance with the requirements of Section 1.0(c) of Cease and Desist Order No. CCC-03-CD-12, and I am writing to provide comments on the Draft Plan. In general, the Draft Plan is a good beginning, although it is somewhat lacking in breath and detail.

Following are the Commission Staff's comments on the Draft Plan:

(1) The Plan should include a description of the existing and historic activity at the site and a more detailed discussion of the future uses planned for the site in the revised business plan.

(2) The Plan should provide a 6-month timeline at the end of which the removal of the unpermitted development and restoration of the site shall be fully completed. The timeline should identify targets for completion of each phase of the project. I understand it is difficult to set deadlines until the local permits are issued and work can proceed. We recommend that you provide an estimate of the number of days required to complete each phase of the project after issuance of the demolition and building permits by Marin County (e.g. 60 days after issuance of the permits, phase 2 will be completed).

(3) The Plan should include complete removal of all of the discarded or abandoned oyster cultivation equipment in the estuary including nylon bags, racks, hangers and stakes. National Park Service ("NPS") staff has documented discarded and abandoned equipment in the estuary and along the shoreline at low tide. All of these materials must be removed from the estuary and disposed of outside of the coastal zone.

(4) The Plan should include extraction or excavation and complete removal and disposal of the creosote impregnated posts around the grey water pit and seaward of Building J.

(5) The Plan should provide more information about the testing and inspections required to demolish Building B (the mobile home) and any other structures.

(6) The Plan should explain how and where the debris from the demolition and removal of the unpermitted development would be disposed of outside of the coastal zone.

(7) The Plan should provide additional information regarding the number of people that will be living at the site. Please specify the number of people currently living at the site and explain why Johnson is proposing to maintain a crew of 10 on-site workers if Johnson plans to move the processing operation off-site. Please specify if Johnson is proposing to house people at the site other than the workers.

(8) If you have received from NPS the test results from the water and soil samples taken from the grey water pit, the Plan should include a summary of those results. If the results were negative and Johnson will be filling-in the pit, please specify the amount and source of topsoil that will be used to cap the oyster shell that will be used to fill the pit (we have discussed a minimum of a 12 inch layer of soil).

Additional clarifications: Please include in the Plan a definition of "original structures." What is a "BAAQMD J Number"?

I hope these comments are helpful and will provide you with guidance to finalize the Plan. If you have any questions, please contact me at 415-904-5294.

Sincerely,

Chris Darnell
Headquarters Enforcement Specialist

cc: Tom Johnson, Johnson Oyster Company
Robert P. Oliker, Attorney for Johnson Oyster Company
Don Neubacher, Superintendent, Point Reyes National Seashore

Don Neubacher
07/14/2004 09:33 AM
PDT

To: CJWhit@att.net
cc: CDarnell@coastal.ca.gov
Subject: Results for Oyster Greywater

Carol, the results have been in for a while on the disposal pit; I assume you got them from Chris. They look good and the pit can be filled.

However, before any work gets underway, I really do want a full scale plan of work to be accomplished with deadlines to be approved by us as well as Marin County and the Coastal Commission. I noticed on the new survey map and have now verified the JOC has many structures on NPS property that is not under any lease, including all the estuary shoreline. Therefore, any work in this area should be reviewed and approved by us.

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Don Neubacher/PORE/NPS on 07/14/2004 09:27 AM -----

Analytical110@aol.com
06/24/2004 08:40 PM
EDT

To: Brannon_Ketcham@nps.gov, Don_Neubacher@nps.gov
cc: Mary_Cooprider@nps.gov
Subject: Results for Oyster Greywater

Attached are the results for your Oyster Greywater project. The MBAS results should be received tomorrow (Friday, 6/25/04). Mark will call you with the results.

Thanks,

Janine 4061506 Point Reyes National Seashore

Analytical Sciences

Report Date: June 24, 2004

Mary Cooprider
Point Reyes National Seashore
1 Bear Valley Road
Point Reyes Station, CA 94956

LABORATORY REPORT

Project Name: **Oyster Greywater** **WQ Monitoring**

Lab Project Number: **4061506**

This 7 page report of analytical data has been reviewed and approved for release.

Mark A. Valentini

Mark A. Valentini, Ph.D.
Laboratory Director

PO Box 750336
Petaluma, CA 94975-0336
Telephone: (707) 769-3128

110 Liberty Street
Petaluma, CA 94952
Fax: (707) 769-8093

TPH Gasoline & MBTEX in Water

Lab #	Sample ID	Analysis	Result (ug/L)	RDL (ug/L)
22930	JO 1	TPH/Gasoline	ND	50
		MTBE	ND	2.5
		Benzene	ND	0.5
		Toluene	ND	0.5
		Ethyl Benzene	ND	0.5
		Xylenes	ND	1.5

Date Sampled: 06/15/04
Date Received: 06/15/04
Date Analyzed: 06/16/04
Method: EPA 5030/8015M/8020
QC Batch #: 4535

Lab #	Sample ID	Analysis	Result (ug/L)	RDL (ug/L)
22931	JO 2	TPH/Gasoline	ND	50
		MTBE	ND	2.5
		Benzene	ND	0.5
		Toluene	ND	0.5
		Ethyl Benzene	ND	0.5
		Xylenes	ND	1.5

Date Sampled: 06/15/04
Date Received: 06/15/04
Date Analyzed: 06/16/04
Method: EPA 5030/8015M/8020
QC Batch #: 4535

Lab Project #: 4061506

CA Lab Accreditation #: 2303

Total Recoverable Petroleum Hydrocarbons in Water

Lab #	Sample ID	Analysis	Result (mg/L)	RDL (mg/L)
22930	JO 1	TRPH	ND	1.0

Date Sampled: 06/15/04
Date Received: 06/15/04
Date Extracted: 06/22/04
Date Analyzed: 06/22/04
QC Batch #: S0221
Method: EPA 418.1M
10/30w Motor Oil was used as the standard

Lab #	Sample ID	Analysis	Result (mg/L)	RDL (mg/L)
22931	JO 2	TRPH	ND	1.0

Date Sampled: 06/15/04
Date Received: 06/15/04
Date Extracted: 06/22/04
Date Analyzed: 06/22/04
QC Batch #: S0221
Method: EPA 418.1M
10/30w Motor Oil was used as the standard

Lab Project #: 4061506

CA Lab Accreditation #: 2303

Metals in Water

Lab #	Sample ID	Analysis	Result (mg/L)	RDL (mg/L)
22930	JO 1	Cadmium (Cd)	ND	0.01
		Chromium (Cr)	ND	0.01
		Lead (Pb)	ND	0.05
		Nickel (Ni)	ND	0.05
		Zinc (Zn)	ND	0.05

Date Sampled: 06/15/04
Date Received: 06/15/04
Method: EPA 3050/6010
Date Digested: 06/18/04
Date Analyzed: 06/22/04
QC Batch #: 4549

Lab #	Sample ID	Analysis	Result (mg/L)	RDL (mg/L)
22931	JO 2	Cadmium (Cd)	ND	0.01
		Chromium (Cr)	ND	0.01
		Lead (Pb)	ND	0.05
		Nickel (Ni)	ND	0.05
		Zinc (Zn)	0.20	0.05

Date Sampled: 06/15/04
Date Received: 06/15/04
Method: EPA 3050/6010
Date Digested: 06/18/04
Date Analyzed: 06/22/04
QC Batch #: 4549

Lab Project #: 4061506

CA Lab Accreditation #: 2303

LABORATORY
QUALITY ASSURANCE REPORT

QC Batch #: 4535 **Lab Project #:** 4061506

Sample ID	Compound	Result (ug/L)
MB	TPH/Gas	ND
MB	MTBE	ND
MB	Benzene	ND
MB	Toluene	ND
MB	Ethyl Benzene	ND
MB	Xylenes	ND

Sample #	Sample ID	Compound	Result (ug/L)	Spike Level	% Recv.
22931	CMS	TPH/Gas		NS	
	CMS	Benzene	10.5	10.0	105
	CMS	Toluene	10.4	10.0	104
	CMS	Ethyl Benzene	10.1	10.0	101
	CMS	Xylenes	30.4	30.0	101

Sample #	Sample ID	Compound	Result (ug/L)	Spike Level	% Recv.	RPD
22931	CMSD	TPH/Gas		NS		
	CMSD	Benzene	10.7	10.0	107	1.2
	CMSD	Toluene	10.6	10.0	106	1.7
	CMSD	Ethyl Benzene	10.3	10.0	103	1.3
	CMSD	Xylenes	30.8	30.0	103	1.4

MB = Method Blank; LCS = Laboratory Control Sample; CMS = Client Matrix Spike; CMSD = Client Matrix Spike Duplicate
NS = Not Spiked; OR = Over Calibration Range; NR = No Recovery

QC Batch #: S0221 **Lab Project #:** 4061506

Sample ID	Compound	Result (mg/L)
MB	TRPH	ND

Sample ID	Compound	Result (mg/L)	Spike Level	% Recv.
LCS	TRPH	17.7	18.5	95.7

Sample ID	Compound	Result (mg/L)	Spike Level	% Recv.	RPD
LCSD	TRPH	18.1	20.0	90.5	5.6

MB = Method Blank; LCS = Laboratory Control Sample; CMS = Client Matrix Spike; CMSD = Client Matrix Spike Duplicate
NS = Not Spiked; OR = Over Calibration Range; NR = No Recovery

QC Batch #: 4549 **Lab Project #:** 4061506

Sample ID	Compound	Result (mg/L)
MB	Cadmium (Cd)	ND
MB	Chromium (Cr)	ND
MB	Lead (Pb)	ND
MB	Nickel (Ni)	ND
MB	Zinc (Zn)	ND

Sample ID	Compound	Result (mg/L)	Spike Level	% Recv.
LCS	Cadmium (Cd)	0.492	0.500	98.4
LCS	Chromium (Cr)	0.476	0.500	95.2
LCS	Lead (Pb)	0.491	0.500	98.2
LCS	Nickel (Ni)	0.481	0.500	96.2
LCS	Zinc (Zn)	0.469	0.500	93.8

Sample ID	Compound	Result (mg/L)	Spike Level	% Recv.	RPD
LCSD	Cadmium (Cd)	0.495	0.500	99.0	0.61
LCSD	Chromium (Cr)	0.470	0.500	94.0	1.3
LCSD	Lead (Pb)	0.486	0.500	97.2	1.0
LCSD	Nickel (Ni)	0.468	0.500	93.6	2.7
LCSD	Zinc (Zn)	0.470	0.500	94.0	0.21

MB = Method Blank; LCS = Laboratory Control Sample; CMS = Client Matrix Spike; CMSD = Client Matrix Spike Duplicate
NS = Not Spiked; OR = Over Calibration Range; NR = No Recovery

CHAIN OF CUSTODY

Analytical Sciences
P.O. Box 750336, Petaluma, CA 94975-0336
110 Liberty Street, Petaluma, CA 94952
(707) 769-3128
Fax (707) 769-8093

LAB PROJECT NUMBER: 406150L
CLIENT'S PROJECT NAME: Oyster Greywater
CLIENT'S PROJECT NUMBER: WQ Monitoring

Account #6530-4013-3/8 PD

GEOTRACKER EDF: ___ Y ___ N
GLOBAL ID:

COOLER TEMPERATURE: 0° °C

COC

PAGE 1 OF 1

CLIENT INFORMATION

COMPANY NAME: Pt Reyes N.S.
ADDRESS: 1 Bear Valley Rd. Pt Reyes Station, CA 94956
CONTACT: Mary Coppridge
PHONE#: 415 464-5182
FAX #: 415 663-8132

TURNAROUND TIME (check one)

MOBILE LAB ___ 24 HOURS ___
SAME DAY ___ 72 HOURS ___
48 HOURS ___ NORMAL 1
5 DAYS ___

ANALYSIS

ITEM	CLIENT SAMPLE I.D.	DATE SAMPLED	TIME	MATRIX	# CONT.	PRESV. YES/NO	TPH/Gas/MTBE EPA 8015m/8020	TRPH SM 5520 F	Chlorinated Solvents EPA 8010	HGAS SM 5310 C	COMMENTS	LAB SAMPLE #
1	301	6/15/04	8:45	W	4		X	X	X	X		22930
2	302	6/15/04	9:15	W	4		X	X	X	X		22931
3												
4												
5												
6												
7												
8												
9												
10												
11												

SIGNATURES

SAMPLED BY: Mary Coppridge 6-15-04
SIGNATURE DATE TIME

RELINQUISHED BY: Mary Coppridge
SIGNATURE

RECEIVED BY LABORATORY: Cindy Kendall 6/15/04 3:18
SIGNATURE DATE TIME

L1425
02-106

October 19, 2004

Mr. Tom Johnson
Johnson Oyster Company
P. O. Box 69
Inverness, CA 94937

Dear Tom:

We appreciated you taking the time to meet with us on October 15, 2004. We have revised the enclosed Requirements and Timelines, based on input from Johnson Oyster Company and Chris Darnell of the California Coastal Commission.

Please let me know immediately if any changes are necessary. We appreciate your attention to these matters.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure

cc w/c enc:
Nicole Walthall, NPS Field Solicitors Office
Chris Darnell, California Coastal Commission
Kevin Lunny

DLNeubacher:an 10/21/04

REQUIREMENTS AND TIMELINES FOR JOHNSON OYSTER FARM OPERATIONS

The Johnson Oyster Company ("JOC") is operating on National Park Service land in Point Reyes National Seashore under a 1972 Reservation of Use and Occupancy ("Reservation") in which Tom Johnson, as a condition of sale to the National Park Service ("NPS"), reserved the right to operate an oyster farm until 2012. In addition, JOC currently holds two Special Use Permits ("SUPs") issued by the NPS for a well site and waste water treatment field.

JOC's right under the Reservation are contingent upon compliance with various conditions including maintaining the property in a "safe, sanitary and sightly condition, open to reasonable inspection by the National Park Service, and meeting all Federal, State and County health, sanitation, and safety standards applicable to operation of and residence within areas engaged in the processing and retail sale of oysters." The Reservation also makes JOC responsible for providing utility services (including sanitation), not omitting waste, and complying with all NPS rules and regulations. Finally, construction of any temporary or permanent structure, sign or other improvement is subject to the prior written approval of the NPS.

A decade of noncompliance by JOC with the terms and conditions of its Reservation have been documented by the NPS, the County of Marin, the California Coastal Commission and, most recently, the California Department of Health Services, Food and Drug Branch. We understand that this latest violation resulted in the immediate shut-down of the oyster processing (shucking) on JOC reserved lands.

In order to avoid citation by the NPS, termination of the Reservation for breach of contract, and revocation of the SUPs, JOC shall complete the following requirements in advance of the specified deadlines:

1. Obtain and provide copy to NPS of a final inspection permit from Marin County for the septic system that certifies County approval of such system.
   Deadline: October 28, 2004

2. Remove all fencing and debris from former water disposal pit area (adjacent to retail and processing area) and fill hole with clean material.
   Deadline: November 15, 2004

3. Clean-up and properly dispose of all debris along the shoreline of Drakes Estuary within and adjacent to JOC's operations.
   Deadline: November 15, 2004

4. Obtain and provide copy to NPS of applicable retail food establishment permits from the Environmental Health Services Division, Marin County.
   Deadline: December 15, 2004

5. Obtain and provide copy to NPS of permit to drill (already drilled) and operate the drinking water well from the Environmental Health Services Division, Marin County.
   Deadline: January 17, 2005

6. Obtain inspections of the housing on Reservation lands by Marin County, California Public Health Services, and other appropriate agencies. Complete rehabilitation of the housing to meet current health and safety codes and in accordance with the inspections.
Deadline: January 17, 2005

7. Remove all illegal development as required in the California Coastal Commission Cease and Desist Order dated December 11, 2003.
Deadline: January 17, 2005

8. Obtain and provide copy to NPS of building permits from the appropriate State or County agency, such as the Marin County Community Development Agency, for all non-residential structures, if any, to remain on Reservation lands, including any offices, outbuildings, structures adjacent to trailers, or retail sales area.
Deadline: January 17, 2005

9. Submit request for approval to NPS for any buildings proposed to remain on NPS land along with valid applicable building permits from the Marin County Community Development Agency and/or other appropriate agency.
Deadline: January 17, 2005

10. Complete all rehabilitation of the non-housing structures to meet current codes and regulations in accordance with the applicable building permits and approvals.
Deadline: March 15, 2005

Failure to meet each requirement set forth above by the specified deadline will subject JOC to immediate citation by NPS.

Pending timely completion of all of the above requirements, new construction on the Reservation lands and/or on other NPS lands is prohibited.

JOC may submit to the NPS a comprehensive plan for future facility and operational needs, along with square footage requirements, a site plans and housing needs. Upon satisfactory completion of all of the above requirements, the NPS will review and consider for approval such plan.

L1425
02-106

December 4, 2003

Chris Darnell
California Coastal Commission
45 Fremont, Suite 2000
San Francisco, CA 94105

Re: Cease and Desist Order CCC-03-CD-12 (Johnson Oyster Company)

Dear Mr. Darnell:

We want to express our support of the Cease and Desist Order CCC-03-CD12 at Johnson Oyster Company (JOC) within Point Reyes National Seashore. The JOC is under a Use and Occupancy Agreement with the National Park Service (NPS) that essentially allows use of 1.47 acres for aquaculture facilities until 2012. The Agreement requires JOC to meet all local, state and federal regulations and laws.

Over the course of more than ten years, the National Park Service and the County of Marin have worked with JOC to bring them into compliance with appropriate laws and regulations. Most of this effort has resulted in limited progress. The final result was a Stipulated Order (165361; 1997) from the Superior Court of California for Marin County requiring the JOC to obtain proper permits, build proper septic systems, meet appropriate health and safety codes, and remove illegal structures. Under the Order, permitting by the Coastal Commission was required. If JOC did not meet the conditions of the Order within 24 months, they were required to removal all structures and cease operation. To date, they have not fully completed any of the requirements of the Order.

Therefore, the NPS has written JOC to notify them of the park's intent to cancel all use permits for the premises. We appreciate being able to comment on this issue.

Sincerely,

Don L. Neubacher
Superintendent

cc:
County Counsel, Marin County

DLNeubacher:an 12/04/03

2007-00472

MARINE MAMMAL SUPPLEMENT

to the
NATURAL RESOURCES MANAGEMENT PLAN

Point Reyes

National Seashore
California

NATIONAL PARK SERVICE/U.S. DEPARTMENT OF THE INTERIOR

MARINE MAMMAL SUPPLEMENT TO THE

NATURAL RESOURCES MANAGEMENT PLAN

POINT REYES NATIONAL SEASHORE

Recommended: John K. Dawning — Superintendent — 11/17/80 — Date

Approved: Howard H. Chapman — Regional Director, Western Region — 1-21-81 — Date

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Department of the Interior

National Park Service

FINDING OF NO SIGNIFICANT IMPACT

POINT REYES NATIONAL SEASHORE, CALIFORNIA

Western Region

In compliance with the National Environmental Policy Act of 1969, the National Park Service has prepared an environmental assessment on the following proposed project:

MARINE MAMMAL SUPPLEMENT TO THE

NATURAL RESOURCES MANAGEMENT PLAN

POINT REYES NATIONAL SEASHORE

The assessment process did not indicate a significant environmental impact from the proposed action. Consequently, an environmental statement will not be prepared.

The environmental assessment is on file at the above park and will be available for public review upon request.

11/14/80
Date

John H. Jarvis
Superintendent

1/21/81
Date

Howard L. Chapman
Regional Director, Western Region

FINDING OF NO SIGNIFICANT IMPACT FOR
MARINE MAMMAL SUPPLEMENT TO THE
NATURAL RESOURCES MANAGEMENT PLAN

POINT REYES NATIONAL SEASHORE

The National Park Service (NPS) proposes to adopt a plan which provides for the protection and public interpretation of the marine mammals in Point Reyes National Seashore. The six species of marine mammals associated with the seashore are: California and northern sea lions, harbor seal, northern elephant seal, southern sea otter, and the California gray whale. An environmental assessment was prepared in June 1980. Alternatives analyzed included no action, immediate removal of all beached animals, year-round closure of haul-out sites, artificial reintroduction of the sea otter and control of the sea otter population.

The public comment period lasted 75 days, however only four letters were received: three from private organizations, and one from a private citizen. There was general agreement on the content of the plan with most comments reflecting minor technical changes. These have been incorporated.

The NPS proposes to prevent beaching of marine mammals wherever possible, appropriate disposal of marine mammal carcasses, conduct research on animal populations and hauling-out patterns, seasonally control visitor use at haul-out sites and provide visitor interpretive programs.

No additional compliance steps are necessary prior to plan implementation.

The impacts of this proposal will be limited to improvement in the protection of marine mammals in the seashore and increased understanding of marine mammal behavior through research. Based on these limited impacts and public and agency review of the environmental assessment, the NPS records a "finding of no significant impact." Since this proposal does not constitute a major federal action significantly affecting the human environment, an environmental impact statement will not be prepared.

Recommended:

s// John L. Sansing
Superintendent, Point Reyes National Seashore

November 17, 1980
Date

Approved:

Howard H. Chapman
Regional Director, Western Region

1/21/81
Date

MARINE MAMMAL SUPPLEMENT

TO THE NATURAL RESOURCES MANAGEMENT PLAN

POINT REYES NATIONAL SEASHORE

OBJECTIVES OF THE SUPPLEMENT

To protect, preserve and interpret the marine mammals in the park and provide for the enjoyment of these species by the public.

REVIEW OF STATUS OF MARINE MAMMALS IN THE SEASHORE

The four species of pinnipeds (the California, and northern sea lions, harbor seal and northern elephant seal), the southern sea otter and the California gray whale have been associated with what is now Point Reyes National Seashore since California's earliest chronicled times. The gray whale has been largely a transient in near-shore waters but the remainder of these marine mammals were or now are resident at traditional sites (Marine Mammals of the Northwestern Coast of North America, 1874, Charles M. Scammon).

California Gray Whale

Virtually the entire world population of this species migrates along the Point Reyes coastline. Its southbound migration to Mexican breeding and calving sites occurs during a short period from late November to mid-February; its northward migration is spread from late January well into April and May. The whales pass very close to shore at Point Reyes; many occur just beyond the surf. Protected by international law, the gray whale population has recovered from near-extinction in earlier times. Recent evidence from the Farallon Islands/Point Reyes area indicates that as the population increases further some of the animals tend to remain for extended periods (into July and sometimes longer) in these waters, rather than moving all the way to the Arctic for the non-breeding period. Their large numbers and behavior, unique among large baleen whales, affords an opportunity for the public to observe these animals. Whale watching from the Point Reyes Headlands is a popular winter activity.

Southern Sea Otter

Historically this sub-species resided year-round in the near-shore waters of Point Reyes National Seashore, most likely in association with kelp beds (University of California, Museum of Vertebrate Zoology, Berkeley). The species is still widespread along the Alaska coast but was nearly exterminated from the California coast by fur hunters by the end of the 19th century.

A residual population of fewer than 1500 animals has since been expanding from an isolated area of the Big Sur coast at a rate of about 2.5 miles per year at both its northern and southern fronts (California Department of Fish and Game). The northern front has reached Monterey Bay. If left alone, the population would likely reoccupy its former range, including Point Reyes National Seashore. Probable areas of concentration would be in areas where kelp occur: Abalone Point to the Coast Camp area south of Limantour Beach; the Headlands and especially Bird Rock and Tomales Point. In recent times individual or paired sea otters have visited Point Reyes waters (Point Reyes Bird Observatory and University of California, Museum of Vertebrate Zoology, Berkeley).

Northern Stellar Sea Lion

A small population resides year-round on the rocks offshore from the Point Reyes Headlands. The size of the local population, however, is not known. The species has been declining in number at the southern end of its range during the past 40 years; as Point Reyes is in this latter region it is highly likely that this has been the case in the Headlands. Related to the decline have been low pregnancy rates, high pup mortality and a high incidence of premature births. Factors possibly contributing to this decline are disease (including leptospirosis), pollution, heavy metals, pesticides and a contracting range due to increased competition by the California sea lion. The population seems to be remaining healthy in the northern part of its range. Isolated by high cliffs, rough water and existence of an ecological preserve insure that human activities rarely affect the northern sea lion population directly.

California Sea Lion

This migratory species is present at Point Reyes from August to May. Virtually all observed individuals are males, although a few females may be present. It is unknown whether the species breeds at Point Reyes; the northern-most known breeding ground is the Farallon Islands. The world population of this species has increased dramatically during the past 40 years, but population growth has leveled off in recent decades. The number of animals that frequent Point Reyes National Seashore is not known. They do haul out at the Point Reyes Headlands and at Tomales Point. During winter months they are attracted in unknown numbers by the herring spawn in Tomales Bay, primarily in January, February and March.

Northern Elephant Seal

This species once bred at Point Reyes, although the exact locality or the size of the population is not known (Marine Mammals of the Northwestern Coast of North America, 1874, Charles M. Scammon). Based on site characteristics elsewhere, the most probable rookery site was Drakes Beach. The world population is re-colonizing its former range very rapidly.

The history of recolonization at the nearby Farallon Islands indicates that immature animals initially haul out at a prospective locality, usually to molt their fur in the spring. Some would eventually return to breed, especially if left undisturbed. If a breeding population became established, animals would frequent the area virtually year-round. In the past five years several young elephant seals have hauled out on park beaches in the fall. Unexpectedly, three pups, too young to be independent, have also been observed on park beaches in the winter during the past three years; the locations of the mothers was not determined.

Harbor Seal

Harbor seals haul out year-round on rocks, mud-flats and sandy beaches along the Point Reyes coastline. The known traditional hauling out sites are Hog Island, Bird Rock, the Point Reyes Headlands, Drakes and Limantour Esteros, the tip of Limantour Spit and Double Point. Others probably exist. The total Point Reyes population is estimated to be 1,200, making it the largest in California (Point Reyes Bird Observatory). However, this figure is subject to seasonal variation. Use of traditional hauling out sites also seems to be subject to seasonal variation.

The existing and potential conflict between seal habitat requirements and human recreational and commercial interests are important points when assessing the present status of this pinniped species. Depending on the location of the hauling out ground and the method of approach, harbor seals are exceedingly sensitive to human activities in the vicinity of their hauling out grounds and will stampede into the water if such activities are closer than 300 meters (Point Reyes Bird Observatory). The impact of disturbance is two-fold. During the pupping season, pup survival is impaired by the added stress of fleeing a disturbance source. Secondly, if disturbances are frequent and of long duration the seals' hauling out patterns are eventually disrupted so that they may temporarily or permanently abandon the site.

MANAGEMENT AND RESEARCH ACTIONS

Cooperative Agreements

Point Reyes National Seashore maintains a cooperative agreement with the National Marine Fisheries Service to protect and manage the marine mammals in the Seashore.

The California Department of Fish and Game and Point Reyes National Seashore maintain a Memorandum of Understanding for the enforcement of State Fish and Game regulations along the shoreline of the Seashore. This agreement is particularly important with regard to the Point Reyes Headlands and Limantour Estero Reserves because these areas are designated "Natural Research Areas". In these two areas, the Department of Fish and Game and Seashore regulations concerning the taking of marine organisms and entry into the areas are identical.

Live Beached Marine Mammal Action

Every attempt will be made to prevent marine mammals from becoming beached. Whenever possible, a beached animal will be observed by the park staff or their designate for at least 48 hours prior to taking any action. At the end of the observation period, a decision will be made by the Chief Ranger's Office as to whether the animal will be allowed to remain in place, be relocated, turned over to marine mammal rehabilitation facilities or destroyed. Rehabilitated animals will be released back in the Seashore as directed by the Chief Ranger's Office.

Marine Mammal Carcass Action

The carcass will be disposed of in the following manner of priority, as established by the Chief Ranger:

1. In low visitor use areas the carcass will be allowed to naturally decompose. An exception would be the sea otter which would be turned over to the U.S. Fish and Wildlife Service.
2. When the first action is not possible, the carcass will be made available to the California Academy of Science, San Francisco, or the Museum of Vertebrate Zoology, University of California, Berkeley, for research under approved permits.
3. The carcass will be released to other public and private educational facilities.
4. The carcass will be incinerated and/or buried.

Research Project Statements in Priority Order (to be included in the 1981 Revised Natural Resources Management Plan)

Conduct a one to two year harbor seal census study to assess seasonality in hauling out patterns for each of the known hauling grounds, determine the significance of each site to the seals, and identify present and potential conflicts between seal requirements and human recreational uses.

Conduct a study to determine the management implications on the Seashore by a repopulation of the northern elephant seal.

Conduct a one to two year census study to assess seasonality in hauling out patterns and locations of the two species of sea lions in the park.

Conduct a program to accurately catalogue all sightings and inventories of marine mammals and determine the cause of death or diagnosis of illness of any marine mammal, including tests for leptospirosis, San Miguel sea lion virus, heavy metals and pesticide poisoning.

Conduct a study to determine the management implications on the Seashore by a repopulation of the southern sea otter, and to determine if translocation to this area would be in the best interests of this threatened species.

00033002 NPS-PWR-B04-00007-000001 Page 14 of 46

Visitor Use Management of Haul Out Sites

All significant haul out sites will be posted prohibiting visitors or pets within 300 meters of the site during the months the site is used by marine mammals. This regulation will be enforced by National Park Service Rangers.

In cooperation with the National Marine Fisheries Service and the California Department of Fish and Game, flights of aircraft under 1000 feet in elevation will be prohibited within one-quarter mile of any haul out site.

Interpretive Programs

Interpretive and informational programs will be continued and further enhanced to provide visitors with the awareness, appreciation and understanding of the marine mammals of the Seashore.

Specific Management of Individual Species

California gray whale - No specific management action is proposed at this time beyond those already stated in this plan and the General Management Plan for the park.

Southern sea otter - No attempt will be made to reintroduce this species in the park until potential impact is studied, but natural repopulation will be allowed in all areas. Where competition with abalone divers occurs the otter will be protected and be allowed to feed naturally.

Northern (Stellar) sea lion - Currently found only in the Natural Research Areas and, therefore, is protected by the regulations and management of these areas.

California sea lion - Boat patrols will be conducted in Tomales Bay during the herring spawn season to protect the sea lion from poaching and harassment.

Northern elephant seal - Pending the results of the research projects included in this plan, portions of park beaches will be closed when a seal hauls out on the beach. This closure will be limited to the immediate area (100 meters) around the seal and will be closed until the seal leaves or is moved.

Harbor seal - The Double Point haul out site has already been posted as closed to all visitors during the pupping season. Other haul out sites in the park will be observed to determine if the site is being used as a pupping ground and, if so, will be posted as a closed area during the season of May and June.

ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

The agreements the Seashore maintains with the National Marine Fisheries Service and the California Department of Fish and Game will increase the protection of the marine mammals and their habitat.

The live beached marine mammal action will impact the environment by increasing the chances of survival of these marine mammals.

The marine mammal carcass action will allow carcasses to decompose and return nutrients to the system in a natural process. This decomposition may have an adverse aesthetic effect on visitors who may come into contact with the carcass, and could possible aid in the spread of disease as other animals feed upon it. The carcasses turned over to research institutions will increase our knowledge of the species and cause of death.

The research projects proposed will have no environmental impacts of their own, but will result in a better assessment of the status of the marine mammals. The studies will also result in a better understanding of the conflicts between marine mammals and the park visitor.

Restricting visitors and pets from approaching haul out sites during the pupping season will have a beneficial effect on the environment. However, the restriction will limit the visitor in the ability to get a close look at the mammals in their natural setting during this time period. The same effect applies to the 1000 feet restriction placed on aircraft over these areas.

Allowing natural repopulation of the sea otter in the park will have a number of effects on the environment. The abalone population will be greatly reduced in the area, which will reduce the success of those people harvesting abalone, and the oyster farm industry in the area could also be adversely affected. The sea otter is a colorful and active animal and would provide an unforgettable visual experience to the visitor. The kelp beds would be enhanced and would support a greater diversity of biota. The ecology of the area would gradually change to resemble more closely the situation of pre-fur trade times when otters were present as an important ecosystem component.

Boat patrols in Tomales Bay during the herring spawn season would lower the poaching and harassment of all marine life in the area and, thus, have a beneficial effect on the environment.

Closing the immediate area around a hauled out or beached northern elephant seal will protect the animal and allow it to be observed by park personnel to determine the cause of the animal's behavior and decide what action, if any, needs to be taken. This closure will restrict the visitors' use of portions of park beaches although the closures would be minimal as only a few elephant seals have hauled out on park beaches within the past 5 years.

Closing Double Point haul out site during the harbor seal pupping season has been very beneficial to the environment. It has eliminated a great deal of intentional and unintentional harassment by visitors and their dogs. This, in turn, has had a calming effect on the seals and allowed a more natural stay at this site. The closure does adversely affect the visitors' ability to walk the beach in that area during that time.

MITIGATING MEASURES INCLUDED IN THE PROPOSED ACTION

Mitigating measures for beached, live or dead, marine mammals will include closing the immediate area around the animal to prevent conflict with the visitor. Whenever this is not possible due to high visitor use, carcasses may be transported to more isolated areas or turned over to scientific institutions previously listed in this plan. This will reduce the impact on the visitor and lower the chance of spreading disease to other animals. The cause of death of all marine mammals will be determined whenever possible and any carcass known to have a communicable disease will be removed to one of the scientific institutions.

A research study will be conducted to determine the management implications of the sea otter repopulating the area and to determine if translocation to this area would be in the best interest of this threatened species.

Restricting visitors from portions of beaches will be mitigated by interpreting the beached animals to the public to increase visitors' awareness and enjoyment of marine mammals.

ADVERSE EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

The proposed management of marine mammals is designed to enhance rather than adversely affect the resources. Nevertheless, in any chosen action there are "trade-offs" which must be made and occasionally the "trade-offs" involve unavoidable adverse effects in the chosen proposal.

The marine mammal carcass action will allow carcasses to decompose on the beach which could possibly detract from visitors' experiences.

The closure of some beach areas during pupping seasons will restrict visitors' use of these areas, if only for a short period of time.

The natural repopulation of the sea otter while enhancing some marine populations will reduce the abalone and other marine animal populations, thus reducing the potential for harvesting or observance of these animals by the visitor.

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Certain actions included in this supplement would limit local short-term uses of the environment by the visitor but will enhance the long-term natural processes of the environment.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION

There would be no non-renewable resources committed by the plan. The only renewable resource that would be affected would be the nearshore ecosystem which would come to more closely resemble the natural equilibrium which formerly existed when the sea otter was the keystone species in the kelp beds.

ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the proposed beached marine mammal action include removing all animals beached as soon as observed or to take no action at all. Removing all beached mammals would reduce the potential for adverse visitor contact and reduce the potential for the spread of disease to other animals. However, this action would increase the mortality of live beached animals and disrupt the natural cycle of decomposition of dead animals. Furthermore, there is no proper way to dispose of animals in accordance with the Marine Mammal Act. Taking no action at all would allow the beached animals to be harassed and moved by visitors, decreasing its chance for survival and thereby increasing the chance of spreading disease among animals and possibly to the visitor.

The alternative to research would be not conducting any studies at all. This would prevent all factions from gaining a better assessment of the status and habitat of marine mammals, their potential conflict with the public and interaction with other animals.

The alternatives to restricting visitors from haul out sites during pupping seasons would be to either impose a year-round closure or no restrictions whatsoever. No restrictions would allow continued disturbance to the animals which adversely affects their condition and pupping success. Ultimately, continuous disturbance would cause the animals to abandon the site. A year-round restriction would protect the animals but restrict the visitor's use of beaches during periods when no animals are present due to their migratory patterns.

The alternatives to the natural repopulation of the sea otter would be to artificially reintroduce this animal or prevent their repopulation of the area. The sea otter is protected as a "threatened species" under the Endangered Species Act and, therefore, preventing its reintroduction into any area would be a violation of this Act. The artificial reintroduction of the sea otter would hasten the return of the near-shore environment to a condition more closely resembling natural equilibrium but would first require studies to determine whether such an artificial reintroduction would be in the best interest of the threatened species and what effect it would have on the Seashore's ecosystem.

The alternative to boat patrols on Tomales Bay is to conduct no patrols which would reduce gasoline consumption but also allow continued poaching and harassment of all marine life in that area creating a detriment to research and monitoring.

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CONSULTATION AND COORDINATION IN THE DEVELOPMENT OF THE SUPPLEMENT AND IN THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT

During the preparation of the Supplement and Environmental Assessment the following individuals and agencies were consulted for their input of knowledge, suggestions and recommendations.

1. Jim Lecky, Wildlife Biologist, National Marine Fisheries Service, Terminal Island, CA.

2. Sarah Allen, Researcher, Point Reyes Bird Observatory, 4990 State Route #1, Stinson Beach, CA.

3. Robert Jones, Museum of Vertebrate Zoology, University of California, Berkeley, CA.

4. Dr. Leslie Dierhauf, Veterinarian, California Marine Mammal Center, Marin Headlands, Sausalito, CA.

5. Pete Chorney, Law Enforcement Division, National Marine Fisheries San Francisco, CA.

6. Harriett Huber, Biologist, Point Reyes Bird Observatory, 4990 State Route #1, Stinson Beach, CA.

7. David Ainley, Director of Research, Point Reyes Bird Observatory, 4990 State Route #1, Stinson Beach, CA.

COORDINATION IN THE REVIEW OF THE DRAFT SUPPLEMENT AND ENVIRONMENTAL ASSESSMENT

Copies of the Supplement and Assessment were available to the public for review and comment in July and August, 1980. The public review period was originally open for 30 days and then extended 45 days until October. All letters of comment received through September are included in the appendix.

Comments on the preliminary Draft and Assessment were requested from the following agencies, organizations and individuals.

Department of the Army
   Corps of Engineers
Department of Commerce
California Department of Fish and Game
   Marine Resources Division
   Sacramento Headquarters
California Department of Parks and Recreation
   Sacramento Headquarters
   Marin County Headquarters
California Marine Mammal Center
California Native Plant Society
California State Horseman's Association
College of Marin, Biology Department
 Environmental Action Committee of West Marin
Fish and Wildlife Service
Inverness Improvement Association
League of Women Voters of the Bay Area
Marin Audubon Society
Marin County Resource Conservation District
National Audubon Society
National Marine Fisheries
   Wildlife Biology Headquarters
   Law Enforcement Division
National Parks and Conservation Association
Point Reyes Bird Observatory
Resources Agency of California
Sierra Club
Forest Service
University of California, Berkeley
   Museum of Vertebrate Zoology
Vedanta Society of Northern California
West Marin Units, Marin Conservation League
Wilderness Society

Advisory Commission for Golden Gate National Recreation Area
Audubon Canyon Ranch
Conservation Associates
Environmental Forum
Independent Journal
KTOB Radio
Marin County Farm Bureau
Marin Municipal Water District
   Division of Land Management
Marin Rod and Gun Club, Inc.
North Central Coast Commission, California Coastal Zone
   Conservation Commission
People for a Golden Gate-National Recreation Area
Point Reyes Light
Salisbury State College, Maryland
   Department of Geography
San Francisco State University
   Department of Ecology and Systematic Biology

Tomales Bay Association
Tomales Bay Sportsmen's Association
Jerry Friedman
Kay Holbrook
Elizabeth Terwilliger

The following is a list of agencies, organizations, and individuals who submitted comments on the prelimiary Draft Supplement and Assessment.

People for a Golden Gate National Recreation Area
Point Reyes Bird Observatory
Friends of the Sea Otter
Ms. Pamela Ferris-Olsen

SUMMARY OF COMMENTS AND RESPONSES
Comments and Responses are summarized as follow:

People for a Golden Gate National Recreation Area

Comment: The Plan appears to be carefully prepared; there has been consultation and coordination with good people in this field. The only addition would be a statement to allow marine mammals to remain in place after 48 hours as an option under the "Live Beached Marine Mammal Action" section.

Response: An option has been added to the "Live Beached Marine Mammal Action" section to allow animals to remain in place after the 48 hour observation period (pg. 4)

Point Reyes Bird Observatory

Comment: A number of minor technical points on specific words and phrases were listed with the general comment that the plan was good, with some specificity yet enough flexibility to meet most circumstances that could arise.

Response: Each individual point was addressed in the final plan (see pg. 2, line 7, pg. 3, line 3, pg. 3, line 7, pg. 4, line 6). The additional research project statement on the sea lions was added as the third priority (pg. 4).

Friends of the Sea Otter

Comment: Rewrite page 1, par. 4, to better state historical data on sea otter.

Response: Paragraph reworded but not all of comment included.

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Comment: If a sick or dead sea otter should be found at Point Reyes National Seashore, the California Department of Fish and Game or the U.S. Fish and Wildlife Service should be notified.

Response: The telephone numbers and individuals to contact at the Department of Fish and Game and the Fish and Wildlife Service have been included in our marine mammal procedures for the park and those agencies will be notified should such an incident occur.

Comment: Revise proposed study of sea otter to include evaluation of the affects of transplanting the sea otter to Point Reyes National Seashore on the threatened otter population.

Response: Proposed study has been revised to reflect this addition.

Comment: Friends of the Sea Otter wish to help develop programs and literature for the park visitor on the plight of the sea otter and its former role in the Seashore.

Response: The park's Interpretive Division will include this in their interpretive planning on marine mammals and we appreciate the offer of assistance.

Comment: The statement "No attempt will be made to reintroduce this species in the park..." should be omitted.

Response: This statement has been changed to state that no attempt will be made until the impact of reintroduction is studied. This leaves the option of reintroduction available but pending the outcome of thorough study of the impact of reintroduction on the sea otter and the park's ecosystems.

Comment: Rewrite statement on effect of sea otter repopulating Seashore to reflect the fact that the impact would be primarily a change of near-shore systems to more closely resemble the natural conditions of pre-fur trade time.

Response: Statement rewritten (Pg. 6, par. 5).

Comment: Specific, technical comments on words and phrases were addressed.

Response: All comments were considered and adjustements made (pg. 9, par 4, pg. 7, par. 3, pg. 6, par. 5, pg, 8, par, 6).

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Comment: First priority for carcasses should be for their use by scientific and educational institutions with second choice being the natural decomposition.

Response: Our primary resource management objective is to perpetuate natural system processes as closely as possible. The natural decomposition of marine mammal carcasses is part of the process and, therefore, is our first priority in options. We do, however, recognize the need for research on these mammals and will consider the removal of carcasses on a case by case basis.

Ms. Pamela Ferris-Olsen

Comment: More research and information is needed on marine mammals in the Seashore before development of a management plan.

Response: We agree that more research and information is needed (pg. 4, listing research projects), but we cannot wait for all research results before implementing a preservation plan for marine mammals in the Seashore.

Comment: The draft continually refers to the negative impact of the sea otter with no mention of the positive impact.

Response: The plan has been reworded to reflect a more even-handed evaluation of the impacts of the sea otter on the ecosystem.

Comment: Specific comments on words and phrases in plan were addressed.

Response: All comments were considered and adjustments made (pg. 9, par. 5, pg. 7, par. 3, pg. 6, par. 5, pg. 6, par. 2, pg. 5, par. 5, pg. 4, par. 5 and 7).

PEOPLE FOR A GOLDEN GATE NATIONAL RECREATION AREA

[illegible] Clement Street • San Francisco, Calif. 94121 • (415) 752-0777

[illegible]
[illegible] COMMITTEE

August 14, 1980

John Sansing, Superintendent
Point Reyes National Seashore
Point Reyes, CA 94956

Dear John,

People For a Golden Gate National Recreation Area appreciates the opportunity to comment upon the Draft Marine Mammal Supplement to the Natural Resources Management Plan.

The only specific comment we have is that on page 4, under "Live Beached Marine Mammal Action," we would suggest the addition of the following underlined phrase: "as to whether the animal will be allowed to remain in place, be relocated..."

The plan appears to be carefully prepared; there has been consultation and coordination with good people in this field.

Sincerely,

Amy Meyer, Co-Chairman

POINT REYES BIRD OBSERVATORY

4990 Shoreline Highway, Stinson Beach, California 94970
Telephone (415) 868-1221

13 August 80

Superintendent John Sansing
Point Reyes National Seashore
Point Reyes Station,
California 94956

Dear John,

Thank you for the opportunity to comment on the draft Marine Mammal Supplement to the Natural Resources Management Plan. David Ainley, Harriet Huber, Sarah Allen, and I have reviewed the draft and would like to make the following suggestions:

Pg. 2, line 7 under "Northern Sea Lion"...Sentence should begin, "Factors possibly contributing..."

Pg. 3, line 3...should read, "...to molt their fur in the spring."

Pg. 3, line 7...should read, "...hauled out at Drakes Beach in the fall..." (they are not molting then)

Pg. 4, line 6 under "Live Beached Marine Mammal Action"... The list of possible actions should include, probably as the first choice, leaving the animal alone (and possibly protecting it from visitors) for longer than 48 hours. Adding this option would be consistent with pg. 6, paragraph 7.

Pg. 4, under "Research Project Statements"...We think that the seasonal status of the two sea lions should be assessed, perhaps as a third priority. Both species are in a process of transition in this region, and some background (baseline) information should be gathered for comparison in the future.

Pg. 5, under "Specific Management of Individual Species"... Northern elephant seal...This paragraph should not limit the proposed action to Drakes Beach. As it is written, it assumes that Drakes is the only beach where they will haul out, or that they won't get this level of protection if they haul out elsewhere.

Pg. 7, second paragraph...The first sentence presumably refers only to harbor seals and not to northern elephant seals whose appearance could affect visitor use outside the pupping season (pg. 5).

Finally, in reference to pg. 3, line 10, I thought the two northern elephant seal pups last winter were at Point Reyes Beach between South Beach and the Point. Did I hear that wrong?

Aside from the above points, which are mostly minor and technical, it looks like a good plan to us, one with some specificity, yet enough flexibility to meet most of the circumstances that should come up.

Sincerely,

Burr Heneman

Burr Heneman
Executive Director

FRIENDS OF THE SEA OTTER

P.O. BOX FF, CARMEL, CALIFORNIA 93921

August 30, 1980

Mr. John L. Sansing
Superintendent
Point Reyes National Seashore
Point Reyes, California 94956

Dear Superintendent Sansing:

On behalf of 4000 members nation-wide, FRIENDS OF THE SEA OTTER welcomes the opportunity to submit the following comments on the Draft Marine Mammal Supplement to the Natural Resources Management Plan, Point Reyes National Seashore. FRIENDS OF THE SEA OTTER is a conservation organization established in 1968 to help protect a healthy population of Southern Sea Otters and their marine environment. As the waters off Point Reyes once harbored large numbers of sea otters, and as otters may eventually come to reoccupy this area (occasional sightings have occurred in recent times), we are keenly interested in the Park Service's efforts to protect, preserve and interpret the Seashore's present and former marine mammal populations and their marine habitat.

We are very pleased with the spirit of stewardship which the Park Service has demonstrated at Point Reyes, and we welcome the development of a Marine Mammal Supplement which is consistent with the philosophy and objectives of the Natural Resources Plan for Point Reyes National Seashore (June 1976), which states:

> "Point Reyes is superlative for its scenery and for the refuge it provides for man and for the elements of its natural ecosystems. It is large and varied enough to generate in people a vital feeling of being close to nature and can best serve man by providing a rich combination of scenic, biologic, historic, and recreational resources close to a major, rapidly expanding population core." (emphasis mine)

It is too early to know if the otters themselves, or if those government agencies now bearing the responsibility for the Southern Sea Otter's recovery, will determine that Point Reyes will again be a refuge for a significant number of otters. However, should they return, the Seashore will be enriched by the presence of this animal which epitomizes a "rich combination of scenic, biologic, historic and recreational" attributes.

If the beleagured sea otter, now threatened by oil spills and sport and commercial shellfish interests, seeks a safe haven at Point Reyes National Seashore, we trust the Park Service will welcome it home.

Sincerely,

Carol Fulton

Carol Fulton

Enclosures

cc: Mr. Howard Chapman, NPS
Dr. Milton Kolipinski, NPS
Mr. Bill Pierce, NPS
Mr. Carl Benz, USFWS
Mr. John Twiss, MMC
Margaret Owings, FSO

Specific Comments

Page 1, para 4, Change to read, "Historically, the Southern Sea Otter resided year-round ... The species, which once ranged along the shores of the Eastern Pacific from Alaska south to Baja California, was nearly exterminated by fur hunters by the end of the 19th century. Although the Alaskan populations have recovered to an estimated 100,000 - 140,000 animals, the most recent census in California estimated fewer than 1,500 animals (California Department of Fish & Game census of June, 1979). Since its "rediscovery" off the Big Sur coast in 1938, the Southern Sea Otter has re-established its range north to Santa Cruz and south to Pismo Beach -- a total distance of about 200 miles, or approximately 10% of its former range. In 1977, the Southern Sea Otter was designated a "Threatened Species" under the Endangered Species Act, primarily due to its extreme vulnerability to oil spills, its reduced population and restricted distribution. Supposedly, if left alone and barring unforeseen circumstances, the population could eventually reoccupy its former range, including ..."

(Note: the Southern Sea Otter is not a species, but a subspecies (Enhydra lutris nereis) of the species Enhydra lutris, and so designated in its listing as a Threatened Species.)

Page 4, para 2, Live Beached Marine Mammals. In the unlikely event that a sick or injured sea otter should haul out at Pt. Reyes National Seashore, the California Department of Fish & Game or the U.S. Fish & Widlife Service should be notified. As the Marine Mammal Center in Fort Cronkhite has neither the facilities nor experience to care for sea otters, we suggest you contact veterinarian Tom Williams in Pacific Grove (24-hour number 408-649-4111) or Jack Ames in the Monterey office of CDFG (408-649-2870, home 633-4181). Both men have extensive experience in handling and caring for sea otters, and could recommend procedures for local personnel to follow.

Page 4, para 3, Marine Mammal Carcass Action. As the Southern Sea Otter is a "Threatened Species," California Department of Fish & Game or the U.S. Fish & Wildlife Service must be notified to take possession of the carcass. All available information should be obtained from the carcass when discovered, and then it should be placed in a freezer to prevent further decomposition if necropsy cannot be performed right away.

Page 4, para 7, Change to read: "Conduct a study to determine the potential effects on the Seashore by a repopulation of the Southern Sea Otter, and to determine if translocation to this area would be in the best interest of the threatened otter population." (To avoid duplication, this should be done in conjunction with the U.S. Fish & Wildlife Service which is currently examining possible translocation sites -- see comment below.)

Page 5, para 3 Interpretive Programs: Although the Southern Sea Otter is now only a rare visitor to Pt. Reyes, we urge the Park Service to make a vigorous effort to inform the public of the important role the otter formerly played in the Seashore's coastal waters. While the sea otter is a tragic example of man's over exploitation, it is also a valiant survivor -- a symbol of hope that strict protection and wise management will bring about the recovery of this decimated population. We offer our help in developing programs and literature to better acquaint Seashore visitors with the plight of the Southern sea otter.

Page 5, para 5 We strongly support the statements, "...natural repopulation will be allowed in all areas. Where competition with abalone divers occurs the otter will be protected and be allowed to feed naturally." They uphold the spirit of the Natural Resources Management Plan for Point Reyes, which cites as its first Resources Management Objective:

> "The resources of the Seashore will be managed and developed to perpetuate the quality of appearing to be a major piece of "untouched" California coastal landscape."

However, the phrase, "No attempt will be made to reintroduce this species in the park,..." should be omitted, and it is contradictory to another Resources Management Objective which states:

> "Steps will be taken to determine the means and feasibility of reintroducing extirpated animal species."

Although translocation of sea otters to the Point Reyes National Seashore may be unlikely, it cannot be ruled out altogether. The U.S. Fish & Wildlife Service, in consultation with the California Department of Fish & Game, the Marine Mammal Commission, the National Parks Service and other interested parties, is currently preparing a Recovery Plan to restore the Southern Sea Otter to non-threatened

status and eventually to re-establish and maintain optimum sustainable populations in natural habitats within its former range in U.S. waters. As major oil tanker ports are located near both ends of the otters' current range, and as their entire range is bracketed by the two largest-nominated tracts in OCS Lease Sale #53, establishment of a breeding population in an area less susceptible to oil spills is under careful scrutiny, and all sites ecologically and biologically appropriate are under consideration. Sadly, however, we must note that Point Reyes itself is threatened by potential spills from tanker traffic heading for San Francisco Bay, as well as by the proposed off-shore oil development in the Bodega Basin.

Page 6, para 5 Change to read: If the sea otter should repopulate the Seashore, the ecology of the area would gradually change to resemble more closely the pristine situation of pre-fur trade times, when otters were present as an important ecosystem component. The sea otter has been identified as a "keystone species" with a significant ecological role in controlling the numbers and sizes of grazers such as sea urchins and abalones in kelp forests. Such control by sea otters results in enhanced kelp growth and an increased potential for kelp forests to support an abundant and highly diverse biota which uses kelp habitat for shelter and food, including finfish which are heavily utilized by man. While the otter will compete with man by reducing the number of legal-sized shellfish available, it will leave healthy juvenile populations and breeding stock. Eventual reoccupation by sea otters would add a new dimension to the educational, recreational and scientific attributes of the Seashore.

Question: We wonder what percentage of Seashore visitors would actually be affected by otters eating abalones? It is our understanding that abalone diving is already restricted in the Seashore due to the presence of sharks in nearshore waters and the protection of certain areas from human intrusion, i.e., the tidal zone fronting the Point Reyes headland. Also how accessible would the oysters be to the otters? Aren't they already grown in enclosures to protect them from other marine predators?

Page 7, para 3 See comment on Page 4, para 7.

Page 8, para 4 See comment on Page 6, para 5. The natural repopulation of the sea otter, while enhancing some marine animal populations, may reduce the number of legal-sized abalones, thus reducing potential harvesting for visitors. (Delete mention of observance, for few of the 41 different items on the otter's varied menu provide a visual experience for park visitors.)

Page 8, para 6 See comment on Page 6, para 5, and restate to provide a more balanced perspective of the otter's effect on the nearshore ecosystem. Suggest: "The only renewable resource that would be affected would be the nearshore ecosystem which would come to more closely resemble the natural equilibrium which formerly existed when the sea otter was the keystone species in the kelp forests."

Page 9, para 4 Change 2nd and 3rd sentences to read: "The sea otter is protected as a "Threatened Species" under the Endangered Species Act, and therefore preventing its reintroduction into the area would be in violation of this Act. The artifical reintroduction of the sea otter would hasten the return of the nearshore environment to a condition more closely resembling natural equilibrium, but would first require studies to determine whether such an artificial reintroduction would be in the best interest of the threatened Southern Sea Otter population, and what effect it would have on the Seashore ecosystem.

General Comments

Page 4, para 2 " ", " 3 The sections on live and dead beached marine mammals should be rewritten to indicate the differences in procedures followed for pinnipeds and cetaceans, and to clarify the statement that whenever possible beached animals will be observed for 48 hours before any action will be undertaken. Also, we believe first priority for carcasses should be their use by scientific and educational institutions, with second choice being natural decomposition or burning/burial if necessary.

Pa.:la Fe. is-Olson
2431 Lockw od Avenue
Fremont, Ca. 94538

August 20, 1980

Howard Chapman
Regional Director
National Park Service
Western Regional Office
450 Golden Gate Avenue
San Francisco, CA 94102

Dear Mr. Chapman:

On August 27, 1976 I submitted written commentary on the National Park Service's draft of the Natural Resources Management Plan and Environmental Assessment (June 1976). At that time I commended the Service for its endeavor. The Plan reflected a general concern for the natural environment. The steps outlined in the Plan were an attempt to maintain and restore the Seashore in a natural state. This document, however, was overwhelmingly directed towards the management of terrestrial and aquatic resources, in spite of the statement on page 3 of the Plan that, " the actions proposed in the natural resources management plan deal with the marine as well as the terrestrial environment". Management programs and research needs were not addressed for the marine ecosystem. It, therefore, is a significant step forward towards achieving the goal of maintaining and restoring the Seashore as an integral unit that a Marine Mammal Supplement has been drafted.

The lack of a policy for marine mammal management within the Park boundaries has impeded the Service from achieving its goals of managing and perpetuating the quality of all the Seashore's natural resources. The Marine Mammal Supplement will provide the Service with tools to manage the marine environment and to attain its objective "to protect, preserve, and interpret the marine mammals in the park" (Marine Mammal Supplement, 1980). However, to be most effective in achieving these objectives, some fundamental problems in the draft must be addressed and rectified. The lack of population data, unfounded or weak assumptions, and strategies dealing with live marine mammals and carcasses need to be dealt with prior to finalizing the management supplement.

It is imperative to have information on population size and on distribution and types of use by area of the Seashore by marine mammals before developing management programs. Marine mammal censuses can provide data on the status of local populations. Significant changes in these populations may reflect local conditions that can also have implications for other marine organisms and for man. Increased mortality rates may serve as an indicator of changes in the levels of pesticides, heavy metals, and bacterial infections. Population counts can, therefore, offer information on population trends, and in cases where negative impacts are noted, indicate where research needs to be conducted to ascertain and alleviate problems. In situations where populations become intensely concentrated, management decisions can be made to obtain information on the causes for population build-ups, potential impacts, and allow a reasonable determination of what action(s) is required. In addition to census data providing figures on the size of the population, it can indicate the distribution of animals and facilitate the regulation of human utilization

of areas.

The U. S. Congress, in the Marine Mammal Protection Act of 1972, legislatively defined wildlife conservation and management as "the collection and application of biological information for the purposes of increasing and maintaining the number of animals within species and populations of marine mammals...such terms include the entire scope of activities that constitute a modern scientific resource program, including but not limited to, research, census, law enforcement, habitat acquisition and improvement"(Poole and Trefethen. 1978. In Wildlife and America. Council on Environmental Quality). In addition to the mandates of the Marine Mammal Protection Act, most marine mammals are also protected and their management regulated by the Endangered Species Act of 1973 and the Convention on International Trade in Endangered Species. Because "knowledge is the essential prerequisite to making a decision" (Poole and Trefethen. 1978. Ibid.), it is imperative that all aspects of marine mammal biology and ecology be investigated prior to finalizing the management plan being developed for Point Reyes National Seashore. Investigations should be conducted on basic biology and ecology to ascertain minimum requirements for breeding, feeding and resting; human interactions; man-induced mortality both direct and indirect(including monitoring the habitat for pesticide, heavy metal and bacteria levels). This information can be collected through field observations and research, literature searches, and carcass analysis.

Stranding information and necropsies can provide important data on distribution, feeding and breeding behavior, causes of mortality including heavy metals and pesticides, and age/sex specific mortality figures. While there presently is no centralized data bank for information gathered on marine mammal strandings, every attempt should be made to collect basic information and to provide it to the National Marine Fisheries Service, Scientific Event Alert Network (Smithsonian Institution), and any academic or scientific institution interested.

Not until these points are addressed and incorporated will the management plan provide a minimum level of protection. It will then insure a continuing collection of data needed for long-term management decisions within Seashore boundaries as well as along the entire coast. To omit these recommendations will only perpetuate the status quo and allow these populations to go uncensused, and thus, unprotected from human harassment, environmental degradation, and possibly result in the decline of local populations.

Dr. Kenneth S. Norris, noted marine mammalogist from the University of California, Santa Cruz, has wisely pointed out that "wildlife management is largely a matter of human management"(Wildlife and America. 1978. Council on Environmental Quality). Often human-marine mammal conflicts can be simply avoided by putting restrictions on human use of an area on a daily or seasonal basis. Not all situations are so easily resolved. In instances, where potential or real conflicts require a more detailed consideration, the alternatives should be reviewed using current scientific information, pertinent laws, and other guidelines relavent to the management issue. Management decisions should be made with objectivity and not colored by biases that are a result of resource conflicts. The current draft is weakened through assumptions that the presence of marine mammals will result in negative impacts (eg. under the headings

Research Project Statements in Priority Order, Specific Management of Individual Species, Environmental Impact of the Proposed Action). This seems to be the case particularly for the sections relating to the sea otter. While The draft continually refers to the negative impact that otters will bring to abalone beds in the area, there is no mention of the positive ones that will also result. In the Natural Resources Management Plan and Environmental Assessment (June 1976), it was stated that "one reason for the decline in kelp abundance that may be attributable to the actions of man is the specific elimination of the sea otter from the habitat. The line of reasoning, in brief, is that sea otters eat--among many other items--sea urchins; with the removal of sea otters, sea urchins multiplied far beyond the numbers for naturally balanced populations (emphasis mine); sea urchins chew off kelp near the base (holdfast) of the stipe ('stem"); with a substantial increase in the number of sea urchins, there is a corresponding decline in kelp stands" (pg. 28). It has been suggested by Palmisano and Estes (1975) that the sea otter represents a keystone species, as such, the return of the otter to Point Reyes would result in the reestablishment of conditions more similar to the nearshore community prior to the extermination of otters and allow for the maintenance of a "stable shellfish population in Seashore waters"(Natural Resources Management Plan and Environmental Assessment, 1976). As a National Seashore, management programs must be assessed to deal with the goals of "perpetuat(ing) the quality of appearing to be a major piece of 'untouched' California coastal landscape(Natural Resources Management Plan and Environmental Assessment. 1976), and providing recreation consistent with these and other objectives.

It has also been assumed that the presence of marine mammal carcasses will have negative impacts on visitors to Point Reyes National Seashore. It cannot be denied that some people find death objectionable or that carcasses may become particularly smelly, however there are others who realize that death represents an aspect of the natural ecosystem. Carcasses can be the site of temporary abundances of animal life including mammalian and avian predators and scavengers. The Seashore should not exert itself to remove carcasses in instances where public health is not a problem; instead the corpses should be used as a tool to describe ecological processes and stimulate discussions relating to mortality especially man-induced causes. It should be pointed out that carcasses provide a rare opportunity for people to get a close look at marine mammals. They also have aesthetic values as shown in the most recent Audubon Magazine, in which photographs of a dead gull and a vertebrae from a marine mammal are published (Audubon Magazine, July 1980, vol. 82, no.4).

If the preceeding general and the following specific comments are incorporated into the Marine Mammal Supplement, they will serve to "enhance rather than adversely affect the resources"(Marine Mammal Supplement). Without addressing the need for more research on marine mammal biology and ecology; conducting actual studies on the local populations to obtain census, distribution, and mortality figures; collecting and disseminating carcass data; and analyzing this information objectively to establish a management program that meets the objectives of the 1976 Natural Resources Management Plan and Environmental Assessment and the Federal regulations pertaining to the marine mammals at Point Reyes National Seasore, the supplement will not serve to protect, preserve and interpret marine mammals in the park, will continue to impede the dissemination of information, and will avoid the responsibilities of habitat monitoring, law enforcement, and public education that are

necessary prerequisites for survival of local populations of marine organisms, not just marine mammals. They are important in providing continued enjoyment of these species by the public for this generation and those in the future.

Thank you for allowing me to submit these comments. Even though I commented on the 1976 Plan I did not receive this draft directly from the Park Service; this may be the result of the change of my address. The copy I have worked with had no due date, but I was told that comments would be received through September 1. The most recent copy I received lists a deadline of August 15, so I do hope that you will still accept and consider these comments. Please make note of my new address and place my name back on your roster for further mailings.

Sincerely,

Pamela Ferris-Olson

Pamela Ferris-Olson

cc: John Sansing
Marine Mammal Commission

pg. 1, para. 4, line 3. Reference incomplete. Give the title and date of document or name of individual who provided this information.

pg. 2, para.1, lines 9-11. References are again incomplete. Cite title of publication or individual responsible for the information.

pg. 2., para. 2, line 2. The size of the local population, however... Clarification as to what population's size is unknown is needed because the preceeding sentence refers to the local population, while the one following refers to the species.

pg. 2, para 2, lines 2-11. Provide citation for this information. This section is poorly phrased and should be rewritten to insure clarity.

It should be pointed out that because declines are known to be occurring in the southern portion of the range and because Point Reyes National Seashore is in this zone that population censuses are extremely important for monitoring the local populations. This will be important in assessing programs initiated in an attempt to alleviate the factors attributing to decline. It would also facilitate future status determinations should conditions continue to worsen.

pg. 2, para 3, lines 3-4. Information on breeding sites is important for determining geographic distribution and management of breeding areas at Point Reyes should they exist.

pg. 2, para 3, lines 5-6. If the population has increased over the last 40 years, but growth has leveled off in recent decades, it is important to find out what is actually happening to population growth. Again, the number of animals is needed to allow monitoring of population status and to establish local management policies.

pg. 3, para 2, lines 6 & para 3, line 7. Incomplete citation.

pg. 3, para. 4, line 3. Appendix A of the supplement was not attached.

pg. 4, para 2, line 1. This statement most likely refers to dead whales and, therefore should be clarified. The rational for not wanting these large marine mammal carcasses to become beached should be included (ie. cost of removal, potential heath risks, etc.). If this is indeed the intent of this sentence then it should be removed from the section on Live Beached Marine Mammal Action or else the section should be retitled.

It should be noted that in all other cases, National Park Service employees are not to become involved with preventing nature from taking its course and, therefore, tired or ill marine mammals will not be obstructed from coming ashore. The management plan should establish guidelines to help in the assessment of whether medical attention should be provided. Forty-eight hours could be critical for the survival of an unweaned pup, an animal with severe lacerations, or one entwined in netting. While there will be cases where no action will be needed (eg. molting individuals) a 48 hour grace period could well serve as the difference between survival or a needless death. Protection of the animal while ashore must also be

addressed. If an animal is to remain on the beach, with or without medical attention, it should be guarded to prevent predation, vandalism, and general harassment. To insure that no laws are broken and that the animal receives adequate attention, the Park Service should contact the National Marine Fisheries Service when beachings occur especially in the case of an endangered species,and the California Department of Fish and Game and the U. S. Fish and Wildlife Service if a live otter or a carcass of this species washes ashore. These agencies have experience in handling marine mammals and will know the protocol for relocating, rehabilitating, and properly disposing of them. In addition, a local vetrinarian certified to handle marine mammals and endangered species should be identified and placed "on call" to offer medical assistance as the need arises. The Marine Mammal Center, located at Fort Chronkite, might adequately serve this purpose and offer speedy responses for consultation on such problems.

pg. 4, para. 3, lines3-11. This section is totally inadequate for the purposes of marine mammal preservation and management(see pg 2 of this letter). The primary goal should be the collection of data on every stranding. Information should be logged on the date and location of stranding; age, sex, and condition of the animal; and standard measurements should be taken. Tissue samples should also be collected. Therefore, a new priority #1 should be added stating that all carcasses will be examined to ascertain basic biological information(see Marine Mammal Supplement, pg. 7, para. 1, lines 7-8).

Priority #2 should be the disbursement of the carcasses to academic institutions or other agencies with approved permits. If local institutions do not want the entire carcass, the National Marine Fisheries Service and the Scientific Events Alert Network should be alerted so that other institutions at greater distances may be contacted to determine what portions of the carcasses should be salvaged.

Priority #3 as originally stated can only take place if these facilities are granted permits for the possession of marine mammal parts. This should be clarified with the National Marine Fisheries Service.

Priority #4 should be a combination of the priorities presently listed as #1 and #4.

pg. 4, para. 4-7. As stated earlier (see pg 1 of this letter) the major research goal for the Seashore should be to conduct population censuses for pinnipeds; therefore, Research Project #3 should be given a ranking of #1, followed by the project currently given priority #1 (study of harbor seals).

pg. 4, para. 5 & 7, lines 1 & 1. ...to determine the potential impact... should be replaced with, to determine the management implications. The Seashore's management objectives have already been stated to be those of managing and developing the resources to "perpetuate the quality of appearing to be a major piece of "untouched" California coastal landscape (and thus the)...diversity and contrast...will be maintained..." (Natural Resources Management Plan and Environmental Assessment. 1976). The fact that the sea otter as well as the other marine mammals mentioned in the Plan "are native to the seashore

and formerly occurred here in good numbers is well known" (Natural Resources Management Plan and Environmental Assessment. 1976). The Service should therefore be concerned with analyzing effective management for the species as they return. It does not appear to be within the National Park Service's goals to obstruct their return but only to mitigate impacts through wise and objective resource management policies. This also is consistent with the Specific Management of Individual Species section under which it is stated that "natural repopulation will be allowed in all areas". More importantly it is stated that "where competition with abalone divers occurs the otter will be protected and be allowed to feed naturally" (Marine Mammal Supplement. 1980). This is a statement of policy and should, therefore be made clear throughout the plan. Thus any research to be conducted by the National Park Service should facilitate management of marine mammals and mitigate potential and actual conflicts.

pg. 5, para 4, lines 1-3. If the Seashore's administration has jurisdiction over the water beyond the terrestrial boundaries, then the Administration should be responsible for harassment of whales by fishermen, divers, and boat traffic. Actual enforcement could be attained through a cooperative agreement with the Coast Guard and should extend to all marine mammals in the water offshore of Point Reyes National Seashore.

pg. 5, para. 5, line 1. The U. S. Fish and Wildlife Service and the Marine Mammal Commission in cooperation with local authorities and other federal agencies will decide where reintroductions will occur, therefore, this supplement should not close the door on possible translocations to Point Reyes National Seashore. Change sentence to read, No attempt is being currently considered...

pg. 6, para 2, line 1. It is unclear why the continued survival of an individual will impact the environment, afterall it had been a part of the marine ecosystem. If this statement implies a negative impact due to the use of resources, then a study would have to be conducted to show that the animal was actually having a significant affect on the system. Another question raised here is how it was determined that a beached mammal has a greater chance of survival. It would be best to omit this sentence or at least clarify and justify these points.

pg. 6, para 2, line 4. This decomposition may have (see pg.3 of this letter).

pg. 6, para. 3, line 1. ...environmental impacts of their own,

pg. 6, para. 5, line 4. It should be noted here that the abalone will not be wiped out and will exist in populations more closely resembling the "untouched" California coastline. In addition, kelp beds may return in greater profusion and facilitate the reestablishment of other invertebrates, fishes, birds, and marine mammals that benefit from this association.

pg. 6, para.5, lines 4-5.It is unclear just how vulnerable the oysters are

to sea otters. Since they are cultivated in cages and grown in a protected area, fencing should adequately preserve the oysters from otter depredations. If this is the case, the only affect further fencing would have would be to increase monetary expenditures. Fencing has additional benefits because it reduces depredations by other large marine organisms.

pg. 6, para 5, line 5. The sea otter is not a colorful mammal(ie. pelage is not multicolored), however, its behavior might be so described.

pg. 6, para. 7, line 2. ...to be observed by park personnel...

pg. 7, para. 1, line 5. This will reduce...

pg. 7, para. 3, line 1....to determine the management implications of...

pg. 9, para. 5, line 3. The sea otter was listed as a "threatened" species under the guidelines of the Endangered Species Act of 1973 in January 1977.

pg. 9, para. 5, lines 5-8. Again the positive aspects are overlooked (see pg. 3 of this letter).

pg. 9, para. 4, lines 2-3. It is hard to image that the shellfish consumed by sea otters have high visiblity. Certainly, the establishment of kelp beds and the association of bird and marine mammal life is more visible from land than abalones, sea urchins, etc. As for the divers, otters do help to enhance the environment for other invertebrate species and fish, so that underwater experiences only change in quantity and species of marine animals not in absolute terms.

MOVEMENT AND ACTIVITY PATTERNS OF HARBOR SEALS AT DRAKES ESTERO, CALIFORNIA, 1986-87

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Annual Report to the Sanctuary Programs Office, National Oceanic and Atmospheric Administration

INTRODUCTION

Harbor seal colonies in Point Reyes, Marin County, represent about 20% of the mainland population during the breeding season (Allen and Huber 1984, Hanan et al. 1986), and consequently, deserve attention when devising regional management policies. Estimates for the size of the state and Point Reyes populations are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. As a result, estimates are likely low and one cannot relate numbers among seasons. Several researchers have addressed the problem using radio tagged animals and have derived correction factors with varying attendance patterns based on location, time of day, and season of year (Brown and Mate 1981, Pitcher and McAllister 1981 and Yochem et al. 1987). These researchers determined that the differences between total number hauled out and the estimates of abundance were a function of variations in daily haul-out patterns as well as movements to other areas.

In the Point Reyes area we determined previously that seals displayed diurnal and seasonal variation in haul-out patterns (Allen and Huber 1983, 1984). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods. We determined in 1985-86 with the aid of radio-telemetry that seasonal variation was a function of seals both moving to other haul-out sites outside of Point Reyes and hauling out on fewer days during the winter months (Allen et al. 1986). A larger proportion of seals hauled out on a daily basis in August than in December, and this difference appeared to be more pronounced for females than for males. We have no comparable data for the breeding season, though, because transmitters were shed one month prior to the breeding season in 1986. As a consequence, there is a gap in our data set for a significant period in the seals' annual cycle. Evidence from movement patterns of radio tagged seals also suggests that Drakes Estero is a focal breeding area for seals ranging as far south as Monterey Bay and as far north as the Klamath River and that female seals are more likely to migrate than males.

Our objectives for the second year of study using radio-telemetry were to 1) compare daily and seasonal variability in haul-out behavior between the two years, 2) determine the destination of departing animals with particular emphasis on adult female seals, and 3) determine the haul-out pattern during the breeding season and premolt period. We also wanted to track movements of weaned pups since this age group is being affected by the halibut gill net fishery. In 1983-84 an estimated 383 (SE 194) harbor seals were incidentally taken in gill nets from Bodega Bay to Half Moon Bay; most of these were immature seals (D.

Hanan, California Department of Fish and Game, pers. commun.).

Information on seasonal activity patterns and fall/winter movements would be valuable for any long-term management program for seals in the Point Reyes area, and, in conjunction with results accumulated elsewhere (Stewart and Yochem 1983; Herder 1986), could provide more accurate estimates of the California harbor seal population.

STUDY AREA AND METHODS

Harbor seals haul out in Drakes Estero year round at a number of locations including numerous tidal mud flats that are exposed at low, medium and medium-high tide levels and Limantour Spit which is exposed at all tide levels. We chose to capture and tag seals at Drakes Estero because it is one of the largest breeding areas in Point Reyes and because the capture technique we wished to use was only possible in an estuarine environment. Other estuaries in Point Reyes (Bolinas Lagoon and Tomales Bay) are exposed to substantial levels of human disturbance (Allen et al. 1985, Allen and Huber 1984), and consequently, movement and activity patterns would likely be significantly altered there.

Over a two day period in 1986 (July 21 and 22), we sucessfully captured about 35 animals and affixed transmitters to 22 . On March 9 and 11 of 1987, we captured about 90 animals and affixed transmitters to 12 seals. During both capture periods, we caught seals in a 130 m long gill net, with 8-inch mesh, set off the haul-out site and then pulled ashore. Two power boats were used to deploy the net adjacent to the haul-out site. This method of capture was successfully used in 1985 without incident at Drakes Estero and enabled us to capture a large number of seals over a short period of time, thereby minimizing the duration of disturbance days to the herd (Beach et al. 1985). As was observed in 1985, some seals departed from Drakes Estero during the days of capture, but no seals departed permanently from the estero during the following week. Consequently, we do not believe that the capture technique disrupted the normal activity patterns of the seals.

Eighteen to twenty people were involved in the capture including personnel from the Point Reyes National Seashore, the Gulf of the Farallones National Marine Sanctuary, the National Marine Fisheries Service, the California Department of Fish and Game, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Game, and the Point Reyes Bird Observatory. In addition, a veterinarian monitored the condition of restrained seals and any seal deemed stressed was immediately released. The veterinarian also collected nasal and oral mucosa from animals in 1986 and these samples were transferred to the

Center for Disease Control in Atlanta, Georgia for biological analysis. Prior to this capture period several dead adult harbor seals had washed up on beaches at nearby Double Point and at Drakes Estero, and a bacterial agent was the suspected cause of death. We took the opportunity of having live animals in hand to determine if disease was present in this local population.

Captured seals were weighed, measured (length and girth), sexed, flipper-tagged, patch-tagged, and radio-tagged. We double flipper-tagged seals with lime green "Allflex" cattle ear tags manufactured by Veterinarian Supplies instead of the "Riese" tags used in 1985. The "Allflex" tags had larger numbers which could be easily read in the field. We attached an international orange colored vinyl strip with 3" numbers to each flipper tag which further aided in individual identification. Two neoprene patches with an individual number or symbol code were glued with "lock-tight" super glue to the fur between the should blades to provide an additional visual mark. A radio transmitter manufactured by Advanced Telemetry Systems, Inc (Bethel, Minnesota) was glued to the fur on the back of the seal's head with "Devcon" 5-minute epoxy. Radio transmitters were 9x3x3 cm, weighed 60 gms, had a 13-inch flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute.

We monitored seals with an automated recording station and aerial surveys, following the procedures used in 1985. The receiving station established at Drakes Estero recorded seals within a three-mile radius on a 24-hour basis. A seal was considered hauled out if it was recorded with three consecutive strong pen markes within a 1 hour period; a seal was considered in the vicinity but in the water if a strong pen mark in conjunction with three weak marks was recorded within a one hour period. We manually checked frequencies to determine if radio interference from the nearby radio communication facilities (U. S. Coast Guard and RCA Global Communications Center) triggered pens and found that interference did not hinder distinguishing whether seals were hauled out. Radio interference on several frequencies, though, prevented our distinguishing whether animals were in the water, and so we did not analyze strip chart data for the presence of seals in the vicinity. In addition, female seals with very young pups (less than 5 d) on occasion would rest in shallow water rolling and submerging the transmitter antenna. As a result, the strip chart recorder indicated that the animal was not hauled out. Females with pups also would on occasion "bottle" in the water giving a strong regular signal indicating that the seal was hauled out. Consequently, haul-out times in our analysis may be biased for this period for female animals.

A test transmitter was placed in a PVC pipe at seal "head lift" level (12" above the ground) on the haul out site to verify that the receiving system was functioning

properly and to determine when the haul-out site was exposed during tidal cycles and available to seals.

The remote receiving station was in operation continuously from 23 July 1986 through 30 June 1987 except for intermittant periods when equipment malfunctioned. We checked and maintained the remote station a minimum of two times per week, and during the 1987 breeding season, we were present almost daily. During visits we scanned all frequencies and checked for signal drift. Each signal was checked for a period of five to ten minutes to detect seals in the water. We made visual searches for marked animals to check for flipper tag and transmitter loss. At this time we also collected behavioral information on females and pups and on spatial distribution within the estero.

To locate dispersing seals we attempted to make semi-weekly aerial surveys along the cental and northern California coast. The length of flight depended on our success in locating all animals. Seals were monitored by two people using scanning receivers and frequencies chosen were continuously scanned for three seconds each. Typically, the plane would begin searching at Drakes Estero and then travel north to a designated distance and then fly south of Drakes Estero. In this manner, the coastline was covered two times by two people in order to maximize detection. When a seal was located, activity, time, and location were recorded. Most flights ranged from Point Arena south to Half Moon Bay and into San Francisco Bay. We scheduled flights on days when tides were low to medium to maximize numbers of seals hauled out.

We made weekly ground searches in addition to aerial flights to locate animals absent from Drakes Estero. From this we were able to identify feeding areas and to determine if seals temporarily relocated at other local haul-out sites. We monitored six seals for a 24 hr period on June 1, 1987, locating and recording activities every 15 min. From this information, we wished to verify accuracy of the remote receiving station and to identify local feeding areas.

DATA TREATMENT

We categorized seals captured in July 1986 by the amount of time and the time of year that they were present at Drakes Estero. We defined seals as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" if they departed in the fall but returned during the following breeding season, and "transients" if they were present at Drakes Estero during the capture but resided away from Drakes Estero during the rest of the study period. Movements greater than 25 km were defined as long distant and less than 25 km as local.

Seal behavior at Drakes Estero was classified as either hauled out or absent and descriptive statistics for all lengths are calculated for each animal by season. We chose August, December, and April-May-June data to illustrate the

seasonal differences in haul-out behavior and compared these results with those collected in 1985. When comparing time of haul out initiation and the length of haul-out-bout, we classified initiation into four categories (0100-0400 hr, 0500-01200 hr, 1300-1700 hr and 1700-2400 hr) and classified length of haul-out-bout into four categories (1-4, 5-8, 8-12, > 12).

We estimated the absolute abundance of seals using Drakes Estero in March 1987 with a modified Lincoln-Peterson Index mark-recapture model (Seber 1982). For this analysis, we only included seals marked in March 1987 in order to avoid sample bias of sex and age class representation. We calculated 16 estimates but selected an estimate prior to the onset of the pupping season in order to avoid violation of the assumption of a closed population.

All information recorded on the strip chart recorder was transferred to the "DBase III+" database system. The "SPSS" statistical program for micro-computers was used for most analyses. Analyses presented here are primarily descriptive but we intend to provide more detailed analyses in our final report.

RESULTS

We captured 30 seals in July 1986, and of these we radio tagged 22 (10 adult females, 5 adult males, and 5 immatures of both sexes), and flipper tagged an additional eight animals (5 adult males, 2 adult females and one immature) (Table 1). In March 1987, we captured and marked an additional 65 seals. Of these, we radio tagged 12 (10 adult pregnant females and 2 adult males), flipper tagged 50 seals of all age classes (22 immatures, 17 adult females and 11 adult males), and marked three seals with neoprene patches. We released many seals because of time constraints of marking animals (Table 2). On average, males weighed 8 kg more than females in July 1987 (Table 3). Though females in 1986 weighed about the same as those in 1987, males on average weighed 11 kg less in 1987. Both males and females weighed substantially more in March 1987; the weight gain in females may be explained in part by pregnancy.

All but three transmitters (86%) attached in July 1986 remained attached to seals for a minimum of five months, 15 (68%) for six months, eight (36%) for eight months, and three (14%) for ten months (Table 4). All but one transmitter attached in March 1987 remained attached until the molt in June. Of the seals radio tagged in July 1986, we were able to locate, either visually or aurally, all but three seals through March 1987. Two of these three were immature and one was an adult female (RT119) whose transmitter ceased functioning 10 d after attachment. All seals radio tagged in March 1987 were located regularly until transmitters were shed in June.

We noted a marked increase in the number of seals with fresh shark bites in the fall of 1986 compared to previous years. Three flipper tagged seals (including RT119) and five non-tagged seals had fresh shark bites in September. It is possible that the three missing seals may have been killed by sharks. The shark wound on RT119 raked the entire lower left side of her body, and after October, we no longer observed her at Drakes Estero. The other two tagged seals had minor bites (less than 1 foot across) and these scars healed within four months.

For both capture periods we used an "Allflex" cattle ear tag because the numbers were large and easily distinguished in the field. Unfortunately, these tags were easily shed and so resighting information on flipper tagged seals after about four months was unreliable. In contrast, the "Riese" tags attached in 1985 were still seen on seals as of July 1987.

MOVEMENTS

All radio tagged seals captured in July 1986 were resighted at Drakes Estero several times during the study period, and we were able to monitor the movements of most seals through February 1987. Three seals were excluded from

analysis of movement patterns. The transmiiter on RT119 ceased functioning within one month and two others (RT325, RT279) could not be located after September, having either died, moved outside the range of the aerial surveys, or lost their transmitters.

As was observed in 1985, seals moved both north and south of the capture site; however, in contrast to the previous year, only four radio tagged seals (21%) traveled more than 25 km from Drakes Estero and only two (both females) relocated permanently at other sites during winter months (Tables 5 & 6). Eleven seals (58%) were recorded hauled out exclusively at Drakes Estero, seven others (37%) on two haul out sites, and only one on three haul out sites.

We classified seventeen seals (90%) as residents of Drakes Estero; however, four of these were also recorded hauled out at Point Reyes Headland (PRH). Eight other resident seals were recorded at least once in the water around PRH. Two resident seals traveled distances greater than 25 km during the winter months but returned within a month to Drakes Estero . We classified only two female seals (RT137 and RT306) as breeders, both of which traveled greater than 25 km away from Drakes Estero. No radio tagged seals were classified as transients.

Long-range movements of greater than 25 km were recorded for four of 19 seals (3 females and 1 male). One female (RT137) resided throughout the winter months at Pescadero State Beach (south 106 km) and returned to Drakes Estero the following spring. RT305 moved locally and to Tomales Bay (north 48 km) during the winter months and also returned to Drakes Estero the following spring. One female (RT246) traveled north to Tomales Bay in October but returned to Drakes Estero by the beginning of November. One male (RT504) traveled north to Stone Lagoon, Humbolt County (410 km) in early November but returned to Drakes Estero by November 28. Our sample size was too small for comparing differences of movement between sex or age groups.

Short-range movements of less than 25 km occurred regularly throughout the study period. Most of these movements were to PRH, though seals were also recorded feeding in Drakes Bay both north and south of Drakes Estero.

One male and one female seal radio tagged in March 1987 relocated away from Drakes Estero. RT060 traveled to Bolinas Lagoon (25 km south) in early April and returned in early May. RT432 divided her time equally between Drakes Estero and PRH until April 20 when she returned to Drakes Estero and gave birth on April 22. She remained at Drakes Estero continuously until she weaned her pup on May 18 at which time she returned to PRH. Until she shed her transmitter in June, she continued to spend equal amounts of time at PRH and Drakes Estero. All other radio tagged seals were recorded at least once in the water around PRH but none hauled out there. In addition, flipper tagged seals were recorded at Double Point, Bolinas Lagoon, and PRH between March 30 and July 30.

ACTIVITY PATTERNS

Seals exhibited distinct seasonal and circadian trends in haul out behavior at Drakes Estero as was observed in 1985. Adult seals were hauled out an average of 90% of the total number of days monitored in July and 81% in August but only 74% in December (Tables 7 and 8). The difference between the months July and December is significant ($p = .02$, $n = 17$, Wilcoxon matched-pairs sign-rank test) but between August and December is not significant ($p = 0.5$, $n = 17$, Wilcoxon matched-pairs sign-rank test).. In March and April just prior to the breeding season, the percentage of days hauled per month was also low, and then during May, the percentage increased again to 92% ($p = .002$, $n = 14$, Wilcoxon matched-pairs sign-rank test). Immature seals hauled out on fewer days than adults ; however, the sample size was too small to make meaningful comparisons. The change in the number of days that seals were hauled out in winter was the similar for females and males.

The average percentage of tagged seals hauled out per day relative to the total number of tagged seals was also greater for July, May and June than for December, March, and April (Table 9). **The percentage for August was low compared to that of 1985; however, if immatures are excluded from the analysis, the percentage increases to 76%. Immature seals appeared to haul out on fewer days in August than adults.**

When resident seals were not hauled out, they were either in the water in the vicinity of the haul out or were absent from Drakes Estero. The length of time that seals were absent averaged 1.0 to 2.5 consecutive days per month; the longest absence was seven days (Table 10). The average number of trips per month per seal was greatest for December (4.8 trips) and least for May (1.0 trips). The percentage of seals that went on trips per month was least in May and greatest in August (Table 10). Immature seals appeared to take more trips ($\bar{x} = 4.3$; 22 of 60 trips) than adults in August; however, the length of trips was the same. In many cases when seals were absent for more than 3 d, we were able to locate them hauled out at PRH.

When seals were present in Drakes Estero, the haul out pattern was strongly diurnal for all months monitored as was noted in 1985. The percentage of tagged seals hauled out over a 24-hr period was largest between 0500 and 1600 hr for all months; the percentages hauled per hour, however, varied between months (Figure 2). Greater than 50% of tagged seals hauled out in May and June between 0500 and 1400 hr. In December, percentages were fairly uniform throughout all daylight hrs. These results are similar to those calculated for 1985.

On average, seals hauled out for a total of seven hours per day in August, December and March, and nine hours per day in April, May and June. In July, during the peak molt period, seals hauled out 11 hours per day (Table 11). Seals

hauled out for significantly longer hours per day during the pupping season ($p = .002$, $n = 13$, Wilcoxon matched pairs signed-rank test; comparing March and May). There appeared to be no difference in the total number of hours hauled per day between males and females or between adults and immatures for all months.

The average number of haul-out-bouts per day was 1.5 ($n = 194$, $SE = .05$) for August, and 1.4 ($n = 166$, $SE = .04$) for December. During the breeding season, seals averaged 2.4 haul-out-bouts per day ($n = 139$, $SE = .06$) between the median birthing and the median weaning dates, but only 1.5 per day ($n = 142$, $SE = .06$) in April two weeks prior to the mean birthing date.

Most haul-out-bouts averaged about five hours except in July, and 20% of all haul-out bouts were 2 hrs or less, regardless of month (Table 11). Though seals initiated haul-out-bouts at all hours of the day, most initiations occurred during daylight hours before 1200 hr (Figures 3 and 4). In July, April and May, however, many initiations occurred between 0100 and 0400 hr. This difference may be explained in part by females hauling out to nurse pups.

The length of haul-out-bout was affected by the time of initiation for all months tested such that seals that first hauled out between 0100 and 1200 hr were on shore longer than seals that initiated a haul-out-bout between 1200 and 2400 hr (July: $X^2 = 80.9$, $df = 9$, $p < .001$; August: $X^2 = 59.3$, $df = 9$, $p < .001$; December: $X^2 = 69.8$, $df = 9$, $p < .001$; May: $X^2 = 80.2$, $df = 9$, $p < .001$: June: $X^2 = 58.4$, $df = 9$, $p < .001$). For all months, more than 80% of the haul-out-bouts lasting for more than 12 hr occurred between 0100 and 1200 hr and less than 10% occurred after 1700 hr.

On June 1 and 2 1987, we monitored six radio tagged seals (4 females, 2 males) for 24 hrs from 0900-0900 hr, locating and recording activities every 15 min. The average number of hours hauled was 9.4 ($SE = 2.6$); however, the range in hours was from 1.25 to 18.5. Three seals hauled out two times during this 24 hr period, two three times, and one once. The seal that hauled for 18.5 hr was the only one to haul out at night, and coincidently this seal had just returned from hauling out for several days at PRH. Because seals could haul out at Limantour Spit at all tide levels, tide did not appear to influence the haul out pattern. When tidal mud bars were awash with rising tides, seals moved to the Spit.

During the 24 hr period, we were able to locate continuously all but one seal. Four seals traveled both north and south of the estero but stayed within a 5 mi radius of the estero, one seal never left the estero, and one seal traveled north out of range for 9.5 hrs. All seals spent a considerable amount of time in the channel of the estero or near the mouth, presumably feeding. Sunrise was at about 6:00 hr on June 2, and two seals promptly hauled out along with several non-tagged seals. By 8:00 hr, two more tagged seals hauled out, and the seal that remained all

night had again retreated to the water. At the time of my departure (9:00 hr), five seals were in the identical locations as recorded at 9:00 hr the previous day; four were hauled out at Limantour Spit and two were in the water at the mouth of the estero.

From a sample of 16 days between March 16 and April 15, we selected an estimate of abundance of 949 seals (95% confidence interval: LL 692 and UL 1206) using Drakes Estero (Figure 5). On sample day 4 (March 24), we sighted 30 marked animals hauled out among a herd of 441 seals. On sample day 6, the first pup was observed at Drakes Estero. From that date on, the assumption of a closed population was violated and estimates and confidence intervals fluctuated considerably.

BREEDING SEASON

Twenty of 28 adult female seals tagged in March of 1987 were seen at least once with pups. In addition, five of ten female seals tagged in July 1986, were seen with pups. We were able to monitor closely 15 tagged seals throughout this season. The median pupping date for these seals was April 23, and by April 28, 80% of the females had given birth (range: April 16 to April 30). The median weaning date was May 25, and by May 28, 80% of the pups had been weaned (range: May 14 to May 30). The average number of days that females were seen with pups was 30.9 (SE = 0.6, n = 15) (Table 13). Of the radio tagged seals, only one (RT821) was observed separated from a pup; 24 days after giving birth, she was seen without pup and searching throughout the estero for two hrs. On two subsequent days, she was observed searching intermittantly. All other females were seen in constant attendance with pups until the date of weaning. Weaning appeared to be abrupt. Characteristically, females departed for a minimum of one day from the estero after weaning, and one female (RT432) relocated to PRH.

For the first two weeks after giving birth, females stayed exclusively within the estero, but after that time, they began to depart for an increasing number of hours during the night. Whether pups accompanied females on these excursions is not known.

For the first two weeks with pup, females hauled out for an average total of 13.3 hrs per day (SE = 0.8, n = 10), and for the first couple of days after birth, females often hauled out for more than 20 hrs. Unexpectedly, males also hauled out for long hours between the median birthing date of April 23 and the median weaning date of May 25 ($\overline{x}$ = 13.1, SE = 2.4, n = 3). For two weeks after pups were weaned, the average total number of hours hauled was 8.0 (SE = 0.7, n = 8) for females (from estimated weaning date to 14 d) and 6.2 (SE = 0.9, n = 4) for males (for period May 12 to May 27). Since mating occurs in the water, it is not surprising that males would spend less time hauled out during the weaning

period; however, the difference between the sexes is not significant ($p = 0.27$, $n = 12$, Fisher's Exact Test).

DISCUSSION

Results from the second survey year again indicate that the decline in seal numbers during winter months is related to both seasonal movement away from Drakes Estero and a reduction in the number of days that resident seals spent hauled out. Movements of greater than 25 km were much more pronounced in 1985 than in 1986, and instead, many of the seals that remained at Drakes Estero often relocated for brief periods at Point Reyes Headland. The observed differences between years may be attributed to different individual preferences, to greater local food availability, or to some unknown factor. Similar to results in Alaska (Picther and McAllister 1981) and on San Nicolas Island in California (Yochem et al. 1987), we found a high level of site fidelity, with seals using no more than three sites. All movements were to well established haul out sites in estuaries (Tomales Bay and Bolinas Lagoon), and at coastal sites (Pescadero, Double Point, and PRH). In contrast to 1985, long range movements occurred during all months except during the height of the breeding season.

Herder (1986) observed that seals at the Klamath River, California, exhibited the greatest local movement during the period April to June. Our results indicate that more local movement occurred prior to the median birthing date and after the median weaning date, but virtually no movement occurred between those dates. Two of 12 seals (one adult male and one adult female) radio tagged in March 1987, relocated to other haul-out sites prior to the breeding season, but both returned within five days of the median birthing date.

Immature seals did not appear to travel greater distances than adult animals, as suggested by Pitcher and McAllister (1981); however, our sample size is small. One immature seal rarely departed from the Estero, one relocated intermittantly at PRH, and one traveled both to Duxbury Reef and to Tomales Bay.

The observed movements indicate that Drakes Estero is an important breeding area for seals ranging south to Pescadero and north to Stone Lagoon, an overall distance of 516 km. This range is similar to that documented in 1985. Movements also indicate that there is substantial mixing among harbor seal colonies both locally and greater than 25 km. Herder (1986) and Brown and Mate (1983) also recorded movements of seals between colonies in the Klamath River and Alsea Bay, Oregon, and between seals in Oregon and Washington.

In general, movements appear to be motivated by a group preference for breeding at Drakes Estero, but by an individual preference for feeding areas. As noted in 1985, migrant seals were highly individual in distance of movement and final destination. Individual preference may be influenced by past experience and current food availability. Seals do not appear to be responding to a single prey

situation as was noted in winter movements of seals in Oregon and Wasington (Beach et al. 1985, Brown and Mate 1983), but instead, individuals may be expressing a preference for location based on past experience, including foraging success. The fact that two seals traveled great distances (and presumably expended considerable energy) but promptly returned, suggests that past experience may have movtivated the initial movement, but that current food availability influenced where seals ultimately spent the greater proportion of their time during the winter months.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals during the molt (June, July, and early August) and the breeding season (April and May) than in December or March. As observed in 1985, the average percentage of all radio tagged seals hauled out on any given day per month was substantially higher than figures derived by both Yochem et al. (1987) and Pitcher and MacAllister (1981). The difference is partly explained by the months chosen for analysis; nonetheless, our December figure of 63% is still higher than that estimated by Yochem et al. (1987). These differences also may be attributed to the larger number of immature animals tagged in their sample versus the larger number of adult animals tagged in our sample. The percentage of days per month that immature seals were hauled out in our study was similar to figures derived by Yochem et al. (1987). A study designed to accomodate these biases would greatly improve estimates.

When hauled out, the total number of hours per day that seals spent on shore was similar for all months except during the breeding and molt periods. Stewart and Yochem (1983) observed a higher average time per day that seals were hauled out, 39%, than we found for seals at Drakes Estero (29%: 7 of 24 hrs for most months). Differences may be attributed to more exposure to disturbance from humans; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human disturbance. Though we expected pregnant females to require more time feeding than males, the percentage of days hauled out in March and April and the total number of hours per day hauled were not significantly different between the sexes.

The strong diurnal haul out pattern documented at Drakes Estero previously (Allen and Huber 1983), and shown by many other researchers (e.g. Boulva and McLaren 1979, Fancher 1979, and Stewart and Yochem 1983), was further confirmed in this year of study. Though seals hauled out at all hours of a day, peak abundance, based on the percentage of tagged seals, occurred from early morning to mid-day. Peak abundance for the year occurred in June between 0500 and 1400 hr. This represented between 60% and 73% of the estimated number of seals in the area.

Yochem et al. (1987) found that 7 of 17 seals preferred hauling out at night and suggested that this behavior could influence estimates of abundance. We identified 4 of 21

seals (3 pups and 1 adult female) in August and 4 of 15 (2 pups and 2 adult females) in December that preferred hauling out at night. In May, higher percentages of seals hauled out at night, but in most cases, these were females with pups that also hauled out for extended periods during daylight hours. Stewart and Yochem (1983) determined that time of initiation of a haul-out-bout did not influence the length of the bout; however, we found that during all months, seals hauled out for longer periods when bouts were initiated between 0100 and 1200 hr than for other time periods during day or night.

Absences of resident seals from Drakes Esetro averaged from one to two days suggesting absentees were foraging close by; local movement patterns observed during aerial and ground surveys also support this conclusion. This pattern of local movement was the same for all months and for both years. Immatures appeared to take more trips than adults in August, but we have no comparable data for other months. Once female seals had given birth in 1987, they were present daily in Drakes Estero until pups were weaned.

Attendance patterns indicate that seals spend between 50 and 70% of the time engaged in foraging activities and that most seals forage at night. All recorded foraging activities and movements of seals during aerial surveys appeared to be limited to within 0.8 km of shore. Though offshore movements of greater than 10 km by harbor seals have been recorded by others (Pitcher and McAllister 1981, Spaulding 1964, Wahl 1977), our results suggest nearshore feeding is more typical.

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Table 1. Standard measurements of harbor seals tagged at Drakes Estero, July 1986.

FLIPPER TAG	RADIO TAG	AGE	SEX	LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)	COMMENTS
302	224	PUP	F	88	69	20.4	
304	419	AD	M	146	106	70.3	
306	281	PUP	M	96	74	22.7	
308		AD	M	149	-	67.6	
310	306	1YR	F	107	83	31.8	
312	137	AD	F	140	104	63.5	Not pregnant
313		AD	F	130	103	65.8	
316	529	AD	F	141	104	65.8	
317		1YR	F	116	81	35.8	
320		AD	M	145	105	73.5	
322	342	AD	M	163	111	81.6	
324	198	AD	M	158	-	88.5	
326	540	PUP	F	95	73	19.5	
328	616	AD	F	162	-	90.3	Pregnant
330	590	AD	M	138	104	68.5	
332		AD	M	142	106	81.6	
334		AD	M	170	115	77.6	
335		AD	M	148	112	78.9	Pregnant
338	482	AD	F	139	105	64.4	
340		AD	F	145	104	64.4	
341	645	AD	F	133	105	70.3	Shark scar/Preg
344	246	AD	F	138	101	55.3	Pregnant
346	504	AD	M	143	106	70.3	Shark scar
348	444	AD	M	140	107	74.8	
350	325	1YR	F	114	82	36.3	
352	119	AD	F	145	101	63.5	
354	362	AD	F	134	98	59.8	Not pregnant
355	467	AD	F	143	103	69.4	Pregnant
357	160	AD	F	146	99	70.3	Pregnant
359	267	AD	M	149	104	71.7	Shark scar

Table 2. Standard measurements of harbor seals tagged at Drakes Estero, March 1987.

FLIPPER TAG	RADIO TAG	AGE	YEAR	SEX	LENGTH	GIRTH	WEIGHT (kg)	RECAPTURE	COMMENTS
-				F	132	105	-		
-		J		F	126	99	-		
-		J		F	118	86	40.8		
363		J		F	-	-	-		
371		J		F	-	-	-		
373		J		F	-	-	-		
386		J	1	F	99	77	30.8		
430		J	1	F	111	83	28.6		
434		J	1	F	103	75	38.6	X540	
436		J	1	F	115	85	40.8		
438		J	1	F	109	80	33.1		
440		J	1	F	107	90	33.1		
443		J	1	F	98	82	32.2		
445		J	1	F	98	78	28.6		
447		J	1	F	89	81	34.5		
449		J	1	F	112	80	34.9		
451		J		F	118	86	36.3		
-		J		M	115	87	40.4		
366		J		M	-	-	-		
368		J		M	-	-	-		
412		J	2	M	120	91	40.8		
416		J		M	114	86	32.7		
432		J	1	M	110	80	29.5		
365		A		F	135	115	84.8		Pregnant
374	432	A		F	137	128	112.0		"
378	26	A		F	150	126	104.3		"
380	46	A		F	143	128	106.6		"
384	844	A		F	165	127	109.8		"
387		A		F	138	123	78.9		"
390	92	A		F	143	121	98.4		"
392	116	A		F	143	123	96.2		"
394		A		F	-	-	81.2		?
396	856	A		F	153	-	113.4		Pregnant
398	874	A		F	143	122	94.4		"
400		A		F	136	119	89.4		"
410	622	A		F	159	139	116.6		"
418		A		F	154	121	102.9		"
419		A		F	137	109	70.8		"
421		A		F	143	125	87.1		
424		A		F	149	115	83.0		Not pregnant
428		A		F	150	115	98.4		?
441	822	A		F	151	134	-	X234	Pregnant
453		A		F	156	133	-		?
455		A		F	132	125	-		Pregnant
457		A		F	134	123	-		"
461		A		F	143	124	-		"

463		A	F	139	128	-		?
465		A	F	146	119	-		Pregnant
467		A	F	153	111	-		Not pregnant
471		A	F	146	127	-		Pregnant
475		A	F	124	120	-		"
212		A	M	-	-	-	T212	
221		A	M	-	-	-	T221	
382		A	M	-	-	-		
402	894	A	M	163	126	102.1		
403		A	M	141	115	87.1		
406		A	M	145	110	78.0		
408		A	M	147	118	89.4		
413	60	A	M	174	128	116.6		
426		A	M	149	105	83.5		
459		A	M	153	112	-		
469		A	M	150	123	-		
473		A	M	150	112	-		

Table 3. Average standard measurements of seals tagged in 1986 and 1987; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals.

		LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)
1986				
Adult Males	$\bar{x}$	149.25	107.6	75.41
	SE	2.79	1.18	1.8
	n	12	10	12
Adult Females	$\bar{x}$	141.33	102.46	66.9
	SE	2.38	0.72	2.5
	n	12	11	12
1 Year-Olds	$\bar{x}$	112.3	82.0	34.6
	SE	2.73	0.58	1.4
	n	3	3	3
Pups	$\bar{x}$	93.0	72.0	20.9
	SE	2.52	1.53	1.0
	n	3	3	3
1987				
Adult Males	$\bar{x}$	152.44	116.56	92.8
	SE	3.37	2.59	5.8
	n	9	9	6
Adult Females	$\bar{x}$	144.52	123.08	96.0
	SE	1.76	1.35	3.1
		27	26	18
Immature	$\bar{x}$	110.78	85.06	34.7
	SE	2.52	1.79	1.1
	n	18	18	16

Table 4. Length of attachment of radio transmitters on seals and last date seal was seen or heard.

SEAL	DATE ATTACH	LAST DATE W/XMATR	MIN. LENGTH OF ATTACH.(d)	DATE LAST OBSERVED
1986				
117	7/22/86	7/31/86	10	1/6/87
224	7/21/86	3/20/87	243	3/26/87
419	7/21/86	1/22/87	186	6/29/87
281	7/21/86	9/11/86	53	9/11/86
306	7/21/86	4/6/87	260	4/6/87
137	7/21/86	1/10/87	174	5/22/87
529	7/22/86	2/3/87	197	3/6/87
342	7/22/86	2/1/87	195	2/24/87
198	7/22/86	1/22	185	6/29/87
540	7/22/86	12/19	151	4/2/87
616	7/22/86	1/22	185	6/24/87
590	7/22/86	4/22	275	4/22/87
482	7/22/86	2/3	197	5/12/87
645	7/22/86	1/22	185	6/29/87
246	7/22/86	12/10	142	3/2/87
504	7/22/86	5/17/87	300	6/29/87
444	7/22/86	4/17/87	270	6/27/87
325	7/22/86	9/9/86	51	9/9/86
362	7/22/86	4/2/87	255	6/27/87
467	7/22/86	5/24	307	6/24/87
160	7/22/86	12/22	154	6/29/87
267	7/22/86	5/17/87	300	6/26/87
1987				
432	3/9/87	6/17	101	6/29/87
026	3/9/87	6/17	101	6/29/87
046	3/9/87	4/23	99	6/29/87
844	3/9/87	6/17	101	6/14/87
092	3/9/87	6/25	109	6/29/87
116	3/9/87	6/17	101	6/29/87
856	3/9/87	6/22	106	6/29/87
874	3/9/87	6/20	104	6/29/87
894	3/9/87	6/27	111	6/29/87
821	3/11/87	6/20	102	6/29/87
621	3/9/87	6/16	100	6/29/87
058	3/9/87	6/27	111	6/27/87

Table 5. Distance of movement >25 km and locations of individual seals radio tagged in 1986.

SEAL	#MOVES	AVE. DISTANCE (KM)	LOCATIONS	# LOCATIONS HAULED
137	4	81	PSB/MB/DE	3
161	0	-	DE	1
196	0	-	DE	1
223	0	-	DE	1
246	2	48	TB/DE	2
267	0	-	DE	1
305	3	36	DE/TB	2
343	0	-	DE	1
362	0	-	DE	1
418	0	-	DE	1
445	0	-	DE	1
467	0	-	DE	1
482	0	-	DE	1
504	2	410	SL/DE	2
531*	0	-	DE	2
540*	0	-	DE	2
590*	0	-	DE	2
616*	0	-	DE	2
644	0	-	DE	1

* These seals were frequently hauled out at PRH.

Table 6. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys. Behavior is classified as A = active/swimming; I = inactive/hauled out.

Seal	7/29	7/30	8/31	9/5	9/9	9/21	9/22	9/30	10/13	10/14	10/30	11/10	11/28	12/10	1/8	2/7	2/23	3/24	4/6	5/18
137	D	D	D		DB/I		PSB/I	MB/C	MB/C	MB/C			PSB/C	PSB/C	PSB/C					
161	D	D			D	D		D			D	D	D	D						
196	D	D			D			D		D	D	D	D	D	D					
223		D	D		0	D		D			D		D	D	D	D				
246	D	D	D		D			D		TB/C	D			D						
267	D	D	D		D	D		D		D	D	D	D	D	D	D	D	D	D	
279					DB/I															
305	D		DR/I		TB/C	TB/C				0	TB/C	TB/C			D				D	
325	D	D			DB/I									PRH/I	PRH/I					
343	D	D			D			D		D	D									
362	D	D	D		D			D		D	D	D	D	D	D	D		D	D	
418	D	D			D					D	D	D	D	D	D					
445	D	D	D		D			D		D	D	D		D	D			D	D	
467	D	D	D			D		D		D	D	D		D	D	D		D		
482	D	D	D		D			D		D	D		D	D	D					
504	D	D			PRH/I			D		D	D	SL/C	D	D	D			D	D	
531	D	D			D			D		D	D	D	D	D	PRH/C	D			D	
540	D	D			PRH/I						D		D	D	D					
590	D	D			D			D		D	D			D	D		PRH/C	D	PRH/C	
616					D	PRH/I		D		D	D	D	PRH/I	PRH/I	D					
644	D	D	D		DB/I			D		D	D	D		D	D					
092																			BL/C	D
060																				PRH/C
431																		CR/I		
046																		PRH/I		
874																				

Locations with distances (km) from capture site:

BL	= Bolinas, Marin County	25
D	= Drakes Estero, Marin County	0
DB	= Drakes Bay, Marin County	<10
DR	= Duxbury Reef, Marin County	22
MB	= Muir Beach, Marin County	38
PRH	= Point Reyes Headland, Marin County	12
PSB	= Pescadero State Beach, San Mateo County	106
SL	= Stone Lagoon/Prairie Creek, Humboldt County	410
TB	= Tomales Bay, Marin County	48

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Table 7. Percentage of days present per month for sex and age classes; $\bar{x}$ is the mean percentage, SE is the standard error, and n is the number of seals.

	July	Aug	Dec	Mar	Apr	May	June
Females							
$\bar{x}$	85.6	84.8	70.43	64.2	63.8	91.3	86.6
SE	7.05	7.5	5.6	5.2	12.6	4.7	6.6
n	10	9	7	12	11	10	9
Males							
$\bar{x}$	96.9	76.0	78.4	72.7	62.3	94.0	83.0
SE	3.2	8.8	5.6	11.3	18.7	2.9	17.0
n	7	7	7	6	6	4	2
Immatures							
$\bar{x}$	57.6	38.8	52.5				
SE	18.1	7.7	13.5				
n	5	5	2				
Total Adults							
$\bar{x}$	90.2	80.7	74.4	67.0	63.3	92.1	85.9
SE	4.6	5.6	4.0	5.0	6.7	3.4	5.8
n	17	15	14	18	17	14	11

Table 8. Percentage of days per month each radio tagged seal hauled out at Drakes Estero.

SEAL	JULY	AUG	DEC	MAR	APR	MAY	JUN
Females							
117	78	*					
137	67	23	0	*			
161	100	100	83	*			
246	100	100	0	*			
362	100	94	90	79			
467	100	97	79	50	83	100	*
482	100	90	59	*			
531	100	84	72	*			
616	33	36	48	*			
644	78	77	62	*			
Males							
196	100	94	93				
267	100	77	97	96	100	95	*
343	100	48	62	*			
418	100	86	86	*			
444	100	94	83	79	71		
503	100	94	62	58	93	95	*
590	78	39	66	25	10	*	*
Immatures							
224	11	52	66	29	*		
279	44	42	*				
305	100	58	0	0			
325	100	19	*				
540	33	23	39	*			
Females							
024				83	60	100	94
043				61	58	–	
090				52	47	93	88
116				39	67	97	88
432				35	50	50	35
620				61	53	93	94
821				62	67	93	90
843				78	67	93	100
856				87	87	97	100
871				83	63	97	90
Males							
058				78	0	86	66
893				100	100	100	100

* Transmitter ceased functioning.

Table 9. Average percentage of radio tagged seals hauled out per day by month relative to the total number of radio tagged seals (seals relocated at other haul out sites at distances greater than 25 km not included); $\bar{x}$ is the average, SE is the standard error, and n is the number of days monitored per month.

	MONTH						
No. Seals	JUL 22	AUG 21	DEC 19	MAR 19	APR 17	MAY 14	JUN 11
$\bar{x}$	82.8	66.9	63.0	64.3	68.2	91.7	86.9
SE	1.6	2.1	2.3	1.7	2.9	2.4	1.9
n	9	31	28	23	20	27	20

Table 10. Length of time seals were absent from Drakes Estero, excluding seals that relocated to other haul outs; seal in the number of seals monitored per month, n1 is the total number of trips recorded per month, n2 is the number of seals that took trips each month, $\bar{x}$ days is the average length in days of trips, $\bar{x}$ trips is the average number of trips per month, and SE is the standard error for each.

	1986			MONTH		1987	
	JUL	AUG	DEC	MAR	APR	MAY	JUN
Seal	21	20	15	15	13	11	10
n1	13	60	53	30	27	2	7
$\bar{x}$ days/mo	1.8	2.5	1.4	2.2	1.4	1.0	2.0
SE	0.3	0.3	0.1	0.9	0.1	0.0	0.5
mode	1	1	1	1	1	1	1
range	1-5	1-7	1-13	1-7	1-3	1	1-4
$\bar{x}$ trips/mo	1.9	3.5	4.8	3.0	2.7	1.0	1.8
SE	0.3	0.5	0.9	0.4	0.4	0.0	0.8
range	1-3	1-9	1-11	1-5	1-5	1	1-4
n2	7	17	11	10	10	2	4
% Seals to take trips	33	85	73	67	77	18	40

Table 11. Average number of total hours per day seals were hauled out at Drakes Estero by month and by sex and age class; n is the number of seals.

		1986			MONTH		1987	
		JUL	AUG	DEC	MAR	APR	MAY	JUN
TOTAL HOURS								
All seals	$\bar{x}$	11.2	7.6	7.2	7.7	8.9	9.7	9.5
	SE	.4	.3	.3	.4	.4	.6	.4
	n	21	10	16	10	15	14	11
	range	1-22						1-19
Adult female	$\bar{x}$	10.4	6.9	6.6	7.1	8.7	9.9	9.5
	SE	.6	.4	.5	.3	.4	.7	.4
	n	11	7	7	12	11	10	9
Adult male	$\bar{x}$	12.5	8.1	7.9	8.5	9.7	9.2	9.5
	SE	.6	.4	.4	.5	1.1	1.5	1.0
	n	5	7	7	6	4	4	2
Immature	$\bar{x}$	10.5	6.8	7.2	--	--	--	--
	SE	.8	.3	1.0				
	n	5	5	2				
LENGTH OF BOUT								
All seals	$\bar{x}$	7.9	5.5	5.7	--	5.25	4.5	5.8
	SE	.4	.2	.3		.2	.2	.3
	range	1-37	1-18	1-20		1-34	1-19	1-21

Table 12. Birthing and weaning dates of pregnant females radio and flipper tagged in July 1986 and March 1987.

SEAL	ESTIMATED BIRTHDAY	ESTIMATED WEAN DAY	#DAYS W/PUP
RADIO-TAGGED			
024	4/28	5/26	30
090	4/30	5/28	29
116	4/28	5/28	31
432	4/22	5/18	27
467	4/27	5/30	39
621	4/26	5/29	34
821	4/26	5/19	24
843	4/23	5/22	30
856	4/21	5/23	33
871	4/23	5/25	33
FLIPPER-TAGGED			
X043*	4/22	5/27	33
T365	4/16	5/14	29
T465	4/19	5/21	33
T454	4/28	5/25	28
X645*	4/30	5/30	31

* Radio tag had ceased functioning.

FIGURE 1. Capture site and locations of movement of harbor seals in California, 1986-87.

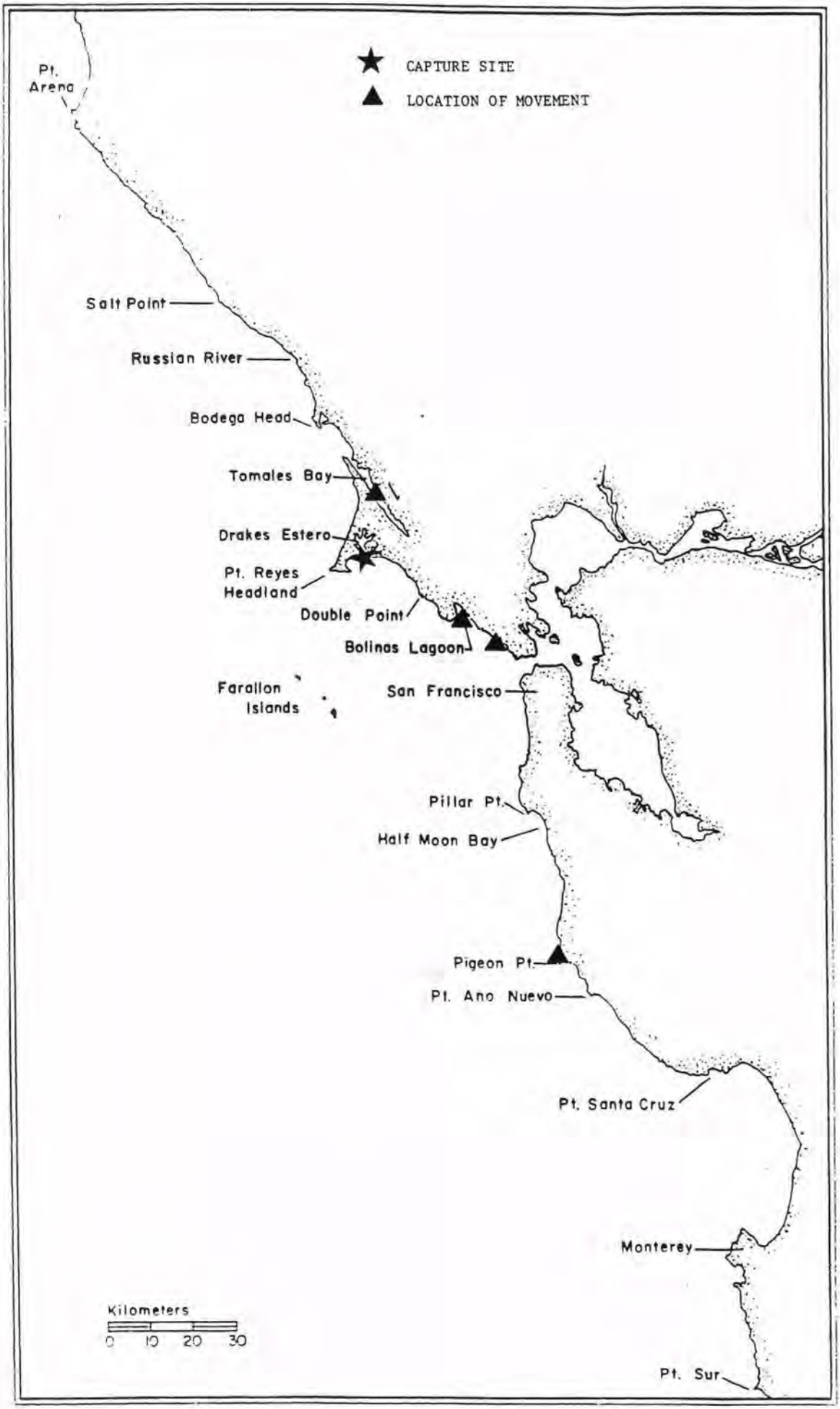

CAPTURE SITE
LOCATION OF MOVEMENT
Pt. Arena
Salt Point
Russian River
Bodega Head
Tomales Bay
Drakes Estero
Pt. Reyes Headland
Double Point
Bolinas Lagoon
Farallon Islands
San Francisco
Pillar Pt.
Half Moon Bay
Pigeon Pt.
Pt. Ano Nuevo
Pt. Santa Cruz
Monterey
Pt. Sur
Kilometers
0 10 20 30

Figure 2. Percentage of radio tagged seals hauled out by hour of day.

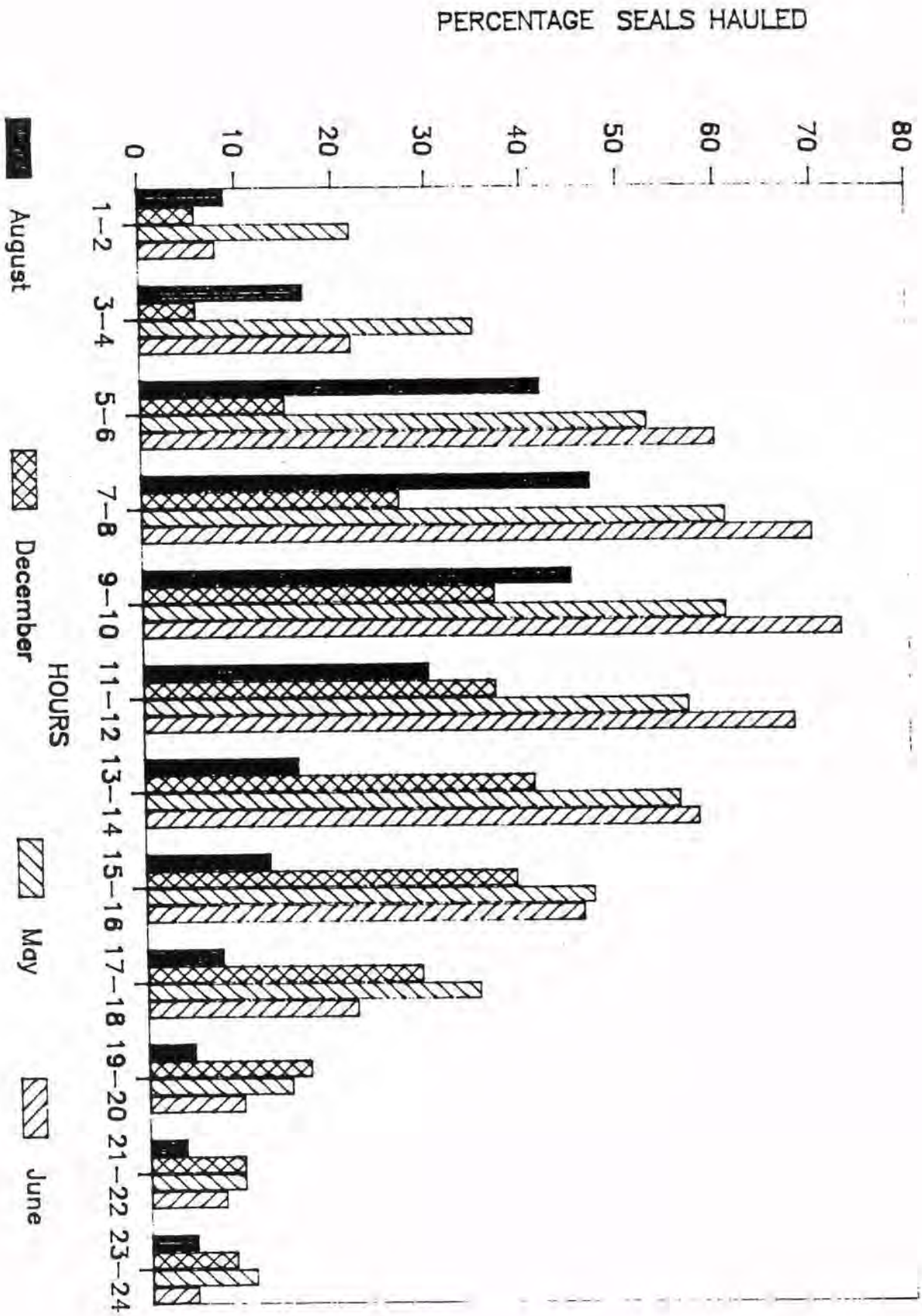

PERCENTAGE SEALS HAULED
0
10
20
30
40
50
60
70
80
1–2
3–4
5–6
7–8
9–10
11–12
13–14
15–16
17–18
19–20
21–22
23–24
HOURS
August
December
May
June

FIGURE 3. Initiation of haul-out-bouts by hour of day for the months July, August, and December.

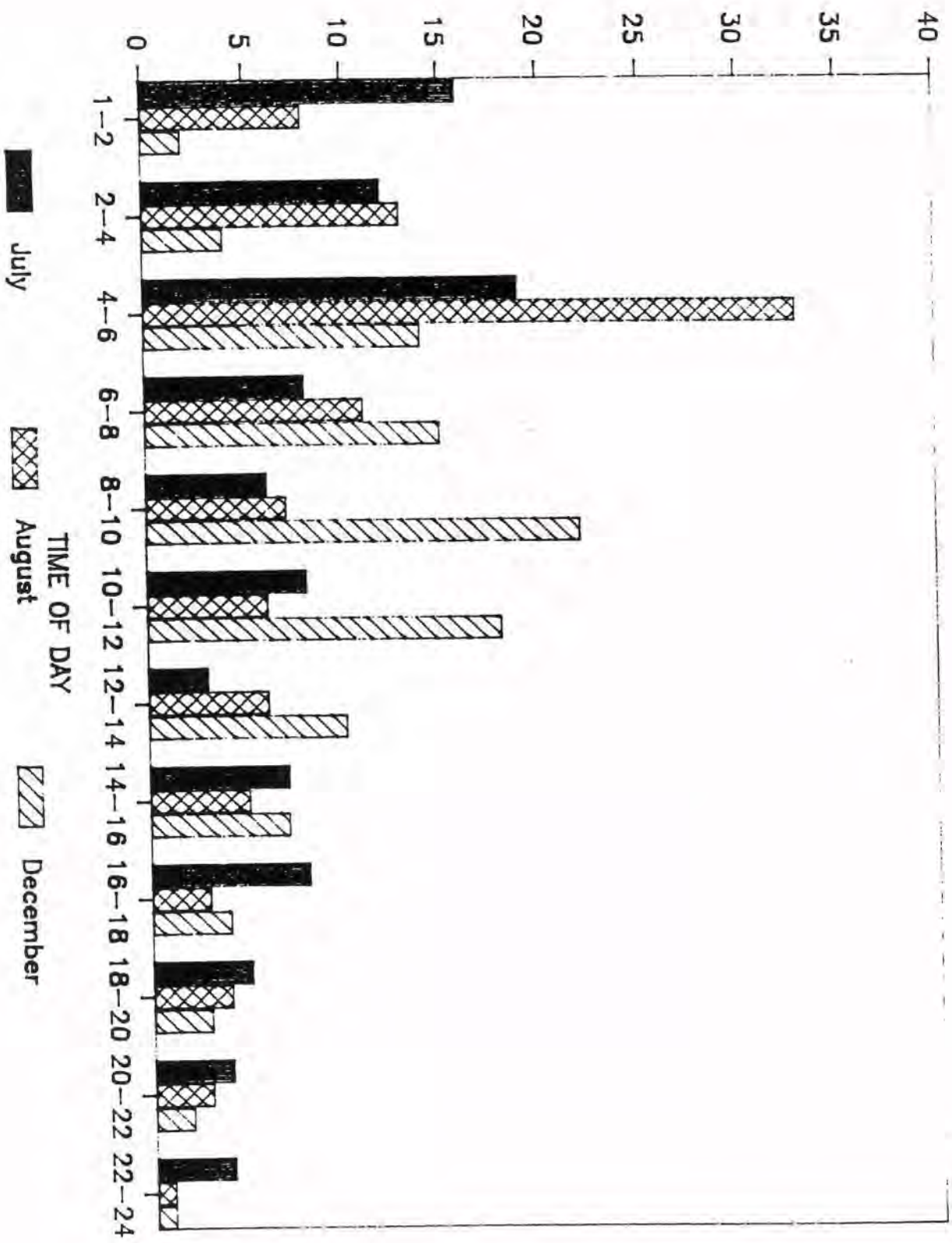

PERCENTAGE OF INITIATIONS
0
5
10
15
20
25
30
35
40
1-2
2-4
4-6
6-8
8-10
10-12
12-14
14-16
16-18
18-20
20-22
22-24
TIME OF DAY
July
August
December

Figure 4. Initiation of haul-out-bouts by hour of day for the months April, May, and June.

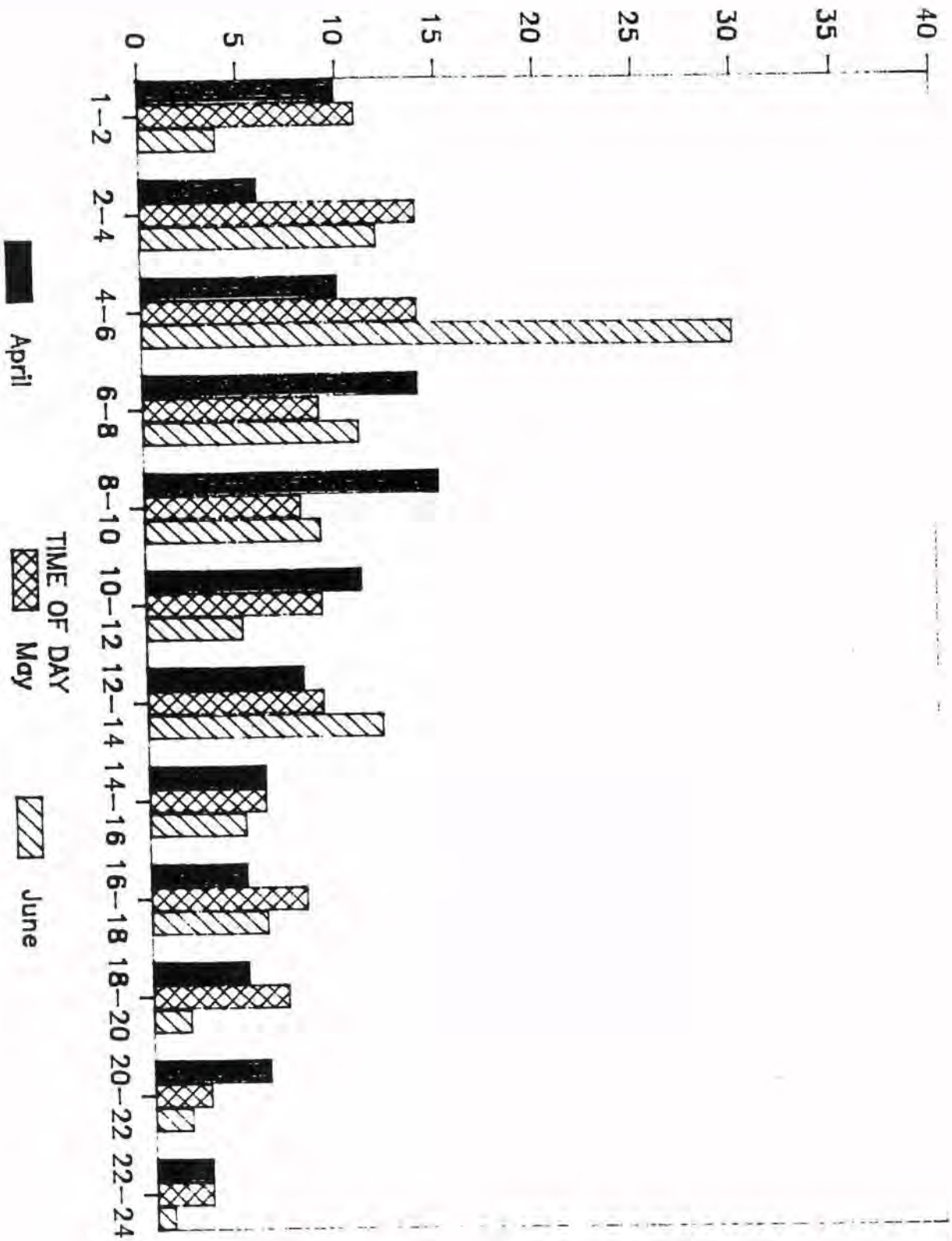
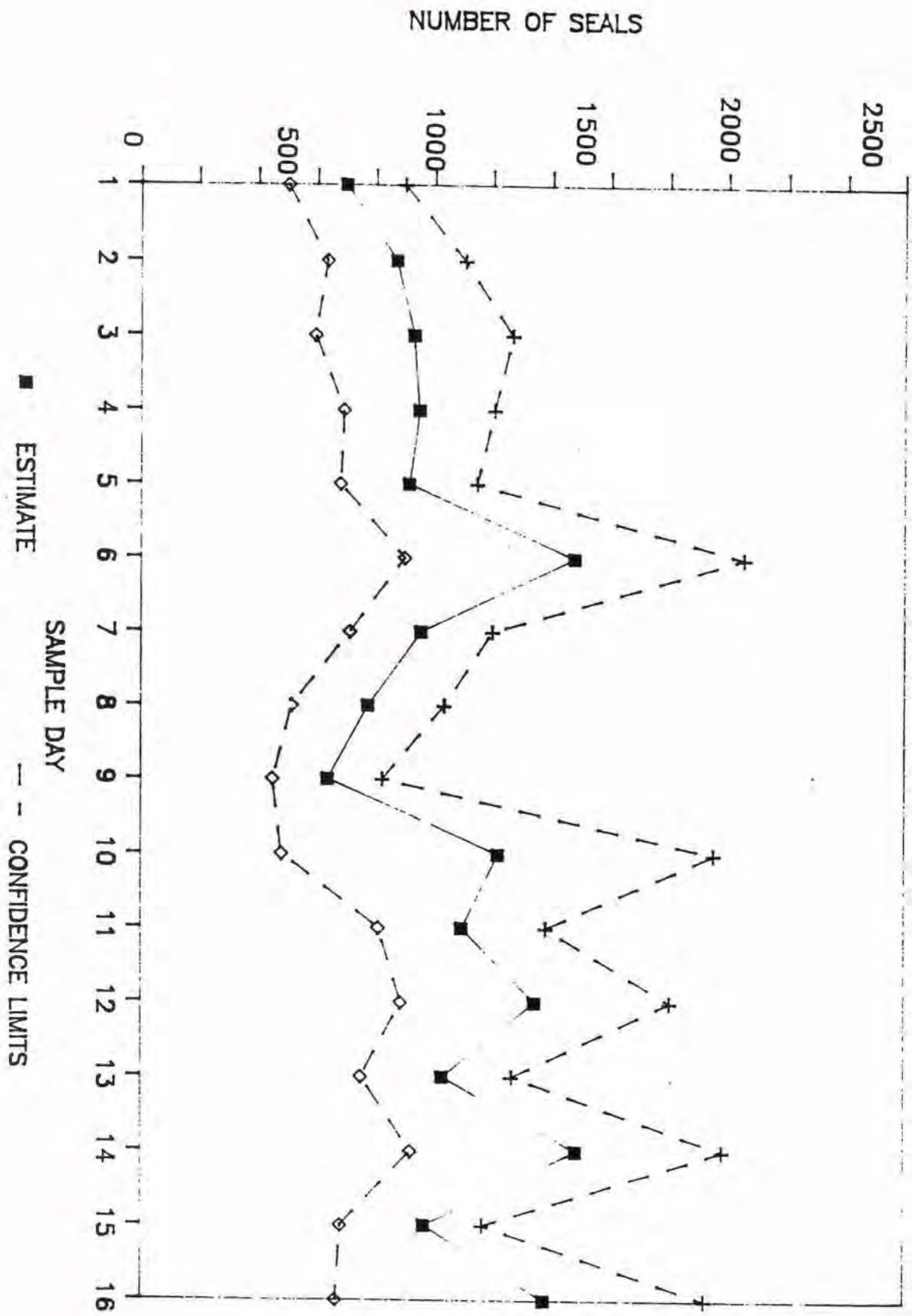

PERCENTAGE OF INITIATIONS
0
5
10
15
20
25
30
35
40
1–2
2–4
4–6
6–8
8–10
10–12
12–14
14–16
16–18
18–20
20–22
22–24
TIME OF DAY
April
May
June

Figure 5. Estimate of absolute abundance of seals at Drakes Estero in March 1987.


NUMBER OF SEALS
2500
2000
1500
1000
500
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SAMPLE DAY
ESTIMATE
CONFIDENCE LIMITS

Movement and Activity Patterns of Harbor Seals at the Point Reyes Peninsula, California

By

Sarah Allen Miller

B.S. (University of California) 1976

THESIS

Submitted in partial satisfaction of the requirements for the degree of

MASTER OF SCIENCE

in

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in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA at BERKELEY

Approved: ..... 12 Dec 1988

Chair Russell D. Congalton ..... Date 19 Dec 1988

..... 12 Dec 1988

****

MOVEMENT AND ACTIVITY PATTERNS OF HARBOR SEALS AT THE POINT REYES PENINSULA, CALIFORNIA

Sarah Allen Miller

ABSTRACT

Seasonal and diel activity patterns of harbor seals were studied at Drakes Estero on the Point Reyes Peninsula, California, between 1985 and 1987. Activity patterns and movements were monitored with radio telemetry. Movements ranged south 210 km to Monterey Bay and north 480 km to the Klamath River. All movements >25 km occurred during the nonbreeding season and most seals returned to Drakes Estero by the following breeding season. More seals migrated in 1985 than 1986, and of the seals that migrated in 1985, more were females than males.

Seals hauled out for more hours per day and for more days per month during the breeding/molt season than during the winter. From November through March, the average percentage of radio-tagged seals hauled out per day varied between 52 and 81%, and from April through July, between 68% and 92%. Total hours per day that seals were hauled out during the breeding/molt season ranged from 9 to 11 hrs and for the nonbreeding season from 7 to 8 hrs. Foraging trips averaged 1.0 to 2.7 consecutive days per month, and seals took more trips per month during the nonbreeding season than during the breeding/molt season. The percentage of tagged seals hauled out over a 24-hr period was largest between 0500 and 1600 hr, regardless of season.

The amount of time that seals spent onshore varied seasonally. During the nonbreeding season seals spent about 30% of the time per day (7 hr) hauled out and 70% (17 hr) either traveling to feeding areas or engaged in foraging activities. During the breeding/molt season, however, they were hauled out 38 to 46% of the time per day (9 to 11 hr); the increase was due to additional haul-out bouts and during the molt to prolongation of individual bouts. The total hours per day, the length of a single haul-out bout, and the

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proportion of days hauled out per month were similar for males and females. Preference for location of haul-out site was the only significant difference in haul-out behavior between males and females, and segregation occurred only during the breeding season.

Based on a mark-recapture model, an estimated 950 seals used Drakes Estero in March 1987 (95% confidence interval: LL 692 and UL 1206). Recommendations for further study are to 1) determine biases associated with age-related differences in movement and activity patterns, 2) devise methods for monitoring seals with radio telemetry through the molt, and 3) research biases associated with annual variation in movement patterns.

Dec 19 1995

Approved: Dr. Reginald Barrett

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In memory of my father, Richard Donovan Allen, who loved the sea.

13a. Average number of hours per day seals were hauled out at Drakes Estero by month and by sex and age class, 1985-86; x is the average, SE is standard error, and n is number of seals monitored.

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INTRODUCTION

Conservation, management, and protection of harbor seals, Phoca vitulina richardsi, come under the purview of the Marine Mammal Protection Act (MMPA) of 1972 (Public Law 92-522). A primary directive of the MMPA is to protect marine mammal stocks from declining below the optimum sustainable population (OSP) which is defined as "the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent" (Sec. 3(9) of the MMPA). Eberhardt (1977) interpreted the meaning of OSP as a level ranging between the maximum sustainable yield and asymptotic levels. In fulfillment of the MMPA guidelines, research has been directed toward identifying the OSP for all marine mammal species.

In California, the California Department of Fish and Game (CDFG), in cooperation with the National Marine Fisheries Service (NMFS) of the U. S. Department of Commerce, has been conducting annual, statewide, aerial surveys of harbor seals to assess the status of the population (Miller 1983, Hanan 1986, and Hanan et al. 1987). Harbor seal colonies along the Point Reyes coastline, Marin County, represent about 20% of the California mainland population during the breeding season (Allen and Huber 1984a, Hanan 1986), and consequently, have received attention from CDFG and NMFS, the agencies responsible for enforcement of the MMPA. Estimates for the size of the Point Reyes population, though, are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. As a result, estimates are likely low and one cannot relate numbers among seasons. In fact, establishing OSP for any marine mammal has been impeded by the difficulty of censusing species that spend a major portion of their lives in the water. A major endeavor in research, therefore, has been to devise accurate methods of population estimation (Eberhardt et al. 1979). For pinnipeds, all of these methods revolve around defining the amount of time seals, individually or as a group, spend on shore. Several researchers have addressed the problem using radio-tagged harbor seals and have derived correction factors with varying attendance patterns based on location, time of day,

and season of year (Brown and Mate 1983, Pitcher and McAllister 1981, Harvey 1987, Thompson 1987, and Yochem et al. 1987). Researchers have related differences between total number hauled out and estimates of abundance with variations in daily and seasonal haul-out patterns and with movements to other areas.

Local factors influencing the number of harbor seals hauled out on shore have been ascribed to food availability, tide level, time of day, weather, and disturbance (Brown and Mate 1983, Slater and Markowitz 1983, Stewart 1984, Allen et al. 1985, Harvey 1987, and Thompson 1987). Seasonal factors affecting number of seals hauled out include breeding, molt, and food availability (Loughlin 1978, Brown and Mate 1983, Stewart and Yochem 1983, Allen et al. 1985, Harvey 1987). Brown and Mate (1983) suggested that movement accounted for seasonal changes in number of harbor seals hauled out in Oregon and that movements were associated with seasonal changes in reproductive status and in response to seasonal variability in the abundance of coastal fish populations. Harbor seals at the Klamath River, California, moved locally to alternate haul-out sites year round and dispersed long distances in winter months (Herder 1986).

In the Point Reyes area harbor seals display diurnal and seasonal variation in haul-out patterns (Allen and Huber 1984a, Allen et al. 1985). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods, with a maximum of 2502 seals counted on June 28, 1984. Diurnal and tidal effects on seal haul-out behavior varied but most seals hauled out from mid-day to late afternoon at low to medium tides, depending on the physical attributes of each location. The diurnal pattern was similar to that of the southern Channel Islands (Stewart 1984), Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), and Bolinas Lagoon (Allen et al. 1985). During fall and winter months, the maximum number of seals was around 1000 animals. The winter decline in seal numbers may be the result of seals either moving to other haul-out sites outside of Point Reyes, or spending more time at sea.

Information on seasonal activity patterns and fall/winter movements would be valuable for any long-term management program for seals in the Point Reyes area, and in conjunction with results accumulated elsewhere (Harvey 1987, Herder 1986, Yochem et al. 1987), could provide more accurate estimates of abundance of the harbor seal population in California (Ribic et al. 1986). The objectives of this study were

to determine: 1) if the apparent decline in seal numbers during the winter months is a function of seasonal migration or a change in the haul-out pattern, 2) the destination of departing animals, 3) daily and seasonal variability in haul-out behavior, and 4) if gender or age accounted for variations in the above. Hypotheses associated with these objectives are that the winter decline in the number of seals hauled out is a function of movement out of the area and that daily and seasonal variability in haul-out behavior is related to sex and age class.

STUDY AREA AND METHODS

Study Area

The Point Reyes coastline extends from the mouth of Tomales Bay (38° 30'N) south to and including Bolinas Bay (37° 30'N) (Figure 1). Coastal embayments include Tomales Bay, Drakes Estero and Bolinas Lagoon. The Point Reyes National Seashore, the Golden Gate National Recreation Area, the Gulf of the Farallones National Marine Sanctuary, and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game and the California State Water Resources Control Board as Areas of Special Biological Significance because of their unique biological attributes (Chan 1979). The safeguards provided by these agencies and the inaccessibility of much of the area have protected the seals from human disruption. Consequently, seal terrestrial habitat usage probably has not changed significantly over the past century.

The topographical diversity of this coastline provides a broad range of substrates upon which seals haul-out in large groups. These include tidal mud flats, offshore tidal ledges and sandy beaches. A haul-out site is a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). At Point Reyes, these sites include sand bars in Tomales Bay, Tomales Point, Point Reyes Headland, Drakes Estero, Limantour Spit, Double Point, Duxbury Reef, and Bolinas Lagoon (Figure 1).

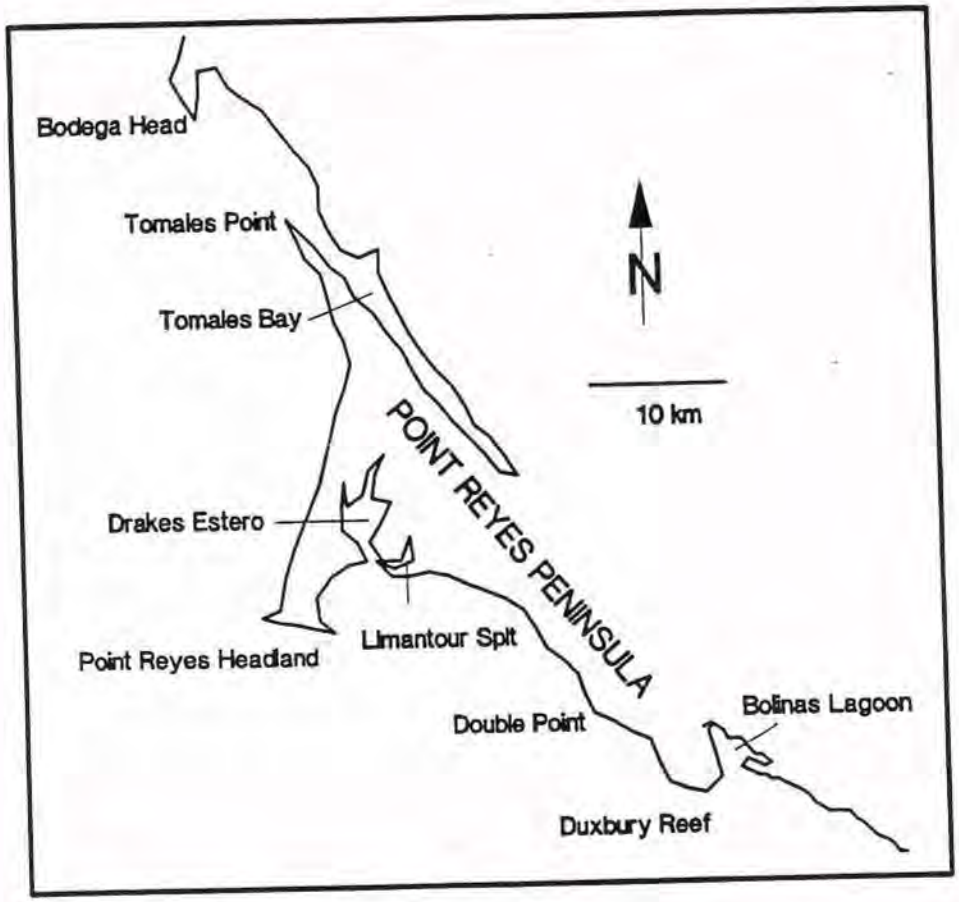

Figure 1. Haul-out sites of harbor seals along the Point Reyes coastline, Marin County, California.

Drakes Estero was selected as the study site because the capture technique chosen is only possible in an estuarine environment and because Drakes Estero is one of the main breeding locations in the Point Reyes area (Allen and Huber 1984a; Figure 2). Other estuaries along the Point Reyes coastline (Bolinas Lagoon and Tomales Bay) are exposed to substantial levels of human disturbance (Allen and Huber 1984b, Allen et al. 1985), and consequently, movement and activity patterns would likely be atypical there.

Drakes Estero is a system of drowned valleys invaded by the sea and is surrounded by low bluffs composed of a geologic formation described as the Drakes Bay Formation which includes fine-grained siltstone interbedded with mudstone (Galloway 1977). The embayment is 35.7 km^2 and is protected from ocean wave action by sandspits (Mudie and Byrne 1980). Tidal exchange occurs through a narrow inlet that is 1.5-3.0 m deep at mean low water. Siltation within the estero has escalated since the turn of the century when cattle ranching was established, and currently, a deep channel courses only half way up the estero (Mudie and Byrne 1980). Present human uses in and around the estero include recreational fishing and canoeing, commercial mariculture, and cattle ranching.

The climate is characterized by moderate temperatures and precipitation. The average annual precipitation at Point Reyes Lighthouse over a 64 yr period was 51 cm and the average annual temperature over 52 yrs was 20° C (Galloway 1977). Fog and drizzle during the summer months are common resulting in a daily temperature mean difference between January and September of only 3° C.

Seals haul-out in Drakes Estero on a number of tidal sand bars exposed at low to medium-high tides. The sand bar used most frequently by the seals is near the estero mouth (A) and is bordered by the main channel with a depth of 8 m. Seals also haul-out near the mouth of the estero on the tip of Limantour Beach (L) at all tide levels (Figure 2).

Capture

The method used to capture seals was conceived by personnel from the Washington Department of Game and the Oregon Department of Fish and Wildlife. We caught seals in a 130-m long gill-net, with 20-cm mesh, set off the haul-out site and then pulled ashore. The net had a lead line on the bottom which

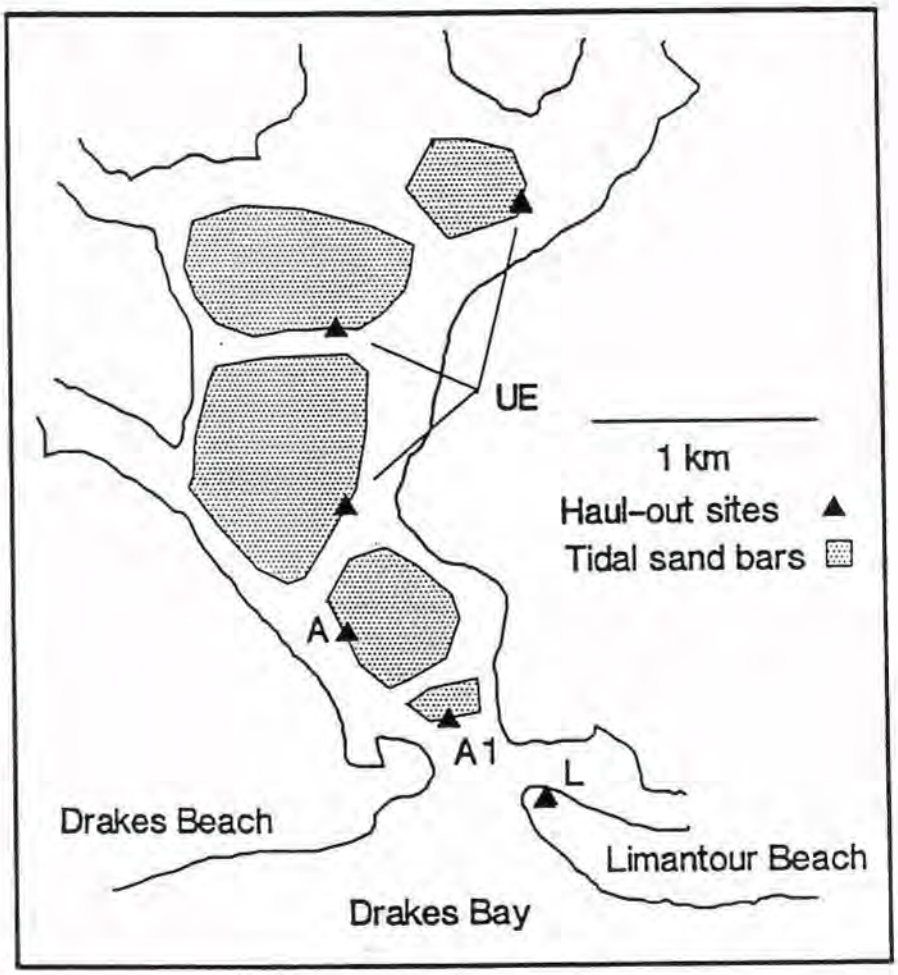

Figure 2. Harbor seal haul-out sites within Drakes Estero; A is the primary haul-out site, A1 is used during the breeding season, L is Limantour Beach, and UE are haul-out sites up the estero.

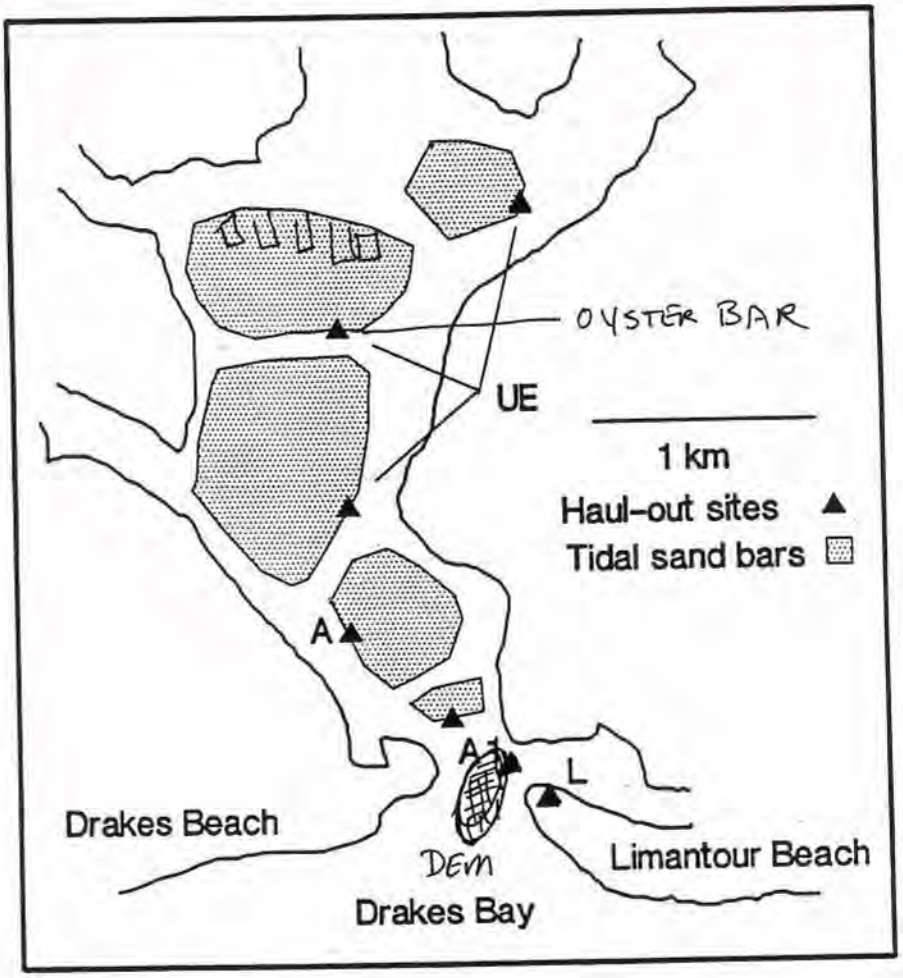

Figure 2. Harbor seal haul-out sites within Drakes Estero; A is the primary haul-out site, A1 is used during the breeding season, L is Limantour Beach, and UE are haul-out sites up the estero.

prevented seals from escaping underneath. Two power boats were used to deploy the net adjacent to the haul-out site. The lead boat carried the net on a platform set above the transom. This boat approached the hauled out seals at about 20 knots, set the net as the seals entered the water, and then landed on the far side of the sand bar. A second boat retrieved the other end of the net, landing on the near end of the bar. Seals were thus captured in a beach seine fashion. This method enabled the capture of a large number of seals over a short period of time, thereby minimizing the frequency of disturbance (Beach et al. 1985, Brown 1981, Jeffries et al. 1985).

Eighteen to twenty people were involved in the capture including personnel from Point Reyes National Seashore, Gulf of the Farallones National Marine Sanctuary, National Marine Fisheries Service, California Department of Fish and Game, Oregon Department of Fish and Wildlife, Washington Department of Fish and Game, the University of California, and Point Reyes Bird Observatory. In addition, a veterinarian monitored the condition of restrained seals and any seal deemed dangerously stressed was immediately released.

Capture periods were initially scheduled for late July to coincide with the pelage molt to maximize the length of transmitter attachment (see below). An additional capture period in March was scheduled because many transmitters had fallen off by February. No radio-tagged seals departed permanently from the estero during the week following the capture, and consequently, I assume that the capture technique did not disrupt the normal activity patterns of the seals.

Tagging Technique

Captured seals were weighed, measured (length and maximum girth), and sexed. All seals were marked with flipper-tags in the webbing of the hind flippers and with a neoprene patch on the dorsum (Figure 3). Certain seals were selected to be radio-tagged. We double flipper-tagged seals with plastic, lime green, "Riese" cattle ear tags in 1985 and lime green "Allflex" cattle ear tags (Veterinarian Supplies, Harbor City, California 90710) in 1986 and 1987. The "Allflex" tags had larger numbers which could be easily read in the field at a distance of 150 m. We attached a bright orange colored vinyl strip with 7.6 cm numbers to each flipper tag which further aided in identification of individuals. Two neoprene patches with an individual

number or symbol code were glued with "Lock-tight" Super Glue to the fur between the shoulder blades to provide an additional visual mark.

A radio transmitter manufactured by Advanced Telemetry Systems, Inc. (Isanti, Minnesota 55040) was glued to the fur on the posterior of the seal's head with "Devcon" 5-minute epoxy (Figure 3). Radio-transmitters were 9x3x3 cm, weighed 60 gms, had a 33 cm flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute. Placement of the transmitter on the head allowed for tracking movements of seals while in the water when they surfaced to breathe. Radio signals could be monitored to 5 km from bluffs (50-100 m) along the coastline and to 16 km from aircraft (100-300 m).

Monitoring

Seals were monitored with an automated recording station, and by ground and aerial surveys. The automated recording station was established on a 30-m bluff overlooking Drakes Estero 150 m from the primary haul-out site and consisted of an "Esterline Angus", 20-channel, strip chart recorder, a programmable scanning receiver, a 12-volt marine battery, and a "Yagi" antenna. The receiving station recorded seals within a 4-km radius on a 24-hr basis. Each frequency was monitored by the scanning receiver for 32 sec and was scanned five to six times per hour. A seal was considered hauled out within a 1-hr period if the pen was triggered continuously for three consecutive 32-sec intervals; a seal was considered in the vicinity but in the water if the pen was triggered continuously for one 32-sec interval in conjunction with three 32-sec intervals that displayed discontinuous pen marks.

Frequencies were checked to determine if radio interference from nearby radio communication facilities (U. S. Coast Guard and RCA Global Communications Center) triggered pens. Interference did not hinder the recording of hauled out seals. However, radio interference on several frequencies prevented determining whether animals were in the water, and so strip chart data were not analyzed for the presence of these particular seals in the water. In addition, female seals with very young pups (less than 5 d) on occasion would rest in shallow water rolling and submerging the transmitter antenna. As a result, the strip chart recorder registered that the animal was not hauled out. Females with pups also on occasion would rest

vertically in the water with head raised above the surface and the recorder registered that the seal was hauled out. Consequently, haul-out times of females in this analysis may be biased for this period.

A beacon transmitter was placed in a PVC pipe at seal "head lift" level (31 cm above the ground) on the haul-out site to verify that the receiving system was functioning properly and to determine when the haul-out site was exposed during tidal cycles and therefore available to seals.

The station was in operation continuously from July 31 through September 5, and from October 25 through December 31, 1985; and from January 1 through April 30, 1986. It was again in operation from 23 July 1986 through 30 June 1987 except for intermittent periods when equipment malfunctioned.

The station was inspected and maintained a minimum of two times per week and almost daily during the 1987 breeding season. During visits all frequencies were scanned and checked for signal drift. Each signal was monitored for a period of five to ten minutes to detect seals in the water. The scan period was selected based on averaging dive times of radio-tagged seals during the first month of the project ($x = 3$ min, range 0.08 to 9.75 min, SD = 2 min, $n = 76$). Seals onshore were visually scanned for marks to check for flipper-tag or transmitter loss. At this time, information on female and pup behavior and on spatial distribution within the estero was recorded.

Ten all-day censuses were conducted at Drakes Estero to compare the diurnal haul-out pattern of the herd with that of individually marked seals and to determine the accuracy of the equipment in distinguishing the presence or absence of seals. In addition, six seals were monitored for a 24-hr period on June 1, 1987, and their location and activities were recorded every 15 min. From this information, accuracy of the remote receiving station could be compared with field observations and local feeding areas could be identified.

To locate dispersing seals, semi-weekly aerial surveys along the central and northern California coast were scheduled. A Cessna 180, single engine, aeroplane was used for all flights, and Yagi receiving antennas were mounted on the wing struts (Mech 1983). An antenna was mounted on each side of the aircraft and pointed to the side so that the strongest signal is received from the side. With this arrangement, seals could be detected for a distance of 16 km on either side of the plane as it cruised along the coast. Typically, scheduled aerial surveys began at Drakes Estero and then proceeded north to Point Arena, south

to Half Moon Bay, and then into San Francisco Bay. Length of flight depended on success in locating all animals. However, if individual seals were not recorded for one month either by the remote receiving station or by ground surveys, then aerial surveys were extended north to the Oregon border or south to Point Conception.

Seals were monitored by two people using scanning receivers and frequencies chosen were continuously scanned for three seconds each. In this manner, much of the coastline was covered two times by two people thereby maximizing detection. When a seal was located, activity, time, and location were recorded. Flights were scheduled on weekdays around tides that were low to medium to maximize the likelihood of seals being hauled out. Under this sampling regime, I assumed that major shifts in location (both spatially and temporally) would be recorded but that local and short-term movements might be over looked.

Ground surveys were scheduled in addition to aerial flights to account for local, short-term movements along the Point Reyes Peninsula. Surveys were made once per week to locate animals absent from Drakes Estero. Typically ground surveys extended along the coastline from Limantour Beach to the north end of Point Reyes Beach. Feeding areas and movement to local haul-out sites were identified from this exercise. Uneven topography hindered the mobility necessary for obtaining several fixes for triangulation to determine precise locations of animals in the water (Tester 1971); however, seals on shore were easily located visually for confirmation of position.

Data Analysis

Radio-tagged seals were categorized by the amount of time and the season that they were present at Drakes Estero. Seals were defined as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" if they departed in the fall but returned during the following breeding season, and "transients" if they were present at Drakes Estero during the capture and shortly thereafter, but resided away from Drakes Estero during the rest of the study period. Movements greater than 25 km were defined as long distance and less than 25 km as local.

Seal behavior at Drakes Estero was classified as either hauled out or absent. Descriptive statistics were calculated for each behavior for each animal by season. The months December and March (winter) and April through June (spring) were chosen to illustrate seasonal differences in haul-out behavior. The months August, December and March were used for comparing year to year differences. A chi-square test statistic was used when comparing time of haul-out initiation and the length of haul-out bout; initiation time was categorized into four periods (0000-0500, 0500-01200, 1200-1700 and 1700-2400 hr) and length of haul-out bout was categorized into four periods (1-4, 4-8, 8-12, $\geq$ 12 hr).

The absolute abundance of seals using Drakes Estero in March 1987 was estimated with a modified Lincoln-Peterson Index mark-recapture model (Caughley 1977: 141). For this analysis, only seals marked in March 1987 were included to avoid sample bias of sex and age class representation and of tag loss from the previous year. Sixteen estimates were made but an estimate prior to the onset of the pupping season was selected to avoid violation of the closed population assumption. The probability of tag loss was estimated with the equation

$$p = B^1/(2B^2+B^1)$$

where p is the probability that an animal will lose one tag, B^1 is the number of animals counted with one tag and B^2 is the number of animals counted with two tags (Caughley 1977: 140).

All information recorded on the strip chart recorder was transferred to a "DBase III+" database. The "SPSS" statistical program for micro-computers was used for most analyses. Non-parametric statistical analyses including Mann-Whitney U test and Fisher's Exact test were used for comparing behaviors of gender and between-year differences in behavior. Wilcoxon matched-pairs sign-rank tests were applied to test seasonal differences in haul-out behavior when the same individuals were sampled over two different time periods. To test the null hypothesis for independence of location within the estero with sex, a chi-square test of independence was performed (Sokal and Rohlf 1981).

RESULTS

Between 1985 and 1987 during three capture periods, 109 seals were flipper-tagged, and of these, 51 were radio-tagged. In 1985 (July 31 - August 1), radio transmitters were attached to 17 adult seals and an

additional three were flipper-tagged (Table 1a); in 1986 (July 21 and 22), transmitters were affixed to 22 and flipper tags to eight (Table 1b); and on March 9 and 11 of 1987, 92 animals were captured and transmitters affixed to 12 and flipper-tags to 47 (Table 1c). During the March capture, many seals were released because of time constraints. One adult male seal died during handling procedures. A necropsy was performed and cause of death was likely related to respiratory failure due to shock (Beach et al. 1985).

On average, adult males weighed 24 kg more and were 16 cm longer than adult females in July 1985 and weighed 9 kg more than females in July 1986 (Table 2). Though females in 1985 weighed about the same as those in 1986, males on average weighed less in 1986. Adult males and females both weighed substantially more in March 1987 than in July 1986; the weight gain in females may be explained in part by pregnancy. Average length of adult males was not substantially different from that of females for all three periods. Immatures were about 35 cm shorter than adults, and on average, weighed 34 kg both in July 1986 and March 1987.

Tag Loss

An insufficient number of seals were tagged in 1985 or 1986 for analysis of flipper-tag loss, but in 1987, the probability of flipper tag loss was estimated to be 0.31 after four months (June 26) and 0.57 after five months (July 31). Consequently, resighting information on seals with "Allflex" flipper-tags was unreliable after four months. In contrast, the "Riese" flipper-tags attached in 1985 were still seen periodically on six seals as of June 1987. "Allflex" tags were square in shape and may have snagged on objects more easily than "Riese" tags; on one occasion, I observed fishing line hanging from an "Allflex" flipper tag.

Transmitter Life Span and Loss

Length of transmitter attachment affected analysis of movement patterns such that movements of seals absent from Drakes Estero were less likely to be documented after January for both years. The median length of attachment for 1985 was 221 d ($\bar{x}$ = 181 d, SD = 80, n = 17) and 1986 was 186 d ($\bar{x}$ = 194 d, SD = 81, n = 22; Tables 3a and 3b). In 1986 transmitters tended to remain on male seals longer than on females but the difference in days was not significant ($p = 0.08$; Mann-Whitney U test). All but two

Table 1a. Standard measurements of 21 adult harbor seals tagged at Drakes Estero, August 1985; SE is standard error.

Flipper Tag No.	Radio Tag No.	Sex	Length (cm)	Girth (cm)	Weight (kg)	Comments
229	024	F	146	98	63.5	
216	033	F	138	95	56.7	
225	092	F	148	96	55.8	
214	234	F	147	120	86.2	
206	313	F	145	103	63.5	
--	415	F	131	94	50.0	
232	491	F	121	94	56.7	
228	710	F	138	96	63.5	
--	047	M	150	108	74.8	
--	084	M	154	112	93.0	Old shark bite
224	124	M	148	125	77.1	
--	176	M	148	118	84.4	
204	256	M	146	105	74.8	Old shark bite
--	272	M	167	117	90.7	
218	435	M	168	106	79.4	
201	753	M	147	118	93.0	
210	974	M	163	114	90.7	
212		M	155	111	90.7	
222		M	144	107	77.1	
220		M	150	--	83.9	
		M	173	117	102.0	

Table 1b. Standard measurements of 30 harbor seals tagged at Drakes Estero, July 1986.

Flipper Tag No.	Radio Tag No.	Age*	Sex	Length (cm)	Girth (cm)	Weight (kg)	Comments
302	224	P	F	88	69	20.4	
304	419	A	M	146	106	70.3	
306	281	P	M	96	74	22.7	
308		A	M	149	--	67.6	
310	306	I	F	107	83	31.8	
312	137	A	F	140	104	63.5	Not pregnant
313		A	F	130	103	65.8	
316	531	A	F	141	104	65.8	
317		I	F	116	81	35.8	
320		A	M	145	105	73.5	
322	343	A	M	163	111	81.6	
324	198	A	M	158	--	88.5	
326	540	P	F	95	73	19.5	
328	616	A	F	162	--	90.3	Pregnant
330	590	A	M	138	104	68.5	
332		A	M	142	106	81.6	
334		A	M	170	115	77.6	
335		A	M	148	112	78.9	
338	482	A	F	139	105	64.4	Pregnant
340		A	F	145	104	64.4	
341	645	A	F	133	105	70.3	Shark scar/Preg
344	246	A	F	138	101	55.3	Pregnant
346	504	A	M	143	106	70.3	Shark scar
348	444	A	M	140	107	74.8	
350	325	I	F	114	82	36.3	
352	117	A	F	145	101	63.5	
354	362	A	F	134	98	59.8	Not pregnant
355	467	A	F	143	103	69.4	Pregnant
357	160	A	F	146	99	70.3	Pregnant
359	267	A	M	149	104	71.7	Shark scar

* A = adult, P = pup, and I = immature.

Table 1c. Standard measurements of 63 harbor seals tagged at Drakes Estero, March 1987.

Flipper Tag No.	Radio Tag No.	Age*	Sex	Length (cm)	Girth (cm)	Weight (kg)	Comments
--		--	F	--	132	105	
--		I	F	--	126	99	
--		I	F	118	86	40.8	
363		I	F	--	--	--	
371		I	F	--	--	--	
373		I	F	--	--	--	
386		I	F	99	77	30.8	
430		I	F	111	83	28.6	
434		I	F	103	75	38.6	RT540
436		I	F	115	85	40.8	
438		I	F	109	80	33.1	
440		I	F	107	90	33.1	
443		I	F	98	82	32.2	
445		I	F	98	78	28.6	
447		I	F	89	81	34.5	
449		I	F	112	80	34.9	
451		I	F	118	86	36.3	
--		I	M	115	87	40.4	
366		I	M	--	--	--	
368		I	M	--	--	--	
412		I	M	120	91	40.8	
416		I	M	114	86	32.7	
432		I	M	110	80	29.5	
365		A	F	135	115	84.8	Pregnant
374	432	A	F	137	128	112.0	Pregnant
378	026	A	F	150	126	104.3	Pregnant
380	046	A	F	143	128	106.6	Pregnant
384	844	A	F	165	127	109.8	Pregnant
387		A	F	138	123	78.9	Pregnant
3900	092	A	F	143	121	98.4	Pregnant
392	116	A	F	143	123	96.2	Pregnant
394		A	F	--	--	81.2	
396	856	A	F	153	--	113.4	Pregnant
398	874	A	F	143	122	94.4	Pregnant
400		A	F	136	119	89.4	Pregnant
410	622	A	F	159	139	116.6	Pregnant
418		A	F	154	121	102.9	Pregnant
419		A	F	137	109	70.8	Pregnant
421		A	F	143	125	87.1	Pregnant
424		A	F	149	115	83.0	Not pregnant
428		A	F	150	115	98.4	
441	821	A	F	151	134		--RT234/Pregnant

453		A	F	156	133	--	
455		A	F	132	125	--	Pregnant
457		A	F	134	123	--	Pregnant
461		A	F	143	124	--	Pregnant
463		A	F	139	128	--	
465		A	F	146	119	--	Pregnant
467		A	F	153	111	--	Not pregnant
471		A	F	146	127	--	Pregnant
475		A	F	124	120	--	Pregnant
212		A	M	--	--	--	FT212
221		A	M	--	--	--	FT221
382		A	M	--	--	--	
402	894	A	M	163	126	102.1	
403		A	M	141	115	87.1	
406		A	M	145	110	78.0	
408		A	M	147	118	89.4	
413	060	A	M	174	128	116.6	
426		A	M	149	105	83.5	
459		A	M	153	112	--	
469		A	M	150	123	--	
473		A	M	150	112	--	

* A = adult and I = immature.

Table 2. Average standard measurements of seals tagged in 1985, 1986, and 1987; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals.

		LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)
1985				
Adult Males:	$\bar{x}$	154.8	113.2	85.5
	SE	2.8	1.7	2.5
	n	13	12	13
Adult Females:	$\bar{x}$	139.0	99.5	62.0
	SE	3.3	3.1	3.9
	n	8	8	8
Total Adults:	$\bar{x}$	149.0	107.7	76.6
	SE	2.6	2.1	3.3
	n	21	20	21
1986				
Adult Males:	$\bar{x}$	149.4	107.6	75.4
	SE	2.79	1.2	1.8
	n	12	10	12
Adult Females:	$\bar{x}$	141.3	102.5	66.9
	SE	2.4	0.7	2.5
	n	12	11	12
Immatures:	$\bar{x}$	112.3	82.0	34.6
	SE	2.7	0.6	1.4
	n	3	3	3
Pups:	$\bar{x}$	93.0	72.0	20.9
	SE	2.5	1.5	1.0
	n	3	3	3
Total Adults:	$\bar{x}$	145.3	104.9	71.2
	SE	0.5	1.1	1.2
	n	24	21	24
1987				
Adult Males:	$\bar{x}$	152.4	116.6	92.8
	SE	3.4	2.6	5.8
	n	9	9	6
Adult Females:	$\bar{x}$	144.5	123.08	96.0
	SE	1.8	1.4	3.1
	n	27	26	18
Immatures:	$\bar{x}$	110.8	85.1	34.7
	SE	2.5	1.8	1.1
	n	18	18	16
Total Adults:	$\bar{x}$	146.5	121.4	95.2
	SE	0.6	0.8	0.4
	n	36	35	24

Table 3a. Duration of radio-transmitter attachment on seals tagged in 1985 and last date seal was located visually or with receiver.

Seal	Date Attached	Last Date Attached	Days Attached	Date Last Observed
024	8/01/85	11/12/85	101	4/29/86
033	8/01/85	3/03/86	240	7/10/86
047	7/31/85	3/12/86	221	7/10/86
084	7/31/85	3/27/86	236	7/10/86
092	8/01/85	3/19/86	228	7/03/86
124	8/01/85	3/06/86	236	4/08/87
176	7/31/85	1/08/86	158	1/08/86
234	8/01/85	1/24/86	174	*
256	7/31/85	8/09/85	7	7/21/86
272	7/31/85	8/28/85	26	7/10/86
313	8/01/85	12/19/85	138	5/22/86
415	7/31/85	4/18/86	258	4/18/86
435	8/01/85	1/01/86	151	7/3/86
491	8/01/85	12/19/85	138	6/08/88
710	8/01/85	3/19/86	228	7/23/86
753	8/01/85	5/03/86	273	7/10/86
974	8/01/85	4/16/86	256	7/03/86
		Average	181	
		SD	80	

* Seal was retagged as RT821 in March 1987.

Table 3b. Duration of transmitter attachment on seals tagged in 1986 and last date seal was located visually or with receiver.

Seal	Date Attached	Last Date Attached	Days Attached	Date Last Observed
119	7/22/86	7/31/86	10	1/06/87
224	7/21/86	3/20/87	243	3/26/87
419	7/21/86	1/22/87	186	6/29/87
281	7/21/86	9/11/86	53	9/11/86
306	7/21/86	4/06/87	260	4/06/87
137	7/21/86	1/10/87	174	5/22/87
529	7/22/86	2/03/87	197	3/06/87
342	7/22/86	2/01/87	195	2/24/87
198	7/22/86	1/22/87	185	6/29/87
540	7/22/86	12/19/86	151	4/02/87
616	7/22/86	1/22/87	185	6/24/87
590	7/22/86	4/22/87	275	4/22/87
482	7/22/86	2/03/87	197	5/12/87
645	7/22/86	1/22/87	185	6/29/87
246	7/22/86	12/10/86	142	7/06/87
504	7/22/86	5/17/87	300	6/29/87
444	7/22/86	4/17/87	270	6/27/87
325	7/22/86	9/09/86	51	9/09/86
362	7/22/86	4/02/87	255	6/27/87
467	7/22/86	5/24/87	307	6/24/87
160	7/22/86	12/22/86	154	6/29/87
267	7/22/86	5/17/87	300	6/26/87
		Average	194	
		SD	81	

transmitters (88%) attached in 1985 remained on seals for a minimum of five months, nine (53%) for seven months, six (35%) for eight months, and one for nine months. Of 22 transmitters attached in 1986, 19 (86%) remained attached for a minimum of five months, 15 (68%) for six months, eight (36%) for eight months, and three (14%) for ten months. The maximum length of attachment was 273 d for seals tagged in 1985 and 307 d for those in 1986. All but one transmitter attached in March 1987 remained functioning for four months, i.e., until the molt in June (Table 3c).

All but one (RT176) of the seals radio-tagged in 1985 were located at least once every two weeks, either visually or with receiver, until April 1986. The radio-tags of two seals (RT256 and RT272) ceased functioning within the first month of study; however, both were observed periodically at Drakes Estero for the entire year. Of the seals radio-tagged in July 1986, all but three were located intermittently through February 1987. Two of these three were immature (RT281 and RT325) and one was an adult female (RT119) whose transmitter ceased functioning 10 d after attachment. All seals radio-tagged in March 1987 were located regularly until transmitters were shed in June.

Seals with transmitters that ceased functioning within two months of attachment were excluded from analysis of movement patterns; these included RT256 and RT272 of 1985, and RT119 of 1986. In addition, RT325 and RT281 were excluded from movement analysis because they could not be located after September. It is possible that these two missing seals may have been killed by sharks (Ainley et al. 1985, Stewart and Yochem 1984). A number of seals with fresh shark bites were noted in the fall of 1986. Three adult flipper-tagged seals (including RT119) and five untagged seals had fresh shark bites in September. The wound on RT119 raked the entire lower left flank. The other two flipper-tagged seals had minor bites (less than 30 cm across) and these scars healed within four months.

Movements

In 1985, eight (53%) radio-tagged seals were classified as residents, four (27%) as breeders, and three (20%) as transients (Tables 4a and 5a). Seven seals (5 females and 2 males) left within one month of the date of capture, and four of these returned the following breeding season. In 1986, most seals (90%) were classified as residents (Table 4b and 5b). Five of these were also recorded hauled out periodically at Point Reyes Headland (PRH) and two traveled distances greater than 25 km during the winter months but

Table 3c. Duration of radio-transmitter attachment on seals tagged in 1987 and last date seal was located visually or with receiver.

Seal	Date Attached	Last Date Attached	Days Attached	Date Last Observed
432	3/09/87	6/17/87	101	6/29/87
026	3/09/87	6/17/87	101	6/29/87
046	3/09/87	4/23/87	99	6/29/87
844	3/09/87	6/17/87	101	6/14/87
092	3/09/87	6/25/87	109	6/29/87
116	3/09/87	6/17/87	101	6/29/87
856	3/09/87	6/22/87	106	6/29/87
874	3/09/87	6/20/87	104	6/29/87
894	3/09/87	6/27/87	111	6/29/87
821	3/11/87	6/20/87	102	6/29/87
622	3/09/87	6/16/87	100	6/29/87
060	3/09/87	6/27/87	111	6/27/87
		Average	104	
		SD	4	

Table 4a. Data for trips over 25 km taken by seals radio-tagged in 1985; $\bar{x}$ is average for total and n is number of seals to take trips.

Seal	Status[a]	No. Moves	Average Distance (km)	Location[b]	No. Locations
Females:					
024	B	2	480	KR/DE	2
033	R	0	--	DE	1
092	B	2	210	MB/DE	2
234	R	0	--	DE	1
313	B	3	47	TB/SP/DE	3
415	T	2	58	SR/RR	3
491	T	3	24	DP/PRH/DP	3
710	R	2	48	TB/DE	2
	$\bar{x}$	2.3	128		2.1
	n	6			
Males:					
047[c]	R	0	--	DE	1
084	R	0	--	DE	1
124	T	4	18	PRH/DP/DE/DP	3
176	R	0	--	DE	1
435	R	2	20	BP/DE	2
753	R	0	--	DE	1
974	B	2	48	TB/DE	2
	$\bar{x}$	2.7	28		1.6
	n	3			

[a] Status of seal; R = resident, B = breeder, T = transient.

[b] Locations:

BP = Bolinas Point, Marin Co.
DE = Drakes Estero, Marin Co.
DP = Double Point, Marin Co.
KR = Klamath River, Del Norte Co.
MB = Monterey Bay, Santa Cruz Co.
RR = Russian River, Sonoma Co.
SP = Salt Point, Sonoma Co.
SR = Sea Ranch, Mendocino Co.
TB = Tomales Bay, Marin Co.

[c] Hauled out frequently at Point Reyes Headland (12 km).

Table 4b. Data for trips over 25 km taken by seals radio-tagged in 1986; $\bar{x}$ is average for total and n is number of seals to take trips.

Seal	Status[a]	No. Moves	Average Distance (km)	Location[b]	No. Locations
137	B	4	81	PSB/MB/DE	3
160	R	0	--	DE	1
198	R	0	--	DE	1
224	R	0	--	DE	1
246	R	2	48	TB/DE	2
267	R	0	--	DE	1
305	B	3	47	DR/TB/DE	3
342	R	0	--	DE	1
362	R	0	--	DE	1
419	R	0	--	DE	1
444	R	0	--	DE	1
467	R	0	--	DE	1
482	R	0	--	DE	1
504	R	2	410	PC/DE	2
591[c]	R	0	--	DE	2
540[c]	R	0	--	DE	2
590[c]	R	0	--	DE	2
616[c]	R	0	--	DE	2
645[c]	R	0	--	DE	2
	$\bar{x}$	2.8	144		1.6
	n	4			

[a] Status of seal; R = resident, B = breeder, T = transient.

[b] Locations:

DE = Drakes Estero, Marin Co.
DR = Duxbury Reef, Marin Co.
MB = Muir Beach, Marin Co.
PC = Prairie Creek, Humboldt Co.
TB = Tomales Bay, Marin Co.

[c] Hauled out frequently at Point Reyes Headland (12 km).

Table 5a. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys, 1985-86. Behavior is classified as A (active/swimming) and I (inactive/hauled out).

Seal	Date																						
	8/9	8/15	8/29	9/12	9/13	9/19	9/26	10/4	10/10	10/22	10/23	10/28	10/31	11/8	11/21	11/26	12/19	2/7	2/27	3/20	3/23	3/25	4/2	4/18
024	DE/I			DE/I			DE/I		KR/A					DE/I	DE/I					DE/I	DE/I	DE/I		
033				PRH/A			DE/I		DB/A				DE/A	DP/A	DE/I			PRH/A	PRH/A					
047						DE/A	DE/I	DE/I	DE/A				DE/A	DE/I	DE/I	DE/I				DE/I	DE/I			
084					MB/I				DE/I		MB/I										MB/I			
092	DE/I			DP/I				DP/I	DP/A					DE/I	DE/I	DE/I	DP/I							
124	PRH/A			DE/I			DE/A		DB/A															
176			DE/I	DE/I			DE/I		DE/I				BH/A	TB/A		SP/I	SP/I							
234			TB/A	TB/I				TB/A	TB/I								RR/I	RR/I		RR/I		RR/I	RR/I	RR/I
313	DE/I								SR/I			DB/A	BP/A	DE/I	DE/I									
415							DE/I										DP/I							
435				DE/I		DP/I	DP/A	PRH/A	DP/A					DE/I	DE/I				DE/A	DE/I				
491	DE/I						DE/I	TB/A		DE/A		DE/A	DB/A		DE/I	DE/I			DE/I	DE/I	DE/I	DE/I	DE/I	DE/I
710	DE/I			DE/I			DE/I		DE/I						DE/I	DE/I						TB/I	TB/I	DE/I
753							DE/I					TB/I	BH/A	TB/I	TB/I		TB/I	TB/A	TB/I					
974	DE/I	TB/I	TB/I	TB/I			TB/I	TB/I																

Locations with linear distances (km) from capture site:

BH = Bodega Head	40	MB = Monterey Bay	210
BP = Bolinas Point	20	PRH = Pt. Reyes Head	12
DE = Drakes Estero	0	RR = Russian River	55
DB = Drakes Bay	<10	SP = Salt Point	65
DP = Double Point	16	SR = Sea Ranch	85
KR = Klamath River	480	TB = Tomales Bay	40

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Table 5b. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys, 1986-87. Behavior is classified as A (active/swimming) and I (inactive/hauled out).

	Date																	
Seal	7/29	7/30	8/31	9/9	9/21	9/22	9/30	10/13	10/14	10/30	11/10	11/28	12/10	1/8	2/7	2/23	3/24	4/6	5/18
137	DE/I	DE/I	DE/I	DB/I		PSB/I	MB/A	MB/A	MB/A			PSB/A	PSB/A	PSB/A					
160	DE/I	DE/I		DE/I	DE/I		DE/I			DE/I	DE/I	DE/I	DE/I						
198	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I	DE/I	DE/I	DE/I	DE/I					
224		DE/I	DE/I	DE/I			DE/I			DE/I		DE/I	DE/I	DE/I	DE/I				
246	DE/I	DE/I	DE/I	DE/I			DE/I		TB/I	DE/I			DE/I						
267	DE/I	DE/I	DE/I	DE/I	DE/I				DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	
281				DB/A															
306	DE/I		DR/A	TB/I	TB/I					TB/I	TB/I			DE/I				DE/A	
325	DE/I	DE/I		DB/A															
342	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I			PRH/A	PRH/A					
362	DE/I	DE/I	DE/I	DE/I			DE/I		DE/I	DE/I	DE/I	DE/I	DE/I	DE/I	DE/I		DE/I	DE/I	
419	DE/I	DE/I		DE/I					DE/I	DE/I	DE/I	DE/I	DE/I	DE/I					
444	DE/I	DE/I	DE/I	DE/I			DE/I		DE/I	DE/I	DE/I		DE/I	DE/I			DE/I	DE/I	
467	DE/I	DE/I	DE/I		DE/I		DE/I		DE/I	DE/I	DE/I		DE/I	DE/I	DE/I		DE/I		
482	DE/I	DE/I	DE/I	DE/I			DE/I		DE/I	DE/I		DE/I	DE/I	DE/I					
504	DE/I	DE/I		PRH/A			DE/I		DE/I	DE/I	PC/I	DE/I	DE/I	DE/I			DE/I	DE/I	
529	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I	DE/I	DE/I	DE/I	PRH/I	DE/I			DE/I	
540	DE/I	DE/I		PRH/A						DE/I		DE/I	DE/I	DE/I					
590	DE/I	DE/I		DE/I			DE/I		DE/I	DE/I			DE/I	DE/I		PRH/I	DE/I	PRH/I	
616				DE/I	PRH/I		DE/I		DE/I	DE/I	DE/I	PRH/A	PRH/A	DE/I					
645	DE/I	DE/I	DE/I	DB/A			DE/I		DE/I	DE/I	DE/I		DE/I	DE/I					
046																	PRH/A	DE/I	
060																		BL/A	DE/I
090																		DP/A	DE/I
432																			PRH/I
874																	PRH/I	DE/I	DE/I

Locations with linear distances (km) from capture site:

BL = Bolinas Lagoon	25
DE = Drakes Estero	0
DB = Drakes Bay	<10
DR = Duxbury Reef	22
MB = Muir Beach	38
PRH = Pt. Reyes Head	12
PSB = Pescadero State Beach	106
PC = Prairie Creek	410
TB = Tomales Bay	48

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returned within one month to Drakes Estero. In contrast to 1985, only two (10%) seals were classified as breeders and none as transients.

Locations to which seals migrated ranged both north and south of Drakes Estero; however, most (8 of 13) seals traveled to northern sites, four journeyed to southern ones, and one seal traveled to sites in both directions (Figure 4). In all cases, seals traveled to documented harbor seal haul-out sites (Miller 1983). Seals were very individual, though, in location selected and no more than two seals traveled to the same site in a given year. The southern most haul-out site was at Hopkins Marine Station in Monterey Bay (210 km) and the northern most one was at the Klamath River (480 km; Tables 5a and 5b).

The maximum number of recorded haul-out sites used by an individual seal over a one-year cycle was three (Tables 4a and 4b). Five (33%) of the seals tagged in 1985 were recorded exclusively at Drakes Estero, six (40%) on two haul-out sites, and four (27%) on three haul-out sites. Ten seals (53%) of the those tagged in 1986 were recorded hauled out exclusively at Drakes Estero, seven (37%) on two haul-out sites, and two (11%) on three haul-out sites.

Distances traveled to alternate haul-out sites ranged from 12 km to 480 km. Long-range movements of greater than 25 km were recorded for seven of 15 seals in 1985 and four of 19 seals in 1986. In 1985, one female moved north to the Klamath River (480 km) and one traveled south to Monterey Bay (210 km). Both were observed without transmitter at Drakes Estero in April 1986. The seal at Monterey Bay was observed almost weekly hauled out in front of the Hopkins Marine Station from mid-August to mid-March (A. Baldridge, Hopkins Marine Station, CA; C. Deutsch, Univ. of Calif., Santa Cruz, pers. commun.). Five seals traveled to haul-out sites within Point Reyes; three to Tomales Bay and two to Double Point. In 1986, one female (RT137) resided throughout the winter at Pescadero State Beach (south 106 km) and returned to Drakes Estero the following spring. RT305 moved locally and to Tomales Bay (north 48 km) during the winter and also returned to Drakes Estero the following spring. One female (RT246) traveled north to Tomales Bay in October but returned to Drakes Estero by the beginning of November. One male (RT504) was recorded at Drakes Estero on November 5, north at Prairie Creek (410 km), Humboldt County, on November 10, and again at Drakes Estero on November 20.

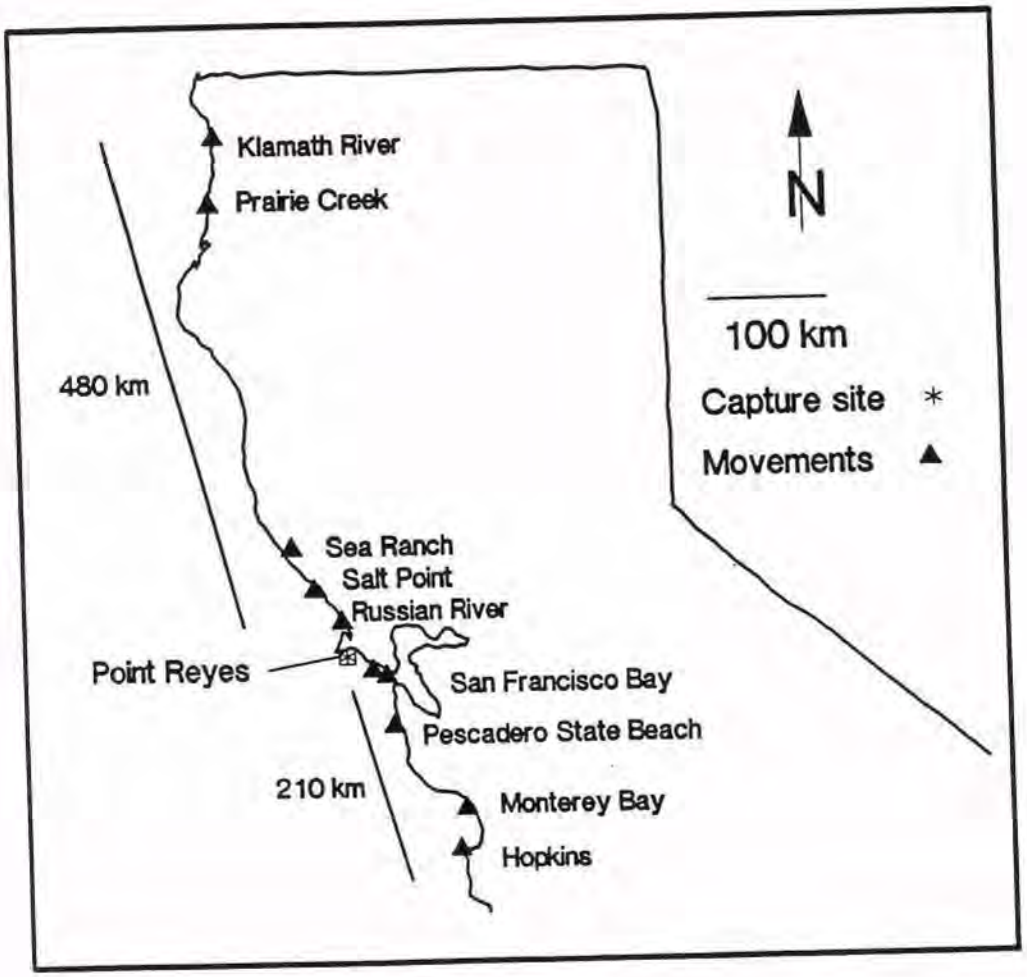

Figure 4. Capture site and resighting locations of harbor seals in California, 1985-1987.

The sample size was too small for comparing differences of movements by sex or age group in 1986, but in 1985 more females (6) traveled long distance than males (2) and females averaged longer distances than males (Table 4a). The pooled results for both years indicate that more movements occurred during the fall (16) than during the winter (5) or spring (6) and that the majority of movements were made by breeders; however, these results may be biased by the length of transmitter attachment (Table 6).

Short-range movements of less than 25 km occurred frequently throughout the study period. Most short-range movements were to Point Reyes Headland (PRH; 12 km) where seals were recorded primarily in the water. Five seals tagged in 1986 were recorded hauled out at PRH and two of these (an immature and adult male) spent more than half their time there. Two transient seals tagged in 1985 relocated to Double Point (16 km south). During both years, seals were also recorded feeding in Drakes Bay both north and south of Drakes Estero.

Two radio-tagged seals captured in March 1987 departed from Drakes Estero. One male (RT060) traveled to Bolinas Lagoon (25 km south) in early April and returned in early May just prior to the estimated weaning date of most pups (see below). One female (RT432) divided her time equally between Drakes Estero and PRH until April 20 when she returned to Drakes Estero and gave birth on April 22. She remained at Drakes Estero continuously until she weaned her pup on May 18 when she returned to PRH. She continued to spend equal amounts of time at PRH and Drakes Estero until her transmitter was shed in June. All other radio-tagged seals in 1987 were recorded at least once in the water around PRH but none hauled out there. In addition, individual seals identified by flipper-tags were recorded at Double Point (6), Bolinas Lagoon (1), and PRH (8) between March 15 and July 30, 1987.

Activity Patterns

All-day censuses at Drakes Estero were conducted to compare the diurnal haul-out pattern of the herd with that of individually marked seals. For both summer and winter in 1985, individual patterns were similar to those of the herd and there was a strong positive correlation between the proportion of tagged seals and the total number of seals hauled out ($r = 0.81$, $p < 0.01$, $n = 86$ counts; Table 7). Consequently, assumptions regarding herd haul-out behavior can be extrapolated from monitoring individuals. Seals

Table 6. Movements greater than 25 km of resident, breeding, and transient seals by year and by season.

	Resident	Breeder	Transient	Totals
Seals tagged 1985	8	4	3	15
Females	3	3	2	
Males	5	1	1	
Seals tagged 1986	17	2	0	19
Females	8	2		
Males	7			
Immatures	2			
No. moves by season:*				
Jul-Oct	4	8	4	16
Nov-Feb	2	2	1	5
Mar-Apr	0	6	0	6

* Combined results for both years.

Table 7. Diurnal haul-out pattern of harbor seals compared to that of radio-tagged individuals at Drakes Estero during summer and winter 1985; Herd is total number of seals hauled out, Tag is total number of tagged seals hauled out, and Prop is number of tagged seals hauled out per hour in proportion to the total number of resident, tagged seals.

Date		Time (PST) 0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
						Summer					
Aug 6	Herd	453	397	429	462	365	259	81	36	17	21
	Tag	8	8	8	9	7	7	3	3	0	0
	Prop	0.6	0.6	0.6	0.6	0.5	0.5	0.2	0.2	0	0
Aug 13	Herd	387	378	325	94	24	106	89	173	192	70
	Tag	5	7	7	5	3	3	4	4	5	2
	Prop	0.5	0.7	0.7	0.5	0.3	0.3	0.4	0.4	0.5	0.2
Aug 20	Herd	389	427	261	372	316	51	1	0	0	6
	Tag	8	8	5	9	8	4	0	0	0	0
	Prop	0.8	0.8	0.5	0.9	0.8	0.4	0	0	0	0
Aug 27	Herd	257	241	174	56	60	72	211	248	265	157
	Tag	3	3	4	2	2	3	8	8	9	9
	Prop	0.3	0.3	0.4	0.2	0.2	0.3	0.8	0.8	0.9	0.9
Sep 3	Herd	100	230	355	252	210	48	0	0	3	24
	Tag	3	4	4	5	5	2	0	0	1	2
	Prop	0.3	0.4	0.4	0.6	0.6	0.2	0	0	0.1	0.2
						Winter					
Jan 1	Herd	190	266	404	467	467	497	192	70	66	0
	Tag	4	4	7	8	8	8	3	1	1	0
	Prop	0.5	0.5	0.9	1.0	1.0	1.0	0.4	0.1	0.1	0
Jan 7	Herd	0	0	0	0	157	329	419	497	498	506
	Tag	0	0	0	0	5	6	7	7	7	7
	Prop	0	0	0	0	.7	.9	1.0	1.0	1.0	1.0
Jan 15	Herd	309	364	413	456	462	451	229	110	0	0
	Tag	3	3	4	4	5	6	5	4	0	0
	Prop	0.4	0.4	0.6	0.6	0.7	0.9	1.0	0.6	0	0
Jan 18	Herd	--	212	210	165	79	64	100	100	110	110
	Tag	--	4	4	3	3	3	3	3	3	4
	Prop	--	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.6
Jan 20	Herd	0	0	14	124	310	372	464	476	467	445
	Tag	0	0	0	2	4	4	5	5	4	4
	Prop	0	0	0	0.3	0.6	0.6	0.7	0.7	0.5	0.6

exhibited distinct seasonal trends in haul-out behavior at Drakes Estero. In 1985, resident seals hauled out an average of 92% (SE = 3%) of the days from August through October, but only 77% (SE = 4%) of the days from November through February (Tables 8a and 9; $p = 0.008$, $n = 8$, Wilcoxon matched-pairs sign-rank test). In 1986, adult seals were hauled out an average of 90% of the total number of days monitored in July and 81% in August but only 74% in December (Tables 8b and 9). The difference between the months July and December was significant ($p = 0.02$, $n = 17$) but not between August and December ($p = 0.5$, $n = 17$, Wilcoxon matched-pairs sign-rank test). In March and April just prior to the breeding season, the percentage of days hauled per month was also low, and then during May, the percentage increased again to 92% ($p = 0.002$, $n = 14$, Wilcoxon matched-pairs sign-rank test). Immature seals hauled out on fewer days than adults; however, the sample size was too small to make meaningful comparisons. In 1985, females appeared to haul-out on fewer days than males in September and November; however, the sample size is too small for useful statistical comparison. There was no significant difference between the number of days that male and female seals were hauled out for the months July and October 1986 ($p > 0.05$; Kolmogorov-Smirnov two-sample test; Table 10). For all other months the percentages were similar.

In 1985, the percentage of tagged seals hauled out per day relative to the total number of tagged seals was also greater for August through October than from January through March (Table 10). For the seals tagged in 1986, the percentages were greater in May, June, and July than in August through April (Table 10). The percentage difference between years for August and September can be explained in part by the inclusion of immatures in the 1986 sample. If immatures are excluded from the analysis, the percentage increases to 76%. Immature seals appeared to haul-out on fewer days in August and September than adults.

When resident seals were not hauled out, they were either in the water within Drakes Estero or were absent from Drakes Estero. The length of time that seals were absent averaged 1.4 to 1.9 consecutive days per month in 1985 and 1.0 to 2.7 in 1986 and 1987 (Table 11). Combined data for both years averaged from 1.5 to 2.5 days per trip (Table 12). The longest absence was for seventeen days but most trips were one day. The average number of trips per month was greatest for February for both years and least for May 1987. Combined data for both years averaged from 2.7 to 5.2 trips per seal per month.

Table 8a. Percentage of days per month individual radio-tagged seals were present at Drakes Estero, 1985-86.

	Month							
Seal	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Females:								
033	90	100	100	90	73	76	58	74
234	90	60	86	52	50	67	*	
491	55	40	**					
710	90	80	86	48	93	73	63	63
Males:								
047	93	100	100	90	83	73	33	50
084	80	80	57	76	93	80	71	65
176	100	100	100	81	93	***		
272	85	*						
435	93	100	100	90	80	*		
753	93	100	100	90	90	80	88	90

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.
*** Condition unknown.

Table 8b. Percentage of days per month individual radio-tagged seals were present at Drakes Estero, 1986-87.

	Month											
Seal	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Females:												
119	78	*										
137	67	23	**									
160	100	100	96	96	93	*						
246	100	100	100	23	33	0	*					
362	100	94	96	92	93	90	86	82	79			
467	100	97	73	65	60	79	86	100	50	83	100	*
482	100	90	92	69	67	59	61	*				
529	100	84	89	77	60	72	71	61	*			
616	33	36	31	57	33	48	50	*				
645	78	77	46	50	40	62	57	*				
024									83	60	100	94
046									61	58	*	
090									52	47	93	88
116									39	67	97	88
432									35	50	50	35
622									61	53	93	94
821									62	67	93	90
844									78	67	93	100
856									87	87	97	100
874									83	63	97	90
Males:												
198	100	94	92	96	83	93	96	*				
267	100	77	96	100	100	97	96	86	*			
342	100	48	46	54	20	62	64	*				
419	100	86	79	77	83	86	*					
444	100	94	89	100	87	83	68	50	71	*		
504	100	94	89	77	40	62	61	39	58	93	95	*
590	78	39	50	73	53	66	75	11	25	10	*	
060									78	0	86	66
893									100	100	100	100
Immatures:												
224	11	52	58	65	50	66	64	36	29	*		
281	44	42	8	***								
305	100	58	**									
325	100	19	19	***								
540	33	23	8	27	33	39	*					

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.
*** Condition unknown

Table 9. Average percentage of days per month seals were hauled out at Drakes Estero by sex and age; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals monitored.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Measurement period 1985-86												
Total Adults:												
$\bar{x}$		87	84	91	77	82	75	63	68			
SE		3.9	7.3	5.4	6.2	5.2	2.0	9.0	6.6			
n		10	9	8	8	8	6	5	5			
Females:												
$\bar{x}$		81	70	91	63	72	72	61	69			
SE		2.9	4.0	8.6	2.9	2.7	2.3	16.3	11.7			
n		4	4	3	3	3	3	2	2			
Males:												
$\bar{x}$		91	92	91	85	88	78	64	68			
SE		0.0	0.1	0.1	0.0	0.0	0.0	0.2	0.1			
n		6	5	5	5	5	3	3	3			
Measurement period 1986-87												
Total Adults:												
$\bar{x}$	90	81	78	74	63	74	73	61	67	63	92	86
SE	4.6	5.6	5.9	5.6	6.7	4.0	4.0	8.0	5.0	6.7	3.4	5.8
n	17	15	15	15	15	14	12	7	18	17	14	11
Females:												
$\bar{x}$	86	85	78	66	60	70	69	81	64	64	91	87
SE	7.1	7.5	9.2	8.3	8.5	5.6	5.4	6.9	5.2	12.6	4.7	6.6
n	10	9	8	8	8	7	6	3	12	11	10	9
Males:												
$\bar{x}$	97	76	77	82	67	78	77	47	73	62	94	83
SE	3.2	8.8	6.5	11.0	11.1	5.6	6.4	15.5	11.3	18.7	2.9	17.0
n	7	7	7	7	7	7	6	4	6	6	4	2
Immatures:												
$\bar{x}$	58	39	23	46	42	53						
SE	18.1	7.7	11.9	19.0	8.5	13.5						
n	5	5	4	2	2	2						

Table 10. Average percentage of radio-tagged seals hauled out per day by month relative to the total number of radio-tagged seals (seals relocated to other haul-out sites are not included); SE is standard error, and n is number of days monitored.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Measurement period 1985-86												
No. Seals		14	8	8	8	8	7	5	5	--	--	--
$\bar{x}$		86	86	88	81	74	65	63	70	--	--	--
SE		3.4	2.8	0.0	4.3	5.2	3.9	5.6	8.0	--	--	--
n		30	5	7	21	30	29	24	21	--	--	--
Measurement period 1986-87												
No. Seals	22	21	20	17	17	17	16	10	19	17	14	11
$\bar{x}$	83	67	64	70	61	69	64	52	64	68	92	87
SE	1.6	2.1	2.0	1.5	2.6	3.3	2.8	3.2	1.7	2.9	2.4	1.9
n	9	31	26	26	30	29	28	26	23	20	27	20

Table 11. Number of consecutive days seals were absent from Drakes Estero, excluding seals that relocated to other sites, for the years 1985-86, and 1986-87. Insufficient data were available for September and October, 1985; n is the number of seals monitored per month, Seal is the number of seals that took trips each month, $\bar{x}$ is mean, and SE is standard error.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Measurement period 1985-86												
n	--	7	--	--	7	7	5	4	3	--	--	--
Seal	--	6	--	--	4	6	4	3	3	--	--	--
$\bar{x}$ days/trip	--	1.5	--	--	1.4	1.9	1.0	1.8	1.4	--	--	--
SE	--	0.3	--	--	0.3	0.6	0.0	0.5	0.2	--	--	--
mode	--	1	--	--	1	1	1	1	1	--	--	--
range	--	1-3	--	--	1-4	1-10	1	1-4	1-2	--	--	--
$\bar{x}$ trips/mo	--	1.7	--	--	2.3	2.7	3.3	4.3	2.7	--	--	--
SE	--	0.5	--	--	0.6	0.6	0.9	1.2	0.9	--	--	--
range	--	1-4	--	--	1-4	1-5	1-5	1-6	1-4	--	--	--
Measurement period 1986-87												
n	21	20	17	16	15	15	13	7	15	13	11	10
Seal	7	17	16	14	14	11	13	6	11	11	3	4
$\bar{x}$ days/trip	1.8	2.5	2.2	2.1	2.7	1.4	1.7	2.0	2.1	1.4	1.0	2.0
SE	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.3	0.5	0.1	0.0	0.5
mode	1	1	1	1	1	1	1	1	1	1	1	1
range	1-5	1-7	1-12	1-17	1-15	1-13	1-4	1-7	1-7	1-3	1	1-4
$\bar{x}$ trips/mo	1.9	3.5	3.8	4.1	4.7	4.8	4.5	5.3	2.6	2.7	1.0	1.8
SE	0.3	0.5	0.7	0.5	0.6	0.9	0.5	0.9	0.4	0.4	0.0	0.8
range	1-3	1-9	1-8	1-7	1-9	1-11	1-7	1-8	1-5	1-5	1	1-4

Table 12. Combined data on number of consecutive days seals were absent from Drakes Estero, excluding seals that relocated to other sites, 1985-87; n is the number of seals monitored per month, Seal is the number of seals that took trips each month, $\bar{x}$ is average, and SE is standard error.

	Month					
	Aug	Nov	Dec	Jan	Feb	Mar
n	22	20	22	17	10	19
Seal	18	16	16	16	8	14
$\bar{x}$ days/trip	2.0	2.5	1.5	1.5	1.8	1.7
SE	0.2	0.3	0.2	0.1	0.2	0.4
mode	1	1	1	1	1	1
range	1-3	1-15	1-13	1-4	1-7	1-7
$\bar{x}$ trips/mo	2.7	4.0	3.9	4.3	5.2	2.8
SE	0.5	0.6	0.7	0.5	0.7	0.4
range	1-9	1-9	1-11	1-7	1-8	1-5
Days absent ($\bar{x}$ days/trip times $\bar{x}$ trips/month):						
	5.4	10.0	5.9	6.3	9.2	4.9

Seals spent more time away from Drakes Estero on foraging trips during the months from September through February, and this trend was most pronounced in November and February (Table 12). For all months except May, June, and July, more than 50% of the seals left the estero at least once. Immature seals appeared to take more trips ($x = 4.3$; 22 of 60 trips) than adults in August; however, the average length of trip was the same as for adults. When seals were absent for more than three days, they often hauled out at PRH.

When seals were present in Drakes Estero, the haul-out pattern was strongly diurnal and most seals hauled out during mid-day regardless of season. The percentage of tagged seals hauled out over a 24-hr period was largest between 0600 and 1600 hr for all months; the percentages hauled per hour, however, varied between months (Figures 5 through 8). Greater than 50% of radio-tagged seals hauled out between 0600 and 1400 hr in May and June 1987. Tide level also influenced the diurnal haul-out pattern. The sand bar where most seals hauled out within Drakes Estero was awash on average 5.1 hrs per 24-hr day ($SD = 1.4$, $n = 13$) and was submerged during tide levels greater than 1.4 m above the mean low except when winter storms would push water levels higher. In the event that sand bars were underwater, seals often hauled out at Limantour Spit which was exposed at all tide levels.

On average, seals hauled out for a total of 7 hrs per day during winter months in both years (Tables 13a and 13b). Seals hauled out for an average of 9 hrs per day during the breeding season (April, May, June) and 11 hrs per day in July during the molt (Table 13b). Seals hauled out for significantly more hours per day during the breeding season than the nonbreeding season ($p = 0.002$, $n = 13$, Wilcoxon matched pairs signed-rank test;comparing March and May). The averages were not significantly different between August and December in 1985 ($p = 0.88$; Wilcoxon matched-pairs sign-ranks test). Males appeared to be on shore for more hours per day than females in 1985, but the sample size was small. In 1986, males also appeared to haul-out for more hours per day; however, the difference was not significant ($p = 0.12$, Mann-Whitney U test, for October). Small sample size restricted testing differences between adults and immatures; however, there appeared to be no difference between the months August and September (Table 13b).

Seals would often come onshore more than once per day. The average number of haul-out bouts was around 1.5 per day for all months except May (Table 14). Seals averaged 2.4 haul-out-bouts per day

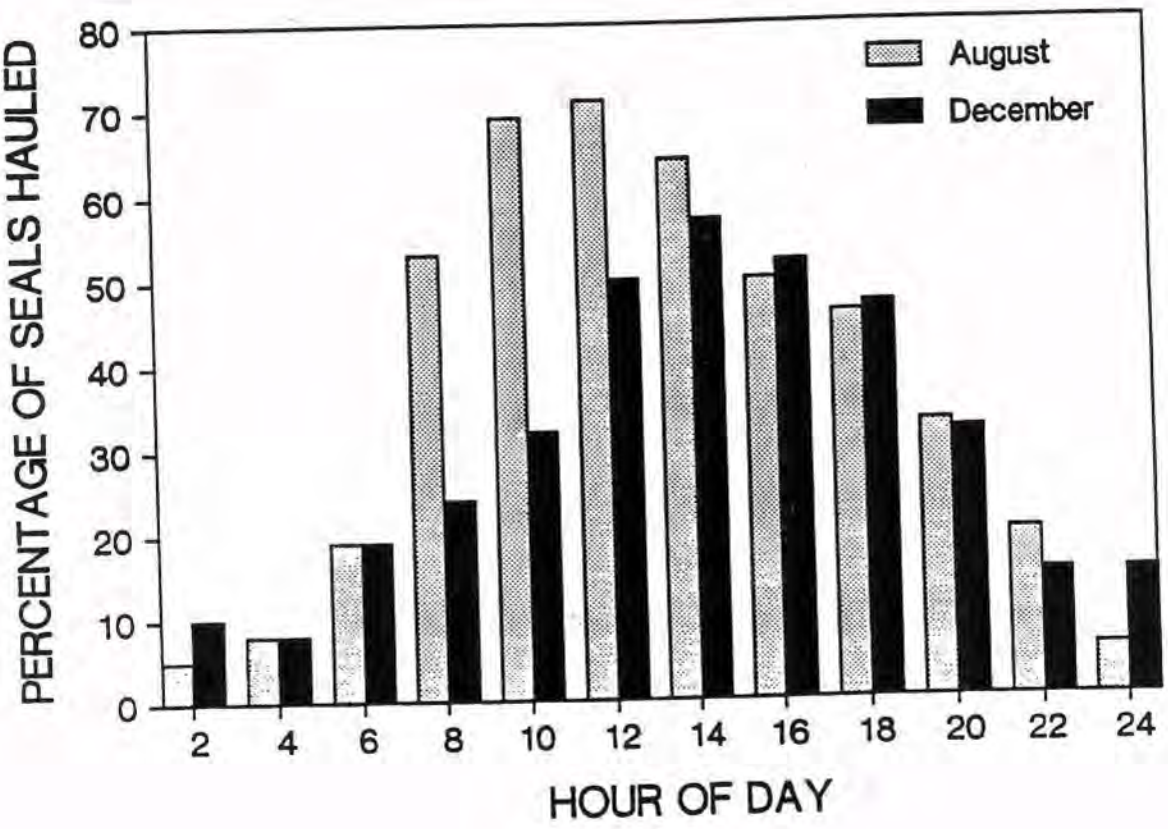

Figure 5. Percentage of radio-tagged seals hauled out by hour of day for August and December, 1985.

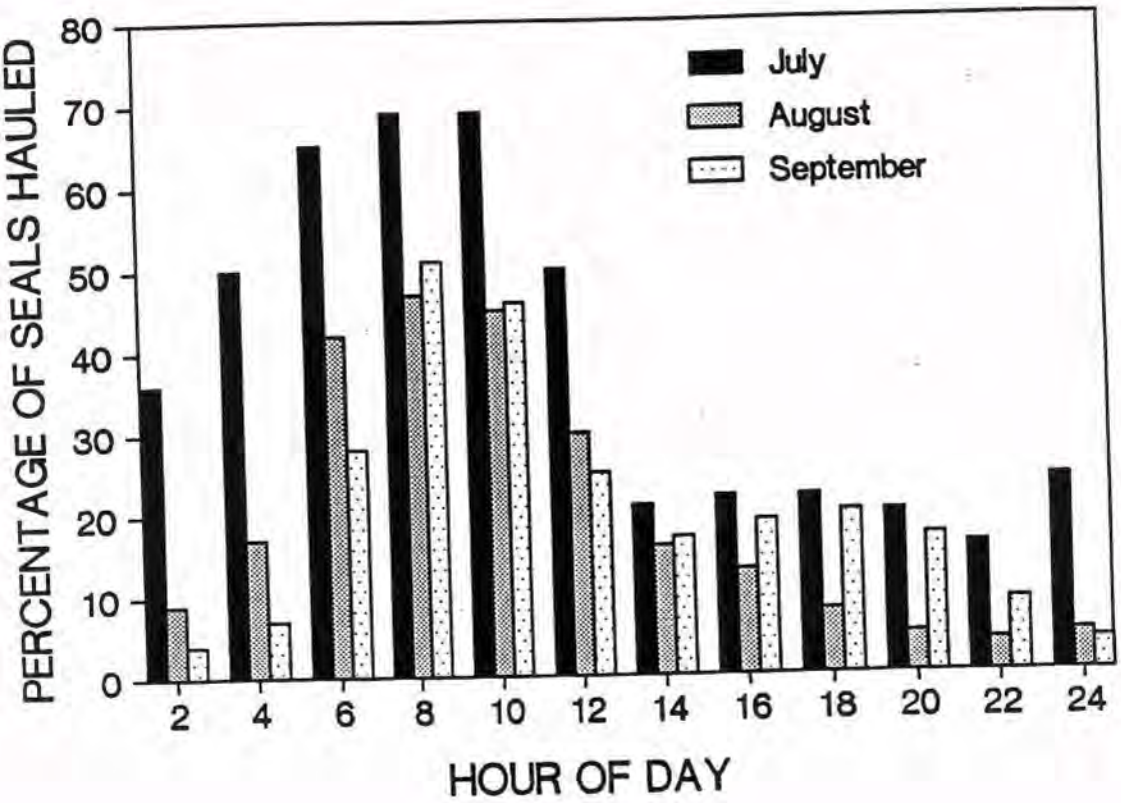

Figure 6. Percentage of radio-tagged seals hauled out by hour of day for summer months, 1986.

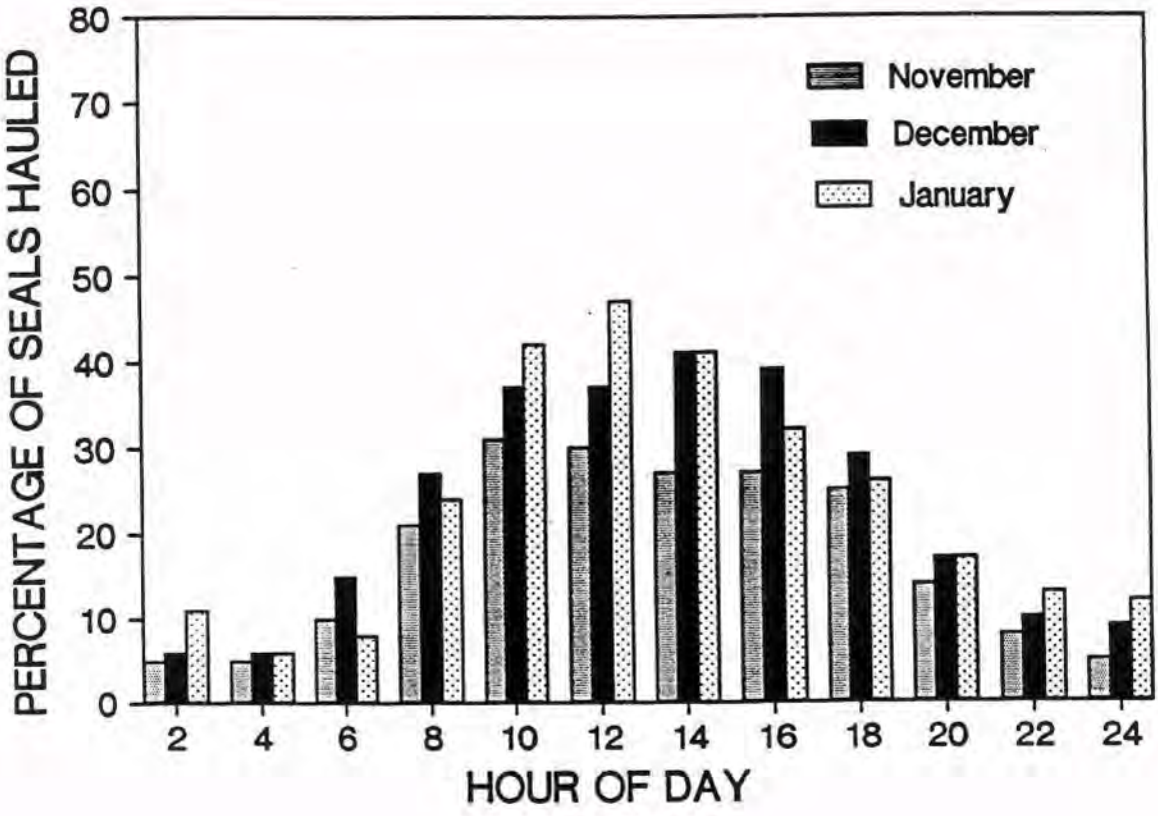

Figure 7. Percentage of radio-tagged seals hauled out by hour of day for winter months, 1986-87.

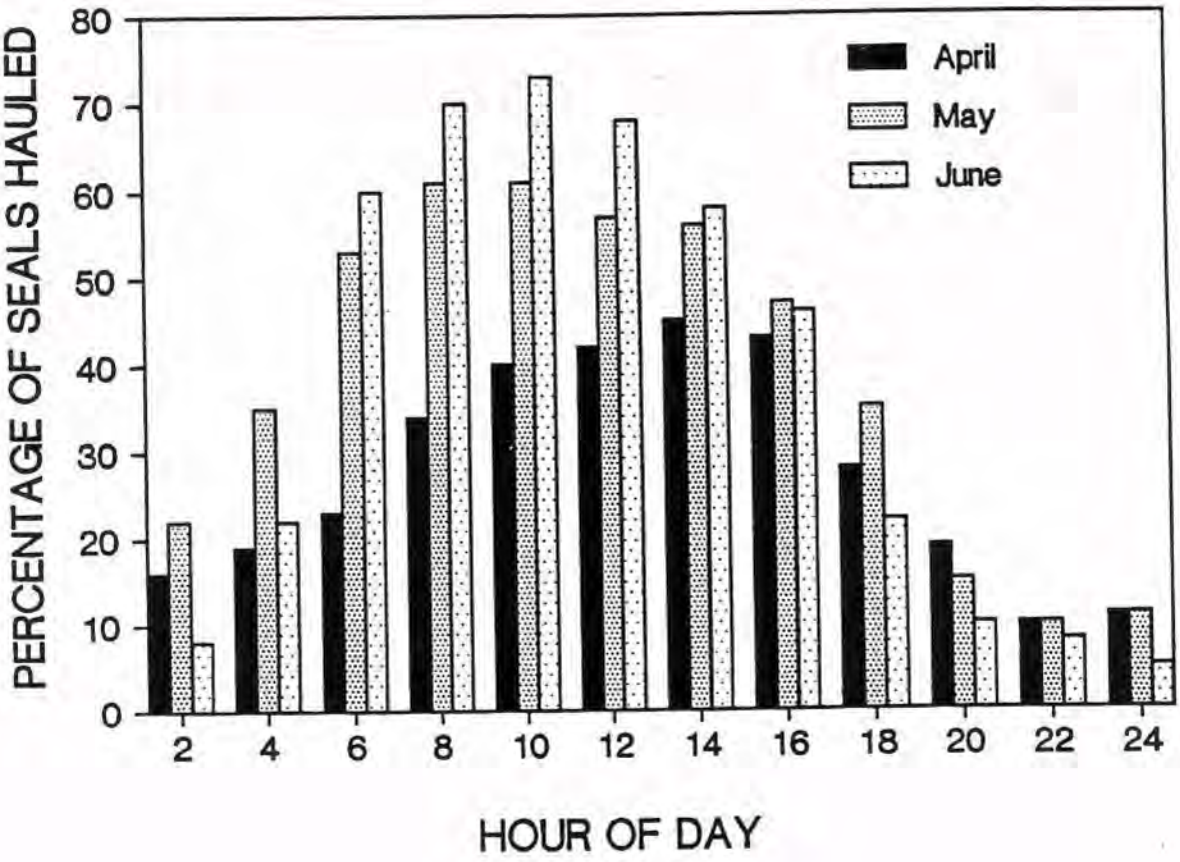

Figure 8. Percentage of radio-tagged seals hauled out by hour of day for spring months, 1987.

Table 13a. Average number of hours per day seals were hauled out at Drakes Estero by month and by sex and age class, 1985-86; $\bar{x}$ is the average, SE is standard error, and n is number of seals monitored.

	Month		
	August	December	March
All seals:			
$\bar{x}$	7.5	7.3	6.9
SE	0.2	0.3	0.3
n	10	8	5
Females:			
$\bar{x}$	7.3	6.0	6.6
SE	0.4	0.5	0.4
n	4	3	2
Males:			
$\bar{x}$	7.6	7.9	7.2
SE	0.3	0.3	0.4
n	6	5	3

Table 13b. Average number of hours per day seals were hauled out at Drakes Estero by month and by sex and age class, 1986-87; $\bar{x}$ is the average, SE is standard error, and n is number of seals monitored.

	Month											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
All seals:												
$\bar{x}$	11.2	6.9	6.8	7.2	6.6	7.2	7.4	7.9	7.5	8.9	9.7	9.5
SE	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.4	0.6	0.4
n	21	14	14	14	14	13	13	7	18	15	14	11
Adult females:												
$\bar{x}$	10.4	6.5	6.5	6.4	6.1	6.4	6.6	6.8	7.1	8.7	9.9	9.5
SE	0.6	0.7	0.7	0.5	0.7	0.5	0.7	0.2	0.3	0.4	0.7	0.4
n	11	7	7	7	7	6	6	4	12	11	10	9
Adult males:												
$\bar{x}$	12.5	7.3	7.2	8.0	7.1	7.9	8.0	9.7	8.5	9.7	9.2	9.5
SE	0.6	0.7	0.5	0.5	0.4	0.4	0.4	0.5	0.8	1.1	1.5	1.0
n	5	7	7	7	7	7	7	3	6	4	4	2
Immatures:												
$\bar{x}$	10.5	6.8										
SE	0.8	0.3										
n	5	5										

Table 14. Length and number of haul-out bouts by month ; $\bar{x}$ is average, SE is standard error, and n is number of seals monitored.

	Month						
	Jul	Aug	Dec	Mar	Apr	May	Jun
Measurement period 1985-86							
n		8	8	6			
$\bar{x}$/length		4.8	5.6	6.1			
SE		0.2	0.2	0.4			
range		1-34	1-17	1-13			
$\bar{x}$/number		1.6	1.4	1.2			
SE		0.1	0.1	0.1			
range		1-4	1-4	1-4			
Measurement period 1986-87							
n	21	19	16	19	15	14	11
$\bar{x}$/length	7.9	5.5	5.7	5.7	5.25	4.5	5.8
SE	0.4	0.2	0.3	0.2	0.2	0.2	0.3
range	1-37	1-27	1-20	1-17	1-34	1-19	1-21
$\bar{x}$/number	1.3	1.5	1.4	1.4	1.7	2.2	1.6
SE	0.0	0.1	0.0	0.1	0.1	0.1	0.1
range	1-3	1-4	1-3	1-5	1-6	1-6	1-4

(n = 139, SE = 0.06,) between the median birthing and the median weaning dates, but only 1.5 per day (n = 142, SE = 0.06) in April two weeks prior to the median birthing date.

Haul-out bouts averaged around 5 hrs for all months except July, when they averaged 8 hrs (Table 14). The length of a haul-out bout was not significantly different between August and December 1985 ($p = 0.84$; Wilcoxon matched-pairs sign-rank test) but did differ between July and August 1986 ($p = 0.0002$; Wilcoxon matched-pairs sign-rank test). Twenty percent of all haul-out bouts were 2 hrs or less; over 90% were 12 hours or less, regardless of month. Maximum length of haul-out bout occurred during the molt (37 hrs) and during the early phase of the birthing season (34 hrs). There did not appear to be a difference in behavior between age classes for the months July and August or between sexes for any month.

Though seals initiated haul-out bouts at all hours of the day, most initiations occurred during daylight hours and before 1200 hr during both years (Figures 9, 10, 11). In April, May and July, however, many initiations occurred between 0100 and 0400 hr. The difference may be explained in part by females hauling out to nurse pups; however, males also initiated haul-outs then. In May, the cumulative percentage for female initiations between 0100 and 0400 hr was 27% and for males was 21%. In June, though, the cumulative percentage for female initiations declined to 14% between 0100 and 0400 hr but for males remained about the same (22%).

The length of haul-out bout was affected by the time of initiation for all months tested except December 1985. Seals that first hauled out between 0000 and 1200 hr were on shore longer than seals that initiated a haul-out bout between 1200 and 2400 hr (July: $X^2 = 80.9$, $df = 9$, $p < 0.001$; August: $X^2 = 59.3$, $df = 9$, $p < 0.001$; December: $X^2 = 69.8$, $df = 9$, $p < 0.001$; May: $X^2 = 80.2$, $df = 9$, $p < 0.001$: June: $X^2 = 58.4$, $df = 9$, $p < 0.001$). For all months, more than 80% of the haul-out bouts lasting for more than 12 hr occurred between 0100 and 1200 hr and less than 10% occurred after 1700 hr.

On June 1 and 2, 1987, I monitored six radio-tagged seals (4 females, 2 males) for 24 hrs beginning at 0900 hr, locating and recording activities every 15 min. The average number of hours hauled was 9.4 (SE = 2.6); however, the range was from 1.3 to 18.5 hr. Three seals hauled out two times during this 24 hr period, two three times, and one once. A seal that hauled for 18.5 hr was the only one to haul-out at night, and coincidentally had just returned from hauling out for several days at PRH. Because seals could haul-out

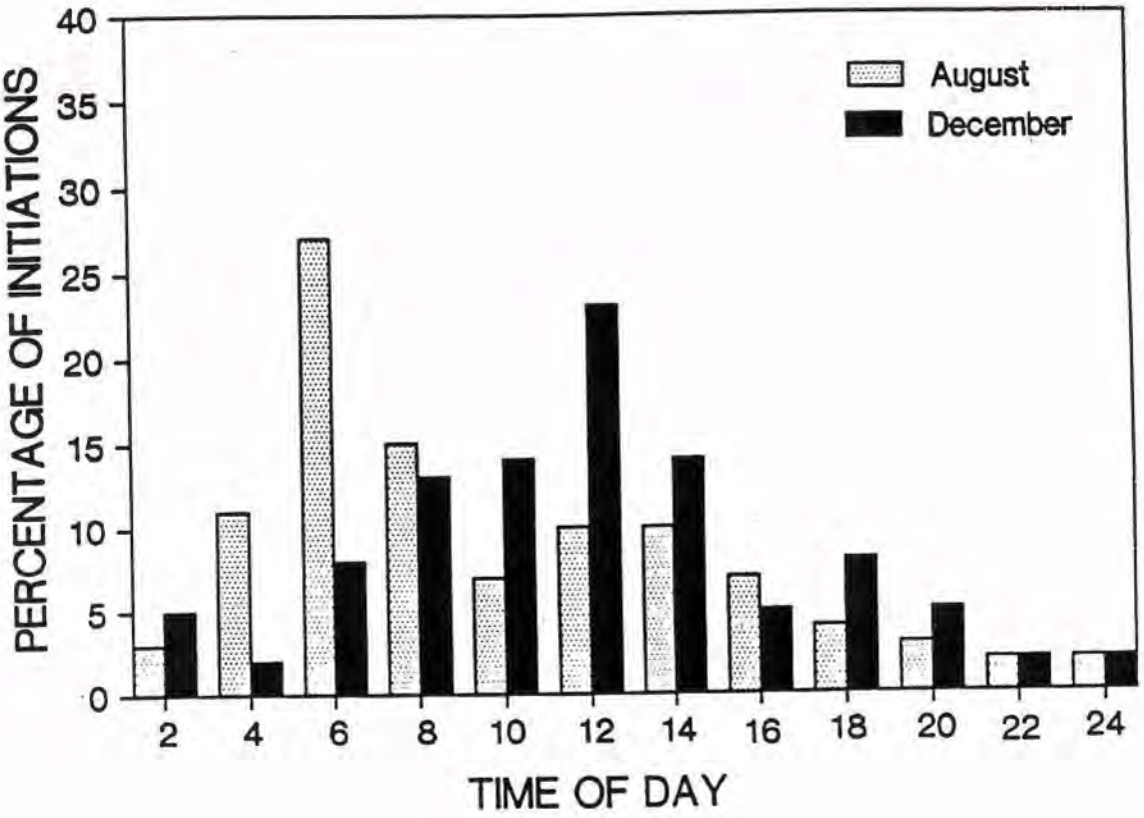

Figure 9. Initiation of haul-out bouts by hour of day for the months August and December, 1985.

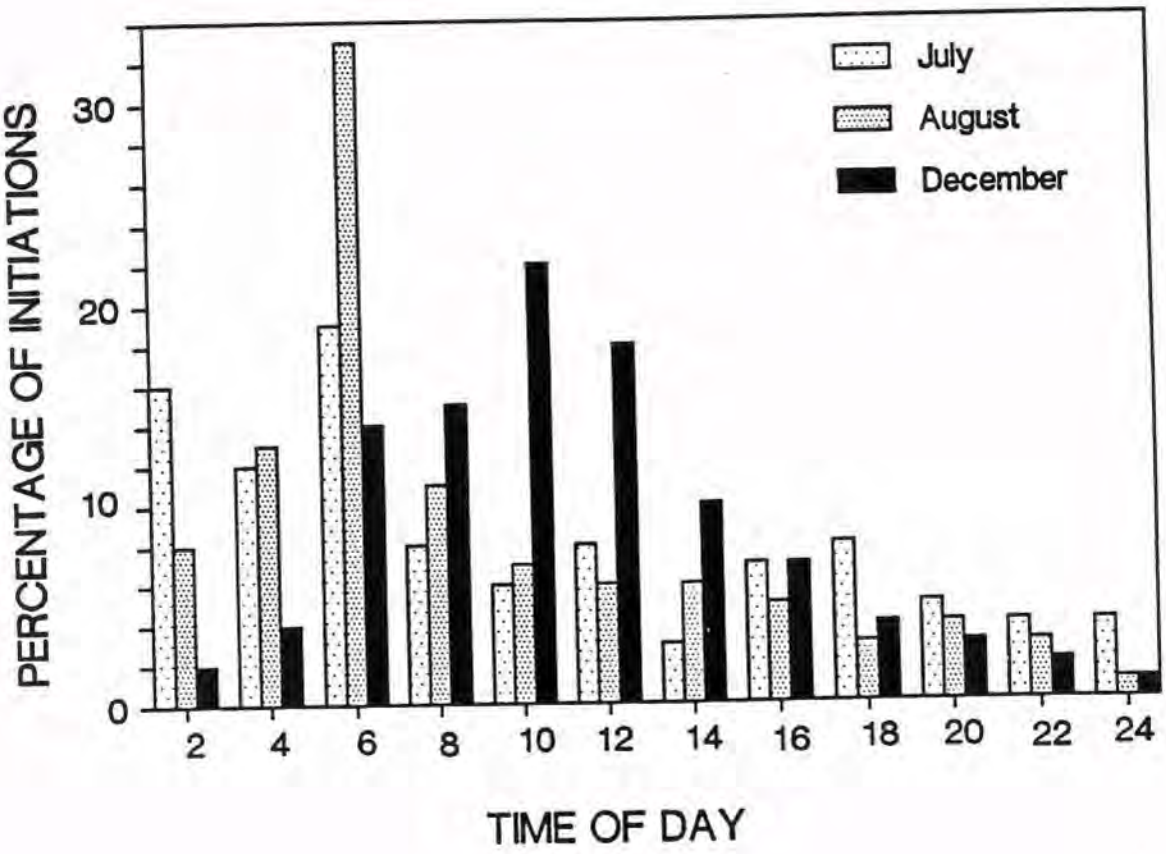

Figure 10. Initiation of haul-out bouts by hour of day for July, August, and December, 1986.

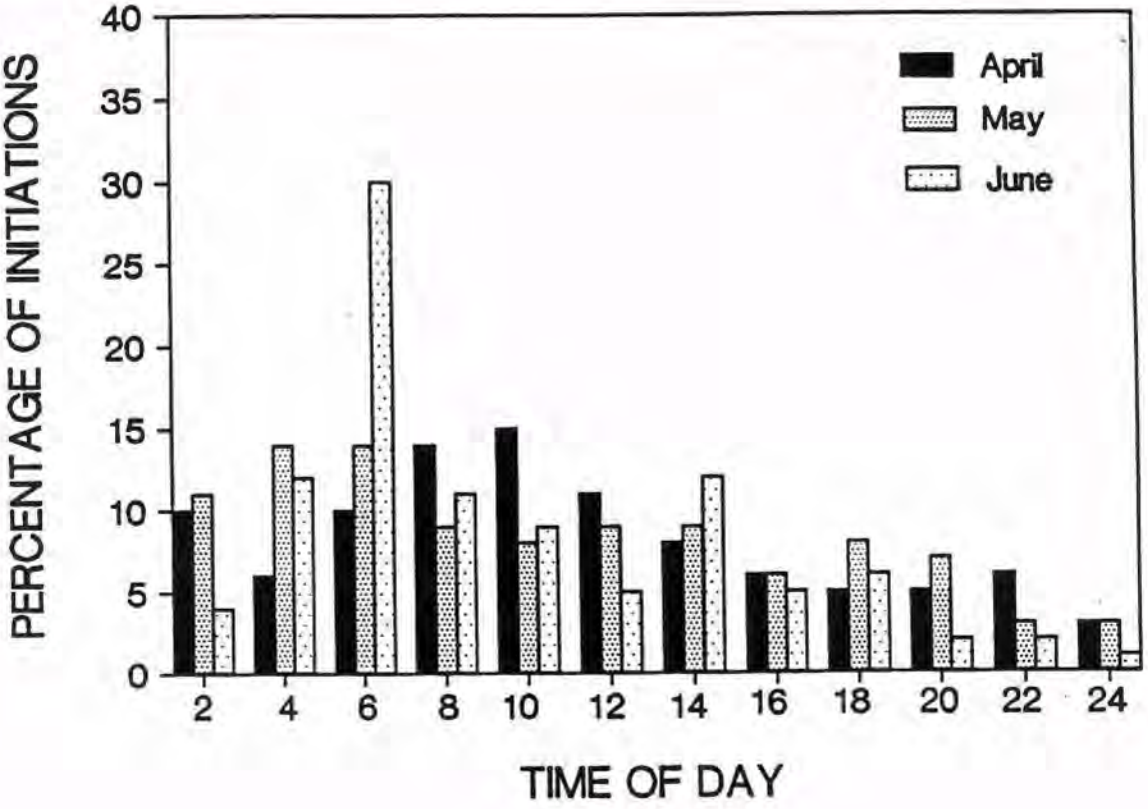

Figure 11. Initiation of haul-out bouts by hour of day for spring months, 1987.

at Limantour Spit at all tide levels, tide did not appear to influence the haul-out pattern. When sand bars in Drakes Estero were awash with rising tides, seals moved to Limantour Spit.

During the 24-hr period, all but one seal were located continuously. Four seals traveled both north and south of the estero but stayed within an 8 km radius, one seal never left the estero, and one seal traveled north out of range for 9.5 hrs. All seals spent a considerable amount of time in the channel of the estero or near the mouth, presumably feeding. Sunrise was at 0600 hr on June 2, and two tagged seals promptly hauled out along with several non-tagged seals. By 0800 hr, two more tagged seals hauled out, and the seal that had remained out all night retreated to the water. At the time of my departure (0900 hr), five seals were in identical locations as recorded at 0900 hr the previous day; four were hauled out at Limantour Spit and two were in the water at the mouth of the estero.

Estimates of Abundance

Direct counts of seals at Drakes Estero indicated that monthly maxima occurred in May, June, and July both in 1986 and 1987 (Figure 12). These numbers, though, are substantially lower than estimates derived from mark-recapture data. From a sample of 16 days between March 16 and April 15, an estimated 949 seals (95% confidence interval: LL 692 and UL 1206) used Drakes Estero (Figure 13). On sample day 4 (March 24), 30 marked animals were hauled out among a herd of 409 seals (18 adults and 12 immatures). On sample day 6 (March 26), the first pup was observed at Drakes Estero. From that date on, the assumption of a closed population was violated and estimates and confidence intervals fluctuated considerably. A population estimate for the same day derived from the expected maximum proportion of seals hauled out mid-day for March (0.455) was 899 (95% confidence interval: LL 769 and UL 1029).

Breeding Season

The first pup was observed at Drakes Estero during the last week of March during both 1986 and 1987. Maximal pup counts were made on April 30 in 1986 (255), and May 6 in 1987 (224). The proportion of pups to total number of seals censused was 0.30 and 0.32, respectively. By the end of May, it became increasingly difficult to distinguish pups from immature seals and few mother-pup pairs were recorded.

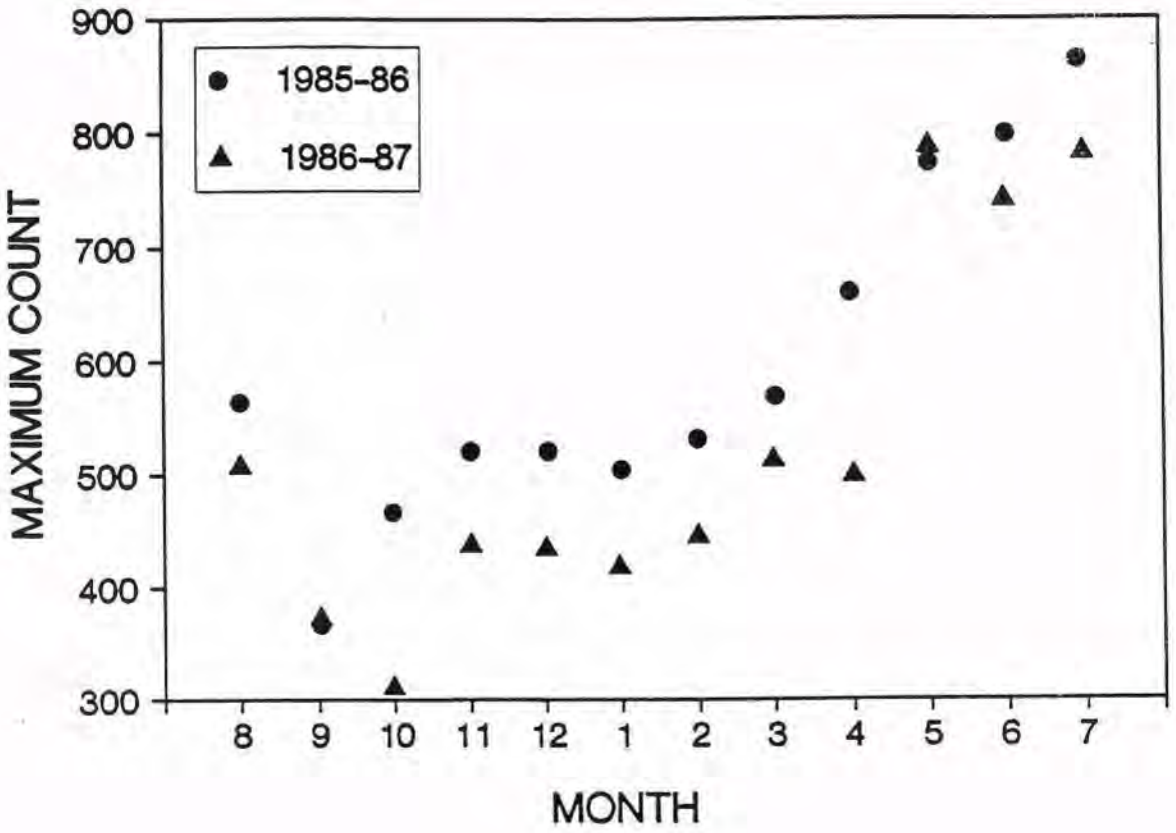

Figure 12. Monthly maximum number of seals counted at Drakes Estero between August 1985 and July 1987.

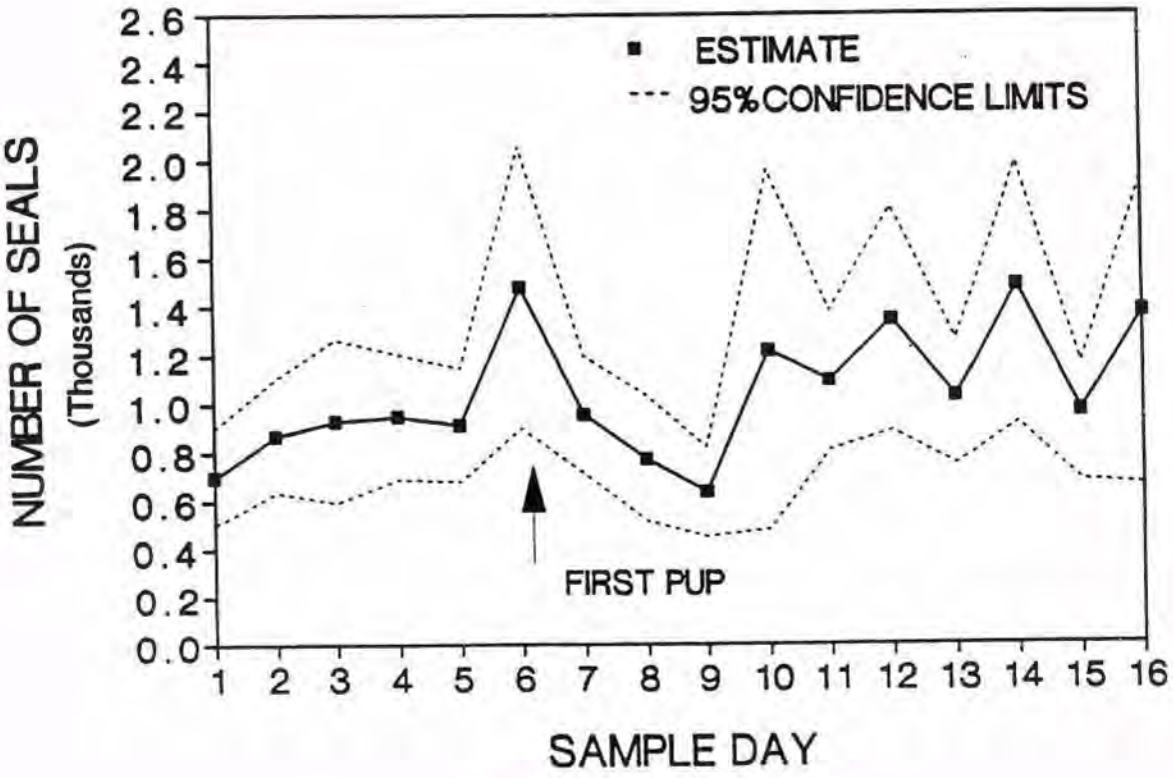

Figure 13. Estimates of absolute abundance of seals at Drakes Estero for March 1987.

Twenty of 28 adult, female seals (71%) tagged in March of 1987 were seen at least once with a pup. In addition, five of ten female seals (50%) tagged in July 1986, were seen with pups. Fifteen tagged seals were closely monitored throughout this season. The median pupping date for these females was April 23, and by April 28, 80% had given birth (range: April 16 to April 30). The median weaning date was May 25, and by May 28, 80% of the pups had been weaned (range: May 14 to May 30). The average number of days that females were seen with pups was 31 (SE = 0.6, n = 15; Table 15). Of the radio-tagged seals, only one (RT821) was observed separated from a pup; 24 days after giving birth, she was seen without pup and searching throughout the estero for two hours. On two subsequent days, she was again observed searching intermittently. All other females were seen in constant attendance with pups until the date of weaning. Weaning appeared to be abrupt. Characteristically, females departed for a minimum of one day from the estero on the day of weaning, and one female (RT432) relocated to PRH.

For the first two weeks after giving birth, females stayed exclusively within the estero, but after that time, they began to depart for an increasing number of hours during the night. Whether pups accompanied females on these excursions is not known. Spatial distribution of seals during the breeding season also changed with increasing use of several additional sites (Figure 2). Twenty-five percent of observations were of radio-tagged seals hauled out at sand bars up the estero, 33.6% at sand bar A1, 28.7% at sand bar A, and 13.4% at Limantour Spit (n = 261 observations). During the winter, though, 91.7% of the observations were of seals at sand bar A and only 8.3% at Limantour (n = 109 observations).

Though spatial segregation by sex was not absolute, the difference between spatial distribution of females with pups and males was significant ($X^2 = 33.55$, df = 3, $p < 0.0001$; Table 16). Females with pups tended to haul-out on sand bar A1 and to avoid Limantour Spit, which males tended to haul-out. During the winter, however, gender differences were not significant ($X^2 = 2.86$, df = 1, $p > 0.05$). Seven of ten females with pups also were remarkably site specific, hauling out at the same location on a subsite during more than 50% of the ground surveys conducted between April 29 and May 27. Female site tenacity was also demonstrated by a radio-tagged female (RT821) observed searching for her pup one day. Over a two-hour period, she investigated pups at two other subsites but returned each time to the locus on sand bar A where she had been seen with pup five times previously. Only one of three male seals expressed a preference

Table 15. Birthing and weaning dates of pregnant females radio- and flipper-tagged in July 1986 and March 1987.

Seal	Estimated Birthday	Estimated Wean Day	Days w/Pup
Radio-tagged			
024	4/28	5/26	30
090	4/30	5/28	29
116	4/28	5/28	31
432	4/22	5/18	27
467	4/27	5/30	39
821	4/26	5/19	24
844	4/23	5/22	30
856	4/21	5/23	33
874	4/23	5/25	33
Flipper-tagged			
RT046*	4/22	5/27	33
T365	4/16	5/14	29
T465	4/19	5/21	33
T454	4/28	5/25	28
RT645*	4/30	5/30	31

* Radio tag had ceased functioning.

Table 16. Spatial distribution of radio-tagged seals hauled out within Drakes Estero by sex and by season, 1986-87. Locations were identified during ground surveys. Number given is the number of days that individual radio-tagged seals were located at each site. A, A1, and U refer to specific sandbars, and L refers to Limantour Spit (see Figure 2).

	Breeding Location				Winter Location			
Sex	A	A1	L	U	A	A1	L	U
Female	55	76	14	52	48	--	3	--
Male	20	9	21	14	52	--	6	--
	$X^2 = 33.55$				$X^2 = 2.86$			
	$p < 0.0001$				$p > 0.05$			

for a location on a haul-out site during the breeding season; however, during the nonbreeding season several male and female seals showed a preference for a particular spot on a haul-out site, and one seal (RT821) continued using the same spot that she had used during the nonbreeding season and the previous breeding season.

During the first two weeks with pup, radio-tagged females hauled out for an average of 13.3 hrs per day (SE = 0.8, n = 10), and for the first couple of days after giving birth, females often hauled out for more than 20 hrs. Unexpectedly, males also hauled out for more hours between the median birthing date of April 23 and the median weaning date of May 25 ($\bar{x}$ = 13.1, S = 2.4, n = 3). For two weeks after pups were weaned, the average total number of hours hauled was 8.0 (SE = 0.7, n = 8) for females (from estimated weaning date to 14 d) and 6.2 (SE = 0.9, n = 4) for males (for period May 12 to May 27). Since mating occurs in the water, it is not surprising that males would spend less time hauled out during the weaning period; however, the difference between the sexes was not significant (p = 0.27, n = 12, Fisher's Exact Test).

DISCUSSION

The decline in seal numbers during winter months at Drakes Estero is related to both seasonal emigration and a reduction in the proportion of days that resident seals haul-out. Movements of greater than 25 km occurred more often in 1985 than in 1986, and instead, seals relocated for brief periods at Point Reyes Headland. The observed differences between years may be attributed to different individual preferences, to greater local food availability, or to some unknown factor. Similar to results in Orkney, Scotland (Thompson 1987), in Alaska (Pitcher and McAllister 1981), on San Nicolas Island in California (Yochem et al. 1987), and in Oregon (Harvey 1987), seals expressed a high level of site fidelity, using no more than three sites. All movements were to well established seal haul-out sites in estuaries, at river mouths, and at coastal sites (Miller 1983, Hanan et al. 1987). Use of more than three sites may have occurred and was not identified, if seals that relocated outside of the Point Reyes Peninsula visited other sites between aerial flights.

In 1985, the majority of long-range movements occurred just prior to the breeding season and after the molt, but in 1986, they occurred during all months except the height of the breeding season. At the

Klamath River, California, Herder (1986) observed that seals traveled significantly more times during the fall and winter and exhibited the greatest local movement during the period April to June. In Orkney, Scotland, Thompson (1987) also found that harbor seals (Phoca vitulina vitulina) made longer trips outside of the study area during the nonbreeding season. In my study more local movement occurred prior to the median birthing date and after the median weaning date, but virtually no movement occurred between those dates. Two of 12 seals (one adult male and one adult female) radio-tagged in March 1987 relocated to other haul-out sites prior to the breeding season but both returned within a few days of the median birthing date. Both Thompson (1987) and Beach et al. (1985) also noted daily attendance during the breeding season.

Herder (1986) and Pitcher and McAllister (1981) observed that immature harbor seals traveled greater distances than adult animals, but in my study, maximal distances were recorded for adults. Immature seals also did not appear to engage in exploratory migration (Baker 1978); however, our sample size was small. One first-year seal rarely departed from Drakes Estero and another relocated intermittently at PRH; one immature traveled to Duxbury Reef and Tomales Bay. Adult females made more long range movements than males in 1985, as was noted by Herder (1986); however, this tendency was not repeated in 1986. Harvey (1987) found no sexual difference in the distance moved by harbor seals in Oregon.

The observed movements indicate that Drakes Estero is an important breeding area for seals ranging as far south as Monterey Bay and north to the Klamath River, an overall distance of 690 km. Movements also indicate that there is substantial social mixing among harbor seal colonies both locally and at distances greater than 25 km; however, mixing did not appear to take place during the breeding season implying that genetic mixing may not be occurring. Brown and Mate (1983) and Herder (1986) also recorded movements of seals between sites in Oregon and Washington, and between colonies in the Klamath River and Alsea Bay, Oregon, respectively. Stewart and Yochem (1983), though, found that inter-island movement of seals on the southern Channel Islands was the exception but that considerable exchange occurred between sites within an island.

Maximum distances traveled by seals in this study were greater than those recorded by Herder (1986) of 300 km from the Klamath River to Alsea Bay, by Boulva and McLaren (1979) of 190 km from Sable Island to Nova Scotia, Canada, or by Beach et al. (1985) of 300 km from the Columbia River to Coos

Bay, Oregon. One seal, though, tagged in Netarts Bay, Oregon, traveled 550 km south to Humboldt Bay, California (Brown and Mate 1983).

In general, movements appeared to be motivated by a group preference for breeding and molting at Drakes Estero, and by an individual preference for feeding areas. Migrant seals were highly individual in distance of movement and final destination. Individual preference may be influenced by past experience and current food availability. Seals do not appear to be responding to a single prey item as was a suggested explanation of winter movements of seals in northern California, Oregon and Washington (Brown and Mate 1983, Beach et al. 1985, Herder 1986, Harvey 1987), but instead, individuals may be expressing a preference for location based on past experience, including foraging success. Fourteen percent of seals radio-tagged over two years, though, visited Tomales Bay during winter when Pacific herring (Clupea harengus) spawn (Spratt 1981). Herder (1986) also observed seals traveling to areas where herring were spawning in Crescent City Harbor, California. The fact that one seal (RT504) traveled great distances (and presumably expended considerable energy) but promptly returned, suggests that past experience may have motivated the initial movement, but that food availability then influenced where it subsequently spent the greater proportion of its time.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals during the breeding season (April and May) and the molt (June and July) than during other months of the year. Peak abundance during these periods have been documented for harbor seals in other areas (Stewart and Yochem 1983, Beach et al. 1985, Harvey 1987, Thompson 1987) and for other phocid seals (e.g. northern elephant seals Mirounga angustirostris (Le Boeuf and Panken 1977), grey seals Halichoerus grypus (Bonner 1981), and Weddell seals Leptonychotes weddelli (Thomas and DeMaster 1983).

The average percentage of total radio-tagged seals hauled out on any given day per month in this study was substantially higher than figures derived by most other researchers studying harbor seals with radio telemetry. Harvey (1987) estimated similar figures for seals radio-tagged in Oregon, hauled out in June (82%) and July (100%) but his percentages for all other months were less than 55%. Stewart and Yochem (1983) calculated that seals hauled out on San Nicolas Island, California, an average of 58% of the days in June and 41% in July. For seals in the Klamath River, Herder (1986) computed an average of 56% of days

in April and 65% in May, and for seals on Tugidak Island, Alaska, Pitcher and McAllister (1981) calculated seals were hauled out on an average of 50% of the days in June.

Dissimilarity between studies is partly explained by differences in sampling techniques and by months chosen for analysis. Harvey (1987) and Yochem et al. (1987) included nonresidents in their analysis, whereas Pitcher and McAllister (1981) eliminated nonresidents. Harvey (1987) argued that by eliminating nonresidents the data may be biased toward resident seals that may rest on shore for longer periods; however, I believe that if the location of nonresidents can be ascertained, then more accurate assessments of time spent ashore for seals in the immediate area can be obtained.

As did Yochem et al. (1987), I calculated the proportion of tagged seals onshore at intervals over 24-hr periods; however, their percentages (11-19%) were still lower than those for Drakes Estero (4-41%) during winter. The difference may be attributed to the larger number of immature animals tagged on San Miguel Island versus the larger number of adult animals tagged in this study (Stewart and Yochem 1983). The percentage of days per month that immature seals were hauled out at Drakes Estero was similar to figures derived by Stewart and Yochem (1983).

The decline in seal numbers onshore at Drakes Estero during the winter is partly a function of a reduction in the total number of hours per day that seals are hauled out. For all months except during the breeding and molt periods, seals spent 29% (7 hr) of each day resting onshore. During the molt, the change is explained by an increase in the duration of a haul-out bout; during the breeding season, though, the increase is due to seals hauling out more frequently. The increase in time spent ashore during the molt is likely related to physiological requirements. The proliferation of epidermal cells is greatly enhanced by maintenance of higher skin temperatures as has been demonstrated in vitro (Feltz and Fay 1966).

Stewart and Yochem (1983) observed seals hauled out for a higher proportion of the day (8.9 hr), than I recorded at Drakes Estero (7 hr). Differences may be attributed to more exposure to disturbance from humans at Drakes Estero; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human disturbance (Allen and Huber 1984b). Yochem et al. (1987) determined that time of initiation of a haul-out bout did not influence the length of the bout; however, I found that during all

months except December 1985, seals hauled out for longer periods when bouts were initiated between 0100 and 1200 hr than for other time periods during day or night.

Sexual differences in activity patterns associated with seasonal reproductive requirements were minimal. Harvey (1987) also found no significant difference in attendance patterns of male and female seals in Oregon during the breeding season; however, his sample size for females with pups was small (3). Intuitively, though, one would expect adult males to spend less time ashore during the breeding season since mating primarily occurs in the water (Allen 1985), and post-lactating females spend less time ashore after weaning pups to replenish fat layers. Thompson (1987) observed this pattern in Orkney, Scotland. At Drakes Estero, the percentage of days hauled out in March, April, and June and the total number of hours hauled per day were not significantly different between the sexes. Males appeared to spend slightly more time in the water immediately after the median weaning date than females, thereby maximizing the opportunity of mating with females either departing from or arriving at a haul-out site. Frequently I observed one radio-tagged male (RT894) resting alone at the mouth of a channel to a haul-out site attended by females with pups. Often he would enter the water and remain at the mouth of the channel.

Preference for location of haul-out was the only significant difference in haul-out behavior between males and females. Herd segregation by sex and age class has been documented by others during the breeding season (Knudtson 1977, Thompson 1987, Allen et al. 1988) and during the nonbreeding season (Sullivan 1979, Payne and Schneider 1984). Site fidelity of individuals within a haul-out site, though, has only been documented by Sullivan (1979) and Heinonen (1985) for adult male seals on offshore rocks in Humboldt and San Mateo Counties, respectively. At Drakes Estero, females with pups exhibited within site fidelity. A primary advantage for this behavior would be to maximize the opportunity for reunion of females with pups should they become separated. During the nonbreeding season, several seals, both male and female, also could often be located at the same position on a given haul-out site. Sullivan (1979) believed that adult males were expressing dominance over females and immatures by selecting rocks to haul-out on which were higher in the supralittoral zone; however, there is no such advantage for seals on sand bars where ample haul-out space is available. Instead, seals may simply be habituated to hauling out at the same

location or to hauling out in proximity to other individual seals, as has been reported by Wilson (1978) for seals in Maine.

The strong diurnal haul-out pattern documented at Drakes Estero previously (Allen and Huber 1984), and shown by many other researchers (e.g. Boulva and McLaren 1979, Fancher 1979, and Stewart 1984), was further confirmed by this study. Though seals hauled out at all hours, peak abundance, based on the percentage of tagged seals, occurred from early morning to mid-day. Yochem et al. (1987) found that 7 of 17 seals preferred hauling out at night and suggested that this behavior could influence estimates of abundance. We identified 4 of 21 seals (3 pups and 1 adult female) in August and 4 of 15 (2 pups and 2 adult females) in December that preferred hauling out at night. In May, higher percentages of seals hauled out at night, but in most cases, these were females with pups that also hauled out for extended periods during daylight hours. Thompson (1987) found that seals in Orkney, Scotland, hauled out primarily during the day and foraged at night during the breeding season; during the nonbreeding season, though, time of day ceased to be a factor in the haul-out pattern. Thompson (1987) speculated that this difference was related to seals foraging for longer intervals during the nonbreeding season. I also established that foraging trips were on average more numerous during the nonbreeding season but that seals were strongly diurnal regardless of season.

Harbor seals may chose to forage at night because of a preference for bottom dwelling fishes that migrate to the surface at night. From stomach content analysis, Jones (1981) determined that harbor seals in northern California foraged primarily on bottom dwelling fish. Families of fishes that are active at night (Moyle and Cech 1986) and that are eaten by harbor seals (Jones 1981, Harvey 1988) include Clupeidae, Scorpaenidae, Embiotocidae, Hexagrammidae, and Sciaenidae. Fishes that are active day and night and are eaten by seals include Salmonidae and Pleuronectidae.

Absences of resident seals from Drakes Estero averaged from one to two days suggesting absentees were foraging close by; local movement patterns observed during aerial and ground surveys also support this conclusion. All recorded foraging activities and movements of seals during aerial surveys were limited to within 3.2 km of shore. Though offshore movements of greater than 10 km by harbor seals have been recorded by others (Spaulding 1964, Wahl 1977, Pitcher and McAllister 1981), nearshore feeding may be

more typical of seals at Point Reyes. Immatures in this study appeared to take more trips than adults in August and September, but there are no comparable data for other months. Once female seals had given birth in 1987, seals of both sexes were present daily in Drakes Estero until pups were weaned.

A more reliable schedule for conducting surveys and minimizing biases is possible once seasonal attendance and activity patterns are understood (Ribic et al. 1986). California Department of Fish and Game has been conducting aerial statewide surveys of harbor seals since 1982 to detect trends in distribution and abundance (Hanan et al. 1987). Attention to population trends has been particularly important during recent years because of an increased incidence of marine mammal - fishery interactions resulting in seal mortality and damage to commercial fishing gear (Beach et al. 1985, Diamond et al. 1986, Harvey 1987). Correction factors, therefore, are desirable to adjust direct counts acquired during aerial surveys.

Boveng (1988) discussed several difficulties in correcting counts due to errors of heterogeneity and to violation of the assumption of a closed population. He considered the most serious problem for estimating total abundance from proportion of seals hauled resulted from sex- and age-specific differences. Ribic et al. (1986) defined several variables requiring correction factors including season, time of day, tide, and sex and age class. Field studies have not yet confirmed sexual or age related differences in attendance patterns (Pitcher and McAllister 1981, Harvey 1987, Thompson 1987, Yochem 1987, Allen et al. 1988). In the Drakes Estero study, the sample size was insufficient for testing age-related differences in behavior but immatures tended to haul-out for fewer days than adults in the fall. Deviations associated with gender were not significantly different except for movement patterns in 1985. Yochem (1987) noted sexual differences in molt sequence and Thompson (1987) demonstrated sexual and age related differences in molt completion dates which may influence the peak abundance for each class. I was unable to acquire reliable data on molt sequence of individuals because of tag loss at the time of molt (transmitters were shed and flipper tag loss was nearing 0.6). Adult females, though, shed transmitters on average 8.6 days earlier than males.

The best strategy for surveying seals in the Point Reyes area would be to census seals midday at the peak of the molt during late June or early July. Seals hauled out for significantly more days per month and more hours per day then than for any other period of the year. Peak abundance occurred between 0600 and 1400 hr which represented between 60% and 73% of the estimated number of seals at Drakes Estero. Ribic

et al. (1986) determined that July counts had lower coefficients of variation and were generally more stable than those for other months of the year. Based on the above and as suggested by Boveng (1988), a correction factor of 1.4 times the total number of animals hauled out could be applied for estimating adult animals at Drakes Estero. This figure, though, would likely underestimate the total population because the attendance patterns of immatures and pups have not been satisfactorily documented during the molt. From studies of immature seals of other species during the molt, one would expect their behavior to be very different from adults (King 1983).

To improve current population estimates, in light of the deficiencies delineated above, future radio-telemetry studies should be designed to include larger sample sizes of each age and sex class. Additionally, research should address biases associated with annual variation. Most telemetry studies are funded for one or two years, and as was demonstrated at Drakes Estero, movement patterns were very different between two years. Between year differences could have been due to different seals sampled or to variation in food availability.

CONCLUSIONS

Results of this study fulfilled the primary objectives delineated in the introduction. The apparent decline in seal numbers during the winter was a function of both migration and a reduction in the frequency of the haul-out pattern. During the nonbreeding season, seals hauled out on fewer days per month and for fewer total hours per day than during the breeding/molt season. The destination of departing seals was detected during most aerial surveys, and movements ranged over a 690 km distance between Monterey Bay and the Klamath River, California. More seals traveled to haul-out sites >25 km from Drakes Estero in 1985 than in 1986; however, several seals relocated intermittently at Point Reyes Headland in 1986.

Results affirm that haul-out behavior of seals varied with time of day and time of year. Seals exhibited a strong diurnal haul-out pattern, regardless of season, with most seals resting onshore mid-day and foraging at night. The amount of time that seals spent onshore, though, varied seasonally. During the nonbreeding season, seals spent about 30% of the day hauled out and 70% either traveling to feeding areas or engaged in foraging activities; during the breeding/molt season, though, they were hauled out 38 to 46%

of the day. During the breeding season, the increase was due to an increase in the frequency of haul-out bouts and during the molt to an increase in the duration of a single haul-out bout.

Age and gender accounted for some of the variation in seal haul-out behavior. Assessment of the influence of age on variation was limited by a small sample size; however, data collected during the fall indicate that immature seals hauled out on fewer days than adults. Once onshore, though, the length of a haul-out bout was no different between age classes. Immatures did not appear to travel longer distances or more frequently than adults. Sexual differences in activity patterns were not significant regardless of season. The total number of hours per day, the length of a single haul-out bout, and the proportion of days hauled out per month were similar for males and females. In 1985 more females migrated and traveled longer distances than males but this trend was not repeated in 1986. Preference for location of haul-out site was the only significant difference in haul-out behavior between males and females and segregation occurred only during the breeding season.

Recommendations for improvement in research design center around determining age-related differences in movement and activity patterns. This can be accomplished in future projects by radio-tagging equal numbers of immatures and adults and increasing the sample size for both. Additionally, a better method of attachment of transmitters and a longer lasting transmitter should be investigated so that individuals can be monitored through the molt and for multiple years. Currently, CDFG statewide aerial surveys occur during the molt; however, all transmitters in this study were shed about two weeks prior to the molt and no telemetry data have been collected through the entire cycle. Nevertheless, major changes in seal haul-out behavior occur during the molt. Attendance patterns during the molt may vary significantly between age and sex classes as was noted by Thompson (1987) and Yochem (1987). Research for several consecutive years would ascertain whether annual differences in movement patterns, as were observed in this study, are typical.

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NOAA Technical Memorandum
NOS MEMD 6

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Washington, D.C.
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U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / Marine and Estuarine Management Division

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INTRODUCTION

Harbor seal colonies in the Point Reyes area, Marin County, contribute about 20% of the mainland California breeding population (Allen and Huber 1984, Hanan et al. 1986) and consequently deserve attention when devising regional management policies. Estimates for the size of the state and Point Reyes populations are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. Consequently, estimates are rough, and are likely low. In addition, it is difficult to relate numbers among seasons. This problem is not unique to the Point Reyes population.

Several researchers have addressed the problem using marked animals and have derived correction factors with varying attendance patterns based on location, time of day, and season of year (Brow.. and Mate 1981, Pitcher and McAllister 1981, Stewart and Yochem 1983, and Sullivan 1979). Stewart and Yochem (1983) for the Channel Islands and Sullivan (1979) for Humboldt Bay, California, found that seals spent about 40% of each day hauled out. Stewart and Yochem (1983) determined that marked seals hauled out on 65% of the days in May, 58% in June, and 35% from October through December. Pitcher and McAllister (1981) estimated that seals in Alaska hauled out on 50% of the days in June and 41% in August, and Herder (1986) found that seals in the Klamath River area hauled out on average 56% of the days in April and 64% in May.

These researchers determined that the differences between total number hauled out and the estimated population were a function of variations in

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daily haul-out patterns as well as movements to other areas. Brown and Mate (1983) determined that dispersal accounted for seasonal changes in the number of seals hauled out in Oregon. Movements appeared to be associated with seasonal changes in reproductive status and in response to feeding strategies (Brown and Mate 1983, Herder 1986). Seals at the Klamath River, California, moved locally to alternate haul out sites year round and dispersed long distances in winter months (Herder 1986). With the exception of one inter-island movement, Stewart and Yochem (1983) found seal movements were local, leading them to conclude that reduced hauling frequency accounted for the decline in seal numbers during the fall and winter months.

In the Point Reyes area we determined previously that seals displayed diurnal and seasonal variation in haul-out patterns (Allen and Huber 1983, 1984). Diurnal and tidal effects on seal haul-out behavior varied within an optimum range with most seal hauled out from mid-day to late afternoon at low to medium tides, depending on the physical attributes of each location. The diurnal pattern was similar to that of the southern Channel Islands (Stewart 1984), Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), and Bolinas Lagoon (Allen et al. 1985). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods. Maximum numbers reached 2449 in May and 2502 in June 1983-84. During the fall and winter, the maximum number of seals was around 1000 animals. It appeared that seals were either moving to other haul-out sites outside of Point Reyes in the winter, or spending more time at sea.

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Information on seasonal activity patterns and fall/winter movements would be invaluable for any long-term management program for seals in the Point Reyes area, and, in conjunction with results accumulated elsewhere (Stewart and Yochem 1983; Herder 1986), could provide more accurate estimates of the California harbor seal population.

In an effort to identify movement and seasonal activity patterns, we undertook a radio-tagging program of harbor seals in Point Reyes. We chose this method based on the successful results obtained from radio-telemetry studies by Brown and Mate (1983), Herder (1986), Pitcher and McAllister (1983), and Stewart and Yochem (1983). Our main objectives were to determine 1) if the apparent decline in seal numbers during the winter months was a function of dispersal and seasonal movements, or a reduction in the frequency of the haul-out pattern, 2) the destination of departing animals, 3) daily and seasonal variability in haul-out behavior, and 4) if gender accounted for variations in the above.

STUDY AREA AND METHODS

Drakes Estero is an estuary where seals haul out on tidal mud flats exposed at low, medium, and medium-high tides, as well as on the tip of Limantour Beach exposed at all tide levels. This location is one of the main breeding areas in the Point Reyes area (Figure 1). Significantly more seals were present during the spring and summer than during fall or winter; however, in contrast to the two other important areas, Tomales Point and Double Point, seals were present in substantial numbers year round (Allen and Huber 1983, 1984). A maximum of 122 pups was counted in May 1983, accounting for 19% (122/656) of the total numbers of seals present. Twenty-three percent (122/527) of all pups in the Point Reyes area occurred at Drakes Estero in 1983.

We chose to tag seals at Drakes Estero because of its significance to the Point Reyes population, because seals there exhibited the seasonal and diurnal activity patterns characteristic of seals elsewhere in the area, and because the capture technique we wished to use was only possible in an estuarine environment.

Over a two-day period (July 31 - August 1) in 1985, we successfully captured about 60 seals and affixed radio transmitters to 17 (nine males and eight females). Our intention was to obtain a sample size of 10 females and 10 males, rather than to randomly capture and tag whatever seals happened to be caught; therefore, we released unmolted and immature seals. Personnel from the Point Reyes National Seashore, the Point Reyes/Farallon Islands National Marine Sanctuary, the National Marine Fisheries Service, the California Department of Fish and Game, the Oregon

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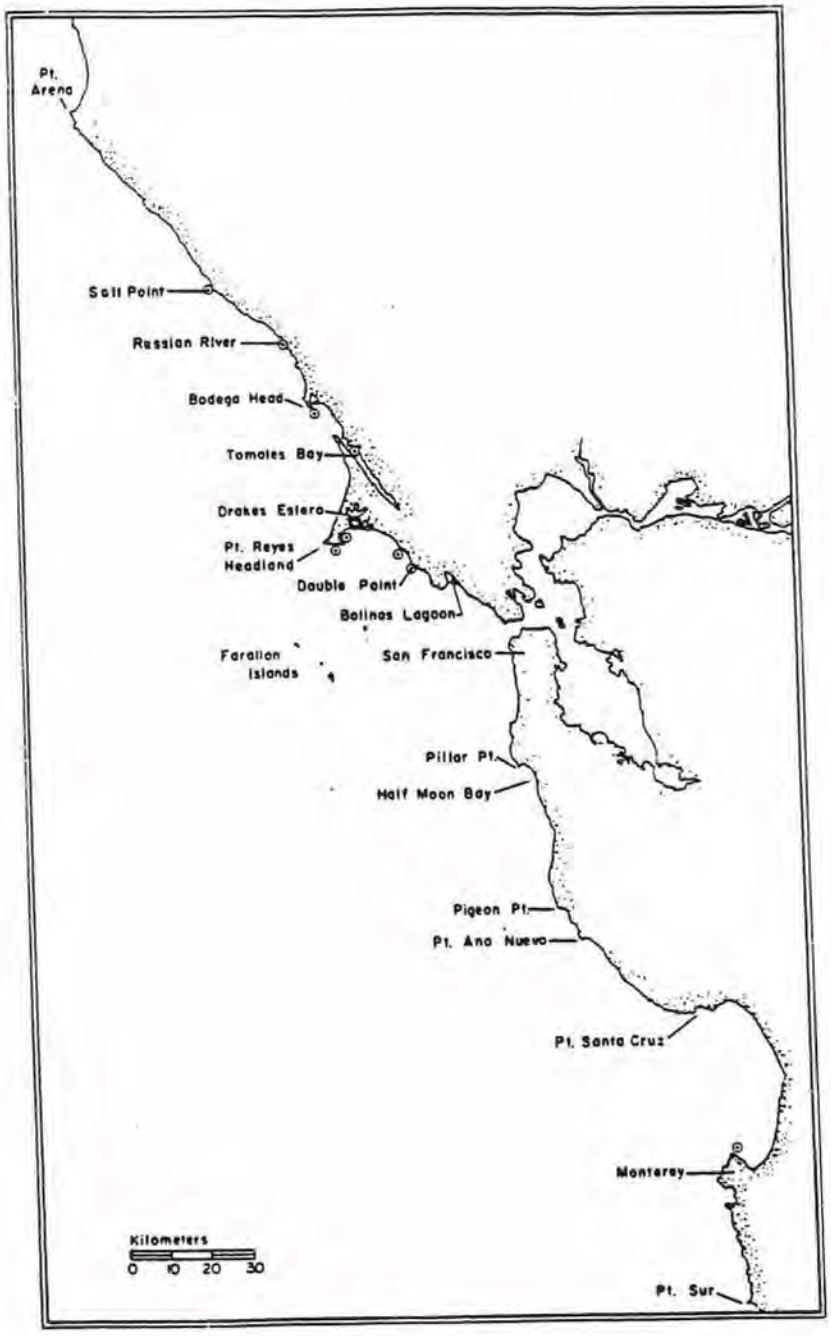

FIGURE 1. Capture site and locations of movement of harbor seals in California, 1985-1986.

Department of Fish and Wildlife, and the Point Reyes Bird Observatory assisted in the capture. We captured seals in a 60-fathom long gill net, with 8-inch mesh, set off the haul-out site and then pulled ashore. Two power boats were used to deploy the net adjacent to the haul-out site. The lead boat carried the net on a platform set above the transom. This boat approached the hauled out seals as rapidly as possible, set the net as the seals entered the water, and then landed on the far side of the haul-out beach. The second boat retrieved the other end of the net and landed. A third boat carried supplies and additional personnel for handling the seals. This method of capture was successfully developed and used in Washington and Oregon for capturing harbor seals in estuaries and enabled the researcher to capture a large number of seals over a short period of time, thereby minimizing the duration of disturbance days to the herd (Beach et al. 1985).

Captured seals were removed from the large net and individually placed in small hoop nets. This temporarily restrained the animals before they were tagged and reduced aggressive interactions between seals, thus reducing injury. Seventeen people were involved in handling the seals. One person recorded data, three weighed seals, two monitored the condition of seals retained in hoop nets, two marked seals with flipper-tags, two to three restrained seals being tagged, one attached the radio transmitter, and one supplied the equipment (tags, resin, etc.). All 17 people were needed to pull the net ashore and place seals in hoop nets.

Captured seals were weighed, measured (length and girth), sexed, flipper-tagged, dye-marked, and radio-tagged. The average time required to

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accomplish this was 15-20 minutes per seal. When the tide level began to flood the haul-out site, any remaining seals were transferred by boat to the mainland for processing. Red Woolite sheep dye which lasts for about three months was used to mark each seal for easy visual resighting. Fourteen seals were flipper-tagged with lime green "Riese" cattle ear tags supplied by NMFS. Two neoprene patches with an individual number code and a color code for gender were glued with "Lock-tight" super glue to the fur between the shoulder blades to provide an additional visual mark. A radio transmitter manufactured by Advanced Telemetry Systems, Inc. (Bethel, Minnesota) was glued to the fur on the back of the seal's head with "Devcon" 5-minute epoxy (for attachment procedures see Beach et al. 1985). By attaching the radio tag to the head of the seal we were able to locate seals when they were in the water. Radio transmitters were 9 x 3 x 3 cm, weighed 60 gms, had a 13-inch flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute.

We monitored seals with an automated recording station and aerial surveys. The automated recording station was established on a bluff overlooking Drakes Estero and consisted of an "Esterline Angus" 20-channel strip chart recorder, a programmable scanning receiver, a 12-volt marine battery, and a "Yagi" antenna. The station recorded seals within a two-mile radius on a 24-hour basis. Each frequency was monitored by the scanning receiver for 32 seconds and was scanned five to six times per hour. A seal was considered hauled out if it was recorded with two strong pen marks in a row within a half-hour period; a seal was considered in the

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vicinity but in the water if a strong pen mark in conjunction with two weak marks within a half-hour was recorded. We manually checked frequencies to determine if radio interference from the nearby radio communication facilities (U. S. Coast Guard Station and RCA Gobal Communications Center) triggered pens and found that interference did not hinder distinguishing whether a seal was hauled out. Radio interference on one frequency prevented our distinguishing whether one animal was in the water but did not hinder our distinguishing when it was hauled out; interpretation was not impaired for the other frequencies. A test transmitter was placed near the remote station to verify that the receiving system was functioning properly. The remote receiving station was in operation from July 31 through September 5, and from October 25 through December 31, 1985; and from January 1 through February 16, and February 21 through April 30, 1986.

We checked and maintained the remote station almost daily in August and semi-weekly for the rest of the study period. During visits we scanned all frequencies and checked for signal drift. Each signal was checked for a period of five to ten minutes to detect seals in the water. We based this scan period from averaging dive times of tagged seals during the first month of the project ($\bar{x}$ = 3 min, range = 5 sec - 9 min 45 sec, SD = 2 min, n = 76). We made visual searches for marked animals to check for transmitter loss or failure.

We also conducted all-day censuses at Drakes Estero to compare the diurnal haul-out pattern of the herd with those of individually marked seals. For both summer and winter, individual patterns were similar to those of the herd (Table 1). Consequently, we were confident in making

Table 1. Diurnal haul-out pattern of the herd in comparison to that of radio-tagged seals at Drakes Estero during the summer and winter seasons; herd = total number of seals hauled out, tagged = total number of tagged seals hauled out, and proportion = the proportion of tagged seals hauled out to the total number of resident, tagged seals.

	TIME (PST)									
	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
SUMMER										
Aug 6										
Herd	453	397	429	462	365	259	81	36	17	21
Tagged	8	8	8	9	7	7	3	3	0	0
Proportion	0.6	0.6	0.6	0.6	0.5	0.5	0.2	0.2	0	0
Aug 13										
Herd	387	378	325	94	24	106	89	173	192	70
Tagged	5	7	7	5	3	3	4	4	5	2
Proportion	0.5	0.7	0.7	0.5	0.3	0.3	0.4	0.4	0.5	0.2
Aug 20										
Herd	389	427	261	372	316	51	1	0	0	6
Tagged	8	8	5	9	8	4	0	0	0	0
Proportion	0.8	0.8	0.5	0.9	0.8	0.4	0	0	0	0
Aug 27										
Herd	257	241	174	56	60	72	211	248	265	157
Tagged	3	3	4	2	2	3	8	8	9	9
Proportion	0.3	0.3	0.4	0.2	0.2	0.3	0.8	0.8	0.9	0.9
Sep 3										
Total	100	230	355	252	210	48	0	0	3	24
Tagged	3	4	4	5	5	2	0	0	1	2
Proportion	0.3	0.4	0.4	0.6	0.6	0.2	0	0	0.1	0.2
WINTER										
Jan 1										
Herd	190	266	404	467	467	497	192	70	66	0
Tagged	4	4	7	8	8	8	3	1	1	0
Proportion	0.5	0.5	0.9	1.0	1.0	1.0	0.4	0.1	0.1	0
Jan 7										
Herd	0	0	0	0	157	329	419	497	498	506
Tagged	0	0	0	0	5	6	7	7	7	7
Proportion	0	0	0	0	0.7	0.9	1.0	1.0	1.0	1.0
Jan 15										
Herd	309	364	413	456	462	451	229	110	RAIN	
Tagged	3	3	4	4	5	6	5	4	0	
Proportion	0.4	0.4	0.6	0.6	0.7	0.9	1.0	0.6	0	
Jan 20										
Herd	0	0	14	124	310	372	464	476	467	445
Tagged	0	0	0	2	4	4	5	5	4	4
Proportion	0	0	0	0.3	0.6	0.6	0.7	0.7	0.5	0.6
Jan 18										
Herd		212	210	165	79	64	100	100	110	110
Tagged		4	4	3	3	3	3	3	3	4
Proportion		0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.6

assumptions regarding herd behavior from data derived from monitoring individuals at Drakes Estero until the spring (after the month of March) when two transmitters that were still functioning were too few to make valuable comparisons. During the all-day censuses we also verified the accuracy of the equipment in distinguishing the presence or absence of seals and whether they were hauled out or in the water.

To locate dispersing seals we attempted to make weekly aerial surveys along the California coast from Monterey Bay to the California/Oregon border. Seals were monitored with a scanning receiver and two wing-mounted, two-element antennae from Telonics (Mesa, Arizona), and frequencies chosen were continuously scanned for three seconds each. When a seal was located, activity, time, and location were recorded. Most flights ranged from Point Arena south to Half Moon Bay and into San Francisco Bay. The flights varied depending on which animals we were trying to locate. We scheduled flights on days when tides were low to medium to maximize numbers of seals hauled out.

DATA ANALYSIS

We defined seals as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" as those which departed in the fall but returned during the following breeding season, and "transients" as those present at Drakes Estero during the capture but which resided away from Drakes Estero during the rest of the study period. Seal behavior at Drakes Estero was classified as either 1) hauled out, 2) in the water, or 3) absent. All information recorded on the Esterline Angus strip charts

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was transferred to the "DBase III" database system. The "SPSS statistical program for micro-computers" was used for all analyses. Analyses presented here are exploratory and primarily descriptive since this is the first of a two-year study. Averages are expressed with $\pm$ standard error. We chose August and December data to illustrate some of the seasonal differences in haul-out behavior.

RESULTS

We captured and radio-tagged 17 seals (eight females, nine males) and flipper-tagged two additional males (Table 2). On average, males weighed 27.5 kg more, and were 10.2 cm longer than females. On the day after capture, all but two of the radio-tagged seals were hauled out again at Drakes Estero, and on the third day after capture all but one seal was hauled out. All but two transmitters (88%) remained attached to seals for a minimum of five months, nine (53%) for seven months, six (35%) for eight months, and one for nine months (Table 3). We were able to locate regularly, either visually or with a receiver, all but one animal through April 1986.

MOVEMENTS

All radio and flipper tagged seals were resighted at Drakes Estero at least once during the study period. Two seals with transmitters that ceased functioning within the first month of study were excluded from all analyses; the two animals involved remained at Drakes for the entire year. Radio-tagged seals moved both north and south of the capture site;

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Table 2. Standard measurements of harbor seals tagged at Drakes Estero, August 1985. (RT = Radio Tag, FT = Flipper Tag.)

Radio Tag	Age	Sex	Length(cm)	Girth(cm)	Weight(kg)	Comments
RT024	AD	F	146	98	63.5	
RT033	AD	F	138	95	56.7	
RT092	AD	F	148	96	55.8	
RT234	AD	F	147	120	86.2	
RT313	AD	F	145	103	63.5	
RT415	AD	F	131	94	50.0	
RT491	AD	F	121	94	56.7	
RT710	AD	F	138	96	63.5	
RT047	AD	M	150	108	74.8	
RT084	AD	M	154	112	93.0	Old shark bite
RT124	AD	M	148	125	77.1	
RT176	AD	M	148	118	84.4	
RT256	AD	M	146	105	74.8	Old shark bite
RT272	AD	M	167	117	90.7	
RT435	AD	M	168	106	79.4	
RT753	AD	M	147	118	9[illegible].0	
RT974	AD	M	163	114	90.7	
FT212	AD	M	155	111	90.7	
FT222	AD	M	144	107	77.1	
FT220	AD	M	150	-	83.9	
--	AD	M	173	117	102.0	
Total Average			149 ± 3	108 ± 2	77 ± 3	
Average for Females			139 ± 3	100 ± 3	62 ± 4	
Average for Males			155 ± 3	113 ± 2	86 ± 2	

Table 3. Minimum estimated length of time transmitters were functional, and date/place seal last located visually or audibly with a receiver.

Seal	Date Last Recorded	Date Last Observed/Recorded	Location[a]	Minimum length of Attachment(days)
024	Nov/12/85	Apr/29/86	DE	101
033	Mar/3/86	Jul/10/86	DE	240
047	Mar/12/86	Jul/10/86	DE	221
084	Mar/27/86	Jul/10/86	DE	236
092	Mar/19/86	Jul/3/86	DE	228
124	Mar/6/86	Jul/ /86	DE	236
176	Jan/8/86	Jan/8/86	DE	158
234	Jan/24/86	Jul/10/86	DE	174
256	Aug/9/85	Jul/21/86	DE	7
272	Aug/28/85	Jul/10/86	DE	26
313	Dec/19/85	May/22/86	DE	138
415	Apr/18/86	Apr/18/86	RR	258
435	Jan/1/86	Jul/3/86	DE	151
491	Dec/19/85	May/10/86	DP	138
710	Mar/19/86	Jul/23/86	DE	228
753	May/3/86	Jul/10/86	DE	273
974	Apr/16/86	Jul/3/86	DE	256

[a] DE = Drakes Estero, DP = Double Point, RR = Russian River.

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movements were within 0.8 km of the shoreline (Table 4, Figure 1). Five seals (33%) were recorded exclusively at Drakes Estero, six others (40%) on a total of two haul-out sites, and four (27%) on three haul-out sites (Table 5).

We classified eight radio-tagged seals (53%) as residents (five males, three females). Of these, three were located once in the water near another, nearby, haul-out site and one (a female) traveled greater than 25 km. We classified four seals (27%) as breeders (three females, one male); all of which traveled greater than 25 km away from Drakes Estero. We classified two females and one male as transients (20%), and these moved both locally and further than 25 km (Table 5).

Long-range movements of greater than 25 km were recorded for 6 of 15 seals. Although females traveled longer distances than males, both sexes moved about the same number of times (Table 5). One female moved north to the Klamath River (480 km) and one traveled south to Monterey Bay (210 km) for the winter months. Both were observed (without transmitter) at Drakes Estero in April 1986. The seal at Monterey Bay was observed on almost a weekly basis hauled out in front of Hopkins Marine Station from mid August to mid-March (Alan Baldridge, Hopkins Marine Station, CA; C. Deutsch, Univ. of Calif., Santa Cruz, CA, pers. comm.). Five seals traveled to nearby haul-out sites at Point Reyes; three to the Tomales Bay haul out site and two to the Double Point haul-out site. Seals were also recorded in the water near the Point Reyes Headland, Wildcat Beach, Bolinas Point, and Drakes Bay near the fish docks.

More movements both local and long distance (20) were recorded during

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Table 4. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys. Behavior is classified as A = active/swimming, I = inactive/hauled out.

FLIGHT DATE/PLAN		SEAL BY RADIO FREQUENCY NUMBER												
		024	033	047	084	092	124	176	234	313	415	435	491	710	753	974
1985																
Aug	9 1	DE/I				DE/I	PRH/A			DE/I			DE/I	DE/I		DE/I
	15 1								DE/I	TB/A						TB/I
	29 1						DP/I	DE/I	DE/I	TB/I		DE/I		DE/I		TB/I
Sep	12 1		DE/I	PRH/A		MB/I							DP/I			
	13 2				DE/A							DE/I	DP/A	DE/I	DE/I	TB/I
	19 1				DE/I			DE/A	DE/I				PRH/A	TB/A		TB/I
	26 1		DE/I	DE/I	DE/I		DP/I			TB/A			DP/A		DE/I	
Oct	4 1				DE/I		DP/A	DB/A	DE/I	TB/I	SR/I			DE/A		
	10 3	KR/A	DB/A	DE/A	DE/I	MB/I						DB/A			DE/A	TB/I
	22 1											BP/A			DB/A	BH/A
	23 2									BH/A		DE/I		DE/I		TB/I
	28 1			DE/A	DE/A			DE/I		TB/A		DE/I		DE/I	DE/I	TB/I
	31 1		DE/I	DP/A	DE/I			DE/I							DE/I	
Nov	8 1		DE/I	DE/I	DE/I			DE/I		SP/I						
	21 1				DE/I			DE/I								TB/I
	26 1	equipment failure					DP/I			SP/I	RR/I		DP/I			TB/A
Dec	10										RR/I			DE/A	DE/I	TB/I
	19 1			PRH/A										DE/A	DE/I	
Feb	7 1			PRH/A							RR/I				DE/I	
	27 1		DE/I		DE/I										DE/I	
Mar	20 1		DE/I		DE/I	MB/I					RR/I				DE/I	TB/I
	23 2		DE/I								RR/I				DE/I	TB/I
	25 1										RR/I				DE/I	DE/I
Apr	2 1															
	18 1															
May	9 1															

Locations with distances (km) from capture site:

DE = Drakes Estero	0	BP = Bolinas Point	20
DB = Drakes Bay	<10	BH = Bodega Head	40
DP = Double Point	16	MB = Monterey Bay	210
KR = Klamath River	480	RR = Russian River	55
SP = Salt Point	65	TB = Tomales Bay	48
SR = Sea Ranch	85	PRH = Pt Reyes Head	12

Flight Plan:

Half Moon Bay to Pt. Arena	= 1
Drakes Estero to Monterey Bay	= 2
San Francisco to Klamath R.	= 3

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Table 5. Distance of movement and locations of individual seals.

Seal	No. of moves	Average distance (km)	Locations[a]	Number of Locations
Females:				
024	2	480 ± 0	KR DE	2
033	-0-	-	DE	1
092	2	210 ± 0	MB DE	2
234	-0-	-	DE	1
313	3	47 ± 11	TB SP DE	3
415	2	58 ± 28	SR RR	3
491	3	24 ± 4	DP PRH DP	3
710	2	48 ± 0	TB DE	2
Totals	14	128 ± 43		
Males:				
047	4	12 ± 0	PRH DE PRH DE	2
084	-0-	-	DE	1
124	4	18 ± 0	PRH DP DE DP	3
176	-0-	-	DE	1
435	2	20 ± 0	BP DE	2
753	-0-	-	DE	1
974	2	48 ± 0	TB DE	2
Totals	12	26 ± 4		

[a] BP = Bolinas Point, DE = Drakes Estero, DP = Double Point, KR = Klamath River, MB = Monterey Bay, PRH = Point Reyes Headlands, RR = Russian River, SP = Salt Point, SR = Sea Ranch, TB = Tomales Bay.

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the fall (August-October) than during the winter (November-February) or the spring (March-April), i.e. eight versus six movements, respectively. Most long distance movements were made by breeders during the fall and the spring when seals were departing to wintering sites after the molt and returning for the breeding season (Table 6). One transient seal that traveled 85 km did not return to Drakes during the breeding season.

ACTIVITY PATTERNS

Resident seals exhibited distinct seasonal and circadian trends in haul-out behavior at Drakes Estero. Resident seals were hauled out an average of 0.92 $\pm$ 0.03 of the days from August through October but only 0.77 $\pm$ 0.04 of days from November through February (Tables 7, 8) ($p = .0081$, $n = 8$, Wilcoxon matched-pairs sign-rank test). The change in number of days that seals were hauled out in winter was more pronounced for females than males but sample sizes were too small to test for significance. If one looks at the individual patterns, there is variation, but the trends are similar. The proportion of tagged seals hauled out per day relative to the total number of tagged resident seals was also greater for August through November than from December through March (Table 9).

When resident seals were not hauled out, they were in the water in the vicinity of the haul out or they were absent from Drakes Estero. The length of absences averaged 1.4 to 1.9 consecutive days for over six months; the longest absence was 10 days (Table 10). Length of absences was similar for females and males.

When seals were present in Drakes Estero, the haul-out was strongly

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Table 6. Movements of resident, breeding, and transient seals by season.[a]

	Resident	Breeder	Transient	Totals
Number of seals	8	4	3	15
Number moves <25 km	11	3	7	21
Number moves >25 km	2	9	2	13
Number of moves by season:				
Aug-Oct				
<25 km	6	2	5	13
>25 km	2	4	1	7
Nov-Feb				
<25 km	5	1	-0-	6
>25 km	-0-	1	1	2
March				
<25 km	-0-	-0-	2	2
>25 km	-0-	4	-0-	4

[a] Local movements not recorded after March because transmitters ceased functioning.

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Table 7. Proportion of days resident seals were hauled out at Drakes Estero during the fall and winter and March, based on number of days monitored. Only resident seals included.

	SEAL BY RADIO FREQUENCY								AVERAGE		
SEASON	033	234	710	047	084	176	435	753	Female	Male	Total
Fall (Aug-Oct)	0.9	0.9	0.9	1.0	0.8	1.0	1.0	1.0	0.9±0.0	0.9±0.0	0.9±0.0
Winter (Nov-Feb)	0.7	0.6	0.7	0.7	0.8	0.9	0.8	0.9	0.7±0.1	0.8±0.0	0.8±0.0
Spring (March)	0.7	-	0.6	0.5	0.7	-	-	0.9	0.7±0.5	0.7±0.1	0.7±0.1

Table 8. Proportion of days per month each seal was hauled out at Drakes Estero.

	MONTH							
Seal	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Females:								
RT033	0.9	1.0	1.0	0.9	0.7	0.8	0.6	0.7
RT234	0.9	0.6	0.9	0.5	0.5	0.7	*	
RT491	0.5	0.4	**					
RT710	0.9	0.8	0.9	0.5	0.9	0.7	0.6	0.6
Males:								
RT047	0.9	1.0	1.0	0.9	0.8	0.7	0.3	0.5
RT084	0.8	0.8	0.6	0.8	0.9	0.8	0.7	0.6
RT176	1.0	1.0	1.0	0.8	0.9	**		
RT272	0.8	*						
RT435	0.9	1.0	1.0	0.9	0.8	*		
RT753	0.9	1.0	1.0	0.9	0.9	0.8	0.9	0.9
Total Average	0.9	0.8	0.9	0.8	0.8	0.7	0.6	0.7
SE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
n	10	9	8	8	8	6	5	5
Female Average	0.8	0.7	0.9	0.6	0.7	0.7	0.6	0.7
SE	0.1	0.1	0.1	0.1	0.1	0.0	0.5	0.5
n	4	4	3	3	3	3	2	2
Male Average	0.9	0.9	0.9	0.8	0.9	0.8	0.6	0.7
SE	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1
n	6	5	5	5	5	3	3	3

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.

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Table 9. Proportion of resident radio-tagged seals hauled out each day (seals with transmitters that are no longer functional, breeders, and transients are excluded).

	MONTH							
Date	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1		0.9		1.0	0.6	0.7	1.0	1.0
2	0.9	0.9		1.0	0.4	-	0.6	1.0
3	1.0	0.9		1.0	0.9	0.6	0.6	0.8
4	0.7	0.9		0.9	1.0	0.4	0.8	1.0
5	0.7	0.8		1.0	1.0	1.0	0.8	1.0
6	0.7			1.0	0.9	1.0	1.0	1.0
7	0.9			1.0	0.7	0.9	0.8	0.2
8	0.8			0.6	1.0	1.0	0.2	0.4
9	0.9			0.9	1.0	0.7	0.8	0
10	0.4			0.6	0.9	0.7	0.8	0
11	0.3			0.8	0.4	0.6	0.8	0
12	0.6			0.8	-	0.6	0	1.0
13	0.8			0.5	0.7	0.7	0.6	0.8
14	0.9			0.5	1.0	0.3	0.2	1.0
15	0.9			0.6	1.0	0.9	0.6	1.0
16	0.8			0.8	1.0	0.4	1.0	0.8
17	0.9			0.8	1.0	0.7		0.8
18	1.0			0.9	1.0	0.9		0.8
19	1.0			1.0	0.9	0.4		0.8
20	1.0			0.9	1.0	0.7		0.5
21	1.0				0.7	0.7	0.8	1.0
22	1.0				0.9	0.6	0.6	
23	1.0				1.0	0.7	0.4	
24	1.0				0.6	0.7	0.4	
25	1.0		0.9		0.6	0.3	0.6	
26	1.0		0.9		0.5	0.6	0.8	
27	0.8		0.9		0.2	0.6	0.6	
28	0.9		0.9		0.2	0.7	0.2	
29	0.9		0.9		0	-		
30	1.0		0.9	0.4	0.5	0.7		
$\bar{x}$	0.9	0.9	0.9	0.8	0.7	0.6	0.6	0.7
SE	0.0	0.0	0	0.0	0.1	0.0	0.1	0.1
Adjusted figures including breeders and transients:								
$\bar{x}$	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.3
SE	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.1

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Table 10. Average length of time resident seals were absent from Drakes Estero, measured in consecutive days. Seals were neither in the vicinity in the water nor hauled out. Insufficient data were available for September and October. Averages and modes for days absent are presented for seal and for each month.

	AVERAGE BY MONTH						AVERAGE ALL MONTHS				
Seal	Aug	Nov	Dec	Jan	Feb	Mar	$\bar{x}$	SE	mode	range	n
033	1	1	2	1	2	1	1.4	0.2	1	1-3	19
234	1	2	3	0	*		2.6	0.8	1	1-10	10
710	2	1	0	1	0	2	1.4	0.3	1	1-3	6
047	1	1	2	1	2	*	1.5	0.3	1	1-4	13
084	2	0	1	1	2	1	1.3	0.2	1	1-3	14
176	0	0	1	*			1.0	0	1	1	2
435	1	0	1	*			1.0	0	1	1	5
Average days by month (all seals combined):											
$\bar{x}$	1.5	1.4	1.9	1.0	1.8	1.4					
SE	0.3	0.3	0.6	0.0	0.5	0.2					
mode	1	1	1	1	1	1					
range	1-3	1-4	1-10	1	1-4	1-2					
n	10	9	16	13	13	8					

* Transmitter ceased functioning.

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diurnal in all months monitored, and most hauled out during mid-day regardless of season. The proportion of tagged seals hauled out over a 24-hr period was largest 0800 to 1400 hr in August, and 1000 to 1600 hr in December (Table 11). On average, seals hauled out for a total of seven hours per day; however, seals would often haul-out more than once per day. The duration of a single hauling bout averaged 4.8 to 5.6 hrs (Table 12). The averages for hours-per-day and length-of-hauling-bout were not significantly different between August and December (hour, $p = .88$; length, $p = .84$; Wilcoxon matched-pairs sign-ranks test, $m = 3$, $n = 5$). Our sample was too small to test for differences between males and females; however, in December two pregnant females (RT234 and RT710) that gave birth in April spent fewer hours on shore per day than males. Individuals hauled out for up to 34 hrs in August, but never more than 17 hrs in December. The average number of hauling bouts per day was similar in August ($\bar{x} = 1.6 \pm 0.05$) and December ($\bar{x} = 1.4 \pm = 0.05$) and for both sexes (females in August, $\bar{x} = 1.7 \pm = 0.08$, and December, $\bar{x} = 1.4 \pm 0.09$; males in August, $\bar{x} = 1.5 \pm 0.06$; and December, $\bar{x} = 1.4 \pm 0.07$) and ranged between one and four. Ninety-five percent of the 372 hauling bouts in August, and 96% of the 212 in December were 12 hrs or less; 20% of the hauling bouts were less than two hrs in both August and December.

The length of a hauling bout was affected by the time of initiation in August such that seals that first hauled out between 0500 and 0900 hr were on shore longer than seals that initiated a haul-out between 0900 and 2400 hr; in December, though, time of initiation did not appear to influence length of bout (Table 13). Though seals initiated a hauling bout

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Table 11. The proportion of resident seals hauled out per day during two-hour intervals.

Hours	August			December		
	$\bar{x}$	SE	n	$\bar{x}$	SE	n
0000-2000	0.1	0.0	30	0.1	0.0	28
0200-0400	0.1	0.0	30	0.1	0.0	28
0400-0600	0.2	0.0	30	0.2	0.1	28
0600-0800	0.5	0.1	30	0.2	0.1	28
0800-1000	0.7	0.1	30	0.3	0.1	28
1000-1200	0.7	0.1	30	0.5	0.1	28
1200-1400	0.6	0.0	30	0.6	0.1	28
1400-1600	0.5	0.1	30	0.5	0.1	28
1600-1800	0.5	0.0	30	0.5	0.1	28
1800-2000	0.3	0.1	30	0.3	0.1	28
2000-2200	0.2	0.0	30	0.2	0.0	28
2200-2400	0.1	0.0	30	0.2	0.0	28

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Table 12. Average number of hours per day and the average duration of haul-out bouts presented for individuals and by season.

	FEMALES			MALES					ALL SEALS
	033	234	710	047	084	176	435	753	
AUGUST:									
Hours/Day									
$\bar{x}$	6.7	8.0	7.1	7.2	7.8	7.6	7.6	7.8	7.5
SE	0.6	0.7	0.7	0.8	0.9	0.8	0.7	0.7	0.2
Median	6.5	8.2	6.5	6.3	8.0	7.5	7.5	7.0	7.0
Range	1-13	1-20	1-17	1-19	1-19	1-19	1-16	1-17	1-20
n	28	27	27	28	24	30	27	28	219
Length of Bout									
$\bar{x}$	4.7	5.4	4.6	6.5	6.3	6.9	6.0	5.5	4.8
SE	0.7	0.7	0.4	1.1	0.9	1.1	0.8	0.7	0.2
Median	4.2	5.0	4.0	4.8	5.0	7.0	5.0	5.0	0.4
Range	1-13	1-20	1-10	1-28	1-19	1-34	1-16	1-17	1-34
n	38	49	52	32	35	40	40	53	339
DECEMBER:									
Hours/Day									
$\bar{x}$	7.0	5.3	5.5	7.8	7.6	8.1	8.1	8.0	7.3
SE	0.8	1.2	0.8	0.6	0.5	0.6	0.6	0.7	0.3
Median	6.0	4.0	5.0	9.0	7.8	7.8	8.0	8.3	7.5
Range	1-15	1-16	1-14	1-13	1-13	1-13	1-16	1-15	1-16
n	19	11	21	26	22	22	23	26	170
Length of Bout									
$\bar{x}$	4.8	4.5	5.0	6.8	7.0	6.7	7.1	5.5	5.6
SE	0.6	1.3	0.8	0.8	0.6	0.9	0.6	0.7	0.2
Median	5.0	2.5	4.5	7.5	7.5	7.3	7.8	5.5	5.5
Range	1-8	1-16	1-14	1-17	1-13	1-13	1-13	1-12	1-17
n	19	11	24	28	27	30	29	40	208

[a] Season is represented by data from one month.

Table 13. Length of haul-out in relationship to time of initiation.

	August					December				
Hours	n	$\bar{x}$	SE	$\tilde{x}$	Range	n	$\bar{x}$	SE	$\tilde{x}$	Range
0100-0500	32	6.88	.89	5.25	1-19	12	5.38	1.14	3.75	1-13
0500-0700	74	7.09	.65	6.0	1-34	33	5.30	.58	5.5	1-13
0700-0900	86	5.63	.39	5.5	1-26	29	6.65	.76	7.0	1-16
0900-1100	47	3.39	.34	3.0	1-12	36	6.96	.49	7.5	1-13
1100-1300	33	3.39	.47	2.5	1-9	44	5.71	.42	6.0	1-13
1300-1500	44	3.74	.39	3.5	1-13	19	5.26	.79	5.0	1-13
1500-1700	28	3.41	.39	3.5	1-8	14	4.89	1.4	2.0	1-17
1700-1900	20	2.83	.77	1.5	1-16	5	5.0	1.49	4.0	1-10
1900-2400	25	1.94	.44	1.0	1-12	20	3.98	.71	2.75	1-12

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at all hours of the day most initiations occurred during daylight hours between 0400 and 1600 hr for August and between 0600 and 1400 hr for December (Table 14). The pattern was similar for both males and females.

DISCUSSION

Results from one survey year indicate that the decline in seal numbers during the winter months is related to both a seasonal movement away from Drakes Estero and a reduction in the number of days spent hauled out for the remaining animals. Among radio-tagged animals, equal numbers remained in and moved away from Drakes Estero; departees were composed of more females than males. Similar to results in Alaska (Pitcher and McAllister 1981) and on San Nicolas Island (Stewart and Yochem 1983), we found a high level of site fidelity, with seals using no more than three sites. Exclusive use of one haul-out site has also been noted in other studies (Boulva and McLaren 1979, Herder 1986, Stewart and Yochem 1983). In contrast to seals at the Klamath River (Herder 1986), most movements of seals from Drakes Estero occurred from August to October; however, we have no data for the period from April to June when Klamath seals exhibited the greatest local movement. We found, as did Herder (1986), that females made more long distant moves than males. Immature seals may travel greater distances than adult animals, as suggested by Pitcher and McAllister (1981), but we have no information on this.

In general, we observed that if a seal moved to a location greater than

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Table 14. Frequency of initiation of haul-out bouts in relationship to time of day by season for females, males, and all seals.

Time	August 1985 n = 28d Female	Male	Total	December 1985 n = 30d Female	Male	Total
0000-0200	2	5	7	4	6	10
0200-0400	3	7	10	4	1	5
0400-0600	24	17	41	8	10	18
0600-0800	35	72	107	8	21	29
0800-1000	24	36	60	7	23	30
1000-1200	10	1,	27	11	39	50
1200-1400	10	30	40	10	22	32
1400-1600	13	24	37	3	7	10
1600-1800	10	18	28	5	13	18
1800-2000	8	9	17	2	8	10
2000-2200	9	2	11	2	3	5
2200-2400	4	1	5	3	3	6

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25 km away from the capture site, it remained there for an extended time rather than continuing to travel. The majority of these long-range movements occurred after the molt and prior to the breeding season. The movements were to well established haul-out sites in estuaries (Tomales Bay), at river mouths (Klamath and Russian rivers), and at coastal sites (Double Point, Hopkins Marine Station).

The localities at which seals relocated may be preferred winter foraging areas. However, because migrant seals were highly individual in the distance of their movement and their final destination, we suggest that seals were not responding to a single prey situation as was noted in winter movements of seals in Oregon and Washington. Instead, individuals may be expressing a preference for location based on past experience, including foraging success (Beach et al. 1985, Brown and Mate 1983).

The observed movements indicate that Drakes Estero is an important breeding area for seals between Monterey Bay and the Klamath River, an overall distance of 690 km. The three seals which did not return to Drakes Estero in the following breeding season may visit Drakes Estero only during the molt, or use it only as a secondary haul-out site as did one transient which visited Drakes Estero twice after capture but resided at Double Point through the breeding season. The movements also indicate that there is substantial mixing among harbor seal colonies along the central and northern California coast, and that seals in central and northern California may represent a subpopulation of harbor seals in California. Herder (1986) and Brown and Mate (1983) also found movement of seals between colonies in the Klamath River and Alsea Bay, Oregon,and between

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seals in Oregon and Washington.

All recorded foraging activities and movements of seals in the Point Reyes area appeared to be limited to within 0.8 km of shore. Though pelagic movements of harbor seals have been recorded by others (Pitcher and McAllister 1981, Spaulding 1964, Stewart and Yochem 1983, Wahl 1977), our results suggest nearshore feeding and migration are more typical than offshore.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals in the fall than the winter months. Our figures on the proportion of days per month spent hauled out and on the proportion of radio-tagged seals hauled out per month were substantially higher than those derived by both Stewart and Yochem (1983) and Pitcher and MacAllister (1979); if we include in our analyses animals that departed from Drakes Estero, our figures would be similar (see Table 9 for adjusted figures). We eliminated these animals from analyses, though, since the location of the departed animals had been ascertained, thereby allowing for more accurate assessments of time spent ashore for seals in the immediate vicinity.

When hauled out, the number of hours per day that seals spent on shore was similar for fall and winter, as was the haul-out time interval. This suggests that despite high tides during the day in winter, with winter storms accentuating high tides, seals were regular in the length of time they hauled out, but not in the number of days hauled out. Both Sullivan (1979) and Stewart and Yochem (1983) observed a higher average time per day that seals were hauled out, 44% and 39%, respectively, than we found for

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seals at Drakes Estero (29%). Differences may be attributed to stronger tidal influences at Drakes Estero or to exposure to disturbance from humans; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human distubance. Seals at Drakes Estero may, therefore, be forced to spend more time in the water. Females may haul-out for shorter periods both in number of days and number of hours per day than males in the winter (see also Stewart and Yochem 1983). The small differences between means coupled with the small sample of animals result in insignificant differences at this time. Pregnant females may require more time feeding than males.

The strong diurnal haul-out pattern documented at Drakes Estero previously (Allen and Huber 1983), and shown by innumerable other researchers (Boulva and McLaren 1979, Fancher 1979, and Stewart and Yochem 1983), was further confirmed in this study. Though seals hauled out at all hours of a day, peak abundance, based on the proportion of tagged animals, occurred mid-day. Stewart and Yochem (1983) determined that time of initiation of a haul-out bout did not influence the length of the bout; however, we found that in August, seals hauled out for longer periods when bouts were initiated between 0100 and 0900 hr than for other time periods during the day or night. In December, time of day did not appear to influence the length of bout during daylight hours but did during the night. Differences may be attributed to changes in day length, and/or frequency of human disturbance at Drakes Estero.

Absences of resident seals from Drakes Estero, averaged about one day suggesting that absentees were foraging fairly close by; the local movement

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patterns observed during aerial surveys also support this conclusion.

SUMMARY

1. Evidence from movement patterns indicates that Drakes Estero is a focal breeding area for seals ranging as far south as Monterey Bay and as far north as the Klamath River, and therefore, that northern and central California may represent a subpopulation of harbor seals in California. It is also likely that some mixing between seals from Oregon and this subpopulation occurs (Herder 1986).

2. A larger proportion of tagged seals hauled out on a daily basis in August (92%) than in December (77%), and this difference appeared to be more pronounced for females than for males.

3. The largest proportion of seals were hauled out between 0400 and 1600 hr in August and this represented between 53% and 71% of the estimated number of seals in the area.

4. Seasonal changes in abundance are a function of the movement of seals away from Drakes Estero and of a decrease in the number of days that seals spent hauled out in the winter.

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PINNIPED ASSESSMENT IN POINT REYES, CALIFORNIA, 1983 TO 1984

Washington, D.C.
August 1987

U.S. DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / Marine and Estuarine Management Division

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NOAA Technical Memorandum
NOS MEMD 7

PINNIPED ASSESSMENT IN POINT REYES, CALIFORNIA, 1983 TO 1984

Sarah G. Allen

Point Reyes Bird Observatory
4990 Shoreline Highway
Stinson Beach, CA 94970

Washington, D.C.
August 1987

UNITED STATES
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REPORT TO
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

NOAA TECHNICAL MEMORANDA SERIES NOS/MEMD

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NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
MARINE AND ESTUARINE MANAGEMENT DIVISION
WASHINGTON, D.C.

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Sarah G. Allen

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ABSTRACT

We surveyed three species of pinnipeds (harbor seals, California sea lions, and northern sea lions) for a second year in Point Reyes, California, from March 1983 through February 1984. Information gathered for both years (1982-83, 1983-84) are compared. Harbor seals, though present year round, were most abundant during the breeding season; the maximum count for the season was 2449 including 527 pups. The majority of breeding seals migrated to coastal locations rather than estuarine ones. At Double Point the breeding population has expanded three-fold since 1976; the annual rate of growth, though, has not been constant. During the non-breeding season, population numbers have remained stable. Sea lions also were seasonally abundant in Point Reyes. Northern sea lion numbers peaked during the breeding season; California sea lion numbers peaked during the southern spring migration and the northern fall migration when traveling to and from breeding grounds, and peaked again in December during the herring run in Tomales Bay. A significantly larger number of California sea lions, composed of mostly immatures, was present in 1983-84 than in 1982-83. The optimum time to census sea lions in Point Reyes was between 1100 and 1600 hr when low tides occurred mid day.

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PART A. HARBOR SEALS

Sarah G. Allen

INTRODUCTION

Throughout historical times, harbor seals, Phoca vitulina, have resided at Point Reyes, California. Scammon (1874) was the first to record their presence (1850's), but only in recent years have researchers attempted to document the seasonal abundance of this species in the California coastal zone (Carlisle and Alpin 1966 and 1971, Dohl et al. 1982, Frey and Alpin 1970, Hanan 1985, Mate 1977, and Miller 1983). The results of these surveys, however, are insufficient for designing a reliable management plan for harbor seals specific to the Point Reyes area. With the more generalized state-wide emphasis of present information, we lack insight into the peculiarities of this local population. In addition, little information has been available on the reproductive rates of harbor seals in the region. Incidental information on pinnipeds in Point Reyes has been noted by Chan (1979) in reports on Areas of Special Biological Significance (ASBS) and by Allen et al. (1985).

Our two-year survey, 1982-1984 was designed to provide comprehensive information on abundance and seasonal use patterns of harbor seals in the coastal zone of the Point Reyes area. In the first survey year, we refined our census techniques by evaluating the tidal and diurnal differences in seal haul-out behavior as well as identifying haul-out sites and the

significance of each. Data from the second survey year validated findings on seasonal and spatial trends. We include in this report analyses of data collected since 1976 at Double Point, the largest breeding site in the region.

STUDY AREA AND METHODS

Study Area

The coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary extends from Bodega Bay (38° 30'N) south to Bolinas Bay (37° 30'N) (Figure 1). Included are embayments such as Tomales Bay, Drakes Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PRNS), the Golden Gate National Recreation Area (GGNRA), and the Marin County Department of Parks and Recreation share boundaries with the Sanctuary over segments of this coastline. In addition to the protection afforded by Park and Sanctuary status, Bird Rock, Point Reyes Headland, and Double Point were designated as Areas of Special Biological Significance (ASBS) by the California Department of Fish and Game (CDFG) and the State Water Resources Control Board.

Much of this coastline remained largely undeveloped even before inclusion into PRNS and GGNRA during the 1960's and 1970's. An agricultural character and the inaccessibility of much of the area afforded protection from human disruption. Consequently, use of habitat by seals has probably has not changed significantly over the past few decades.

The topographical diversity of this coastal zone contributed to the broad range of substrates in seal habitat, including tidal mud flats, offshore tidal ledges, and sandy beaches. Coastal locations included Tomales Point, Point Reyes Headland, Double Point, and Duxbury Reef; estuarine locations included Tomales Bay, Drakes Estero, and Bolinas Lagoon (Figure 1).

Data Collection

We counted seals twice each month at all locations from March 1983 through February 1984. Censuses occurred simultaneously in the afternoon during low to medium-low tides except on a few occasions when weather conditions hindered human access to remote sites. Days when low to medium-low tides occurred mid-day to early afternoon were chosen to maximize counts (Ainley et al. 1977, Allen et al. 1985, Fancher 1979, Stewart 1984). In addition, an all day census at primary locations was conducted in June when seal numbers reach their annual maxima in the area (Allen and Huber 1983, Miller 1983). This all-day census was undertaken to confirm that there were no diurnal and tidal differences in haul out patterns between locations and to provide a maximum estimate of seals in the Point Reyes region.

Whenever possible we classified seals in three categories based on size and color: adults, subadults, and pups. Seals in the eastern Pacific are purported to reach sexual maturity between three and six years of age (Bigg 1969). At locations other than Double Point, Drakes Estero, Point Reyes Headland, and Tomales Point, distance from observer and the oblique angle

of view made it difficult to distinguish subadults. Pups were easily identified at all locations during the breeding season because of their bright coloration and diminutive size.

We counted seals on four to five consecutive days at Double Point during the breeding season (March through June) and molting period (June through August) in 1983 and 1984 in order to determine daily variability in the haul out pattern.

Data Analysis

For analysis of seasonal trends, we divided the year into three seasons: breeding (March through June), summer (July through October), and winter (November through February). We examined seasonal means for the region and for each site and used a t-test to compare the average abundance for spring, summer and winter of 1982 with that of 1983. Age class representation for subadults and pups was expressed as a percentage of the total herd. Maximum counts of pups for the region were based on simultaneous censuses in the event that females with pups might travel between locations. To test whether the seasonal haul-out pattern was different at coastal compared to estuarine locations during breeding and non-breeding seasons (summer and winter seasons combined) in 1982 and 1983, we made two 2 x 2 contingency tables. We used a log-linear model to analyze the tables and then we used Freeman-Tukey deviates to see which cells did not fit the model (Fienberg 1981).

Examination of trends in abundance at Double Point included data collected by Allen (unpublished data) from January 1976 to June 1984.

During that period seals were censused on 325 days with over 625 hours of observation. Seasonal coverage was similar for all years except 1979 and 1980. Most censuses were confined to the hours 0700-1630 because the remoteness of the area required three hours of hiking, round trip. We estimated the increase in the number of seals at Double Point from 1976 to 1984 by dividing the seasonal mean of 1984 by that of 1976. The change in abundance for each year was determined from the formula $\lambda = \frac{\bar{N}_{t+1}}{\bar{N}_t}$, where N is the mean population size and t is the year (Caughley 1977).

We examined the representation of sex and age classes at Double Point in spring 1984 to identify more accurately which animals accounted for this annual peak. The period was divided into early (March to mid-April), middle (mid-April to mid-May), and late (mid-May to June). Seals were categorized as male, female, female with pup, subadult, and pup. We then calculated the percent representation of each category by dividing the number identified for each category by the total number of animals classified. Since male and female adult seals are almost identical in size, we were not able to sex all adult animals and did not attempt to sex subadults.

The daily variability in the number of seals hauled out at Double Point during the breeding season was compared with that of the molt period (late June through July) and the end of molt (August) using the coefficient of variation $CV = \frac{SD}{\bar{x}}$ (Snedecor and Cochran 1967). Only counts from 1200-1400 hr and from 1-3 hr after low tide were used in the analysis. For comparison, we calculated an analogous CV from data gathered at Bolinas

Lagoon by Allen (unpubl. data).

We were able to identify a number of individual females at Double Point by scars and unusual spot patterns. For eight years we noted the recurrence of many of these animals during successive breeding seasons (Allen, unpubl. data). To verify the accuracy of our ability to identify individuals, we compared the presence of known females during consecutive three-day periods during the 1977, 1983 and 1984 breeding seasons, excluding days when excessive disturbance occurred. We calculated the probability of sighting, P, by the formula:

$$P = \frac{N_{1 \text{ and } 3}}{N_{1-3}},$$

where $N_{1 \text{ and } 3}$ is the number of females seen only on days one and three, and N_{1-3} is the number seen on all three days. The average for all three-day periods was used as the probability of sighting (P). Our estimated average probability of sighting was 0.9 (n = 3, range 0.8-1.0). The sample size of known individuals was small (7, 5, 6), but these animals were easily distinguished within a herd composed of 400-700 animals. Since our probability of sighting was within an acceptable range, we felt confident in calculating the pupping frequency of known females and the probability of pupping.

The pupping frequency (pf) of females was figured from the conditional probabilities for successive samples of females in three-year sets using the formula:

$$pf = \frac{\text{No. of same females in denominator seen w/pup in yr}_{i+1}}{\text{No. of females seen in yr}_{i}}$$

Known individual adult females identified from 1977 to 1979 represented set 1, and from 1982 to 1984 represented set 2. We eliminated from our tabulations two groups of known females: 1) females not seen all three years (Siniff et al. 1977); and 2) those that did not have pups in year 1 because they may not have been sexually mature then. We included these two groups of females, however, when presenting a summary of pupping success. The probability of pupping (X) was estimated from a binomial pupping model (Siniff et al. 1977) with the equation $Xp = \frac{\sum P_i}{n}$, where P_i is years with pup for female$_i$ divided by total years female$_i$ was present, and n = the number of known females. Only known females present in three successive years were included in the model. If a female was determined to be pregnant by the size and shape of her abdomen, but was not seen attending a pup later, she was included in the sample as having pupped.

RESULTS

Seasonal and Spatial Use Patterns

Regional

Harbor seals were present year round at all locations censused within the Point Reyes area in 1983 and, as determined in the 1982 survey, the numbers fluctuated seasonally with more seals hauled out in spring ($\bar{x}$ = 1653.4, SE = 121.0, n = 9) and summer ($\bar{x}$ = 1270.1, SE = 210.6, n = 8) than in winter ($\bar{x}$ = 1089.1, SE = 70.1, n = 8)(Table 2). Seasonal means in 1982 versus those in 1983 were not significantly different (spring: t = 1.225, p > 0.1; summer: t = .3318, p > 0.1; winter: t = .7421, 0.2 > p > 0.1). The

highest counts for the region in 1983 occurred in May (2449) and July (2323) (Figure 2). Tomales Point, Drakes Estero, and Double Point were the areas of highest seal concentration contributing most to the total number of pups (Tables 1 and 3). Pups were first identified at haul-out sites in late March, and their numbers peaked during the first week of May for both years with 566 in 1982 and 527 in 1983. Pups represented 24% of the total count (2339) in 1982 and 22% (2449) in 1983 (Table 3). The mean percentage representation of subadult seals at Tomales Point, Point Reyes Headland, Drakes Estero, and Double Point was much the same for all seasons in 1983 (spring: $\bar{x}$ = 18.0, SD = 7.0, n = 8; summer: $\bar{x}$ = 17.4, SD = 3.0, n = 8; winter: $\bar{x}$ = 15.0, SD = 4.4, n = 9). As was observed in the 1982 survey, subadult representation declined in May 1983 ($\bar{x}$ = 8.5%) (173/1820, 79/1101).

The all day census conducted in June 1983 confirmed that more seals were present at all haul-out sites mid-day, a couple of hours after low tide, with only Tomales Bay being exceptional, but did not provide a maximum estimate for the seal population in the Point Reyes region (Table 4). More seals were counted in Tomales Bay early in the morning, but the numbers were only slightly lower mid-day. Though mid-day yielded maximum numbers, many seals remained at haul-out sites into mid-afternoon, despite rising tides. Duxbury Reef could accomodate large numbers of seals until about four hours after low tide when it was awash. Seals that hauled out on offshore rocks at Bird Rock and Double Point shifted to higher ground as the tide rose and consequently, even at five hours after low tide, many seals were hauled out. At estuarine locations haul-out space was reduced slightly beginning a couple of hours prior to high tide, and so a substantial number of seals

remained until late afternoon.

Coastal areas accomodated a large influx of seals during the breeding season ($\bar{x}$ = 992.7, SE = 75.8, n = 9) in comparison to estuarine sites ($\bar{x}$ = 660.8, SE = 59.0, n = 9). During the non-breeding season the coastal populations declined substantially ($\bar{x}$ = 618.3, SE = 83.1, n = 15), whereas estuarine ones declined only slightly ($\bar{x}$ = 595.9, SE = 37.6, n = 15). The log-linear model comparing coastal and estuarine locations during breeding and non-breeding seasons for 1982 and 1983 revealed that none of the variables were equal (X^2 = 26.45, $p < 0.001$). The variable which least fit the model was the figure for estuarine locations during the breeding season in 1983 (Table 5). The estuarine pattern changed significantly in 1983 with fewer seals recorded during the breeding season and more during the non-breeding season compared to that of 1982. Thus, the coastal pattern was similar though not identical for both years. These findings suggested that more seals were migrating to coastal areas than to estuaries during the breeding season.

The seasonal pattern for each haul-out site reflected this difference between coastal and estuarine groups, and when examining each we can identify where the deviation from the 1982 estuarine pattern took place.

Bodega Rock

Seals were seen hauled out on tidal reefs of this offshore sea stack. We counted a maximum of 54 seals in February 1984. Pups were not seen in 1983 (Table 1).

Tomales Bay

Seals hauled out predominantly on tidal sand bars extending from Toms Point to Sand Point in 1983. They were seen infrequently at Hog Island. Seasonal means revealed that numbers remained relatively stable throughout the spring and summer months and were slightly higher in winter (Table 2). The winter peak in 1983 was in contrast to a distinct decline in numbers in the winter of 1982. Here is where the main divergence from the estuarine model occurred. In 1983 both spring and summer numbers were markedly lower than those in 1982 (Appendix I), possibly because of disturbance. Though the frequency of disturbance was similar in 1982 and 1983 (1982: 16 of 26 censuses; 1983: 16 of 28 censuses), the level of human activity was much greater in 1983 (Allen and Huber 1984). A maximum of 45 pups was counted in May which is slightly lower than the figure in 1982 (58) and represents 16% (45/275) of the population in Tomales Bay and 10% (45/527) of all pups censused in the Point Reyes area. A graph of the average number of seals by month, combining data for 1982 and 1983, displays the apparent decline in attendance in early winter and again in June and July when visitor use in the area is high (Figure 3). Seal numbers in January through March were higher than for most other months. Herring, Clupea pallasii, spawn in Tomales Bay at this time [a known prey item of seals in the area (Miller 1983)], and may be related to increased seal abundance.

Tomales Point

The largest concentrations of seals in the vicinity of Tomales Point hauled out on Bird Rock, north tidal rocks and Driftwood Beach. The

seasonal haul-out patterns were nearly identical in 1982 and 1983 with most seals recorded during the breeding season (Table 2). A graph of the average number of seals present by month, combining data for 1982 and 1983 illustrates the rapid increase that occurs there in May, June and July, and the equally rapid decline from August through February (Figure 4). Tomales Point is one of the three most important breeding areas in the Point Reyes region with pups representing 24% (122/514) of total seals censused at the Point and 23% (120/527) of all pups censused in 1983.

Point Reyes Headland

Point Reyes Headland is a minor coastal haul-out area where seals were scattered along offshore rocks and in pocket beaches around Split Rock and Sea Lion Coves. Counts were highest during the breeding season (Table 2); one pup was seen in June. In contrast to 1982, the mean count during winter 1983 was slightly larger than that of the summer. The combined data of 1982 and 1983 reveal an irregular pattern: small numbers of seals were present during April and May, the peak of breeding, and again in winter, but were most abundant just prior to and just after the breeding season (Figure 5). Geographically, this point bisects the distance between two major coastal haul-out sites, and may be frequented by animals moving to or from breeding grounds. We often observed harbor seals sharing pocket beaches here with northern elephant seals, Mirounga angustirostrus, and occasionally observed them displaced by these larger seals.

Drakes Estero

Drakes Estero is one of the three largest breeding areas in the Point Reyes area. Seals hauled out on virtually every sand bar far up into the estero during the breeding season, and Limantour Spit was used primarily then. The 1983 pattern resembled closely that of 1982 with high counts during spring and summer and lower counts during winter (Table 2). A maximum of 122 pups was counted in May 1983, accounting for 19% (122/656) of the total breeding population there. Twenty-three percent (122/527) of all pups in the Point Reyes area occurred at Drakes Estero in 1983. A graph of the combined data from 1982 and 1983 reveals that seals were present in large numbers year round in contrast to the two other most important breeding areas, Tomales Point and Double Point (Figure 6).

Duxbury Reef

The majority of seals hauled out on an intertidal reef extending from Bolinas Headland; we identified a secondary haul-out site in 1983 which was another reef 1/2 mi further north at Bolinas Point. Duxbury Reef was the only coastal site in 1983 where the seasonal mean number of seals was higher in summer than in spring; the average in winter was similar to that in spring (Table 2). The monthly pattern exhibited in Figure 7 displayed a peak in September and October and a decline in July; numbers varied greatly, however, within July. Few pups ($\leq$5) were observed in 1982 and 1983.

Bolinas Lagoon

Bolinas Lagoon is an estuarine habitat where seals haul out on tidal mud

flats bordering two islands, Kent and Pickleweed. In a previous study, Kent Island was the preferred site for all seasons (Allen et al. 1985). In 1982 and 1983, however, Pickleweed Island was the preferred location. The seasonal pattern in 1983 was nearly identical to that of 1982 with a summer annual peak, rather than one in spring, and a much reduced number in winter (Table 2). Bolinas Lagoon was not an important pupping ground; only 17 pups were counted in May both of 1982 and 1983. Bolinas Lagoon, like Drakes Estero, did not display the monthly extremes in seal numbers characteristic of coastal colonies (Figure 8).

Double Point

The seasonal variation in the average number of seals at Double Point in 1983 followed the pattern recorded since 1976 with a large influx of animals occuring in spring and then dispersing rapidly in summer and winter (Table 2). Maximum numbers in 1982 and 1983 occurred during the months from April through July; we observed fewer seals from September through January (Figure 9). The months August/September and February/March were transition periods when numbers declined or increased, respectively. Counts during November reached the annual low. Pups accounted for 32% (262/832) of all seals censused at Double Point in May 1983 and 50% (262/527) of all pups censused in the Point Reyes area (Table 3).

Since 1976, pups have been initially sighted each year in late March or early April; the maximum pup count has occurred consistently during the first two weeks of May. The May peak for all years coincided with the annual peak for all age classes combined, but surprisingly more adult seals

hauled out in June (74%) and July (80%) than in May (59%). The peaks coincided with the mating period and the onset of molt, respectively (Figure 9, Table 6). Females come into estrus after pups are weaned, and mating apparently extends into August (Bigg 1969). We observed mating on four occasions in late May and early June 1983 (Allen 1985). Seals at Double Point molted from early June to early August.

The mean number of subadult seals was largest during the months flanking the breeding season, February and March and June and July (Figure 9, Table 6). During May, the number of subadults declined only slightly, but their proportion to all seals counted then was much lower than in other months. The percent representation of subadults was highest in September, October, and December (Table 6).

A closer examination of sex and age classes of the main herd at Double Point during the breeding season in 1984 revealed distinct trends in the representation of each category (Table 7). Early in the season females (33%), males (30%), and subadults (27%) were equally abundant. At the height of the season, though, the herd consisted primarily of females (38%), particularly females with pups (33%), and pups (39%). Late in the season, the herd also consisted mostly of females (38%) and pups (33%), but fewer females were with pups and the percentage of subadults began to increase. The representation of males remained low from April 17 through May 31.

A comparison of the mean number of seals counted during the 1976 breeding season ($\bar{x}$ = 195.2, SE = 17.6, n = 14, range = 112-320) with that of 1984 ($\bar{x}$ = 578.3, SE = 41.5, n = 22, range = 101-897) showed a three-fold increase. The change in abundance for each year, however, was not linear

over this nine-year period (Table 8). For most years there was no change, but in 1977 and 1982 seal numbers rose. The summer and winter seasonal means for 1976 (summer: $\bar{x}$ = 165.7, SE = 35.7, n = 13; winter: $\bar{x}$ = 123.8, SE = 34.0, n = 9) and 1977 (summer: $\bar{x}$ = 222.6, SE = 35.9, n = 21; winter: $\bar{x}$ = 106.8, SE = 22.1, n = 10) were not substantially different from those of 1983 (summer: $\bar{x}$ = 174.3, SE = 53.7, n = 14; winter: $\bar{x}$ = 215.8, SE = 32.2, n = 15).

Daily Variability

The variability in the number of seals hauled out at Double Point over successive days was greater during the breeding season than during the molt (Table 9). The same was true for the herd in Bolinas Lagoon. At the end of the molting period (August), the daily variability increased substantially at Double Point, but in Bolinas Lagoon it remained the same. Disturbance and inclement weather at Double Point are partially responsible for the increased variation during the breeding season. Because of these uncontrolled factors influencing the daily variability, we are not completely confident with the results of these analyses.

Reproductive Rates

A summary of pupping success of known individual females is presented in Table 10. The proportion of known females observed in a given year that had pups was similar for all years. A small proportion of females were not seen in successive years with the exception of 1984. A larger proportion of females also did not bear pups in 1984. A total of 13 females (present all

three years) were observed with pups in 1977. Eleven of the females were resighted with pups in the second year, yielding a pupping rate of 0.85 (11/13). The proportion of known females that pupped all three years for this set was 0.77 (10/13). In the second set, a total of 11 females (present all three years) were seen with pups and all of these were resighted with pups in 1983. This yielded a pupping rate of 1.0 (11/11); the proportion of females that pupped all three years was 9/11 for a rate of 0.82. Both three-year sets yielded a high probability that females with pups in year 1 would have a pup in successive years. The probability of pupping was 0.89 for set 1 and 0.92 for set 2.

DISCUSSION

The results of the 1982 survey in combination with those of 1983 provide a much clearer understanding of harbor seal aggregations in Point Reyes. We have identified when and where seals are seasonally abundant and when is the optimum time to census. In 1982 we determined that diurnal and tidal effects on seal haul-out behavior vary within an optimum range from mid-day to late afternoon at low to medium tides depending upon the physical attributes of each location. This was verified in the all day simultaneous census in June, 1983. The diurnal pattern was similar to that of other locations in California: Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), Bolinas Lagoon (Allen et al. 1985), and San Miguel Island (Stewart 1984).

It is apparent that the Point Reyes area accomodates a large harbor seal breeding population. Peak figures tabulated in May (2449) and

July (2323) 1983 and in May (2339) and June (2502) 1982 are comparable. Population estimates by the California Department of Fish and Game (CDFG) based on aerial surveys in April and June, 1982 and 1983 (Miller 1983; D. Hanan 1985), are similar to our censuses for those months. The Point Reyes harbor seal population during the breeding season represented 19% of the total estimated California population, excluding the Channel Islands, in 1982 considered to be the largest concentration in the state (Miller 1983). Preliminary analysis of the CDFG survey in 1983 confirms this estimate with a state-wide figure of 9,010 animals in April and 10,763 in June, including an estimated 1852 and 1985 seals, respectively, in Point Reyes (D. Hanan, pers. comm.). Miller calculated an estimate of 1309 pups in California, excluding the Channel Islands, in April 1982. The April 1983 pup count for the state was 642 (D. Hanan pers. comm.). The respective pup estimates calculated by CDFG for Point Reyes were 217 (10% of the total state pup estimate) in 1982 and 157 (25% of the total pup estimate) in 1983. Nearly three-quarters of pups censused by CDFG in Point Reyes in 1983 were at Double Point. The representation of pups at Point Reyes to the state-wide estimate is likely even greater because most pups are born in May rather than April. Consequently, Point Reyes is perhaps even more important as a breeding ground for harbor seals.

Coastal areas accomodated the major portion of migratory animals again in 1983. There was no evidence that estuarine animals shifted to coastal areas to breed. However, a subadult, male seal, rescued from Tomales Bay on 4 March 1984 by the California Marine Mammal Center and released the following day at Point Reyes Headland with a rear flipper tag was identified

by us at Double Point on April 11 and 12, 1984 (L. Amaya, California Marine Mammal Center, Fort Cronkhite, CA., pers. comm.). That the animal arrived at a major coastal haul-out site rather than returning to an estuarine one indicates that the animal was probably familiar with the area. Although seals radio-tagged by Brown and Mate (1983) traveled locally between a coastal haul-out site and estuarine ones, the majority of migrants in the Point Reyes area likely travel from outlying areas. A comparison of aerial surveys conducted by Dohl (1982) in May and January suggested a northward movement of seals from this region to Sonoma and Mendocino Counties in winter. Slater and Markowitz (1983) believed that adult seals dispersed from San Mateo County haul-out sites during the breeding season.

The large influx of animals to coastal areas in Point Reyes during the breeding season is composed primarily of adult seals. The absence of subadult seals during the breeding season also has been documented in other harbor seal populations (Naito and Konno 1979, Slater and Markowitz 1983). Based on our analysis of herd composition at Double Point, adult females may be the primary migrants to the region in April and May. "Nursery" herds in harbor seals have been remarked upon by others (Brown and Mate 1983, Knudtson 1975, Naito and Konno 1979, Slater and Markowitz 1983). In addition, we have documented seasonal breeding site fidelity in females at Double Point where several known females were resighted over successive years. We did not gather information on the sex composition of the herd in June at Double Point; we would expect, though, that males would represent an increasingly larger proportion then because June is the mating season and the onset of molt. The larger number of adult animals at Double Point in

June and July rather than May corroborates this. Thus there may actually be two distinct waves of migrants to rookeries in coastal areas, the first one consisting of mostly pregnant, adult females, and the second one mostly of adult males.

There is little information available for determining whether seal abundance has been increasing in the Point Reyes region. Earlier surveys (Carlisle and Alpin 1966 and 1971, Mate 1977, Risebrough et al. 1978) and data collected at Double Point indicates an increase during the breeding season, but there is no indication that the resident population has changed because summer and winter averages at Double Point have been about the same since 1976. Nevertheless, the rate of expansion in seal numbers at Double Point has not been constant. Instead, 1977 and 1982 are remarkable as years when seal numbers rose substantially and then leveled out during the intervening years. Why these increases occurred is not known.

SUMMARY

1. The optimum time during a day to census seals in Point Reyes is from mid-day to late afternoon at low to medium tides depending upon the physical attributes of each location.

2. Day to day variability in the number of seals at haul-out sites appears to be less during the molt than during the breeding season. We feel a minimum of three successive-day censuses are required for more reliable estimates during the breeding season because of the unpredictable influences of other factors such as human disturbance and extreme weather conditions.

3. Seals should be censused in the first two weeks of May, when pup representation is highest in order to determine an index on the health of the breeding population. A second census in late June or early July, when more adult seals are present at haul-out sites to molt, would provide more reliable estimates for the total population.

4. Annual censuses would provide data for determining trends in abundance. Data at Double Point indicate that the growth rate is not constant.

5. Information on summer and winter movements of breeding animals would be invaluable for any long-term management programs since the breeding population in Point Reyes represents a sizeable proportion of the state population and since these animals migrate from unknown areas. Radio-tagging is the most reliable method for tracking seal movements.

PART B. SEA LIONS

Harriet R. Huber

INTRODUCTION

A two-year survey of the California (Zalophus californianus) and northern (Steller) sea lion (Eumetopias jubatus) populations in the Point Reyes/Farallon Islands National Marine Sanctuary was initiated in March 1982. This survey was designed to determine the size of the Point Reyes sea lion population, its breeding status, seasonal and diurnal fluctuations in haul-out patterns, and how the Pacific herring (Clupea pallasi) run in Tomales Bay affects sea lion numbers along the coast.

Historical information on the Point Reyes sea lion population is sketchy, because identification of the two species was frequently confused during the 1800's. However, both species were present at the Farallones and at Seal Rock in San Francisco, and so presumably they were present at the Point Reyes Headlands as well. During the 1800's northern sea lions apparently bred on the Farallones and California sea lions hauled out in large numbers during the non-breeding season (Allen 1870, Scammon 1874, Allen 1880). In the early twentieth century, mostly northern sea lions occupied what is now Marine Sanctuary waters and only northern sea lions bred there (Everman 1921, Starks 1921, Rowley 1929). California Department of Fish and Game censuses of breeding sea lions along the California coast between 1930 and 1970 (Bonnot 1937, Bonnot et al. 1938, Bureau of Marine Fisheries 1947, Bonnot and Ripley 1948, Carlisle and Alpin

1966, 1971, Frey and Alpin 1970, Ripley et al. 1962) and other censuses (Chan 1979, Dohl 1982, Mate 1977, BLM 1981) are summarized in Allen and Huber 1983, as are the results of the first year of this study (March 1982 to February 1983). These articles describe fluctuations in numbers on the mainland in recent years.

METHODS

We censused California and northern sea lions at the Point Reyes Headlands (Figure 1) twice a month for the first year (March 1982-February 1983) and weekly during the second year (March 1983-February 1984). During both breeding seasons we censused once a week, checking for evidence of births. One census each month lasted from 0700 h to 1800 h to assess sea lion haul-out patterns, to discover when maximum numbers haul out and to determine how seasonal, diurnal and tidal changes affect each species. Some censuses were incomplete because weather (fog, rain, high winds or heat waves) impeded the count. We censused California sea lions at Bodega Rock once a month during the first year and twice a month during the second year. During the herring run in Tomales Bay (December to March) we conducted censuses by boat of California sea lions in the water; nine occurred during the first year and five during in the second year.

All counts of the Point Reyes Headlands were made from Sea Lion Overlook with a 25X spotting scope. In August 1982, a hidden cove containing up to 100 animals was found south of the main haul-out site; from then on we censused regularly from the antenna emplacement north of Sea

Lion Overlook. Descriptions of animals with distinctive scars or marks were recorded whenever seen. Weather and tidal conditions were also noted.

Whenever possible, we separated both sea lion species into five age and sex classes: adult male, subadult male, female-size, immature, and pup. Adult males were defined as full-grown males with completely developed sagital crests, sub-adult males were animals with the beginnings of a sagital crest, female-size were large immature animals of either sex without evidence of sagital crest (this size also included adult females), immatures were small animals of either sex (yearlings and 2 year olds) and pups were pups of the year (May through December). These categories were fairly easy to distinguish among northern sea lions and all animals of this species described as female were indeed females. With California sea lions almost all female-size animals were, in fact, immature males. If we assume that sex ratios of animals hauled out at Point Reyes are similar to animals hauled out at the Farallones, then the number of females changed from virtually no females in the years prior to 1983 to a proportion of one female to every three males in 1983-84 in the female-size and smaller category. We compared mainland censuses with weekly sea lion censuses from the Farallones during the same time period. Because of the difficulty in separating age classes when counting thousands of animals, California sea lions on the Farallones were divided into only four age classes: male, female-size, immature, and pup. Males were defined as any animal with a sagital crest.

RESULTS

California sea lions

Major differences in the number of California sea lions present and the seasonal variation in age/sex classes occurred in all three areas during the second year of censusing (March 1983 to February 1984).

The peak number of animals was 763 on 5 August 1983 at the Point Reyes Headlands (Table 11), 1530 on 31 October at Bodega Head (Table 12), and 5570 on 28 July at the Farallones. These counts are all two to three times greater than peak numbers counted in the first year of the study. Up to 116 Zalophus (95% of them immatures) were counted at Double Point between May and August 1983, another indication of increased numbers at Point Reyes. No California sea lions had been seen at Double Point during theprevious seven years (Allen, unpubl. data).

At Bodega Rock the two years were similar with peaks during the spring and fall migration. Numbers during the second year, however, exhibited a third peak coincident with the Tomales Bay herring run (Figure 10). At the other two sites there was less similarity between years. The monthly mean number of California sea lions was significantly larger during the second year from May to August at Point Reyes (Mann-Whitney U-test $p<0.05$) and from July to September at the Farallones (Mann-Whitney U-test $p<0.025$).

At Point Reyes and the Farallones, not only did the number of animals change between the two years but so did the yearly pattern. In the first year there were three peaks at Point Reyes: in March at the beginning of

the southward migration to the breeding rookeries, in early September during the northward migration, and in late December during the herring run in Tomales Bay (Figure 11). In 1983-84, there was one large peak from May to August which began during the southward migration and lasted through the period of the northward migration. This was followed by a much smaller peak coinciding with the herring run in late December (Figure 11). At the Farallones during 1982-83, there were two peaks, which corresponded to the spring and fall migrations (Figure 12). In 1983-84, a peak persisted through the breeding season when there is normally a decline in numbers (Figure 12), similar to the situation at Point Reyes Headlands.

In looking at the proportion of different age classes in the Point Reyes Zalophus population during 1982-83, we found adult males present in large numbers from March through the first week of June, when numbers dropped dramatically. Numbers remained low during the summer breeding season except for a short peak in August. These peaks in the number of adult males coincided with migration to and from southern rookeries and is the same pattern we have found on the Farallones from 1972 to 1982. The pattern for adult males in 1983-84 was quite different. The southward migration peak began earlier (in March) and was essentially completed by mid-May. During the summer of 1983 the actual number of adult male California sea lions was three times larger than in 1982 but the proportion of adult males in the population dropped significantly from about 20% in 1982 to 10% in 1983 (t-test, $p<0.05$). This indicates that the increase in total numbers was due to a tremendous influx of immature animals rather than an equal increase in all age classes.

At the Farallones, where census results for adult and subadult males were combined into a single category, the changes are not quite as clear. The Farallon situation appears to be similar, however, for during the first year the highest monthly mean number of males and the highest proportion of males (over a third of the population) occurred during the same months, May and October. This indicates that peak numbers were the result of males stopping briefly at the Farallones during migration. In 1983-84, the highest monthly means were in June, July, and August, when adult males comprised only 12 to 14% of the population, again indicating that peak numbers in the summer of 1983 were due to higher numbers of immature animals.

During censuses we noted the presence of up to 22 immature California sea lions tagged on the Channel Islands. Ten of these were tagged at San Miguel Island and 12 were tagged at San Nicolas Island.

Northern sea lions

The difference between 1983-84 and the previous year of study was not as distinct with the northern sea lions as with the California sea lions. The northern sea lion population is quite small at both Point Reyes and the Farallones, and the numbers remained essentially the same for the two years. The yearly patterns in both areas were similar: low numbers in fall and winter with a peak during the breeding season (Figure 13, Figure 14). Maximum numbers reached 20 on 8 May at Point Reyes (Table 13) and 141 on 2 June at the Farallones in 1983-84. When comparing the monthly mean numbers we found no significant differences between the two years in either area (Mann-Whitney U-test, $p>0.05$).

Patterns in occurrence of the various age and sex classes differed between years. At Point Reyes, in 1983 adult males arrived three weeks later and remained six weeks longer than in 1982 whereas subadult males arrived earlier and stayed into November. This was three months longer than in 1982, a "normal" year. Immature animals, seen throughout the year in 1982, disappeared in 1983 after the end of August. Adult females were present the entire year (Table 13). These changes at Point Reyes Headlands reflect similar changes on the Farallones.

Two adult females, one adult male, and one subadult male northern sea lion recognizable by distinctive scars were seen on both Point Reyes and the Farallones.

All day watches

Regardless of season, the sea lions exhibited a strong diurnal haul-out pattern, with low counts morning and evening and a sustained peak from 1100 h to 1600 h (Table 14, Table 15). Two other factors affected numbers at Point Reyes as well: tidal and weather conditions. Lower numbers occurred when the haul-out area was reduced by high tides or large swells, as well as on calm hot days when sea lions frequently went into the water.

No pupping or breeding was observed in either species in 1983-84 at Pt. Reyes.

Tomales Bay

During the winter herring run we censused California sea lions in Tomales Bay five times. A peak number of 37 Zalophus were seen on 20

January 1983. Few Zalophus were seen on other censuses. Five percent of all animals seen in December 1983 and January 1984 were adult males compared to 20% in the previous year.

DISCUSSION

It was fortunate that this study took place between 1982-1984, for we were able to document some dramatic changes in the sea lion populations within the Point Reyes/Farallon Islands National Marine Sanctuary. The changes, which we attribute to the effects of warm waters associated with El Nino, include a remarkable three-fold increase in the California sea lion population and a shift in the haul out pattern of age and sex classes in both species.

The warmer than usual water temperature measured at the Farallones (PRBO, unpublished) and throughout the northeast Pacific altered the distribution of fish species and reduced numbers and breeding success of marine birds and mammals in California (Heath and Francis 1983, DeLong pers. comm., Stewart pers. comm., PRBO unpubl.). Both California and northern sea lions are at the edge of their breeding ranges in the Point Reyes/Farallon Islands National Marine Sanctuary, therefore any unfavorable perturbation to food supply such as occurred during El Niño, may have significant effect on local populations. California sea lions breed primarily south of Point Conception with major rookeries at San Miguel and San Nicolas Islands, California, and the islands off Baja California, Mexico; major breeding areas of northern sea lions are on the Aleutian and

Pribilof Islands in Alaska (Scheffer 1958). Both species have small breeding colonies on the Farallon Islands where up to 27 northern and up to 3 California sea lion pups have been born each year since 1974 (Huber et al. 1985). Ten northern sea lion pups and 3 Zalophus pups were born in 1983 on the Farallones. No cows of either species gave birth on the mainland in 1982 or 1983.

California sea lions

The population of California sea lions has increased throughout its range in the last 50 years; since 1960 the increase has been about 5% each year in California (DeMaster et al. 1982). In the past, only adult and subadult males migrated north, while adult females and juveniles remained near the southern rookeries (Bartholmew 1967). A change in migration pattern was first noted at the Farallones in 1978 when large numbers of immature sea lions began to haul out in the fall. By 1981 the population at the Farallones had tripled. Ainley et al. (1981) proposed that the increase in numbers and in the proportion of immatures at the Farallones was due primarily to changes in the availability of Pacific whiting (Merluccius productus), a primary prey species, near the islands. The availability of whiting to sea lions increased dramatically when the foreign whiting fishery, which was competing directly with sea lions, was eliminated by the imposition of the 200 mile fishing limit in 1977. Unfortunately we do not have comparative censuses for the mainland sea lion population to see if similar changes occurred there.

Changes in the Farallon California sea lion population from 1972 to

1984 are summarized in Figure 12. Prior to 1978 there was only one peak (in the spring) at the Farallones. Between 1978 and 1981 the number of Zalophus on the Farallones grew by 15 to 20% each year, a much higher rate than the rest of the state. This growth which was due primarily to immature animals created a second peak (in the fall). The remarkable increase that occurred during the 1983 breeding season was unprecedented, although the numbers for the rest of the 1983 were within normal ranges. Most of the summer increase in both areas was due to large numbers of one to four year old animals, the number of adult males increased to double the number seen the previous year.

The population at Point Reyes (Figure 11) reflected the same trend that we saw on the Farallones 1982-84. During this time, Heath and Francis (1983) reported reduced numbers of breeding animals at the Channel Islands. Apparently many adult Zalophus remained in central California rather than migrating to southern rookeries during the El Nino summer of 1983. We do not know for certain why so many immature sea lions congregated at the Farallones and Point Reyes, but we can speculate that it was likely the result of an altered distribution of prey.

High numbers of California sea lions seen at Bodega Head and Point Reyes Headland during the 1983-84 winter were probably attracted to the herring spawn in Tomales Bay. That this peak was not recorded at Bodega Head in December 1982 (Figure 10) is probably due to the large winter swells which reduced available haul-out area during censuses.

Northern sea lions

At Point Reyes, little change in the numbers of northern sea lions occurred between 1982-83 and 1983-84 despite great changes in the marine environment during the second year. The population on the mainland is quite small and as a result it was difficult to discover what effects, if any, El Nino had. In 1983-84, peak numbers of animals occurred in May, before the breeding season, whereas in 1982-83 the peak occurred in August, after the breeding season. Numbers during the rest of the year were similar (Figure 13).

The mortality of northern sea lion pups born on the Farallones was higher in 1983 than at any time in the last 10 years but that may be related more to a problem of premature pupping in Eumetopias (Huber et al 1984) than to the effects of El Nino. Although numbers during the breeding season in 1982-83 were higher than in 1983-84 (Figure 14), neither year was significantly different from the monthly means during 1972-81 (t-test $p>0.05$).

In fall 1983 the absence of immature northern sea lions and the extended attendance of subadult males at both coastal and off-shore sites may possibly be related to the El Nino conditions and their effect on prey availability.

We suspect that sea lion populations within the Sanctuary will return to pre-1983 numbers and age-class ratios after the widespread residual effects of El Nino recede.

SUMMARY

1. The California sea lion population hauling out at mainland sites in the Point Reyes/Farallon Islands National Marine Sanctuary is comprised primarily of migrating animals. Numbers peaked at 338 in 1982-83 and at 1530 in 1983-84 at the Point Reyes Headlands. The northern sea lion population reached a maximum of 20 animals at Point Reyes. There is some interchange of animals between the Farallon and Point Reyes populations.

2. Neither species gave birth nor bred at Point Reyes from 1982-84. On the Farallones up to three California sea lion pups and up to 27 northern sea lion pups have been born each year since 1974.

3. Peak numbers of Zalophus occurred during the southern spring migration and northern fall migration to and from breeding rookeries in southern California and Mexico. The population peak of Eumetopias occurred during the summer breeding season.

4. Maximum numbers of both species hauled out between 1100 h to 1600 h. Where high tides and large swells decreased the haul out area, the highest numbers were counted when low tides occurred at mid-day. Numbers decreased on hot, calm days when many animals went into the water.

5. A peak in California sea lions on the coast in December corresponded to the herring run in Tomales Bay. A winter peak was not observed at the Farallones.

6. Numbers of California sea lions within the Sanctuary were greatly inflated during 1983-84, due to an influx of immature animals. This was probably related to the warm waters of El Niño; "normal" numbers are probably closer to the results of censuses in 1982-83.

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Table 1. Harbor seal counts for all sites in the Point Reyes region for 1983-84. Census days during which disturbance occurred are noted with an asterisk. Numbers following a slash indicate pups.

		LOCATION											
DATE	Bodega Rock	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total Pups	Totals
1983													1337
March 9		146	54	123	123	92	363	0	273	99	64		1701
25		148*	25*	162/1	252	179	414	0	404	41	76	1	
31	47												1242
April 7	12	202/2*	0*	102/1	165	71	209*	0	313/22	101	67/1	26	1771
21	30	189/11*	0	164/13	196/14	92/1	334/19	0	634/128	67	65/3	189	
2/3				142	56				104*				
9/10		148/3*	0	163/1	120		322*	0	387/33				
16/17		105/3*	0	55/7*			168/4*	0	250/65				
21									595/144*				
23/24				189/18			485/36*	0	634/107*				
30/1				193/29*					623/167				
May 6		275/45	0	229/42	285/78	25	461/104	141/8	820/241	116	97/17	527	2449
20		169/34*	0	161/48	171/48	fog	218/62*	fog	551/157	122/3	70/10	362	1462
7/8		156/24*		207/38*			480/102*	176/20	716/226*				
12	25						370/90	122/16	267/118*				
14/15		89/19*		159/48*			249/71*	238/25*	567/173*				
21/22	16	152/5*		204/38			83/7*	362/28	335				
28/29		148/23*		161/17*			71/3	340/14	463/48	166/3	67/3	102	1467
June 3		84/2*	0	137/12	70/16	69/1	354/8	150/10	455/103	100/2*	95/2*	135	1600
16		93/2*	0	229/6*	74/2	50	270/3	350	438/91	85/3	136	115	1894
30		--	-	269/14	122/3	74/1	69/3*	345/6					
4/5													
17	15								583/20				
18/19													
25/26		158*		132/13									
30	44												

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DATE	Bodega Rock	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total Pups	Tota
1983 (cont'd)													
July	5	74	0	336	255	68	516	115	747	61	151		2323
	18	93	0	315	265	45	422	150	316	118	174		1898
	16/17	89*		215									
	19 50												
	22						410						
	30/31						305*	250	353				
Aug	1 22	54*	0	232	131	60	324	207	301	138	122		1591
	15	168	0	fog	fog	fog	362	0	51	fog	80		661
	29/30	241	0	33	74	35	310	63	13	0	102		871
	6/7			215									
	13/14	268*							77*				
	17 30												
	27/28	213		41*			380						
	31 2												
Sept	9	--	--	19	84	16	240	0	155	92	54		660
	19	134	0	fog	81	46	298	45	50	270	70		994
	3/4												
	6 21												
	18 14*												
	24/25			26*			252*	74					
Oct	3	113	0	48	167	65	322	0	34	220	102		1071
	17	122	0	38	47	58	137	0	33	254	85		774
	15/16								32				
	22/23 15	95*									60*		
	29/30 35						141	40					
Nov	2	93	0*	51	15	113	415	0	0	235	107		102
	16	136	0	64	163	84	198	48	1	87	74		85
	5/6			49									
	15 47												
	26/27						246*	59					
	29 31												

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DATE		Bodega Rock	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total Pups	Totals
1983 (cont'd)														
Dec	1		--	--	30	67	5	243	15	136	79	46		621
	15		135	0	46	143	fog	248	24	244	100	38		978
	29		150	0	46	59	fog	250	25	283*	104	38		955
	3/4				48					142				
	17/18		118*											
	20	11												
	27	49								348*				
	28													
	31				71*			368	0	281				
1984														
Jan	12		105*	250	63	129	29	313	0	267	45	2		1203
	26		226*	0	50	100	70	321	0	285*	76	26		1154
	14/15				56*									
	17						57							
	21/22													
	23	35						387/1*	0	32*			1	
	28/29						66							
	31						83	363	13	395	106	73		1498
Feb	10		195	0	78	192	34	286	0	237	91	38		1041
	24		202	0	60	93		206						
	3						100							
	8													
	11/12		188*											
	16	54												
	18/19													
	23		331	0										
	25/26				63			250*		303				
	28	41												
Mar	17		195	0										
	25		100	0										

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Table 2. The average number of harbor seals hauled out by season during censuses in the Point Reyes area in 1983-84; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size. Tomales Bay includes Hog Island, Tomales Point includes Bird Rock, and Drakes Estero includes Limantour Estero.

	LOCATION							
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon	All Sites
Breeding								
$\bar{x}$	155.7	337.1	81.5	420.2	501.9	99.7	81.9	1653.4
SE	12.3	31.6	15.9	34.3	32.8	11.7	8.0	121.0
n	16	9	8	17	30	9	9	9
range	84-275	207-514	25-179	168-656	104-832	41-166	64-136	1230-2449
Summer								
$\bar{x}$	138.7	265.6	49.1	393.1	174.3	144.1	100.0	1270.1
SE	19.9	77.4	6.2	41.0	53.7	34.0	12.4	210.6
n	12	8	8	14	14	8	10	8
range	54-268	81-591	16-68	181-631	13-747	61-270	54-174	661-2323
Winter								
$\bar{x}$	193.5	161.0	64.1	304.6	215.8	101.2	49.1	1089.1
SE	84.0	21.9	10.6	16.1	32.2	17.7	11.0	70.1
n	11	9	10	14	15	9	9	8
range	93-355	66-270	5-113	206-415	0-395	44-235	2-107	855-1498

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Table 3. Maximum number of harbor seal pups counted at each haul-out site by month in 1982 and 1983.

Date	LOCATION					
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Bolinas Lagoon
1982						
April	22	19	1	101	262	0
May	58	135	19	170	263	17
June	23	54	18	60	90	4
1983						
April	11	29	1	36	186	3
May	45	120	0	122	262	17
June	2	28	1	18	103.	3

Table 4. The hourly presence of harbor seals at primary locations in the Point Reyes area on June 16, 1983. Low tide was -.7' at 1032 hr, and high tide was 5.2' at 1803 hr. An asterisk (*) indicates disturbance.

	HOUR											
LOCATION	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800
Tomales Bay	91	93	77*	72*	64	81	82	85	77	70	--	--
Bird Rock	133	169	72*	108	173	146	200	234	212	159	148	165
Drakes Estero	151	274	343	370	430	504	491	332	316	218	39	30
Double Point	275	318	325	330	348	375	408	434	455	426	397	212
Duxbury Reef	84	93	95	100	82	54	95	14	0	0	0	0
Bolinas Lagoon	51	65	76	88	91	95	86	87	80	59	43	11
TOTALS	785	1012	988	1068	1188	1255	1362	1186	1140	932	627	418

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Table 5. Freeman-Tukey deviates (FT) for the deviation of the observed from the expected for a log-linear model of independence of year, seal location, and seal reproductive status. The numbers given are the total number of seals counted for each zone during each season.

	Coastal	Estuary
1982		
Breeding	9299	7213
F-T	-1.67	1.93
Non-breeding	7957	7592
F-T	1.83	-1.85
1983		
Breeding	8934	5947
F-T	1.73	-2.09*
Non-Breeding	9275	8938
F-T	-1.68	1.73

* F-T deviate is significant at $\alpha = 0.05$.

Table 6. The average monthly number of harbor seals hauled out at Double Point from 1976 to 1984 for adults, subadults, and all age classes combined. Only those censuses when immatures were distinguished were included in the sample; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size.

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
n	13	15	25	51	52	28	20	15	12	12	9	16
All Age Classes												
$\bar{x}$	128.2	252.2	239.0	372.8	517.9	413.3	397.2	143.6	123.3	82.2	32.7	151.9
SE	26.4	25.4	16.7	25.8	24.4	36.4	29.3	17.2	21.5	21.1	5.2	27.0
Adults												
$\bar{x}$	99.5	204.9	191.9	241.5	304.7	304.3	317.2	97.6	76.7	50.2	22.7	110.5
SE	21.9	21.9	12.7	16.0	16.3	29.6	24.7	15.1	16.9	14.8	5.4	22.3
Subadults												
$\bar{x}$	22.8	41.8	41.5	36.0	36.0	52.5	40.6	19.3	31.4	17.3	4.6	31.6
SE	7.4	6.8	5.4	4.2	3.2	8.8	6.6	3.6	6.4	7.8	1.3	7.0
% Subadult to Total	17.8	16.6	17.4	9.7	7.0	12.7	10.2	13.4	25.5	21.1	14.1	20.8
% Adult to Total	77.6	81.3	80.3	64.8	58.8	73.6	79.9	68.0	62.2	61.1	69.4	72.8

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Table 7. The average percentage of sex and age classes of harbor seals at Double Point during the early, middle, and late periods of the breeding season, 1984; $\bar{x}$ is the mean percent of each class, SD is the standard deviation, and n is the sample size.

		CATEGORY				
		Males	Females	Females w/pups	Subadults	Pups
EARLY	$\bar{x}$	29.8	32.6	7.6	26.6	10.2
n = 6	SD	5.5	2.2	9.0	6.5	9.2
MIDDLE	$\bar{x}$	12.8	37.9	32.7	10.0	39.3
n = 7	SD	3.9	3.9	4.2	2.1	6.2
LATE	$\bar{x}$	11.9	37.9	25.3	16.9	32.9
n = 5	SD	3.9	4.0	10.6	8.5	7.2

Table 8. The yearly changes in abundance at Double Point during the breeding season, 1976 to 1984; $\bar{x}$ is the average number of seals censused for the season and n is the sample size. Rate of increase is calculated from $\lambda = \frac{\bar{N}_{t+1}}{\bar{N}_t}$

Year	n	$\bar{x}$	Rate of Increase
1976	14	195.2	
1977	30	304.5	1.6
1978	19	330.1	1.1
1979	10	287.7	0.9
1980	5	318.0	1.1
1981	13	383.8	1.2
1982	33	525.1	1.4
1983	29	512.7	1.0
1984	22	578.3	1.1

Table 9. The daily variability in the number of seals hauled out at Double Point and Bolinas Lagoon during the breeding season, the molt (July), and the end of molt (August).
CV = coefficient of variation. All censuses were taken from 1200-1300 hrs and 1-3 hrs after low tide.

	Breeding CV	Molt CV	Molt end CV
Double Point	.18	.07	.45
Bolinas Lagoon	.44	.24	.30

Table 10. Summary of pupping success of known female harbor seals at Double Point first identified in 1977 or 1982 and observed over the next two years (Siniff et al. 1977). $\bar{x}$ is the average for the two three-year sets.

	YEAR						
PARAMETER	77	78	79	82	83	84	$\bar{x}$
Females seen with pup	14	14	14	16	15	11	
Females seen without pup	2	2	1	2	1	3	
Females not seen in given year	--	0	1	--	2	4	
TOTAL	16	16	16	18	18	18	
Proportion of total with pup	.88	.88	.88	.89	.83	.61	.83
Proportion of those seen in given year that had pup	.88	.88	.93	.89	.94	.79	.89
Proportion not seen in given year	--	0	.06	--	.11	.22	.10

Table 11. Maximum counts of California sea lions at Pt. Reyes Headlands, 1983-84.

Date	Total	Adult Male	Subadult Male	Female Size	Immature	Unidentified
1983						
Mar 5	188	72	46	56	14	
11	201	101	46	44	9	
20	150	62	38	34	16	
31	112	68	25	15	4	
Apr 7	103	44	22	14	23	
12	88	14	56	9	6	
23	211	70	45	39	17	45
May 8	547	20	121	100	16	290
12	662	119	104	265	35	150
18	569	114	156	227	57	128
24	485	120	107	110	13	38
Jun 1	587	150	148	116	130	43
8	584	36	172	38	110	264
23	164	2	16	78	68	
27	428	19	13	75	271	50
Jul 15	389	28	41	46	186	88
22	412	25	45	68	226	48
28	499	40	31	79	310	39
Aug 5	763	52	98	191	96	326
11	595	23	117	206	112	57
19	523	27	103	174	76	143
26	460	13	123	191	38	95
Sep 6	190	15	15	51	47	12
12	420	35	29	69	104	183
23	417	28	108	165	72	44
27	489	27	104	286	45	27
Oct 6	316	18	44	151	31	72
14	368	86	38	116	51	77
19	207	7	28	112	18	42
26	176	7	43	111	15	
Nov 5	128	42	37	30	19	
15	105	27	39	23	16	
21	61	22	21	12	6	

Table 11. (cont'd)

Date	Total	Adult Male	Subadult Male	Female Size	Immature	Unidentified
1983 (cont'd)						
Dec 5	103	30	29	36	8	
15	321	153	97	62	9	
20	262	49	74	126	13	
27	180	106	46	17	11	
1984						
Jan 2	228	116	40	58	14	
13	18	15	2	1		
18	110	67	20	14	9	
26	81	51	10	13	7	
Feb 1	204	79	30	48	49	
14	239	86	30	85	38	
23	304	159	69	47	29	

Table 12. Maximum counts of California sea lions at Bodega Rock, 1983-84.

Date	Total	Adult Males	Unidentified
1983			
Mar 3	198	14	184
Apr 7	84	4	80
21	13	3	10
May 12	529	8	521
22	427	19	408
Jun 17	71	9	62
30	21		21
Jul 19	100	11	89
Aug 1	420	32	388
17	707	15	692
31	781	24	734
Sep 6	864	26	838
18	685	15	670
Oct 22	1270		1270
31	1530		1530
Nov 15	820		
29	635		
Dec 20	1295		
27	1100		
1984			
Jan 23	421		421
Feb 16	684	10	674
28	275		275
Mar 21	135		135

Table 13. Maximum counts of northern sea lions at Pt. Reyes Headlands, 1983-84.

Date	Total	Adult Male	Subadult Male	Female Size	Immature
1983					
Mar 5	3		2	1	
11	5		1	4	
20	4		1	3	
31	3			3	
Apr 7	3		1	1	1
12	1		0	1	0
23	4		2	2	0
30	3		2	1	0
May 8	20	2	7	7	4
12	19	5	9	5	0
18	17	2	6	5	4
24	19	2	6	6	5
Jun 1	11	4	1	1	5
8	9	1	1	4	3
23	9	0	3	4	1
27	16	3	3	7	3
Jul 7	13	2	3	6	2
15	10	0	3	4	3
22	13	1	2	5	5
28	11	1	1	7	2
Aug 5	13	1	3	7	2
11	8	1	2	5	0
19	9	0	3	5	1
26	8	1	3	4	0
Sep 6	3			3	
12	2			2	
23	7		4	3	
27	14		4	9	
Oct 6	6		2	4	
14	4		2	2	
19	1		1		
26	10	1	1	8	
Nov 3	1			1	
5	2			2	
15	2			2	
21	4			1	

Table 13. (cont'd)

Date	Total	Adult Male	Subadult Male	Female Size	Immature
1983 (cont'd)					
Dec 5	2			2	
15	4			4	
20	5		2	3	
27	2			2	
1984					
Jan 2	2			2	
13	1			1	
18	2			2	
26	3			3	
Feb 1	5		1	4	
14	7	1	1	5	
23	5		1		

Table 14. Hourly counts of California sea lions at Pt. Reyes Headlands, 1982-83 and 1983-84.

	1982-83			1983-84		
	$\bar{x}$	S.D.	n	$\bar{x}$	S.D.	n
0700	59.0	17.4	4	66.7	40.6	4
0800	67.2	61.8	9	176.6	160.1	11
0900	91.5	71.6	11	199.4	177.8	12
1000	94.6	72.8	12	216.4	181.4	12
1100	116.5	70.6	13	229.9	156.3	12
1200	121.3	60.5	13	256.0	171.1	12
1300	115.5	66.4	12	260.3	166.1	12
1400	104.4	65.6	13	267.6	184.4	12
1500	102.9	67.4	10	270.1	177.7	11
1600	102.1	71.9	8	248.4	176.1	12
1700	75.4	21.8	7	208.3	179.9	9
1800	69.2	18.5	6	239.6	162.5	5

Table 15. Hourly counts of northern sea lions at Pt. Reyes Headlands, 1982-83 and 1983-84.

	1982-83			1983-84		
	$\bar{x}$	S.D.	n	$\bar{x}$	S.D.	n
0700	1.0	0.0	3	2.2	2.6	4
0800	3.3	2.1	6	3.1	3.4	9
0900	4.1	2.9	8	3.5	5.0	12
1000	6.4	4.8	9	4.0	5.2	12
1100	7.7	3.9	9	4.5	5.1	12
1200	7.5	5.2	10	4.3	4.4	12
1300	7.8	5.6	10	4.4	5.3	12
1400	7.0	4.8	10	4.3	5.4	12
1500	7.3	5.9	9	4.5	5.2	10
1600	7.3	5.7	7	4.4	5.8	10
1700	5.6	4.8	6	3.0	5.0	9
1800	5.2	4.1	6	3.2	4.1	5

FIGURE 1

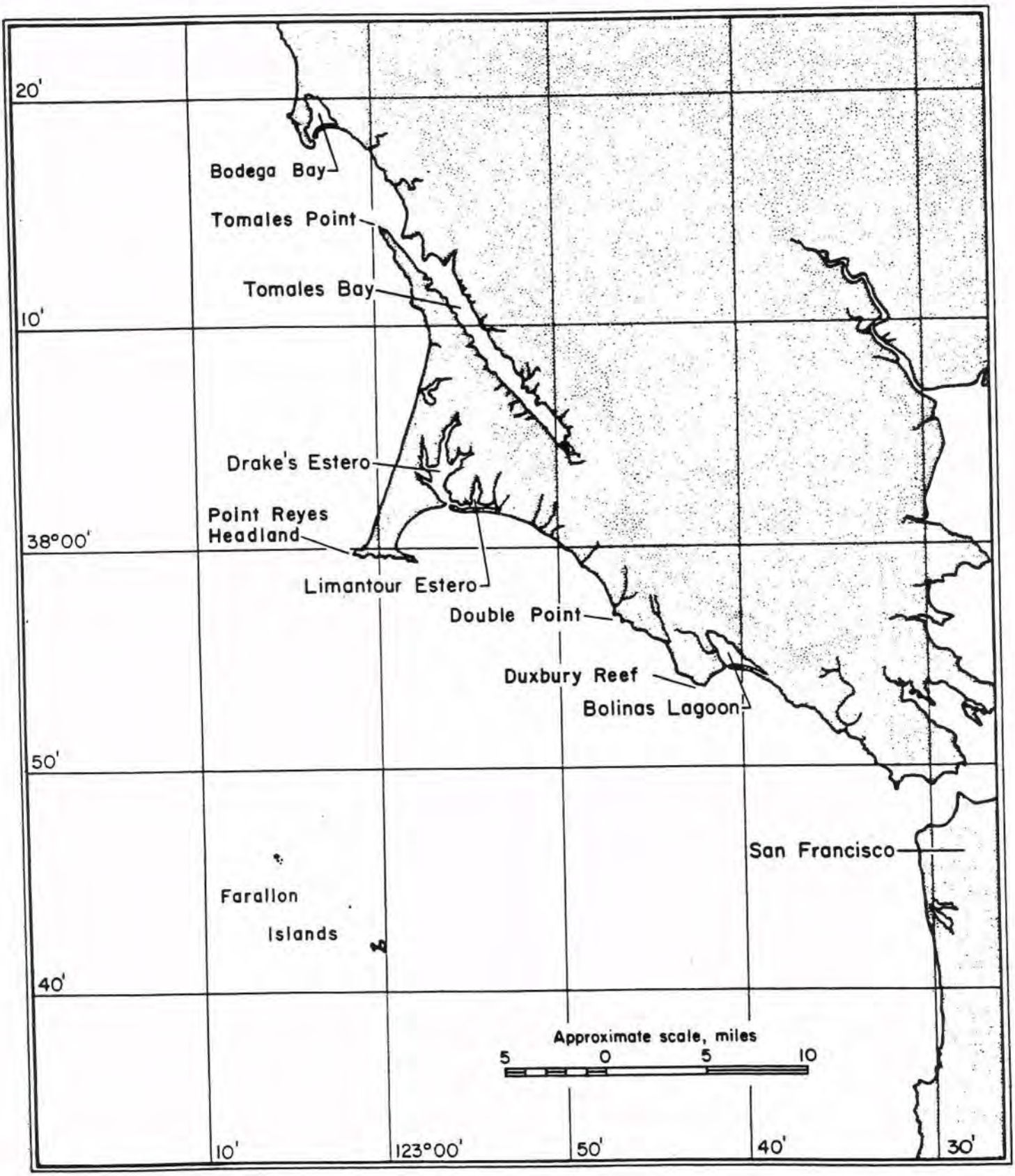
20'
Bodega Bay
Tomales Point
Tomales Bay
10'
Drake's Estero
Point Reyes
Headland
38°00'
Limantour Estero
Double Point
Duxbury Reef
Bolinas Lagoon
50'
San Francisco
Farallon
Islands
40'
Approximate scale, miles
5 0 5 10
10'
123°00'
50'
40'
30'

FIGURE 2

MAXIMUM NUMBER OF HARBOR SEALS BY MONTH POINT REYES, 1983-84

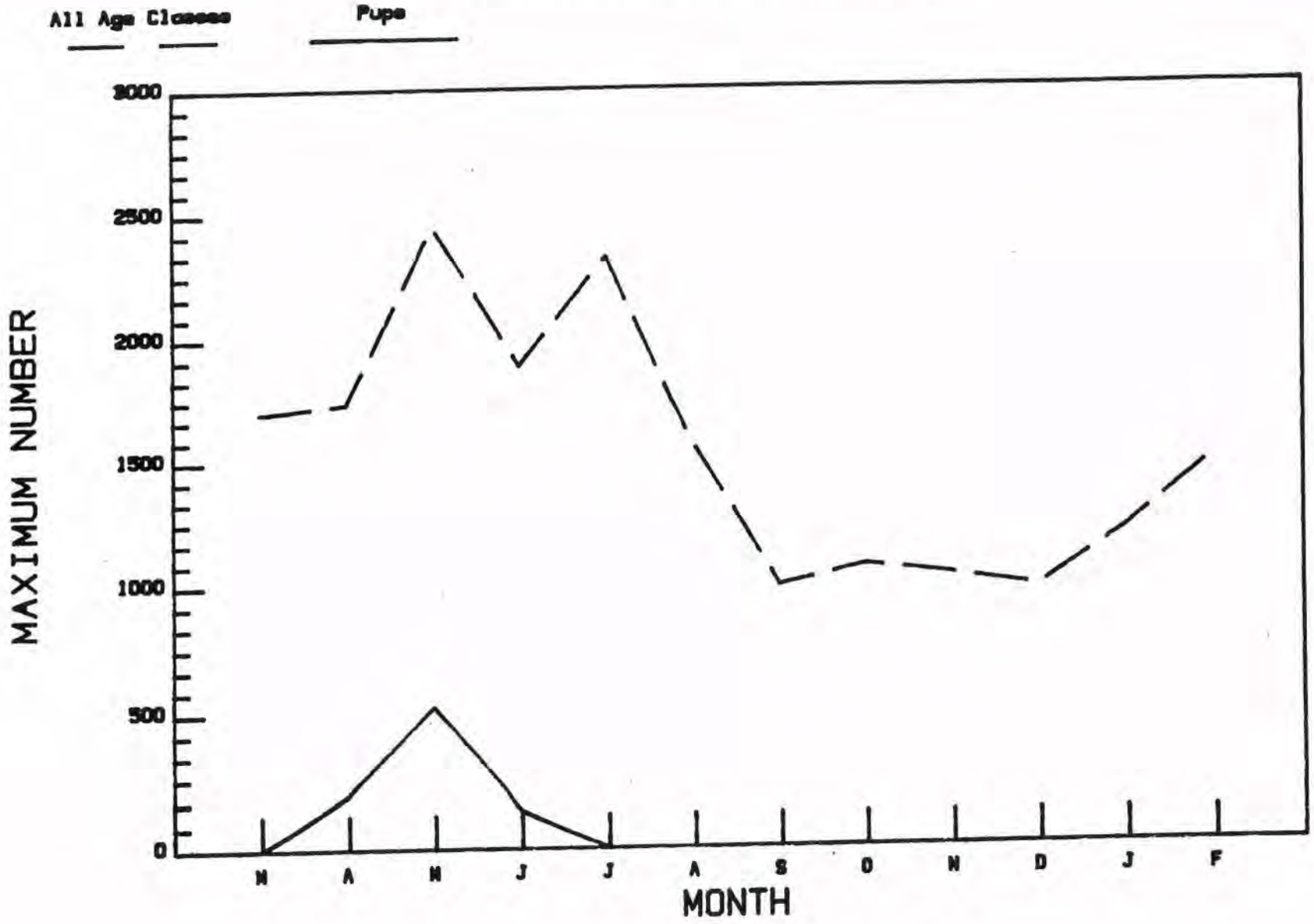

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FIGURE 3

Monthly Mean Number of Harbor Seals 1982-84
Tomales Bay

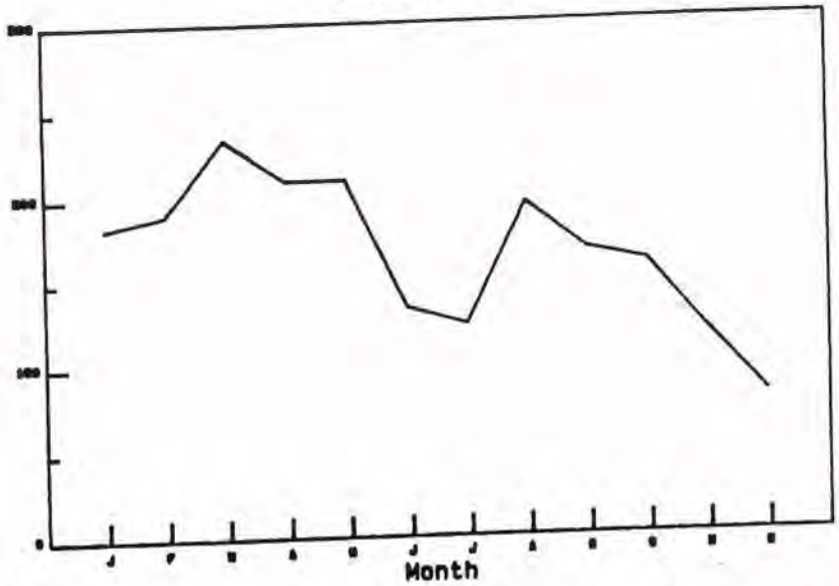

FIGURE 4

Monthly Mean Number of Harbor Seals 1982-84
Tomales Point

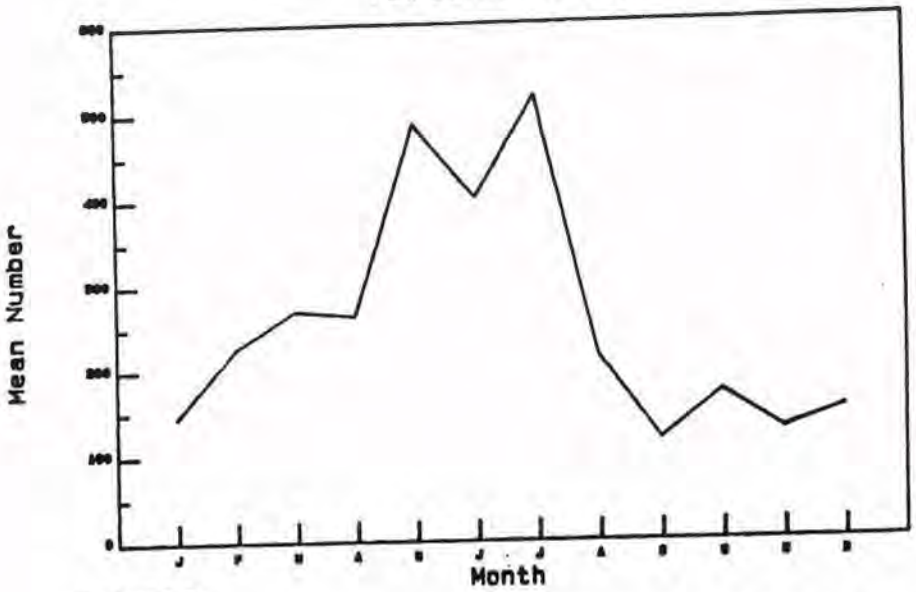

FIGURE 5

Monthly Mean Number of Harbor Seals 1982-84
Point Reyes Headland

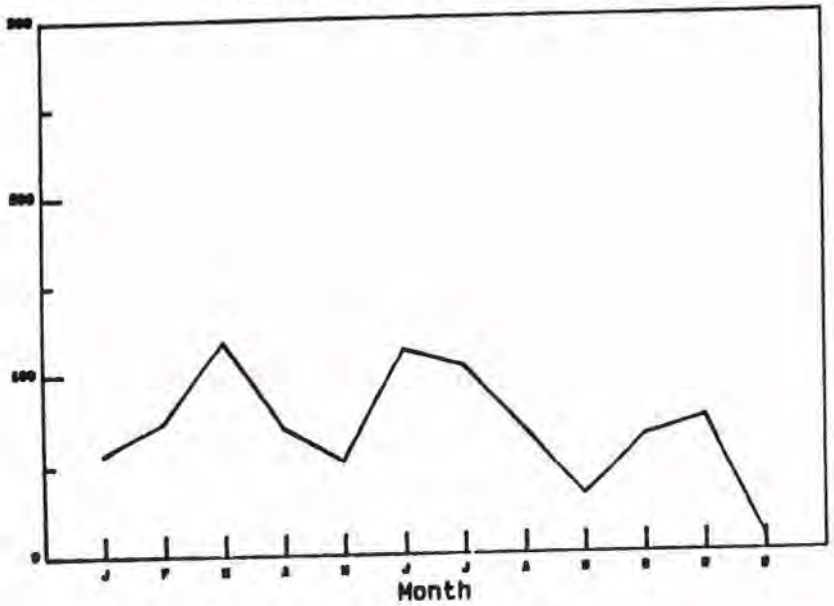

FIGURE 6

Monthly Mean Number of Harbor Seals 1982-84
Drakes Estero

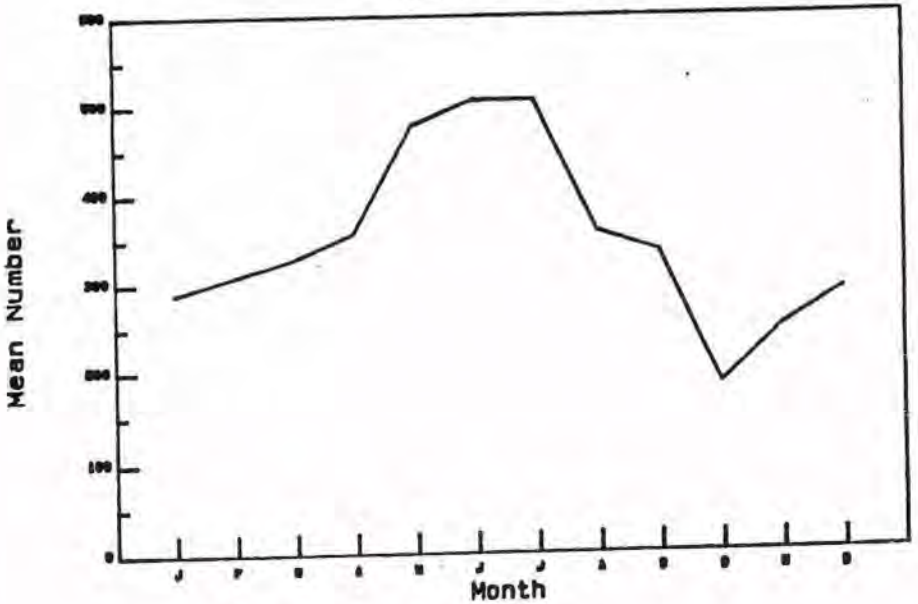

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FIGURE 7

Monthly Mean Number of Harbor Seals 1982-84
Duxbury Reef

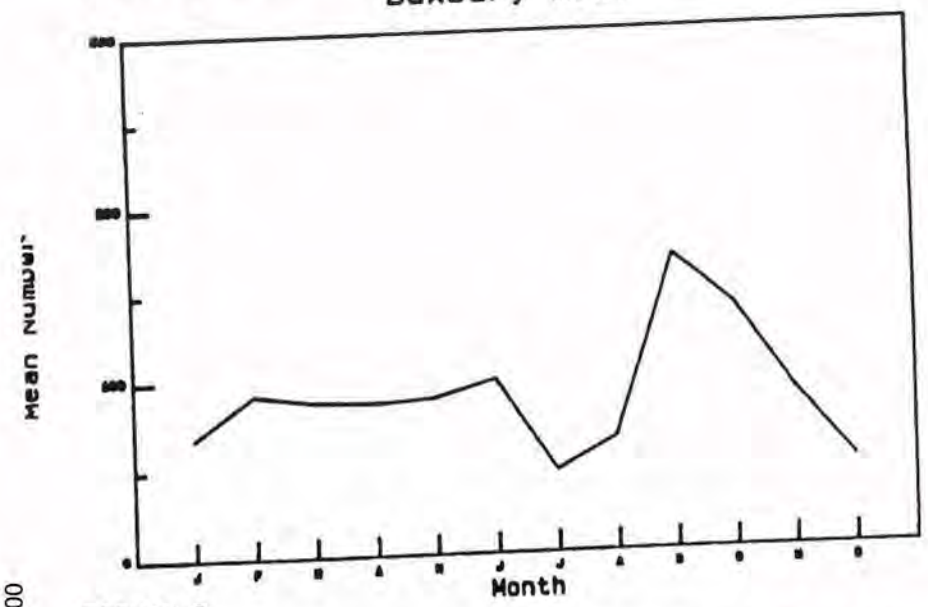

FIGURE 8

Monthly Mean Number of Harbor Seals 1982-84
Bolinas Lagoon

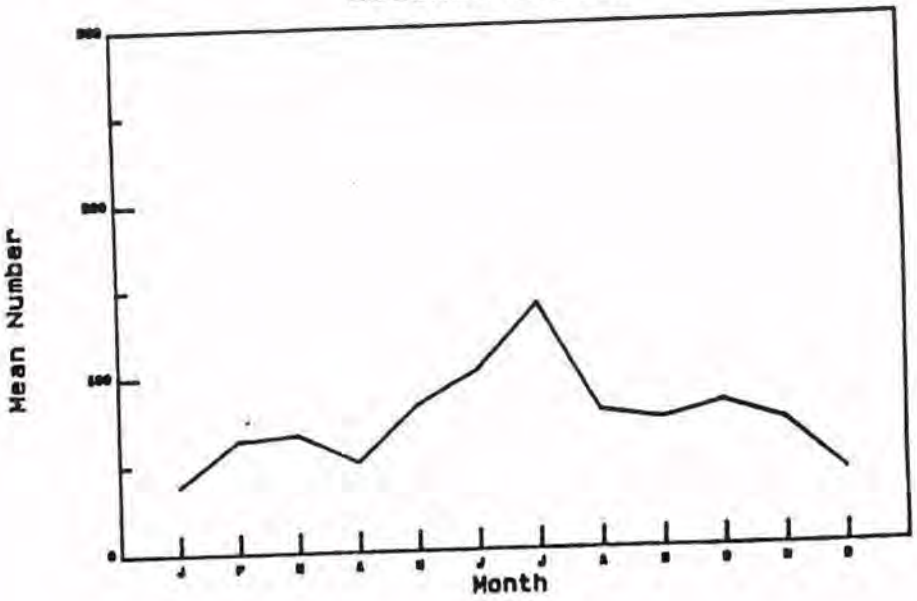

FIGURE 9

Monthly Mean Number of Harbor Seals 1976-84
Double Point

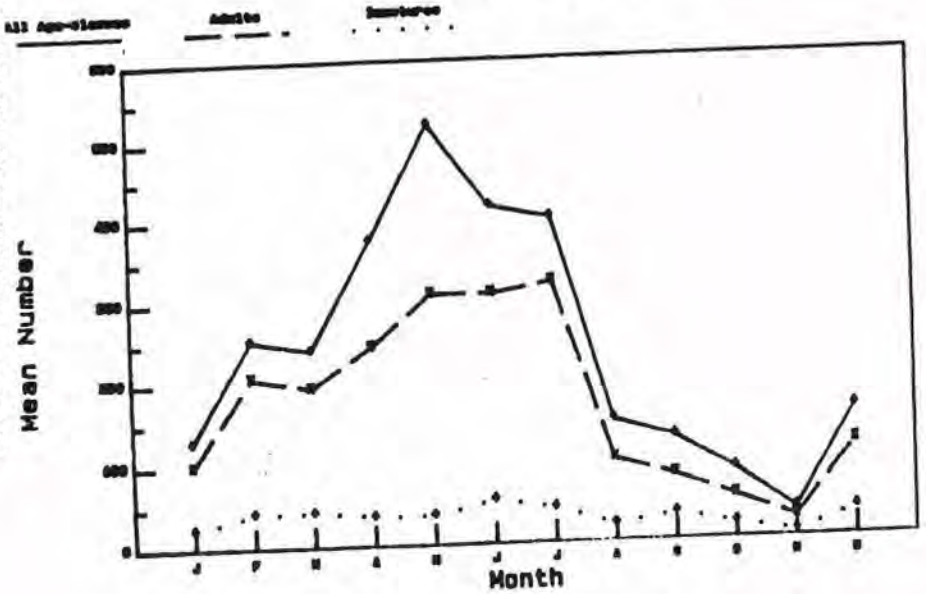

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FIGURE 10

MONTHLY MEAN NUMBER OF CALIFORNIA SEA LIONS AT BODEGA ROCK

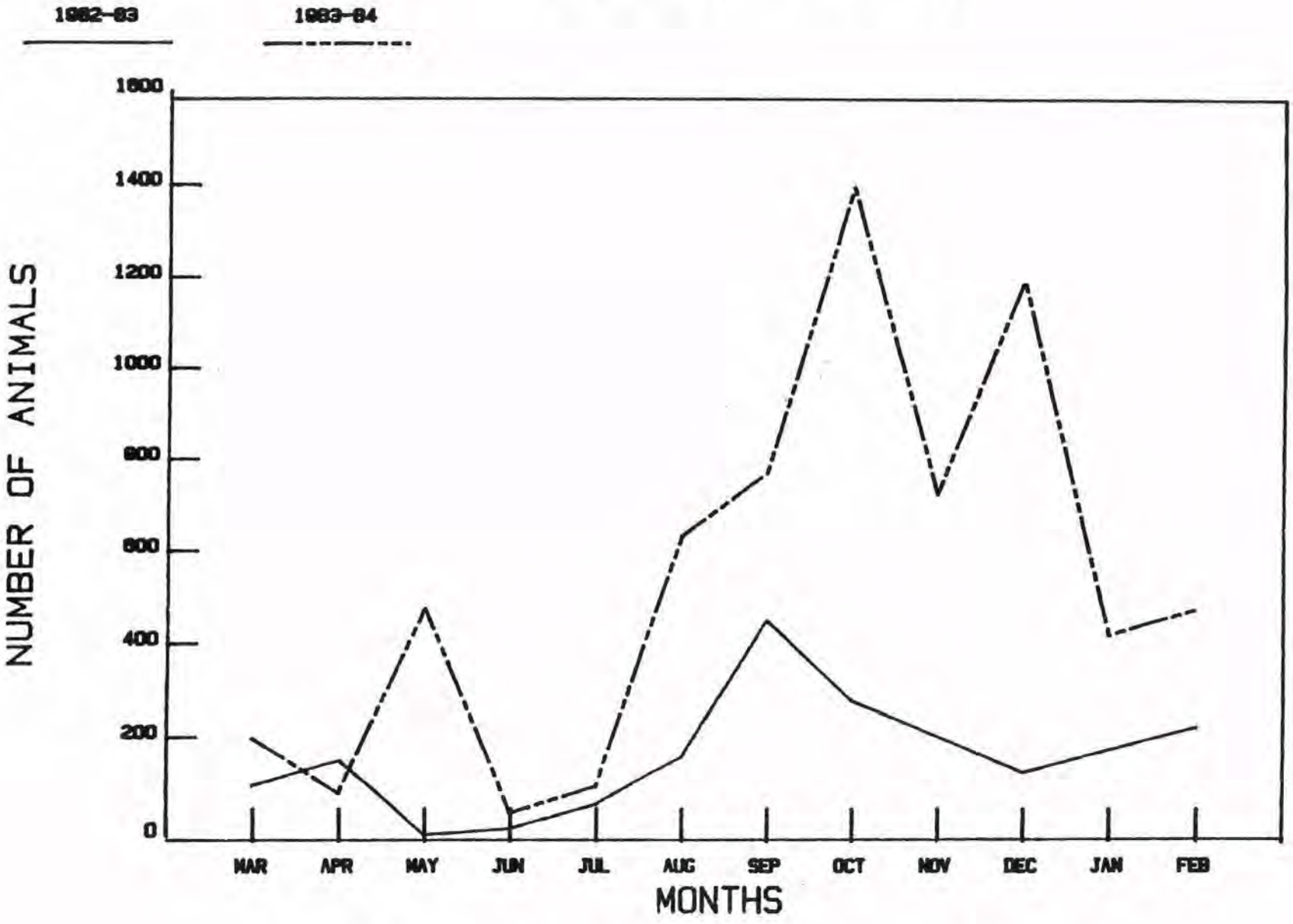

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FIGURE 11

MONTHLY MEAN NUMBER OF CALIFORNIA SEA LIONS AT POINT REYES

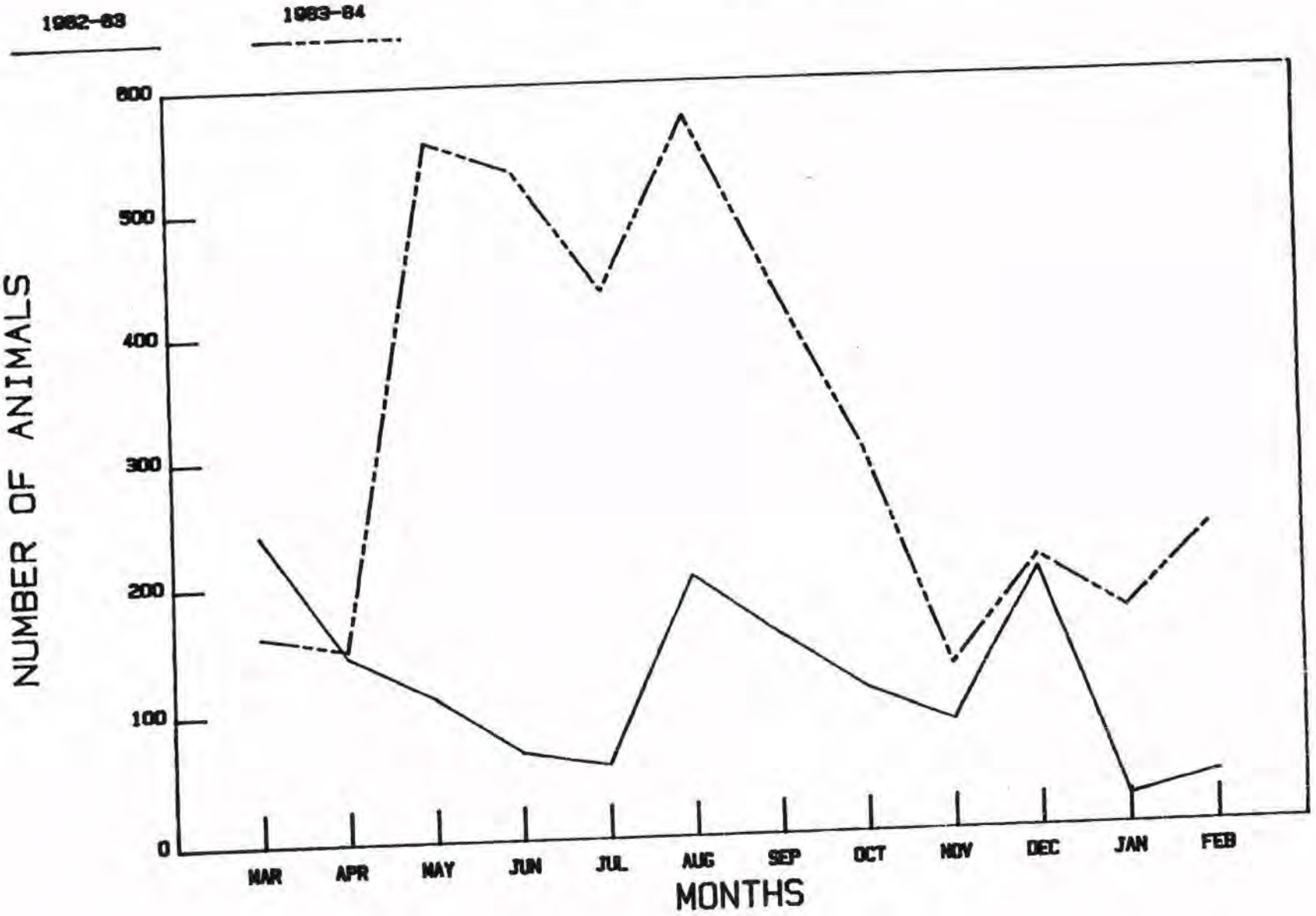

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FIGURE 12

MONTHLY MEAN NUMBER OF CALIFORNIA SEA LIONS AT THE FARALLONES

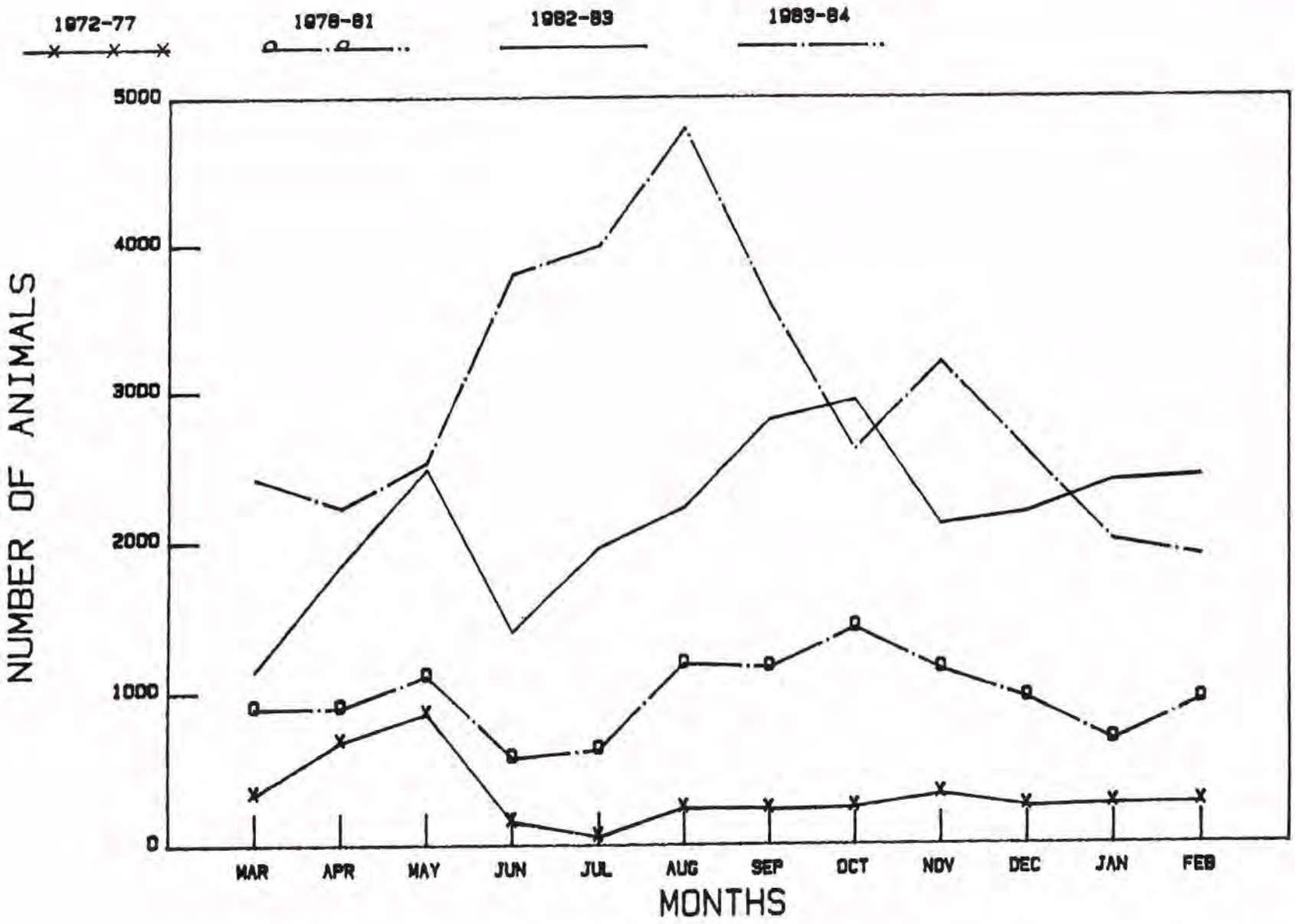

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FIGURE 13

MONTHLY MEAN NUMBER OF NORTHERN SEA LIONS AT POINT REYES

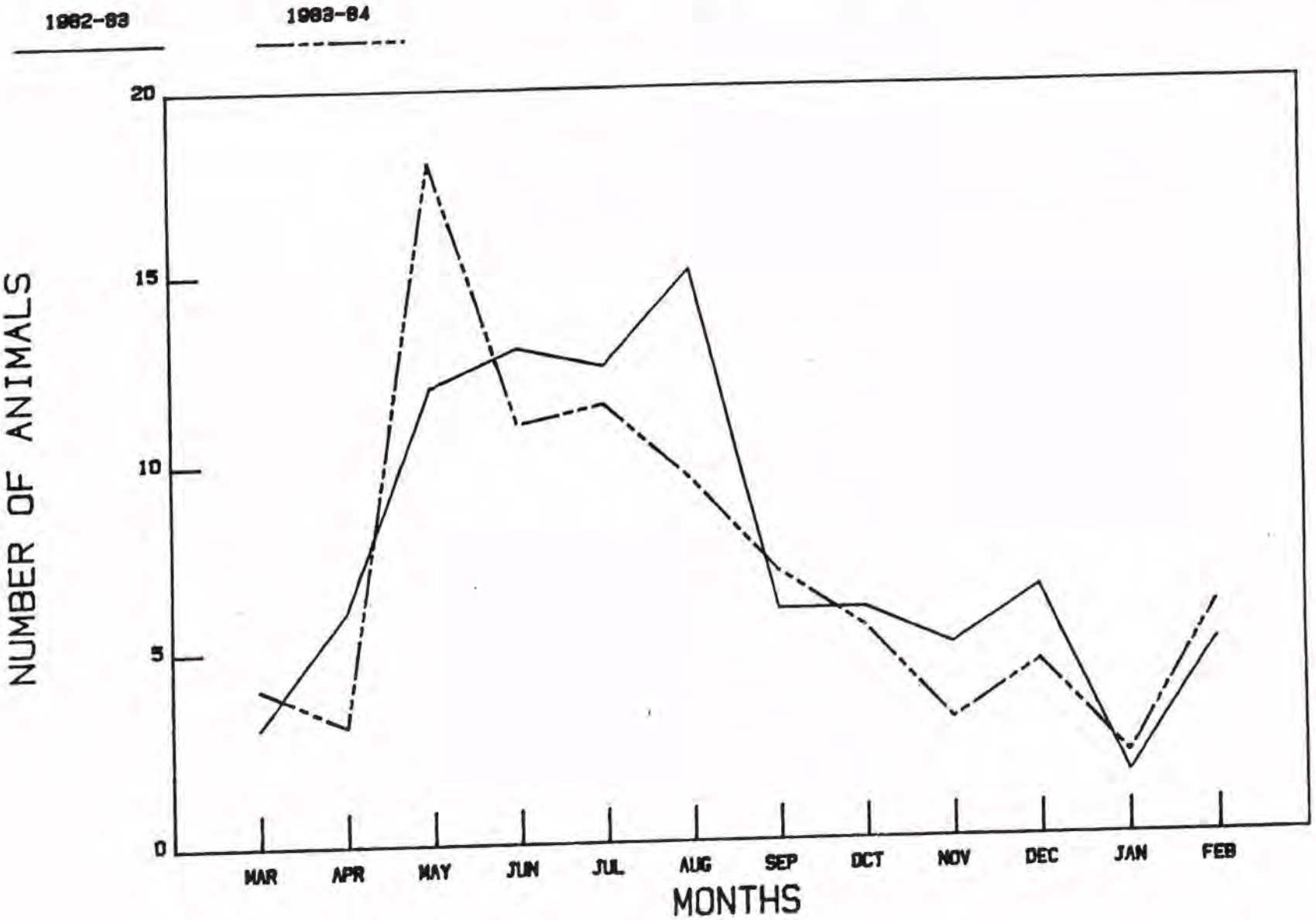

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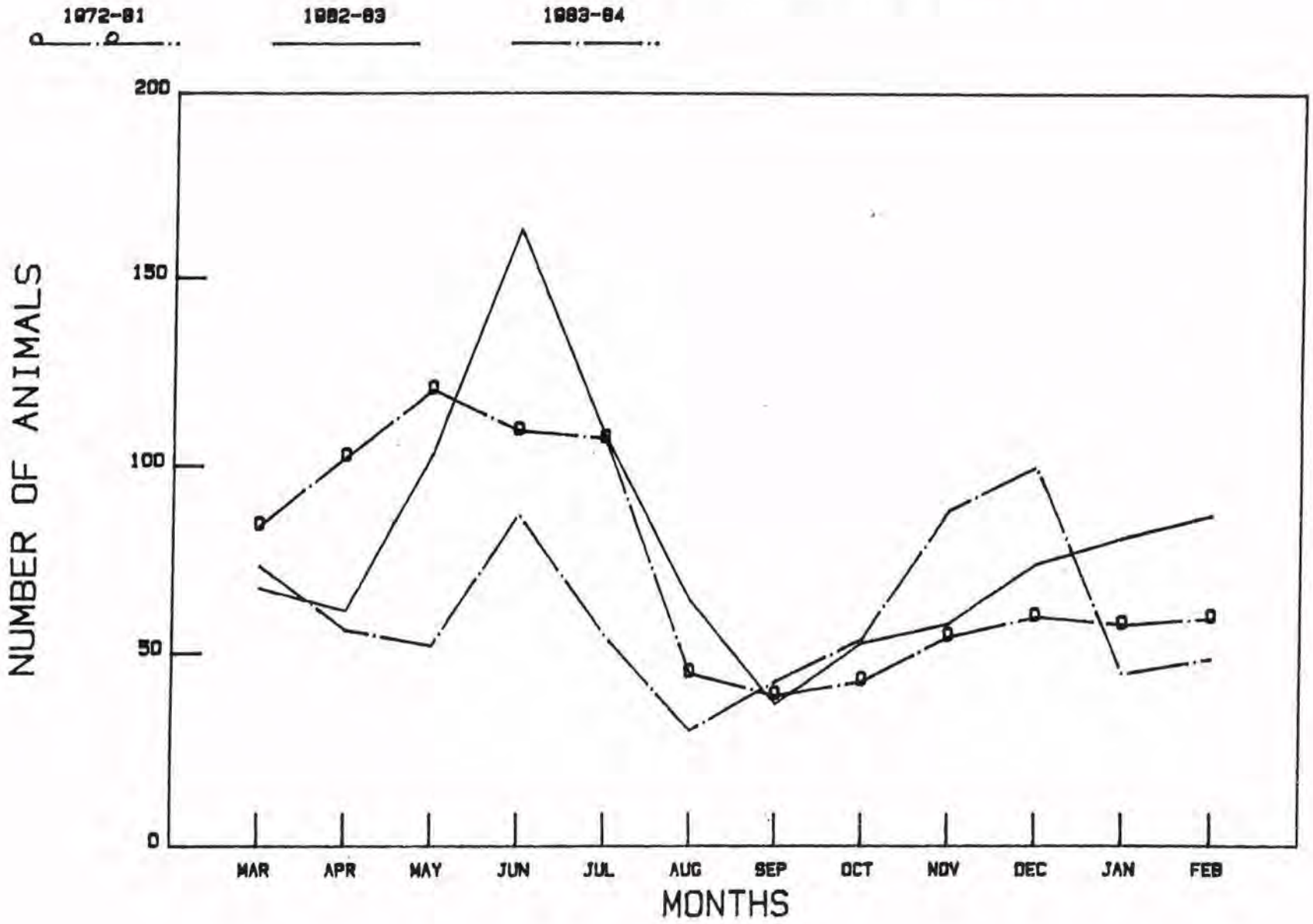
FIGURE 14

MONTHLY MEAN NUMBER OF NORTHERN SEA LIONS AT THE FARALLONES



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Appendix 1.

Table 2. The average number of harbor seals hauled out by season during simultaneous censuses in the Point Reyes/Farallon Islands Marine Sanctuary in 1982 - 83; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size. Tomales Bay includes Hog Island, Tomales Point includes Bird Rock, and Drakes Estero includes Limantour Spit.

	LOCATION							
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon	All Sites
Breeding								
$\bar{x}$	213.0	376.2	104.5	436.7	517.5	82.6	73.8	1839.4
SE	13.3	50.8	16.8	25.3	30.6	9.5	9.6	150.1
n	10	10	10	30	33	10	10	10
range	149-285	151-563	44-232	116-726	228-851	19-109	30-126	
Summer								
$\bar{x}$	191.6	242.9	71.7	331.1	246.5	62.3	83.3	1191.5
SE	21.5	45.5	18.4	39.1	46.1	23.8	10.3	108.5
n	8	8	6	12	8	8	8	8
range	102-281	137-454	13-149	146-469	69-469	0-164	24-138	
Winter								
$\bar{x}$	92.3	158.3	49.1	257.4	142.9	49.5	56.4	692.4
SE	30.7	22.2	17.9	34.5	47.7	21.5	6.1	164.1
n	8	8	8	12	8	8	8	8
range	31-271	80-240	8-155	93-421	30-359	0-148	29-83	

PINNIPED ASSESSMENT IN THE POINT REYES/FARALLON ISLANDS NATIONAL MARINE SANCTUARY, 1982 - 83.

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Point Reyes Bird Observatory
4990 Shoreline Highway
Sinson Beach, CA 94970

ABSTRACT

From March 1982 to February 1983 we censused three species of pinnipeds [harbor seal, California sea lion, and northern (Steller) sea lion] found on the coast of the Point Reyes/Farallon Islands National Marine Sanctuary. We censused harbor seals semi-monthly and simultaneously at all traditional haul out sites. Seals were present throughout the year with most seals recorded in the breeding season; the maximum count for the season was 2502 with 566 pups. An enormous influx of animals occurred primarily at coastal locations during the breeding season and appeared to be from areas outside of the Sanctuary. The diurnal haul out pattern varied depending upon time of day, tide level, and physical features of the hauling ground. Disturbance also modified the seals' diurnal pattern and was considered a factor in reproductive success. Preliminary recommendations for management are presented.

California and northern sea lions were censused weekly during the breeding season (May-August) and semi-monthly during the rest of the year at Sea Lion Overlook, Point Reyes. We divided animals into five age-classes and compared coastal counts to counts on the Farallon Islands. Peak numbers were 338 at the

Headlands in April and 3725 at the Farallones in January for California sea lions; for northern sea lions high counts were 19 at the Headlands in July and 192 at the Farallones also in July. No pups were observed at Point Reyes. Censuses were analyzed to clarify seasonal, diurnal and tidal fluctuations. Sea lions were censused in Tomales Bay during the herring run, December to March.

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INTRODUCTION

The presence of harbor seals, Phoca vitulina richardsi , within the coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary has been documented sporadically since Scammon (1968) first visited Point Reyes in the 1850's. Bonnot (1928) recorded numbers of seals for the California Division of Fish and Game but made only cursory observations in Point Reyes. More recently, Carlisle and Alpin (1966, 1971), Frey (1970), Mate (1977) and the Bureau of Land Management (BLM) (1981; Dohl 1982) conducted aerial surveys of pinnipeds in California. The focus of Mate's survey was on sea lions, and accordingly, the figures for harbor seals were low for the entire region. He distinguished only three seal haul out areas: Drakes Bay, Tomales Bay, and Tomales Point. BLM conducted aerial surveys of marine mammals in central and northern California in 1980 and 1981, and their survey was the first attempt to determine seasonal variability. Their estimates from latitude 37 °30′ to 38 °30′ for harbor seals in 1981 were 1333 in January, 1262 in May, 2559 in June, and 658 in September. Incidental information on pinnipeds was presented by Chan (1979) in reports on Areas of Special Biological Significance (ASBS) in the Point Reyes region, and detailed information on the population at Bolinas Lagoon was provided by Allen (1980). This survey, however, is the first comprehensive assessment of numbers and seasonal use patterns of harbor seals for the entire coastal zone of the Sanctuary. Management plans can be designed from this baseline information in conjunction with that to be collected in the second survey year.

STUDY AREA AND METHODS

The coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary extends from Bodega Bay (38° 30'N) south to and including Bolinas Bay (37° 30'N). Coastal embayments such as Tomales Bay, Drakes Estero, and Bolinas Lagoon, also under the jurisdiction of the Marine Sanctuary, were included. The Point Reyes National Seashore (PRNS), the Golden Gate National Recreation Area (GGNRA), and the Marin County Department of Parks and Recreation share jurisdiction with the Sanctuary over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game (CDFG) and the State Water Resources Control Board as Areas of Special Biological Significance (ASBS) because of their unique biological attributes.

Because of its agricultural character, much of this coastline has remained largely undeveloped even prior to its inclusion in the 1960's and 70's in PRNS and GGNRA. This character and the inaccessibility of much of the area have afforded protection from human disruption to the seals' terrestrial resting periods. Consequently, seal habitat usage probably has not changed significantly over the past century.

The topographical diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out in large groups. These include tidal mud flats, offshore tidal ledges, and sandy beaches. We censused harbor seals from the ground semi-monthly at recognized haul out sites within the coastal zone of the Sanctuary from March 1982 to March 1983. "Haul out site" is defined as a terrestrial location where seals

aggregate on a daily basis. These sites were Hog Island, sand bars in Tomales Bay near Toms Point, Bird Rock and adjacent beaches, Point Reyes Headland, Drakes Estero, Limantour Estero and Limantour Spit, Double Point, Duxbury Reef, and Bolinas Lagoon (Figure 1). In addition, we counted seals monthly at Bodega Rock. Censuses at Limantour Estero, though initially included in this project, were discontinued because seals were absent during low tides and were noted only incidentally during medium tides. The change in seal presence at Limantour Estero can be attributed to the high rate of siltation precipitated by severe storms in 1982 which rendered the area inaccessible.

Seals were censused on weekdays in order to minimize the chance of human disturbance. Censuses occurred simultaneously during low tides except on the few occasions when weather conditions prevented human access to remote sites. Low tide is usually the time when maximum numbers of seals haul out in the San Francisco Bay region (Allen 1980, Fancher 1979, Risebrough 1978).

We categorized harbor seals into three age classes: adults, subadults, and pups. Pups, born April through June, were considered subadults at the end of July because their size and coloration were then indistinguishable from first year immatures (i.e., immatures began to molt, and pup pelage became faded). Harbor seals reach maturity between three and five years, so division of this age group was based solely on size in comparison to adult animals which are about 160 cm long. We excluded information on immature seals for Tomales Bay, Limantour Spit, and Duxbury Reef; age-classes were difficult to separate consistently in these areas because of distance from the observer and glare from the afternoon sun.

Individual animals, those with distinct coloration or scars, were identified whenever possible to determine seal movement between locations. We consistently observed individuals with distinct scars only at Double Point where the observer was on a cliff overlooking the seals 70 m away. "Red" seals, those with a deep russet hue to the pelage, however, were easily counted at all locations. Unfortunately, when seals molted from July through September, the red also disappeared and did not reappear in the population until November (for a description of red seals, see Risebrough 1978).

For analysis of seasonal trends, the year was divided into three seasons: breeding (March through June); summer (July through October); and winter (November through February). We examined seasonal means for the region and for each site. To test whether the seasonal haul out pattern was different at coastal versus estuarine locations, we compared the total number of seals for each habitat during breeding and non-breeding seasons, using a Chi-square test.

Data collected at Bird Rock, Tomales Bay, Drakes Estero, and Bolinas Lagoon by National Park Service (NPS) personnel in 1981 were examined as a reference to that gathered in this study.

Hourly counts during 13 full-day censuses at Drakes Estero were conducted to ascertain diurnal and tidal differences in haul out patterns between Double Point, a coastal habitat, and from Bolinas Lagoon, an estuarine one, where data have been collected previously (Allen unpubl. data, Allen et al. ms.). When examining the daily haul out patterns at Drakes Estero, hourly means were compared combining all seasons. To determine the tidal effect on the hauling pattern at Drakes Estero and at

Double Point, we compared the mean number of seals on land at hourly intervals from one hour prior to four hours after low tide on those days when disturbance did not have a major effect on the seals.

Data collected by Allen (unpubl. data) from January 1976 to March 1982 were included in the analysis of seasonal and diurnal haul out patterns at Double Point. During this seven-year period, seals were censused on 247 days with over 410 hours of observation. Seasonal coverage of the area was regular for all years but 1979 and 1980. The majority of the censuses took place during the breeding season: 1976 (16 d), 1977 (44 d), 1978 (19 d), 1979 (9 d), 1980 (5 d), 1981 (13 d), and 1982 (32 d). Sufficient data for analysis of daily haul out patterns were available only for the breeding season since early morning censuses were rarely conducted during the months of November through February. Most censuses were confined to the hours 0700-1630 because the remoteness of the area required 3 h hiking time round trip, and most were conducted during low to medium tides when access by foot along the beach was possible. We estimated the increase in harbor seal usage at Double Point from 1976 to 1982 by dividing the seasonal means of 1982 by those of 1976, 1977, and 1978.

Harbor seals are well known for their avoidance of humans when hauled out on land, and thus, during censuses we monitored any disruption to their haul out pattern. Disturbance was defined as any activity, human or non-human, that caused at least two seals to stampede into the water. Sources for disturbance were classified as hiker, fisherman (including abalone diver and clam digger), boat (power, non-power), aircraft (plane, helicopter), dog, marine salvagers, natural, and unknown. Marine salvagers were a separate category because of a unique incident when a sailboat

washed ashore in the midst of the haul out area at Double Point.

During April and May, 17 additional censuses (three per week) were made to determine whether pup mortality was higher at a disturbed haul out site (Drakes Estero) than at an undisturbed one (Double Point). The expected relative levels of disturbance were reversed because of the wrecked sailboat at Double Point. The presence of the boat attracted much attention from the news media, the U. S. Coast Guard (which conducted rescue operations), and curiosity seekers. The boat remained on the beach from 11 to 21 April when marine salvagers and PRNS personnel removed it.

During these additional censuses, we collected information on the number of dead pups and on mother-pup separations. We estimated the mortality rate of pups before weaning based on the proportion of the number of dead to the number of live pups. Mother-pup separations were inferred from the presence of lone pups. Harbor seal females characteristically remain in close proximity to their offspring until pups are weaned from three to six weeks after birth. An unattended pup with an estimated age of from 1 to 10 d was considered a lone pup. Lone pups often vocalized and traveled through the herd attempting to nurse from seals of all age-classes. Thus they were easily recognized. We also identified pups which retained the lanugo pelage, normally shed in utero for this subspecies, because we suspected that disturbance might affect premature parturition. Since the reaction of females to disturbance also would have some bearing on pup survival, we compared the number of mother-pup pairs retreating to the water or remaining on land after disturbance versus the reaction of other seals, using a Chi-square test.

We examined human/seal fishery interactions in Tomales Bay by boat from

December through March when herring, Clupea harengus pallasii, spawn (Spratt 1981). Seals were counted on haul out sites and in the water where herring were spawning on nine separate days.

RESULTS

Seasonal and Spatial Use Patterns

Regional

Harbor seals were present year round at all sites censused within the Marine Sanctuary; however, the number of animals predictably fluctuated seasonally (Tables 1 & 2, Figure 2). A comparison of the seasonal means showed that more seals used haul out sites in the breeding ($\bar{x}$ = 1839.4) and the summer ($\bar{x}$ = 1191.5) seasons than during winter ($\bar{x}$ = 692.4). Maximum counts for the region occurred during the pupping season [May (2339) and June (2502)] with Tomales Point, Drakes Estero, and Double Point contributing most of the total number of pups (Tables 1 & 3).

Pups were first sighted during the first week of April and the seasonal peak was in May (566 and 564) with pups representing 24% of the total count (2339) (Figure 2). These two pup counts were remarkably similar, though made two weeks apart. Pups were easily distinguished in the field because their bright pelage contrasted with pre-molt immatures and adults, and because herds were loosely spaced out during this season.

A seasonal trend was not apparent, though, in the number of immature seals for either the breeding or the summer seasons; the presence of subadults at haul out sites averaged from 196.3 (SE = 24.8, range = 141-296, n = 7) to 203.7 (SE = 23.1, range = 128-282, n = 6). During the winter season their representation declined slightly to 155.7 (SE = 21.1, range = 83-257, n = 7). Monthly maximum counts of immatures were suggestive of trends only since not all locations were included in the analysis; nevertheless, they were surprisingly similar with 283 in March,

296 in April, 282 in August, 200 in September, 256 in October, and 257 in February. The numbers were slightly lower for May (177) and June (152) and for December (174) and January (149).

The representation of "red" seals at haul out sites varied considerably and did not prove a good indicator of seal movement between locations. Nonetheless, their presence at certain haul out sites suggested that seals were resident for prolonged periods. For example, at Bolinas Lagoon, one red seal was sighted during most censuses throughout the year except in May and during the molt. Similar examples were noted at Double Point where known individual animals have been followed since 1976. On three occasions in May and June 1982, a flipper-tagged and dye-marked harbor seal was sighted at Point Reyes Headland. The animal had been picked up in San Mateo and rehabilitated at the California Marine Mammal Center. It was subsequently released in January 1982 at the site of retrieval, 80 km south of Point Reyes Headland (M. Weber, pers. comm.). Sighting of the seal was the first confirmation that seals may travel from areas south of San Francisco Bay to Point Reyes.

A comparison of coastal (Tomales Point, Point Reyes Headland, Double Point, and Duxbury Reef) and estuarine (Tomales Bay, Drakes Bay, and Bolinas Lagoon) locations mirrored the seasonal pattern for the region. The degree of change in numbers, though, was significantly greater for coastal areas than for estuaries ($X^2 = 85.01$, $p<0.001$), indicating that more seals were migrating to coastal areas than to estuaries during the breeding season. The mean number of seals counted at coastal areas during the breeding season was 929.9 and was 721.3 for estuarine sites, but during the non-breeding season the means were nearly equal (Table 4, Figure 3).

The seasonal pattern of each haul out site reflected this coastal/estuarine model in most cases, as described below.

Bodega Bay

Bodega Rock is an offshore sea stack situated at the mouth of Bodega Bay. Seals hauled out only on tidal reefs on the east and southeast portions of the island. Our maximum count was 48 seals in February. Only three pups were seen in May (Table 1).

Tomales Bay

Harbor seals hauled out in Tomales Bay on the southeast side of Hog Island and on tidal mud flats extending from Toms Point to Sand Point. Both areas were used throughout the year, but most seals were counted on the tidal mud flats. The seasonal pattern for this area, though similar to the estuarine model, was more difficult to interpret due to frequent disturbances. Seals were disturbed during 16 of the 26 censuses. Nevertheless, seasonal means showed that numbers remained relatively stable during the breeding and summer seasons, and declined in winter months (Tables 1 & 2). A maximum of 58 pups was counted in May. Censuses conducted in 1981 showed a spring peak and a winter decline; however, numbers were also substantially reduced during summer months (Table 5).

Tomales Point

Seals hauled out on a diversity of substrates at Tomales Point. North and South Rocks are examples of rocky intertidal substrates. Rope Beach and South Beach are sandy pocket beaches, and Bird Rock is comprised of

both rocky and sandy features. The largest concentration of animals hauled out on Bird Rock, North Rocks, and South Beach throughout the year. The geographic diversity of this point as well as its juxtaposition to Tomales Bay may explain the significance of the area to seals; it was a major site used by seals during the breeding season with counts ranging from 151 to 563 including 135 pups (Tables 1 & 2). The number of seals declined in summer to an average of 242.1, and dramatically so in winter months. A similar trend was observed during censuses in 1981, but the largest count (647) was made in early July rather than in June (Table 5).

Point Reyes Headland

Point Reyes Headland is another coastal location characterized by offshore rocks and pocket beaches. The largest gathering of seals occurred around the promontory at Split Rock Cove with some seals scattered along offshore rocks at Sea Lion Cove. This was a minor haul out area compared to nearby Tomales Point and Drakes Estero; however, the seasonal pattern resembled the coastal model with a peak during the breeding season ($\bar{x}$ = 104.5) including 19 pups, and a sharp reduction in summer ($\bar{x}$ = 71.7) and again in winter ($\bar{x}$ = 49.1) (Tables 1 & 2). Point Reyes Headland was not censused in 1981. This is the only location within the Sanctuary where other pinniped species haul out on the mainland. Harbor seals did not intermingle with sea lions at Sea Lion Overlook but preferred offshore rocks. Harbor seals did share pocket beaches with a few northern elephant seals at Split Rock Cove.

Drakes Estero

Drakes Estero is an example of an estuarine environment where seals hauled out on tidal mud flats exposed at low, medium, and medium high tides. Numerous sand bars extending far up into the estero were used, but the preferred site was a bar near the estero mouth. Seals were also noted hauled out in large numbers at the tip of Limantour Spit but only during the breeding season (14 of 30 censuses). Surprisingly, seals were absent from Limantour Spit during summer and winter months.

Drakes Estero was a major haul out area year round for harbor seals in the Sanctuary. Maximum numbers during the breeding season ranged from 116 to 726 including 150 pups (Tables 1 & 2). In contrast to coastal populations, the summer decline was more gradual, and numbers during winter were still much higher than those at Double Point and Tomales Point, the other two major rookeries. The same trend was seen in 1981, but the extremes were more pronounced (Table 5).

Double Point

Double Point is a coastal habitat named for its concave, steep, cliff-backed beach enclosed by two jagged promontories, and encompasses a variety of substrates preferred by seals to haul out on. The seals frequented a number of sites within the Double Point area: South Point (a rocky outcrop with tidal reefs); tide pools (exposed at low to medium low tides); south Bolsa Beach (a sandy pocket beach); north Bolsa Beach (an extension of the south beach but separated by the outfall from Pelican Lake); Stormy Stack (an offshore sea stack); and offshore rocks in the bay just south of South Point.

The degree to which each subsite was frequented varied seasonally.

Seals were found at all subsites during the breeding season, though south Bolsa Beach was the area of highest concentration. The tide pools and north Bolsa Beach were used only during this season and almost exclusively by mother-pup pairs. During summer, south Bolsa Beach, South Point, and Stormy Stack were the preferred haul out sites, but seals also were noted on offshore rocks south of South Point. During winter months, the level of use was nearly equal at South Point and south Bolsa Beach.

Studies at Double Point since 1976 (Allen, unpubl. data) reveal a distinct seasonal variability in the number of seals which parallels the seasonal change in subsite preference. Maximum counts for each year consistently occurred during the breeding season from April to the onset of July. Greatly reduced numbers were observed during winter months from October through January. The months August/September and February/March were transition periods when numbers were declining or increasing, respectively (Table 6, Figures 4 & 5). The seasonal means in 1982 were 517.5 for breeding, 246.5 for summer, and 142.9 for winter (Table 2). Pups represented 31% (263/851) of all seals counted in May 1982 at Double Point and 47% (263/566) of all pups censused in the Sanctuary (Tables 1 & 3).

Each year, pups were initially sighted in late March or early April and the maximum pup count consistently occurred in the first two weeks of May. The May peak coincided with the annual peak for all age-classes combined, but surprisingly more adult seals hauled out in July ($\bar{x}$ = 308.4) than in May ($\bar{x}$ = 265.5) (Table 6, Figure 5), which coincides with the mating season and the onset of molt. Females come into estrus after pups are weaned, and mating is purported to extend into August (Bigg 1969). Seals at Double Point molted from July to September.

The mean number of immature seals present at Double Point was largest in February, March, and July and declined during August and the winter months. During the breeding season the numbers declined only slightly, but the proportion of subadults to all seals counted then was much lower than in summer or winter (Table 5).

Based on monthly maximum counts since 1976, the number of seals appeared to increase gradually during the breeding season except in 1979 and 1980. The slight decline during those two years was probably attributable to the small sample size and to frequent disturbances that seals experienced during those censuses; seals were disturbed on five of nine days and three of five days, respectively.

A comparison of the mean number of seals counted during the 1976 breeding season ($\bar{x}$ = 195.2, with 85 pups) with that of 1982 ($\bar{x}$ = 517.5, with 236 pups) revealed almost a three-fold increase in the presence of all seals (2.7) and of pups (3.1) over the seven-year period (Table 7). In 1977 there was a two-fold increase for all seals (1.7) but less so for pups (1.5). The average for 1978 was similar to that of 1977. The maximum number of pups counted each year was 85 (1976), 175 (1977), 177 (1978), 142 (1979), 159 (1980), 229 (1981), and 263 (1982). The annual increase was also complemented by changes in spatial haul out patterns. For example, more seals hauled out at north Bolsa Beach in 1982 (205) than in 1977 (8) or in 1976 (2).

The average numbers of seals hauled out in summer in 1976, 1977, and 1978, however, were similar to those in 1982 (Table 7). The winter seasonal means for 1976 and 1977 also were not substantially different from those of 1982.

Duxbury Reef

Duxbury Reef is a coastal intertidal reef jutting out from Bolinas Point. Though a seasonal pattern was exhibited, numbers varied greatly within each season, and maximum counts were made in September (164) and January (148) rather than during the pupping season (Tables 1 & 2). This wide variation was in part due to disturbance. Seals were disturbed on six of the 28 census days. Duxbury Reef was probably not a pupping ground because the number of pups counted was minimal (5), and pups were noted in June, a weaning period at all other sites within the Sanctuary.

Bolinas Lagoon

Bolinas Lagoon, like Drakes Estero, is an estuarine habitat where seals hauled out on tidal mud flats bordering two islands, Kent Island (KI) and Pickleweed Island (PWI). In a previous study (Allen et al. 1980), KI was the preferred haul out site for all seasons. In 1982, however, PWI was used almost exclusively during winter months; seals were counted at KI on only one of eight winter censuses. Seasonal variation in 1982 followed the pattern of prior years, and in contrast to all other locations within the Sanctuary, the annual peak occurred in summer rather than during the breeding season (Tables 1 & 2). As at all other locations, numbers declined in winter. Bolinas Lagoon was not a major pupping ground, with only 17 pups counted in 1982.

The average numbers of seals censused at Bolinas Lagoon in 1978-79 during the breeding and summer seasons were 38.3 (SE = 2.8, range = 8-101, n = 46) and 59.4 (SE = 5.4, range = 5-105, n = 29), respectively (Allen,

unpubl. data). The maximum number of pups counted in 1979 was 12. When one compares breeding and summer means for 1978 and 1982, the increase in usage over this five-year period is nearly two-fold for the breeding season (1.9) but not very different for the summer season (1.4). The increase in the presence of pups was insubstantial.

Daily Usage

Harbor seals were sighted year round at all locations monitored. On only four occasions were seals not hauled out (three at Duxbury and one at Tomales Bay), though they were seen in the vicinity. On each of these occasions, seals were disturbed prior to our census and failed to rehaul during the census interval.

Seals at Drakes Estero hauled out more frequently at 1300 h ($\bar{x}$ = 324.0, SD = 171.2, n = 13) than in the morning at 0800 h ($\bar{x}$ = 127.3, SD = 165.6, n = 11) or in the late afternoon at 1700 h ($\bar{x}$ = 143.5, SD = 158.0, n = 13) (Figure 6). Only when sand bars were reduced in size at medium to medium-high tides were seals diverted from this pattern, and even when areas were awash, seals would congregate above submerged bars. The mean number of seals hauled out at -1 hour prior to low tide ($\bar{x}$ = 414.0) was not much different from that at +3 hour after low tide ($\bar{x}$ = 457.8), but at +4 hour the numbers began to decline ($\bar{x}$ = 393.8) (Table 8). Disturbances occurred on six of the 13 all-day censuses, but disturbances were short in duration, and seals quickly rehauled.

At Double Point we had sufficient data on the hourly presence of seals only for the breeding season from 0700 to 1600 h. The pattern revealed

there was quite different from that at Drakes Estero, with more seals present on land in the late afternoon at 1600 h ($\bar{x}$ = 683.4) than at 1300 h ($\bar{x}$ = 475.8) (Table 9). Tide, too, seemed to influence the seals' hauling out pattern. When combining all subsites, the mean number of seals hauled out at +3 hour ($\bar{x}$ = 465.7) was higher than at -1 hour prior to low tide ($\bar{x}$ = 374.8): at +4 hour the numbers were higher still ($\bar{x}$ = 567.1) (Table 8). Conversely at the subsite South Point, where rising tides had a more direct effect on haul out space, more seals were hauled out at low tide ($\bar{x}$ = 37.4) than at +3 hour ($\bar{x}$ = 27.6) or at +4 hour ($\bar{x}$ = 21.0) after low tide. As the tide rose, seals shifted from offshore rocks, tide pools, and tidal ledges at South Point to south Bolsa Beach which provided ample space at medium to medium-high tides.

Disturbance

Seals at all haul out sites within the study area experienced some degree of disturbance from human or non-human sources. The activities of fishermen (all categories) caused the greatest disturbance to seals, representing 32% of the 79 disturbances observed (Table 10). Seals on sand bars in Tomales Bay received the highest level of disturbance (46%), the major source being the activities of people digging for clams. More than 100 people on a single day were ferried by boat from Lawson's Landing on the eastern shore of Tomales Bay to these sand bars to dig for clams. Clam diggers also frightened seals at Drakes Estero, as did people canoeing and hiking.

Sources for disturbance at Double Point were almost entirely related to

the presence of the wrecked boat. The majority of these disturbances were from Coast Guard helicopters (6), and personnel involved in the salvage operation (4). Though a dog was observed flushing seals only once, dogs commonly accompanied clam diggers at Tomales Bay and fishermen at Duxbury Reef when seals were disturbed.

Natural sources for disturbance included large birds such as Turkey Vultures, Cathartes aura, and Brown Pelicans, Pelecanus occidentalis, alighting near seals at Drakes Estero; a black-tailed deer, Odocoileus hemoinus, swimming by the Point Reyes Headland herd; and a sudden land slide in the vicinity of the Double Point herd. Thirteen percent of the disturbances were of unknown origin.

During April and May when additional censuses were made, seals were disturbed on six days at Drakes Estero and on nine days at Double Point. At Drakes Estero, these disturbance days occurred throughout the season; disturbances usually resulted from a single event and were short in duration. In contrast, seven disturbance days at Double Point took place during an eight-day period in April. Multiple disturbances occurred on a single day, and marine salvagers remained on the beach for three entire days and one night. The salvagers were 350 m from the south Bolsa Beach herd and 250 m from the north Bolsa Beach herd. Seals were constantly aware of their activities, though salvagers made every attempt to minimize their impact. During eight days prior to the salvage operation, U. S. Coast Guard, U. S. Army, and news media helicopters flew daily over Double Point below 300'. At least twice, helicopters landed on south Bolsa Beach.

The degree to which these disturbances caused mother-pup separations, disrupted nursing periods, and ultimately contributed to pup mortality, could

be inferred from the incidental information that was collected during observations.

Of the 150 pups counted at Drakes Estero, none were found dead and only one lone and one lanugo pup were noted in April. The lone pup was just born when the herd of seals, including the mother, was flushed into the water by a canoer. The pair was permanently reunited 1 h 45 min after separation.

In contrast, 34 dead pups were counted at Double Point (14 in April, 19 in May and 1 in June), representing 13% of all pups (263) counted in 1982. Two of the dead pups displayed lanugo pelage. The majority of dead pups (20) was seen from 29 April to 14 May which coincided with the peak of the pupping season. When the wrecked sailboat was present, seven dead pups were counted. Most pups likely died from starvation, since many were small and very thin.

Most lone pups were counted on 21 April (11), 23 April (11), 29 April (10), 30 April (12) and 2 May (10). Only two lone pups were seen reunited with females. Pups with lanugo pelage were primarily seen in April (32) with only seven seen in May. Our estimate for pups born with lanugo in 1982 was 15%.

On 21 April when salvagers were most active, the number of seals on land was never stable except at South Point, the area most distant from the operation. Seals stampeded <u>en masse</u> six separate times during the 3.5 h observation period, and individual animals, particularly females with pups, were continually retreating to the water. The highest number of seals resting on land on this day was 248, including 31 mother-pup pairs. On 22 April, the day after the salvagers had left, a total of 605 seals,

including 133 mother-pup pairs, were hauled out. The percentage increase in mother-pup pairs hauled out was nearly quadruple. Females with pups were significantly more reactive to disturbances than were other seals. When combining data from eight separate instances, 74 females with pups retreated to the water and 47 pairs remained on shore, whereas only 135 adults/immatures entered the water and 321 remained on shore ($X^2 = 39.85$, $p<0.001$).

Fishery/Seal Interactions

The presence of harbor seals hauled out in Tomales Bay when the herring were spawning fluctuated widely from 0 to 271 (Table 1); however, the numbers were no greater then than during other months (see section on Tomales Bay). Seals were more difficult to census when in the water because they did not travel in compact groups, and instead surfaced randomly and usually alone. Our rough estimates for seals noted in the vicinity of boats involved in commercial herring operations and for seals feeding near spawning fish ranged from four to 50 on nine separate census days. At this time a small group of seals was seen hauled out far up the bay near Papermill Creek, an area hitherto unused.

DISCUSSION

Point Reyes accommodates a significant harbor seal breeding population. Our maximum figure recorded in late June was 2502 and was substantially higher than that collected during most recent surveys (Mate 1977, BLM 1980), but similar to that observed in early July 1981 by Dohl (1982). Dohl, however, reported much lower numbers in May 1981 compared to NPS simultaneous censuses in 1981 and to this survey, particularly for specific locations such as Double Point where only 243 seals including 30 pups were noted. Preliminary data collected in the most recent CDFG aerial survey in 1982 were similar to that presented here (D. Miller, Department of Fish and Game, Menlo Park, CA, pers. comm.).

For some locations within the study area, the CDFG aerial survey figures proved more accurate than ground surveys because of distance from shore and angle of view. Our information on harbor seals at Bodega Rock, for example, was unreliable because seals primarily hauled out on the back side of the island, out of view. Miller recorded 115 seals in May of 1982. The most seen there by us was 48.

All aerial survey estimates failed to equal the number of seals recorded in ground surveys at Double Point and Drakes Estero during the breeding season. Our figures indicated that Double Point was the largest harbor seal pupping ground in the state. Combined with seals recorded at Drakes Estero, Tomales Point, and Tomales Bay, the Point Reyes population of harbor seals represented a significant proportion (14%) of the state population which Miller estimated to be 19,000 in 1982 (Miller, pers. comm.). Miller's estimates for the number of pups in Marin County,

however, were unduly low (224) compared to our counts (566 and 564) because the CDFG survey was in April rather than May.

These figures are not absolute, though, and indicate only trends because we do not know what percentage of the total population is hauled out in a given area even under optimal conditions. Sullivan (1979) estimated that harbor seals spent 50% of daylight hours in the water, and Pitcher's data revealed that radio-tagged seals hauled out 50% of the days during June. Consequently, the harbor seal population in Point Reyes may be substantially higher than our estimates.

Though little information was available for determining whether the reproductive population has been increasing in the Point Reyes area, data collected at Double Point and from Bolinas Lagoon suggest that on a local level there has been an expansion in usage during the breeding season. There is no indication, however, that the size of the resident population at Double Point has changed, because summer and winter means were similar. The increase is explainable, therefore, by the emigration of animals to the area. Because the population of subadults remained relatively stable year round, breeding animals likely represent a major part of the influx. Each year, distinctively marked and scarred adult animals arrived at Double Point, and if present in previous years, would easily have been identified. A rapid increase in the number of harbor seals has also occurred on S. E. Farallon Island during the past decade, also attributable to emigration because only two pups have been observed there in any given season since 1971 (PRBO, unpubl. data).

The seasonal fluctuation in numbers throughout the area was expected. Unexpected, however, was the degree of seasonal change in coastal versus

estuarine aggregations. Coastal populations appeared to receive a significant influx of transient animals in the breeding season, whereas estuarine populations experienced a lesser influx. There was no evidence that estuarine animals shifted to coastal areas to breed, nor that coastal animals moved into estuaries such as Tomales Bay to feed on herring since the number of seals counted there in winter was no greater than during breeding and summer seasons.

Studies by Everitt and Jefferies (1979) in Washington State showed that seasonal movement occurred between Grays Harbor/Willapa Bay and the Columbia River with the former the preferred breeding ground and the latter a wintering area. Movement from bays to coastal locations was not indicated in their study. The same pattern could exist for the Point Reyes region with exchange occurring between Tomales Bay, Drakes Bay, and Bolinas Lagoon. Certainly the post-pupping increase of animals at Bolinas lasting until late October suggests that seals were migrating there for reasons other than pupping. However, the degree of decline in numbers at both Tomales and Drakes Bays during the winter months did not equal the elevation at Bolinas. More likely, seals were traveling to areas outside the Sanctuary. A comparison of aerial surveys conducted by BLM (1980) in May and January denoted a northward movement of seals from this region to Sonoma and Mendocino Counties in winter. In January, seals were using more locations and forming smaller groups; in May, seal haul out sites were reduced 10% and population size increased 25%. The number of haul out sites in Point Reyes did not increase during winter months, further suggesting that seals were migrating to other areas.

Pitcher's (1979) study of radio-tagged harbor seals in Alaska revealed

substantial variation in distances that individuals moved. Some seals moved long distances (194 km) to one or two other locations from the site of capture, and some were year round residents. Year round site fidelity of known seals over a seven-year period has also been documented at Double Point, as has seasonal emigration of known females, demonstrating that seals here may also display breeding site fidelity (Allen, unpubl. data). Information gathered from radio-tagging revealed too that seals spent more time hauled out in June (50%) and less in September (41%) (Pitcher 1979). Winter numbers likely are reduced at Point Reyes both by dispersal and by alterations in daily hauling patterns.

From our analysis, time of day, tide, and substrate type were the determining factors in the diurnal haul out pattern of seals. The influence of each factor, alone and in combination, differed tremendously as is indicated by the variety of patterns documented in other studies (Ainley et al. 1977, Allen et al. 1980, Boulva and McLaren 1979, Calambokidis et al. 1978, Fancher 1979, Pitcher 1979, and Sullivan 1979).

Sullivan (1979) determined that seals hauling out on rocky intertidal areas in northern California were influenced only by tides and did not follow a diurnal pattern. Conversely, on Sable Island along the eastern seaboard of Canada, seals hauled out on sandy beaches independently of tides and daylight hours, but were not present at night (Boulva and McLaren 1979). Calambokidis (1978) found that seals preferred various sites depending upon access at different tide levels.

At Drakes Estero, an estuarine site, more seals were hauled out at mid-day, and tide became a limiting factor primarily when sand bars were inundated. A similar pattern was demonstrated at Bolinas Lagoon in spring

and summer but not in winter (Allen et al. ms.). During the breeding season at Double Point, the number of seals increased progressively throughout the day so that even at medium tides more seals were present. At South Point, a rocky intertidal subsite, seals decreased in number after low tide because of limited hauling out space, and would then shift to the beach. In Point Reyes, therefore, seals seem to haul out within an optimum range from mid-day to late afternoon at low to medium tides. The physical features of each location, though, must be assessed when evalutating daily trends in seal behavior.

Disturbance to seals must also enter into the analysis when distinguishing daily haul out patterns. At heavily disturbed areas such as Strawberry Spit in San Francisco Bay, seals have adapted by hauling out at night (Paulbitski 1975). In this study, seals do not appear to experience levels of disturbance which would preclude their daytime presence. Though seals were often flushed from sand bars in Tomales Bay and Drakes Estero, these were primarily incidental occurrences, subject to seasonal human activites. Alternate haul out sites in the vicinity allowed for some flexibility in seal haul out opportunities, and were believed important to seal adaptability in Bolinas Lagoon (Allen et al. 1980). Certain locations in the Sanctuary, however, lack suitable alternate sites, and consequently, are more vulnerable to disturbances. This is the case primarily for coastal locations where haul out space is limited, as was evidenced at Double Point in 1982 where seals were unable to accommodate to prolonged disturbances. Adequate alternate sites were unavailable, and instead, seals spent more time in the water.

Disturbance was also an important consideration in reproductive

success. The deleterious effects of human-related disturbance on pup survival have been addressed in studies by others (Boulva and McLaren 1979, Kenyon 1972, Johnson 1977). Though no areas in this survey suffered undue pup mortality, deaths were higher at Double Point in 1982 than in 1977 when the percentage was estimated to be 7.4% (Allen 1980). In the 1977 breeding season, seals were flushed into the water on 13 separate days, but in contrast to 1982, disturbances were short in duration. Our 1982 estimate is probably low because carcasses removed by wave scouring and those pups predated upon by sharks would be missed. The 1982 mortality rate was similar to that recorded by Boulva (1979). His research, though, involved manipulation of pups which caused separations and ultimately death in some cases, and therefore, his figures are not representative of an undisturbed population.

Pup mortality at Double Point was probably exacerbated by greater levels of disturbance occurring early in the season. Interruption of nursing periods would tend to weaken young pups, and pup separations/ desertions were likely related to disturbance since females with pups were highly reactive to disturbances. Johnson (1977) reported that the major cause of pup deaths at Tugidak Island, Alaska, was starvation due to disturbance induced separations/desertions of young pups. Some premature births could have been precipitated by disturbance since the percentage of pups with lanugo in 1982 was double that in 1977 (6.3%) (Allen unpubl. data).

The absence of dead pups at Drakes Estero was probabluy due to a combination of strong tidal flushing near the mouth of the estero and haul out sites being completely awash during high tides so that carcass

deposition would be in areas other than the haul out site.

Fishery/seal interaction in Tomales Bay during the herring season was minimal in this study since the numbers of seals censused near fishing vessels were few. Miller (1981) also found little interaction between harbor seals and herring operations in Tomales Bay in 1980, and in fact, fishermen followed the activities of pinnipeds in order to locate concentrations of herring.

Though not included in the scope of this study, pinnipeds did interact with commercial gill net fishing operations from late May to mid-July. Gill nets were constructed of 4" monofilament line and extended up to 2 mi in length. We gathered information from various agencies and organizations involved in collecting beach-cast marine mammals in order to determine whether these fishing operations were incidentally killing marine mammals. The number of dead animals (40) that washed ashore in the area was much higher than expected, with 18 harbor porpoises, 19 harbor seals, and three sea lions. All but three of the 19 harbor seal specimens were of weaner or yearling size (4'). Size may be an important consideration since smaller marine mammals are believed to be susceptible to entanglement and drowning in nets, whereas large animals are able to break away. A few of these specimens were actually entangled in netting when they washed ashore. The incidental take of harbor seals in Alaska, Washington, and Oregon is associated primarily with gill net fishery interactions in which seals are either entangled in nets or shot by fishermen (NMFS 1980).

SUMMARY

Preliminary recommendations are presented here based on results from the first year survey. From these we can modify censusing techniques for the second survey year. Our initial results indicate that diurnal and tidal effects on the hauling out behavior of seals vary within an optimum range from mid-day to late afternoon at low to medium tides. The physical attributes of each location seem to determine when is best to census within this optimum range. Thus more attention will be given to the interplay of these factors when conducting simultaneous censuses.

The breeding population represents a sizable proportion of the state population, and a tremendous number of seals appear to migrate to the Sanctuary to breed from unknown areas. Radio-tagging and tracking of seals could provide valuable information on where these transient breeding animals disperse in summer and winter months. Only with this information can one determine whether resource plans in areas outside of the Sanctuary are in conflict with Sanctuary management plans.

The qualities that attract seals to Point Reyes to breed in large aggregations at Double Point, Drakes Estero and Tomales Point are numerous including suitable habitat and food availability. Likely another important reason is lack of human intrusion since none of these areas have been developed nor are they readily accessible. Consequently, reasons for preserving and protecting existing haul out locations are enhanced. First, however, we must identify present levels of disturbance. From the second survey year we will collect specific data on whether disturbance is severely impacting seals. At the completion of the second survey year, we

will be able to forward recommendations on long term monitoring techniques and on management considerations.

INTRODUCTION

In the past, information on the status of California (Zalophus californianus) and northern (Steller) sea lions (Eumetopias jubata) at Point Reyes has been sketchy. Mention of the historical presence of sea lions in the area is made by Scammon (1874). California Fish and Game censused breeding sea lions along the California coast between 1930 and 1970 (Bonnot, 1937; Bonnot et al., 1938; Bureau of Marine Fisheries, 1947; Bonnot and Ripley, 1948; Ripley et al. 1962; Carlisle and Alpin, 1966, 1971; Frey and Alpin, 1970); but it was not until 1974-75 (Mate, 1977) that aerial surveys to look at seasonal fluctuations in the sea lion population began. Aerial surveys of northern and central California continued in 1980 and 1981 (BLM 1981; Dohl 1982). These and other censuses (Chan, 1979) are summarized in Table 11.

The first year (March 1982 - February 1983) of the sea lion assessment program was set up to initiate close scrutiny of seasonal, diurnal and tidal fluctuations in numbers and age classes of sea lions in the coastal zone of the Point Reyes/Farallon Islands National Marine Sanctuary. We also wanted to determine whether Point Reyes is a breeding rookery or just a haul out area, to establish what interchange occurs between the Point Reyes and the Farallon Island sea lion populations, and to determine how the herring (Clupea harengus) run in Tomales Bay affects sea lion numbers along the coast.

METHODS

We censused California and northern sea lions at the Point Reyes Headlands (Figure 1) twice a month throughout the year (March 1982 - February 1983). During the breeding season we censused once a week checking for evidence of pupping. One census each month lasted from 0700 to 1800 h to assess sea lion haul out patterns, discover when maximum numbers haul out and determine how seasonal, diurnal and tidal changes affect each species. Some censuses were incomplete because weather (fog, high winds or heat waves) impeded the count. California sea lions were censused once a month at Bodega Rock. During the herring run (December to March) there were nine censuses of Zalophus in Tomales Bay by boat.

All counts of the Point Reyes Headlands were made from Sea Lion Overlook with a 25X spotting scope. In August a hidden cove containing up to 100 animals was found south of the main haul out; from then on it was censused regularly from the antenna north of Sea Lion Overlook. Descriptions of animals with distinctive scars or marks were recorded whenever seen. Weather and tidal conditions were also noted.

Whenever possible, both sea lion species were separated into five age-classes: adult male, subadult male, female-size, immature, and pup. These censuses were compared with weekly sea lion censuses on the Farallones during the same time period. Because of the difficulty in separating age classes when counting thousands of animals, California sea lions on the Farallones were divided into four age classes: male, female-size, immature, and pup.

herring nets.

Northern (Steller) Sea Lion

Unlike the California sea lions at Point Reyes whose numbers peak during migration, northern sea lions reach peak numbers during the breeding season from May to August (Fig. 13). This is similar to the pattern on the Farallones (Fig. 14). The high count at the Headlands was 19 animals on 27 August (Table 13) and 192 animals on 24 June at the Farallones.

Female and immature northerns were present year around at Sea Lion Overlook. We counted up to six adult males between May and August. Subadult males were present primarily from April to August with a few sightings in late winter. No pups were observed during the breeding season. Three animals with distincitive marks or scars were recognized at both Point Reyes and the Farallones: a female in January and two subadult males during the breeding season.

During 12 all-day watches the numbers of northern sea lions varied irregularly, depending on the initially chosen haul out sites. If they hauled out on low, off-shore rocks, numbers decreased as swells and tide rose to cover the rocks. If, however, the northerns were hauled out on high rocks, numbers remained high after 1000 h regardless of tide or swell. On calm, hot days animals went into the water as the air temperature increased.

In general, numbers were lowest before 1000 h, then increased and remained high throughout the rest of the day depending on temperature, swells, and haul out area.

Adult and subadult males were seen in the water more frequently than females and immatures. On three days in May a bull was seen feeding on unidentified fish near Double Point.

DISCUSSION

Both California and northern sea lions are at the edge of their breeding ranges in the Farallon/Point Reyes National Marine Sanctuary. California sea lions breed primarily south of Point Conception with major rookeries at the Channel Islands, California and the islands off Baja, Mexico; major breeding areas of northern sea lions are on the Aleutian and Pribilof Islands in Alaska (Scheffer, 1958). Both species have small breeding colonies on the Farallon Islands: 12 northern pups and 2 Zalophus pups were born in 1982. No cows of either species pupped on the mainland in 1982.

The population of California sea lions has increased throughout its range in the last 50 years; for the last several years the increase has been about 5% each year in California. In the past, only adult and subadult males migrated north, while the adult females and juveniles remained near the southern rookeries (Bartholomew, 1967). A change in migration pattern was first noted at the Farallones in 1978 when large numbers of immature sea lions hauled out in the fall. Since then the population at the Farallones has tripled. Ainley et al. (1981) propose that the increase in numbers and in the proportion of immatures at the Farallones is due primarily to the abundance of Pacific whiting Merluccius productus) near the islands. The availability of whiting to sea lions increased dramatically when the foreign whiting fishery, which was competing directly with sea lions, was eliminated by the imposition of the 200 mile fishing limit in 1977. Unfortunately we do not have comparative censuses for the mainland sea lion population.

In general, fluctuations in the number of California sea lions are similar at the Farallones and the Headlands (Figures 7, 9) but there is a sharp peak in numbers at the Headlands in December - January which does not occur at the Farallones. This may be a result of animals concentrating in the area to take advantage of seasonally abundant herring spawning in Tomales Bay.

The age-class distribution between the Farallones and the mainland is quite different. When looking at the age-classes at the Farallones (Figure 12), it is apparent that the adult and subadult males are essentially gone during June and July, begin to return in August, and migrate through in several waves during the fall. These waves decrease by winter as the males head further north and then increase again in April and May as the males return south to the breeding grounds (Mate, 1977). For immatures the pattern is different: numbers increase from August to December. The majority of these animals are young of the year dispersing from pupping areas in Baja and the Channel Islands. Numbers are low during winter and spring.

At Point Reyes the picture is a little more confusing. The adult males follow a similar pattern to the Farallones but immatures peak in number in July rather than in August as they do at the Farallones. This may indicate that dispersing juveniles haul out at the coastal site before moving to the Farallones. The number and percent of female-size animals (primarily 3-5 year old males) is lower throughout the year on the mainland. Conversely, there is a significantly higher number of adult and subadult males at the coast than off-shore ($p<.01$). Although statistically significant, this

difference may not have biological significance. For most of the year the Point Reyes population is less than a tenth the size of the Farallon population and the apparent difference in haul out patterns may merely be due to movements of animals the 18 miles between the two points. It is also possible that it is a real difference and that juveniles concentrate where food is more abundant and consequently easier to catch.

Tomales Bay and San Francisco Bay are the major spawning areas for herring in California. From December to March, herring migrate in large numbers to Tomales Bay where they lay eggs in the eel grass beds. After spawning they return to the open ocean (Spratt 1981). Censuses of sea lions in Tomales Bay during the 1982-83 spawning season were difficult because of severe winter storms. Maximum counts were 33 sea lions on 10 December. Only one sea lion was observed taking fish fron a net, although all the sea lions concentrated at the mouth of the bay near the herring fishing fleet. Only California sea lions were observed. Twenty percent of these were adult males.

In central and southern California waters, the range of California and northern sea lions overlap. While California sea lions have increased, northern sea lions have suffered a concomitant decline in the last half century. Speculation on the causes of this shift include a warming trend in water temperature, a change in food resources, and diseases causing reproductive failure. The northern population at the Headlands is now small (maximum count 19) compared to previous years. Although Chan (1979) recorded observations of pups in June 1975, we did not see evidence of pupping during weekly censuses in May and June. It appears the Headlands

populations since it has changed their environment so drastically. But exactly what these changes are and how they might affect the population in the long term we can only begin to guess at. Continued censuses to compare the interrelationship and differences of the Farallon and Point Reyes populations will improve our chances of understanding population fluctuations of the sea lion populations within the Sanctuary.

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Table 1. Harbor seal, Phoca vitulina richardsii, counts for all sites within the Point Reyes/Farallon Islands Marine Sanctuary. Census days during which disturbances occurred that affected numbers are noted with an asterisk (*); numbers following a slash (/) indicate pups.

	LOCATION											
Date	Bodega	Tomales Bay	Hog Is.	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Liman. Estero	Double Point	Duxbury Reef	Bolinas	Total Pups	Totals
1982													
3 March		246	39	104	47*	78*	193*	0	337	105	65		1214
7 March							116*	0					
19 March		275*	0	102	167	122	489*	0	356	102	63		1676
22 March	36												
7 April						12			428/25*				
8 April									228/53*				
13 April		155/2*	48/1	104/7	121/1	70/1*	336/3	65	274/57*	81	46	68	1254
14 April									346/67*				
15 April						100	455/9	0	279/66*				
17 April									300/60				
18 April							241/17	0					
20 April		242/22*	0	97/14	176/5	44/1	543/36*	0	465/136*	92	24	214	1683
21 April									391/110*				
22 April						70*	479/43	0	639/159				
23 April						70			694/168				
25 April							232/77	0					
27 April						32	338/47	12	375/158		0		
29 April	1*						447/101*	0	720/238		30		
30 April							533/95*	0	749/262*				
1 May						77/7	324/77	78/6					
2 May									722/225				
4 May		147/46	45/12	266/52	297/83	63/5	445/88	96	851/263	19*	77/17	566	2306
5 May									783/251				
6 May						12							
8 May						182/19	260/50	0					

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Table 1 cont.

11 May						70/18	591/127	0	454/166			
13 May						47/9	507/148*	54/10	609/228			
14 May									481/191	81	54/11	
15 May							447/111	75				
16 May						24						
17 May									565/186			
18 May	26/3	151/37	48/9	265/58	269/74	93/11	537/150	94/20	676/205	94	86/17	564	2339
19 May									685/204			
20 May						20	439/63	54/5				
22 May							348/95	0				
25 May							291/40*	0	270/78	32/1*	51/11	
27 May									433/90		62/12	
28 May							559/29*	0				
31 May									626/83*			
1 June		91/15	58/8	283/28	250/26	139/18	224/30	292	566/90	86/3	85/4	221	2074
2 June						113/17	162/21*	312/29	679/80				
3 June						131/17	271/33	145/20					
15 June	31	150	50	211/27	196/16	112/13	57/2	426	577/31	109/5	90/4	98	2009
28 June		185	0*	318/9	243/7	232/15	620/38	106	621/28	39	138	97	2502
12 July		54*	48	235/18	205/14*	149	310*	fog	469/29	0	126/9	41	1596
23 July		219/2	0*	276	178	fog	447/32	0	373/9	1	107	43	1601
27 July							545/48*	0					
29 July	32												
6 Aug		119	0	111	79	87/13	190/6	0	185*	15*	30	19	816
22 Aug							349*	0					
23 Aug		281*	0	136	58	fog	371	0	175	101	77*	0	1199
30 Aug					100								
31 Aug							175	0					
6 Sep		206*	Fog	62	81	51	402	0	141*	164	67*		1174
21 Sep		192	0*	36	101	13*	469*	0	288	141	98		1338
23 Sep	6												
30 Sep							413*	0					
2-4 Oct		168	0	55	116	65	146	0	270*	3	89		912
15-16 Oct		246	0	49 *	165	65	156	0	69	74	72*		896
26 Oct		105	20	100									
30 Oct	26												
31 Oct							365*	0					

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Table 1 cont.

1 Nov		144	0	42	86	22	93	0	49	0*	65*	501
23 Nov				200	135							
29-1 Nov										6*	34*	
29 Nov												
8 Dec	21											
10 Dec		49	0	52	149	8	322	0	47	4	54	685
11 Dec							351*	0				
28 Dec		0*	0	69	72	12	215*	0	31*	1*	29*	429
1983												
7 Jan		60										
10 Jan		76*	38	72	82	75*	130*	0	253	148	62	936
12 Jan							235	0				
19 Jan		45										
22 Jan						60						
24 Jan		150				50						
25 Jan		34*	0*	45	35	38	341	0	84	2	61*	640
9 Feb		0*	31	75	165	10	208	0	290	121	83	983
22 Feb		230*	41	109	129	155	386	0	359	89	61	1559
24 Feb	48						421	0				
4 Mar							326*	157				
9 Mar		146	54	123	123	92	363	0	273	99	64	1337
31 Mar	47											

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Table 2. The average number of harbor seals hauled out by season during simultaneous censuses in the Point Reyes/Farallon Islands Marine Sanctuary in 1982 - 83; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size. Tomales Bay includes Hog Island, Tomales Point includes Bird Rock, and Drakes Estero includes Limantour Spit.

	LOCATION							
	Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon	All Sites
Breeding								
$\bar{x}$	213.0	376.2	104.5	436.7	517.5	82.6	73.8	1839.4
SE	13.3	50.8	16.8	25.3	30.6	9.5	9.6	150.1
n	10	10	10	30	33	10	10	10
range	149-285	151-563	44-232	116-726	228-851	19-109	30-126	
Summer								
$\bar{x}$	191.6	242.9	71.7	331.1	246.5	62.3	83.3	1191.5
SE	21.5	45.5	18.4	39.1	46.1	23.8	10.3	108.5
n	8	8	6	12	8	8	8	8
range	102-281	137-454	13-149	146-469	69-469	0-164	24-138	
Winter								
$\bar{x}$	92.3	158.3	49.1	257.4	142.9	49.5	56.4	692.4
SE	30.7	22.2	17.9	34.5	47.7	21.5	6.1	164.1
n	8	8	8	12	8	8	8	8
range	31-271	80-240	8-155	93-421	30-359	0-148	29-83	

Table 3. The maximum number of harbor seal pups counted by month at each haul out site in the Point Reyes/Farallon Islands Marine Sanctuary in 1981 and 1982. Data for 1981 were provided courtesy of Gary Fellers, National Park Service.

		LOCATION						
		Tomales Bay	Tomales Point	Point Reyes	Drakes Estero	Double Point	Duxbury Reef	Bolinas Lagoon
1981	April	0	0	*	0	5	0	1
	May	25	83		84	196	0	12
	June	0	106		4	54	0	3
1982	April	22	19	1	101	262	0	0
	May	58	135	19	150	263	1	17
	June	23	54	18	60	90	5	4

* Seals at Point Reyes Headland were not censused in 1981.

Table 4. The average number of harbor seals at coastal and estuarine locations during the breeding and non-breeding seasons; $\bar{x}$ is the mean number of seals, SE is the standard deviation, and n is the sample size.

	Coastal	Estuarine
Breeding		
$\bar{x}$	929.9	721.8
SE	85.6	41.0
n	10	10
Non-breeding		
$\bar{x}$	497.3	474.5
SE	62.5	48.4
n	16	16

Table 5. Simultaneous censuses of harbor seals in the Point Reyes National Seashore conducted in 1981 and 1982. Data courtesy of Gary Fellers of the National Park Service.

		LOCATION									
	Date	Tomales Bay	Hog Island	Bird Rock	Tomales Point	Drakes Estero	Limant. Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Total
1981	May	47	225	181	72	295	0	522	-	56	1398
	Jun	50	50	213	181	199	344	577	-	76	1690
	Jul	95	12	419	228	695	0	-	-	85	1534
	Aug	37	35	0	53	326	178	168	0	84	881
	Sept	63	0	17	74	108	0	144	30	45	481
	Oct	6	10	32	12	148	0	31	25	62	326
	Nov	0	0	11	35	191	0	26	0	1	264
	Dec	0	0	56	40	257	0	9	-	25	387
1982	Jan	36	0	62	59	106	0	-	-	-	263
	Feb	149	0	103	149	-	-	317	104	71	893

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Table 6. The average number of harbor seals hauled out at Double Point by month combining data from 1976 to 1982 for adults, subadults, and all age-classes. Only those censuses when immatures were distinguished were included in the analysis; $\bar{x}$ is the mean number, SD is the standard deviation, SE is the standard error, and n is the sample size.

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
n	10	12	23	38	29	21	17	12	10	9	8	9
ADULTS												
$\bar{x}$	87.0	191.8	185.9	207.1	265.5	261.1	308.4	91.4	80.2	60.0	25.4	48.4
SD	71.5	88.1	62.0	105.6	128.8	120.5	101.4	48.7	59.7	56.1	14.9	51.3
SE	22.6	25.4	12.9	17.1	23.9	26.3	24.6	14.1	18.9	17.7	5.3	17.1
SUBADULTS												
$\bar{x}$	13.6	38.7	40.0	24.1	24.6	30.1	36.9	14.0	25.8	19.0	5.1	13.4
SD	16.2	23.5	27.3	15.8	16.1	20.7	19.7	10.1	22.5	31.3	3.6	9.6
SE	5.1	6.8	5.7	2.6	3.0	4.5	4.8	2.9	7.1	10.4	1.3	3.2
ALL AGE CLASSES												
$\bar{x}$	108.3	237.3	231.7	319.8	465.7	349.8	383.9	138.3	133.3	98.0	41.5	79.2
SD	75.9	100.0	82.0	169.0	188.0	147.4	109.8	63.3	71.6	78.7	15.2	60.5
SE	24.0	28.9	17.1	27.4	34.9	32.2	26.6	18.3	22.6	26.2	5.4	20.2
PERCENTAGE OF SUBADULTS TO TOTAL POPULATION												
	12.6	16.3	17.3	7.5	5.3	8.6	9.6	10.1	19.4	19.4	12.3	16.9

Table 7. The seasonal average number of harbor seals at Double Point in 1976, 1977, 1978, and 1982; $\bar{x}$ is the mean, SE is standard error, and n is the sample size.

		Breeding	Summer	Winter
1976				
	$\bar{x}$	195.2	165.7	123.8
	SE	17.6	35.7	34.0
	n	14	13	9
	range	112-320	28-408	26-347
1977				
	$\bar{x}$	304.5	222.6	106.8
	SE	22.1	35.9	22.1
	n	30	21	10
	range	109-594	54-544	36-212
1978				
	$\bar{x}$	330.1	217.6	*
	SE	29.1	67.2	
	n	19	8	
	range	114-556	38-512	
1982				
	$\bar{x}$	517.5	246.5	142.9
	SE	30.6	46.1	47.7
	n	33	8	8
	range	228-851	69-469	30-359

* Insufficient sample size for comparison.

Table 8. The relationship between tide and the number of seals hauled out at Drakes Estero, Double Point, and subsite South Point from -1 hour prior to +4 hour after low tide; $\bar{x}$ is the mean number of seals, SE is the standard error, and n is the sample size.

	HOURS OF LOW TIDE					
	-1	0	+1	+2	+3	+4
Drakes Estero						
$\bar{x}$	414.0	412.3	406.7	417.3	457.8	393.8
SE	29.8	32.3	24.4	28.6	31.0	31.3
n	12	13	13	8	6	5
Double Point						
$\bar{x}$	374.8	435.9	427.8	451.2	465.7	567.1
SE	44.8	42.9	41.4	41.4	43.7	63.2
n	10	16	17	18	14	7
South Point						
$\bar{x}$	27.0	37.4	36.9	32.3	27.6	21.0
SE	6.6	6.6	6.6	6.7	6.6	11.6
n	7	12	14	13	11	6

Table 9. The relationship between time of day and the number of harbor seals hauled out at Double Point in the breeding season during low to medium tides: $\bar{x}$ is the mean number of seals, SD is the standard deviation and n is the samle size. Census days when disturbance occurred were excluded.

	TIME									
	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
$\bar{x}$	261.6	200.3	285.7	260.8	329.5	391.3	475.8	453.0	483.7	683.4
SD	102.5	86.9	85.6	93.1	139.7	144.4	154.9	196.4	186.7	124.6
n	7	12	13	12	13	12	14	16	14	8

Table 10. The incidence of disturbance to harbor seals at each haul out site within the Point Reyes/ Farallon Islands Marine Sanctuary in 1982-83.

	LOCATION										
	Tomales Bay	Hog Is	Bird Rock	Tomales Point	Point Reyes	Drakes Estero	Limantour Spit	Double Point	Duxbury Reef	Bolinas Lagoon	Totals
SOURCES											
Hiker	1			2	2	5			3		13
Fisherman	11					8		1	3	2	25
Boat		4	1	1		4		1		2	13
Aircraft						1		7			8
Marine Salvage								4			4
Dog										1	1
Natural					1	3		1			5
Unknown				1	2	3		3		1	10
TOTALS *	12	4	1	4	5	24	0	17	6	6	79
TOTAL DISTURBANCE DAYS	12	4	1	3	5	20	0	14	6	6	71
TOTAL CENSUS DAYS	26	26	26	26	37	54	54	48	29	32	358
% DAYS DISTURBED	46	15	4	12	14	37	0	29	21	19	20

* More than one disturbance occurred on census days at Drakes Estero, Tomales Point and Double Point.

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Table 11. Population of sea lions at Pt. Reyes, 1936 - 1981.

Year	Date	Northern sea lion	California sea lion	Total Number
1936	21 June - 1 July	45	9	54
1938	13 - 26 June	6	-	6
1946	June			111
1947	June	2		2
1958	June			936
1958	7 Dec		1800	1800
1959	7 Dec		105	105
1960	June			625
1961	June			795
1965	1 - 3 June			259
1967	12 Dec	78		78
1969	3 - 6 June			420
1970	9 - 11 June			197
1975	7 - 18 June	~150	~400	~550 *
	8 - 18 July	10		10 *
1975	4 - 17 Jan	~100	~1000	~1100 *
	14 - 27 Feb	~100	~1500	~1600 *
1981	17 Jan		513	513
	19 - 21 May		518	518
	30 June and 1, 8 July	0	0	0
	28 - 30 Sept		356	356

* Includes animals at Point Arena.

Data from Bonnot, 1937; Bonnot et al., 1938; Bureau of Marine Fisheries, 1947; Bonnot and Ripley, 1948; Ripley et al., 1962; Carlisle and Alpin, 1966; Frey and Alpin, 1970; Carlisle and Alpin, 1971; Chan, 1979; Dohl, 1982.

Table 12. High counts of California sea lions at Point Reyes Headlands, 1982 - 1983.

Date	Total	Adult male	Subadult male	Female size	Immature	Unknown
15 March	234	74	52	94	14	
31 March	244	77	63	92	12	
7 April	338	107	25	116	7	83
15 April	141	27	39	63	12	
27 April	151	52	42	47	10	
6 May	96	60	17	12	7	
16 May	169	65	50	40	14	
20 May	66	40	12	10	4	
30 May	106	56	38	10	1	
1 June	129	24	94	7	4	4
10 June	28	16	9	3		
24 June	64	8	15	20	16	5
1 July	105	2	8	26	69	
8 July	41	6	10	9	16	
23 July	49	28	14	3	4	
3 August	163	91	48	4	0	20
20 August	195	49	71	35	7	33
27 August	262	37	113	61		51
23 Sept	207	43	80	55	28	
29 Sept	118	16	4	69	29	
17 Oct	132	22	12	65	33	
28 Oct	111	18	4	39	41	
12 Nov	144	39	69	32	4	
22 Nov	37	2	24	9	2	
20 Dec	138	21	65	47	4	
28 Dec	270	12	224	31	3	
27 Jan	22	5	12	4	1	
11 Feb	46	8	20	16	2	
17 Feb	39	5	26	6	2	

Table 13. High counts of northern sea lions At Pt. Reyes Headlands, 1982 - 1983.

Date	Total	Adult male	Subadult male	Female size	Immature
15 March	0				
31 March	3		1	2	
7 April	2			1	1
15 April	8		1	6	1
27 April	8	1	2	3	2
6 May	11	3	4	2	2
16 May	12	3	5	3	1
20 May	14	6	4	2	2
30 May	11	4	5		2
1 June	14	3	3	6	2
10 June	11	3	3	4	1
24 June	14	2	4	5	3
1 July	10	3	1	2	4
8 July	11	1	0	4	6
23 July	14	1	5	4	4
3 Aug	14	2	3	7	3
20 Aug	12	1	3	4	4
27 Aug	19	1	6	10	2
23 Sept	7			6	1
29 Sept	4			3	1
17 Oct	6			5	1
28 Oct	5			4	1
12 Nov	7			7	
22 Nov	3			3	
20 Dec	8			4	4
28 Dec	6			4	2
27 Jan	1			1	
11 Feb	6		1	5	
17 Feb	4			3	1

From Allen et al. ms.

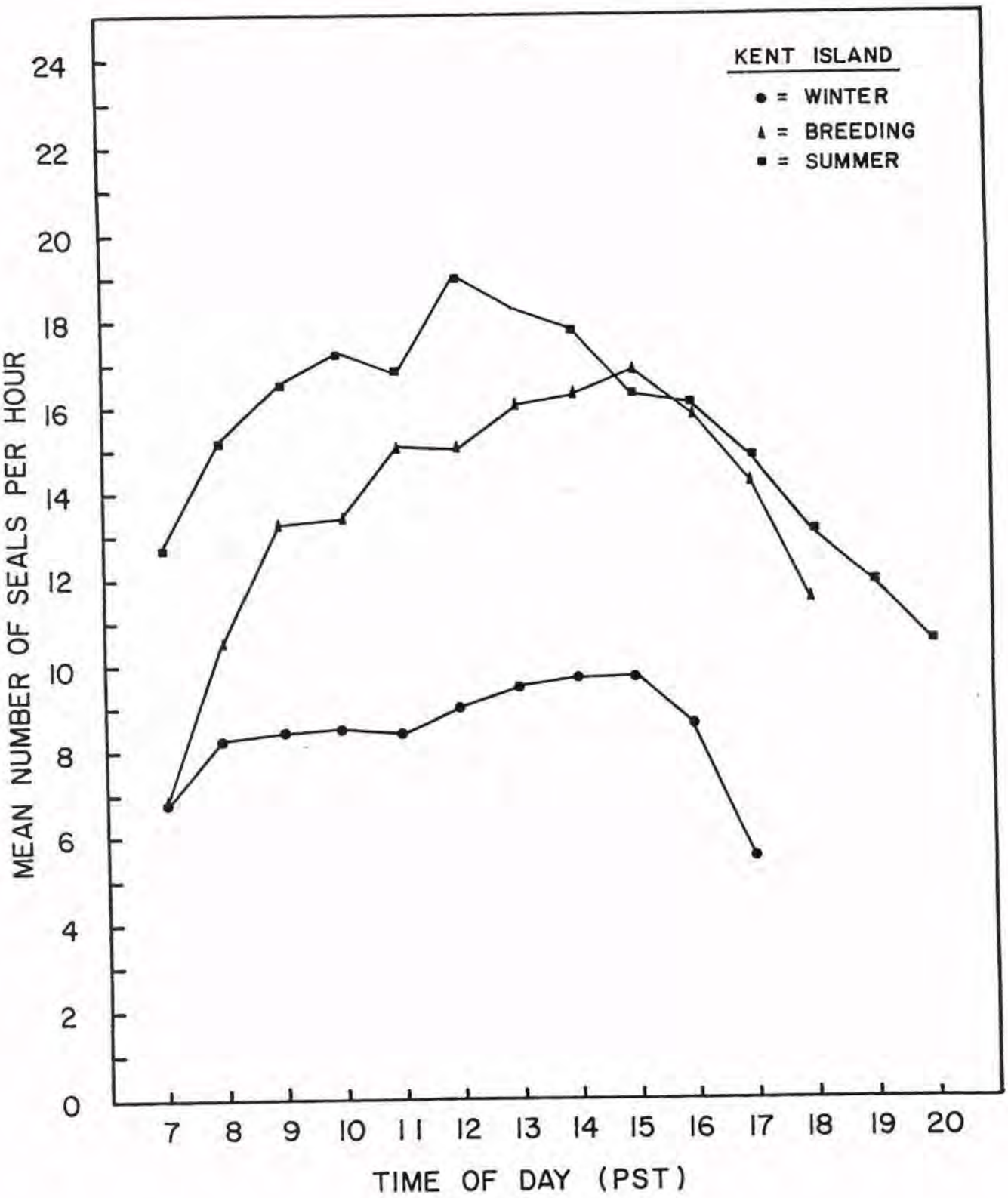


FIGURE I.

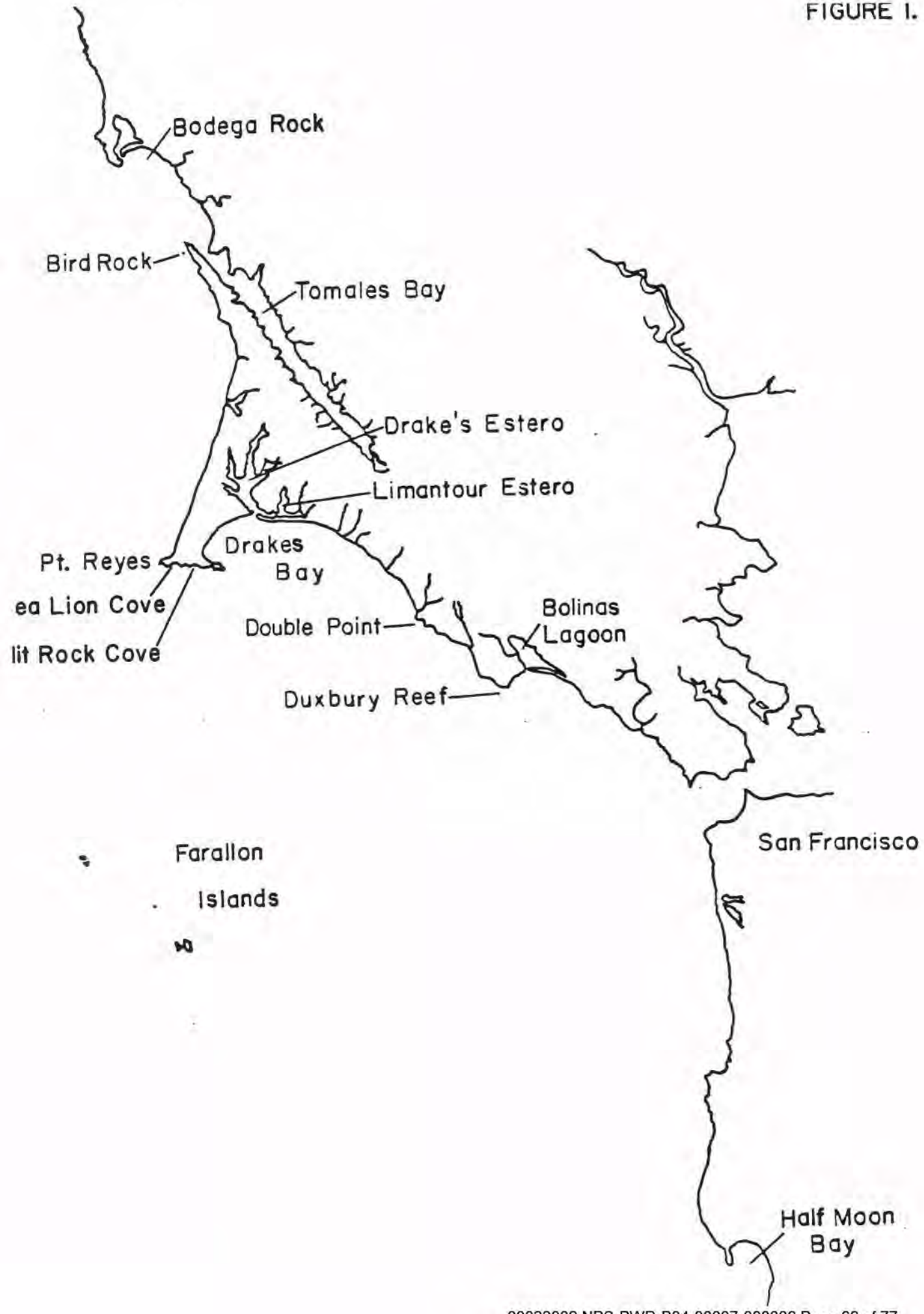

Bodega Rock
Bird Rock
Tomales Bay
Drake's Estero
Limantour Estero
Drakes
Bay
Pt. Reyes
ea Lion Cove
lit Rock Cove
Double Point
Bolinas
Lagoon
Duxbury Reef
Farallon
Islands
San Francisco
Half Moon
Bay

FIGURE 2.

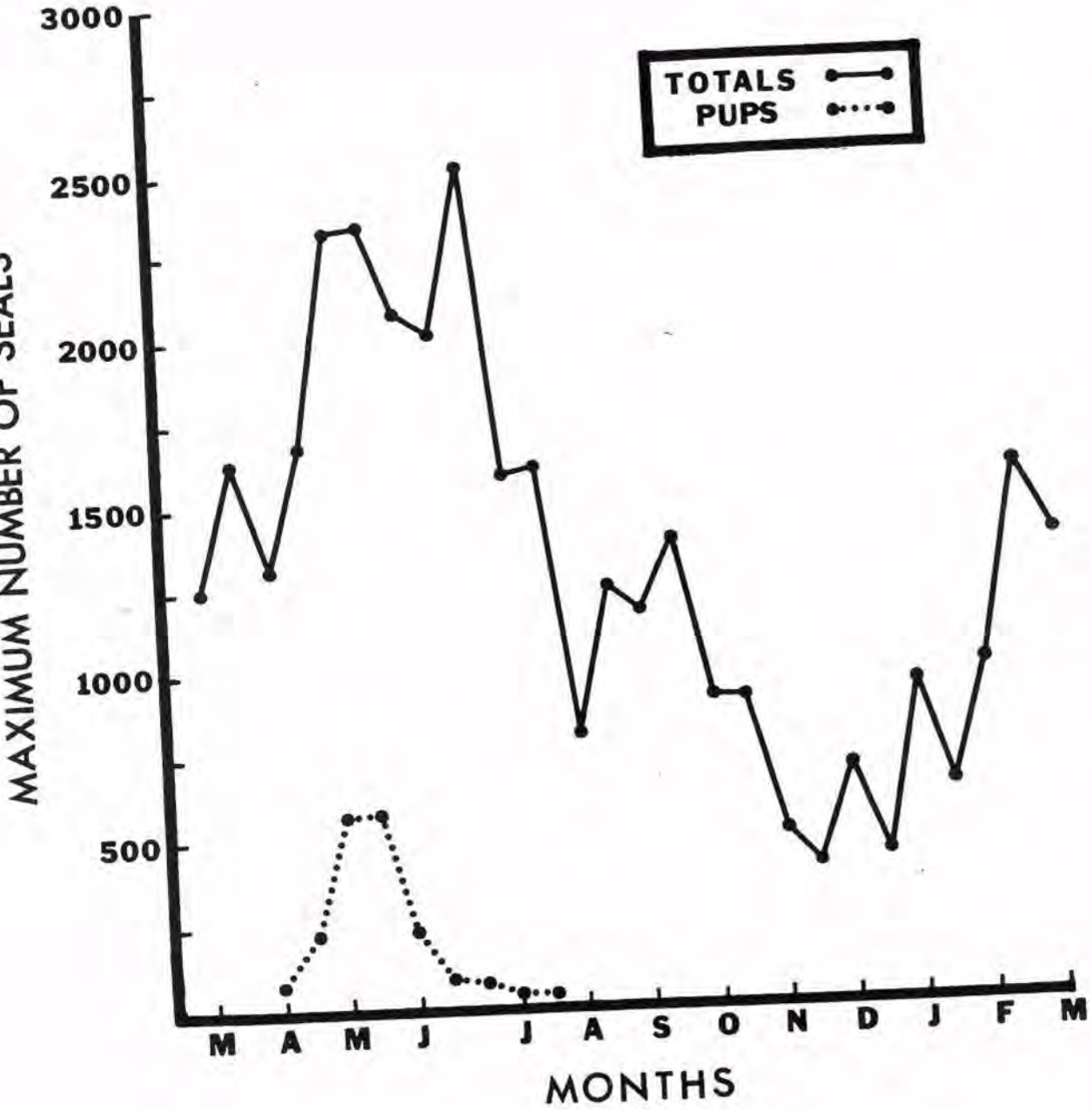

3000
2500
2000
1500
1000
500
MAXIMUM NUMBER OF SEALS
TOTALS
PUPS
M
A
M
J
J
A
S
O
N
D
J
F
M
MONTHS

FIGURE 3.

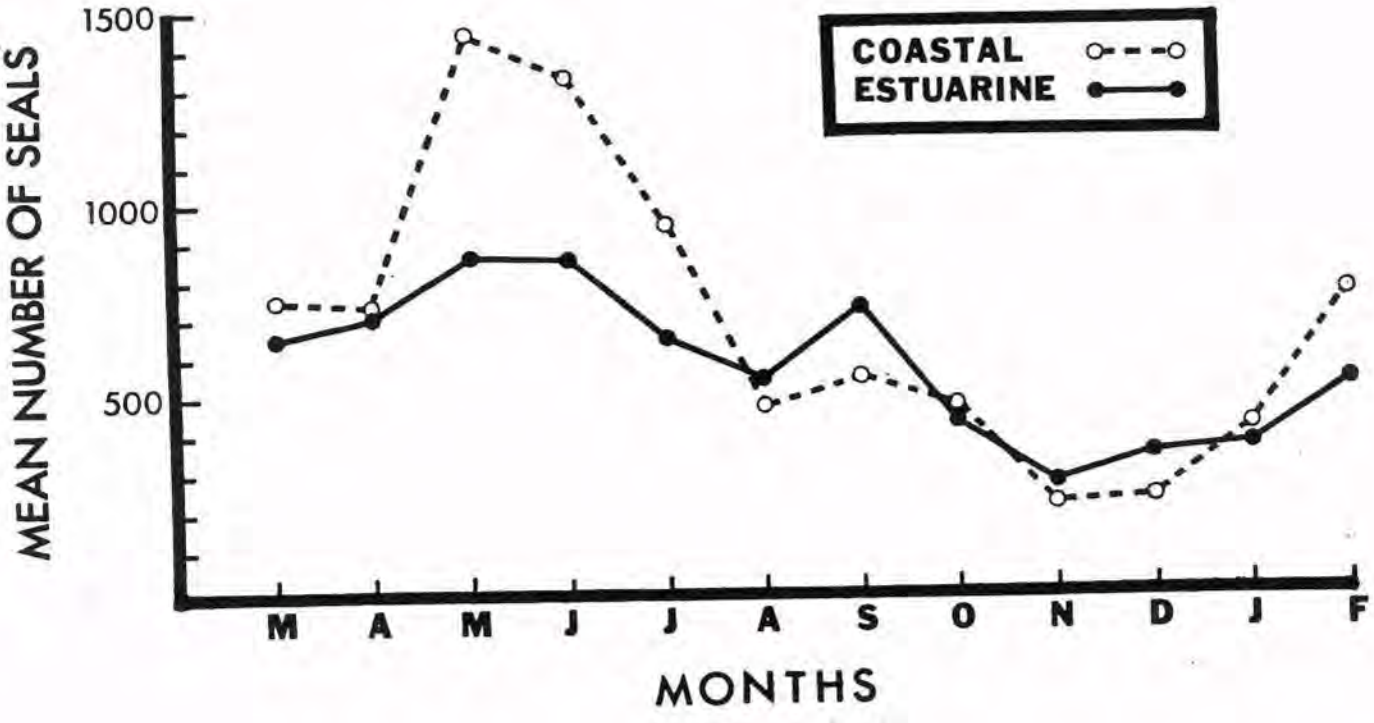

1500
1000
500
MEAN NUMBER OF SEALS
COASTAL
ESTUARINE
M
A
M
J
J
A
S
O
N
D
J
F
MONTHS

FIGURE 4.

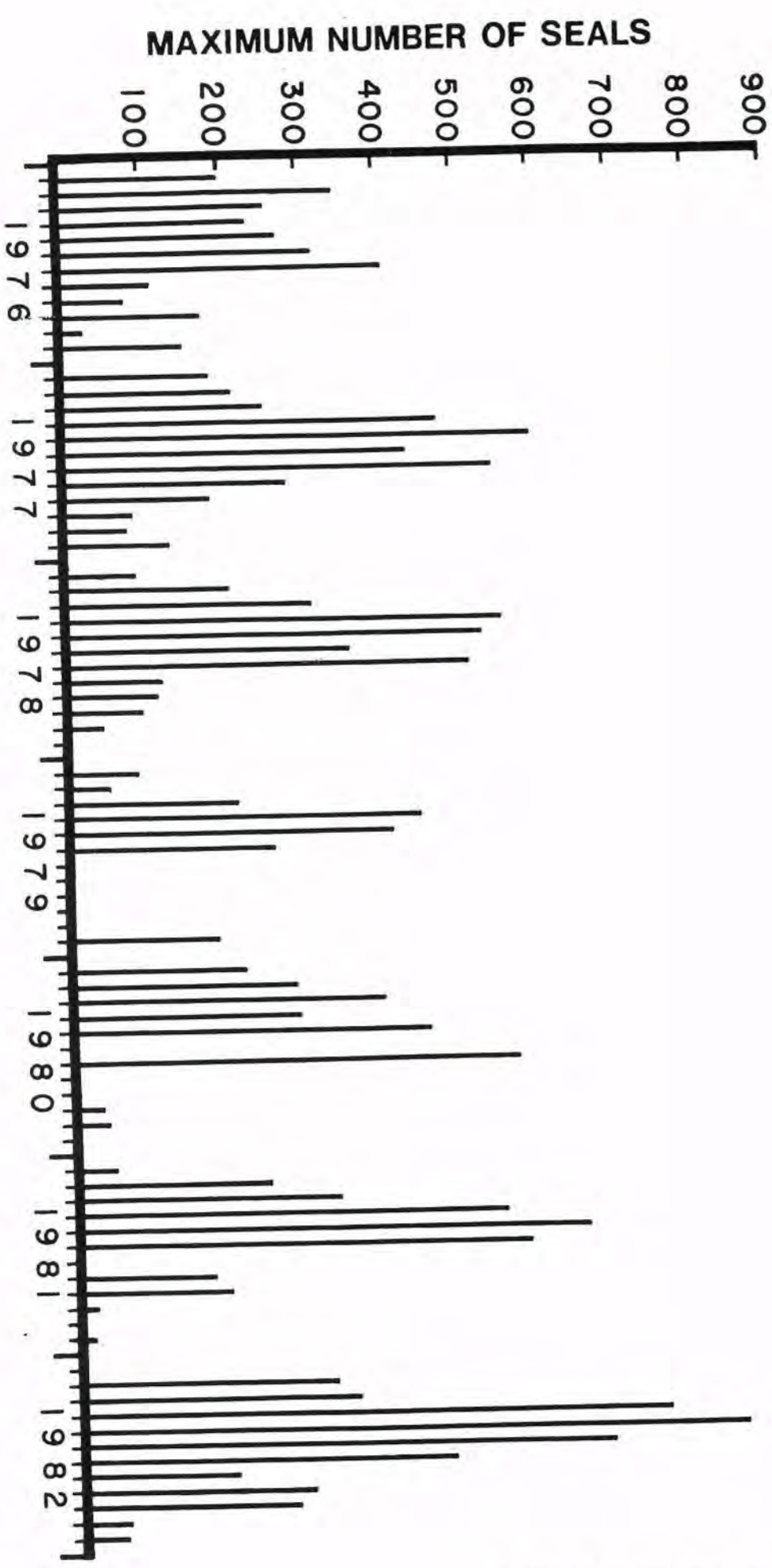

MAXIMUM NUMBER OF SEALS
100
200
300
400
500
600
700
800
900
1976
1977
1978
1979
1980
1981
1982

FIGURE 5.

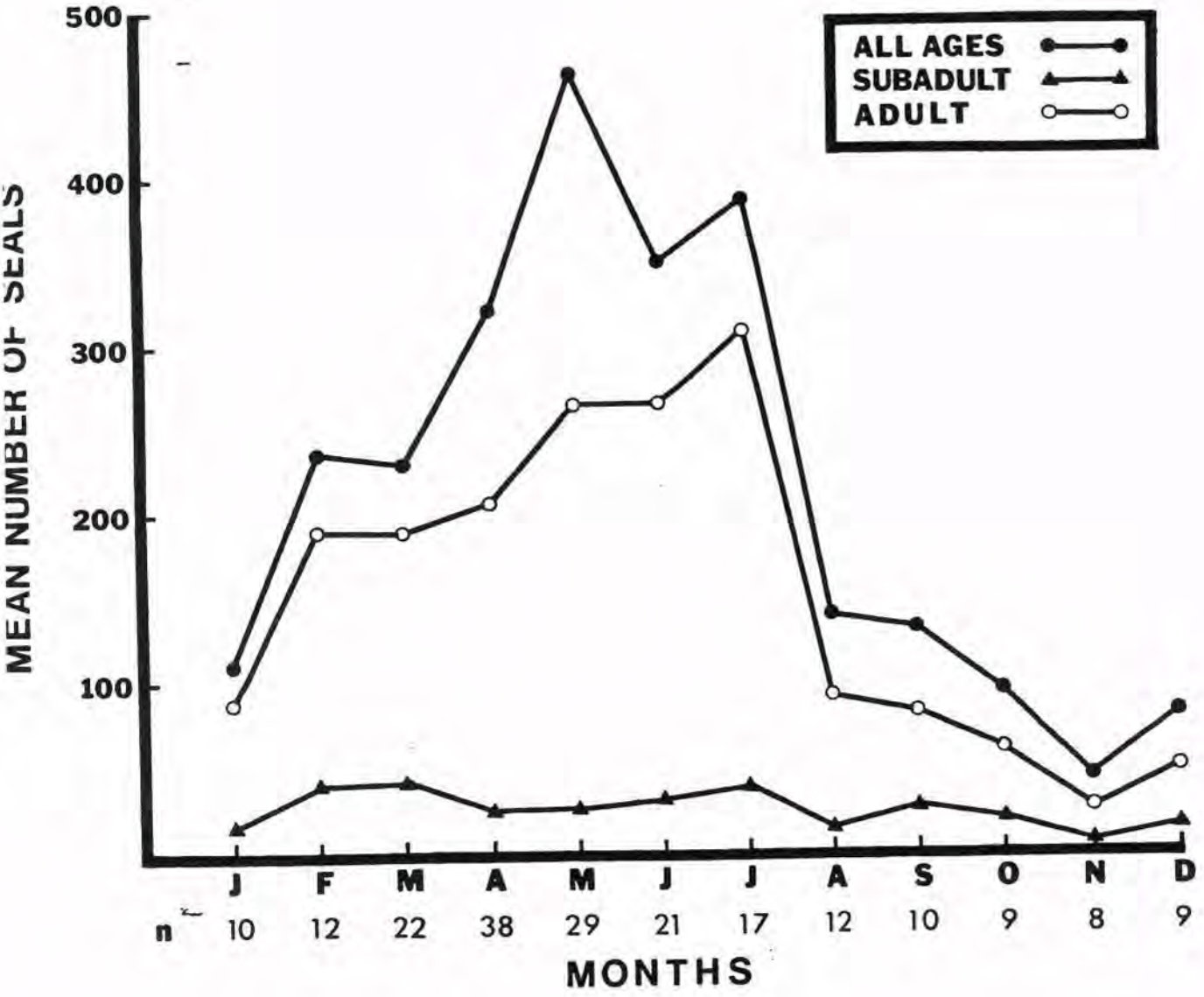

MEAN NUMBER OF SEALS
500
400
300
200
100
ALL AGES
SUBADULT
ADULT
J F M A M J J A S O N D
n 10 12 22 38 29 21 17 12 10 9 8 9
MONTHS

FIGURE 6.

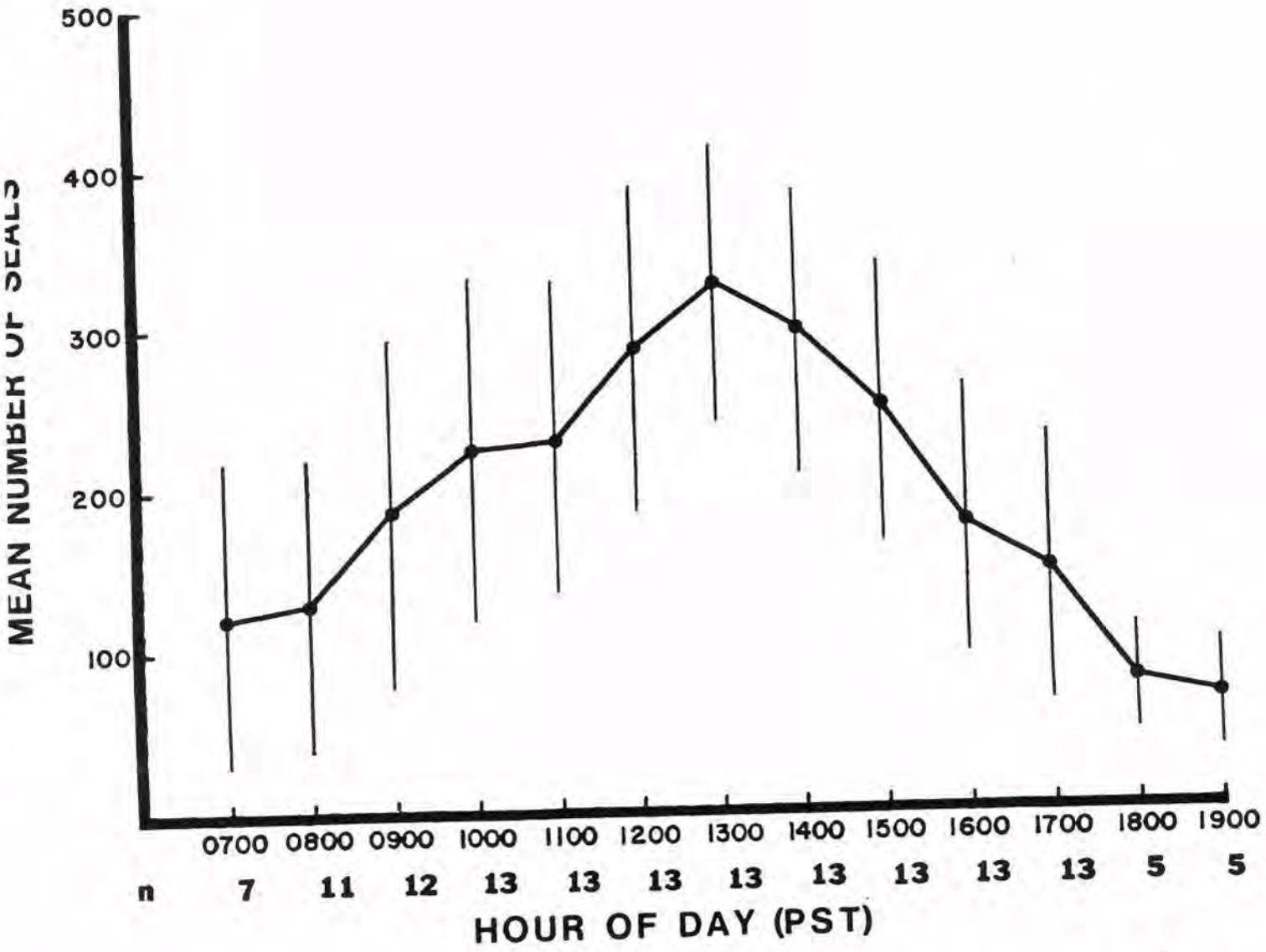
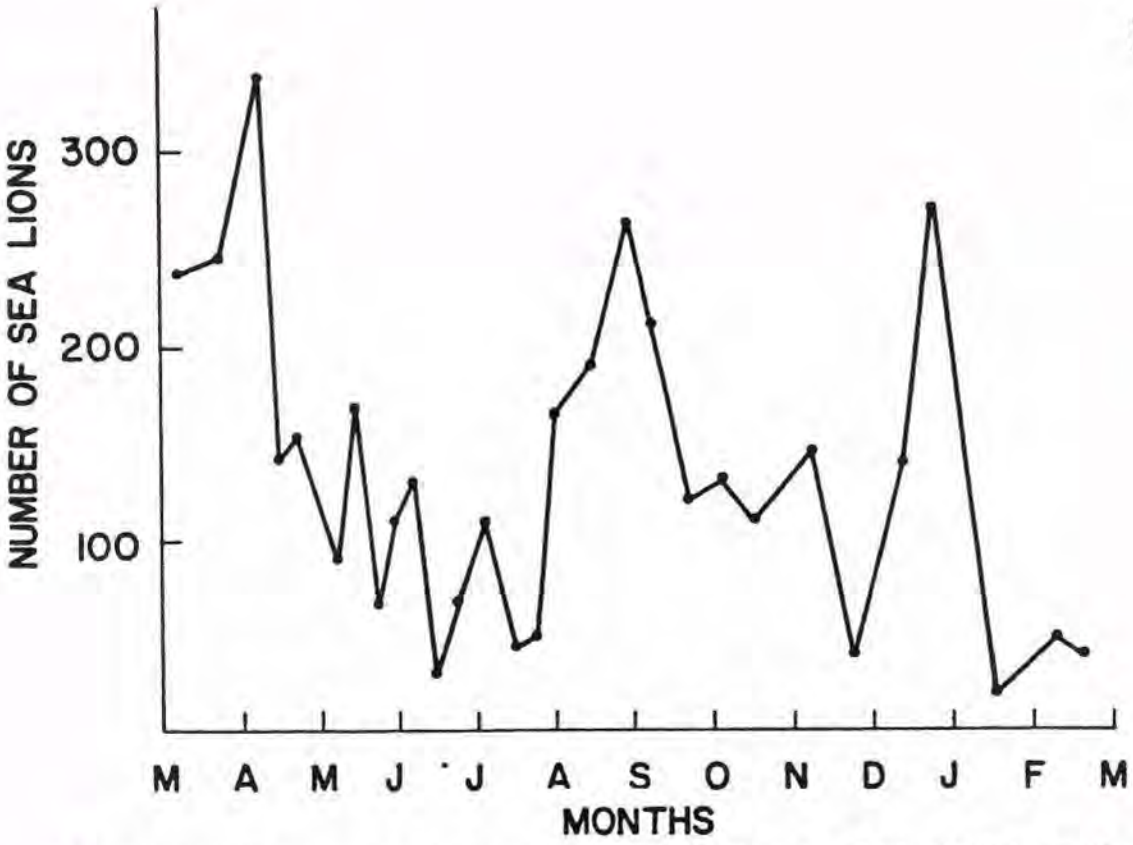
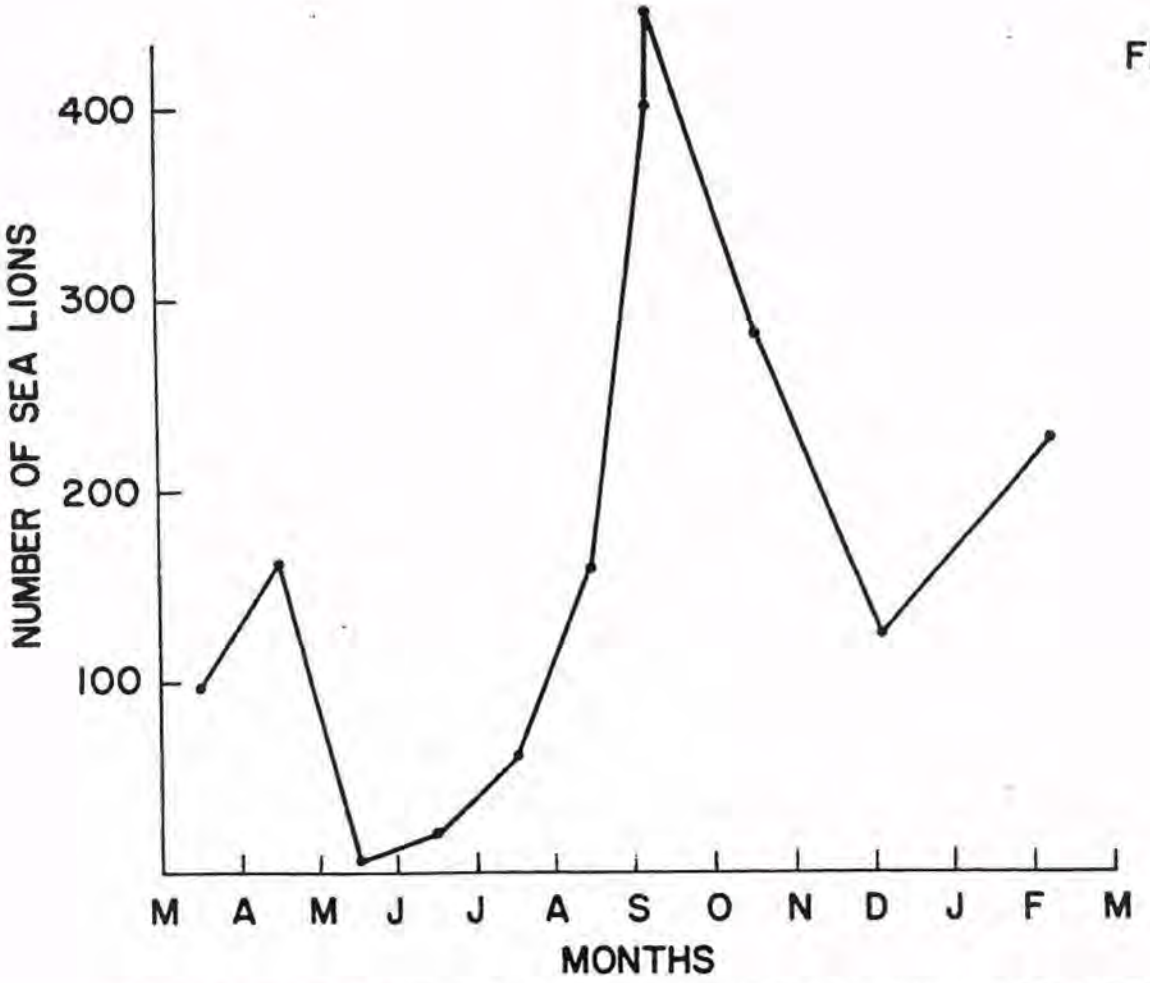

MEAN NUMBER OF SEALS
500
400
300
200
100
0700 0800 0900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900
n 7 11 12 13 13 13 13 13 13 13 13 5 5
HOUR OF DAY (PST)

FIGURE 7.



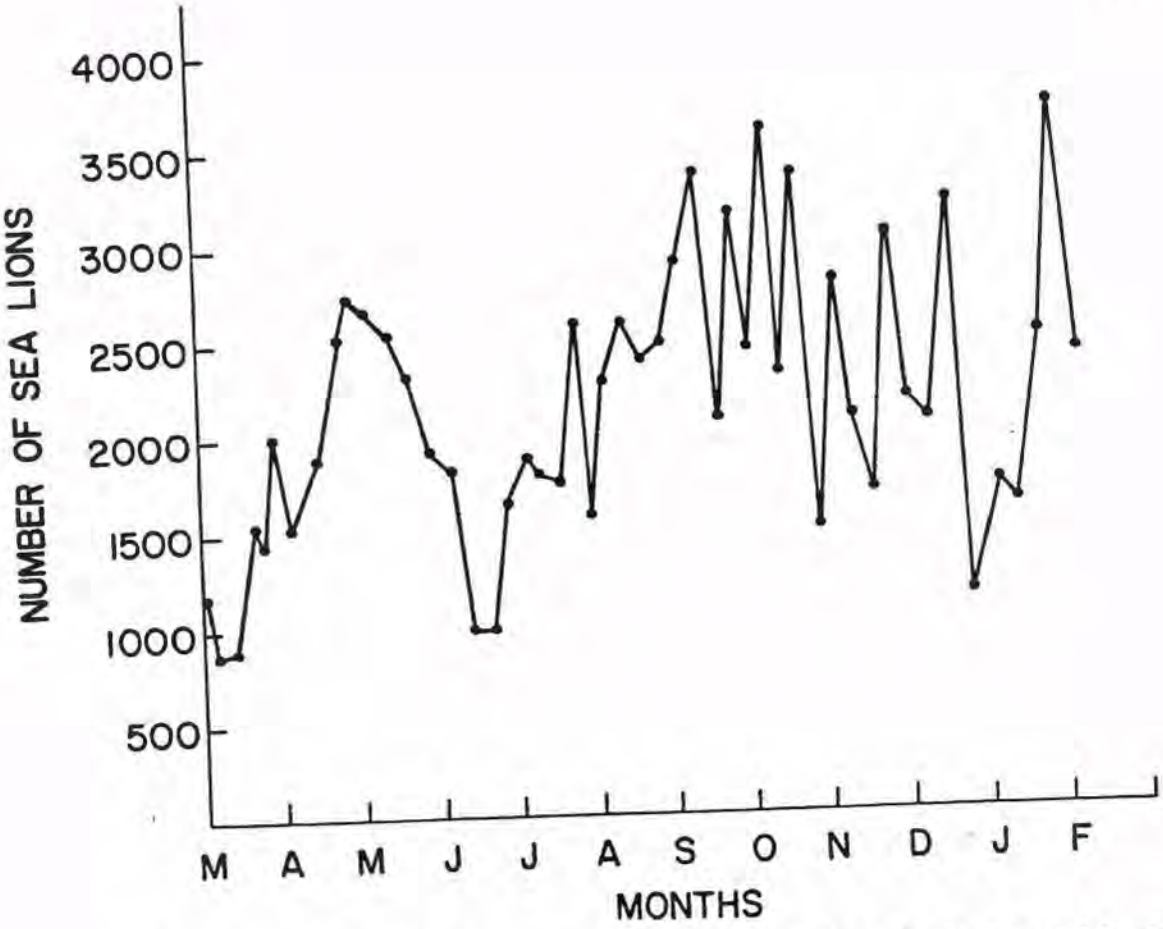
CALIFORNIA SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

FIGURE 8.

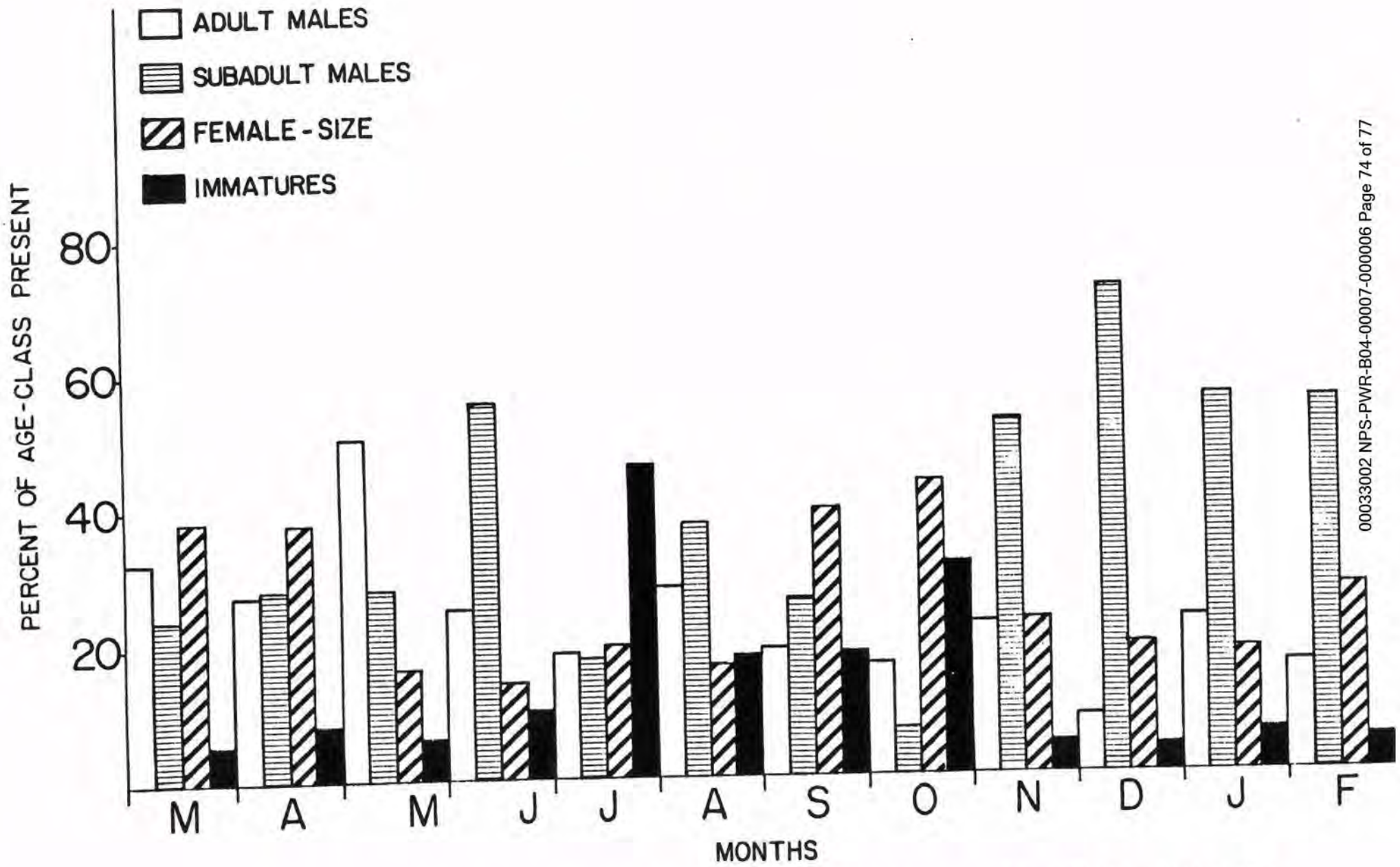


CALIFORNIA SEA LIONS AT BODEGA ROCK, 1982-1983

FIGURE 9.



CALIFORNIA SEA LIONS AT THE FARALLONES, 1982-1983



AGE CLASSES OF CALIFORNIA SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

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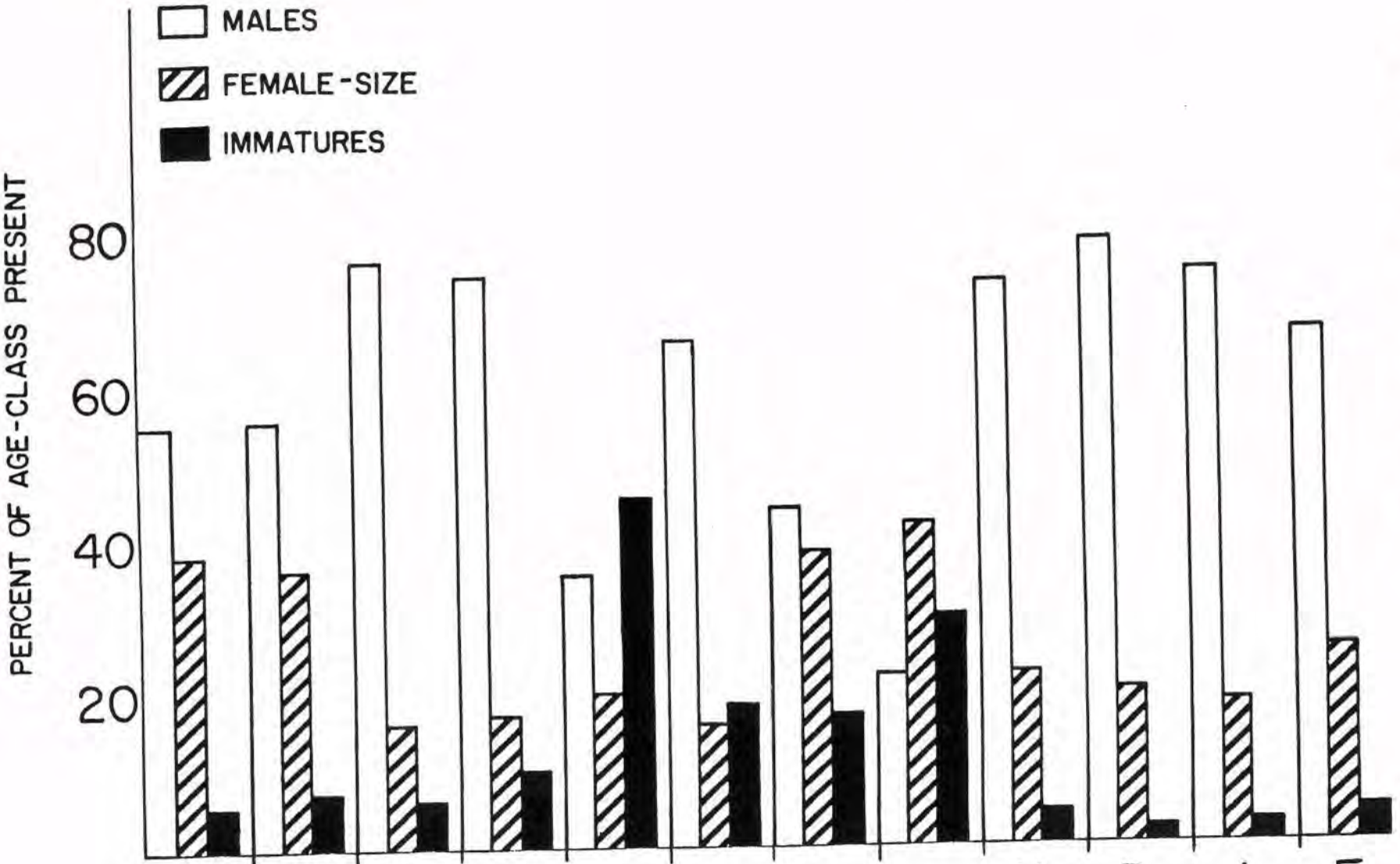
FIGURE 11.



AGE CLASSES OF CALIFORNIA SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

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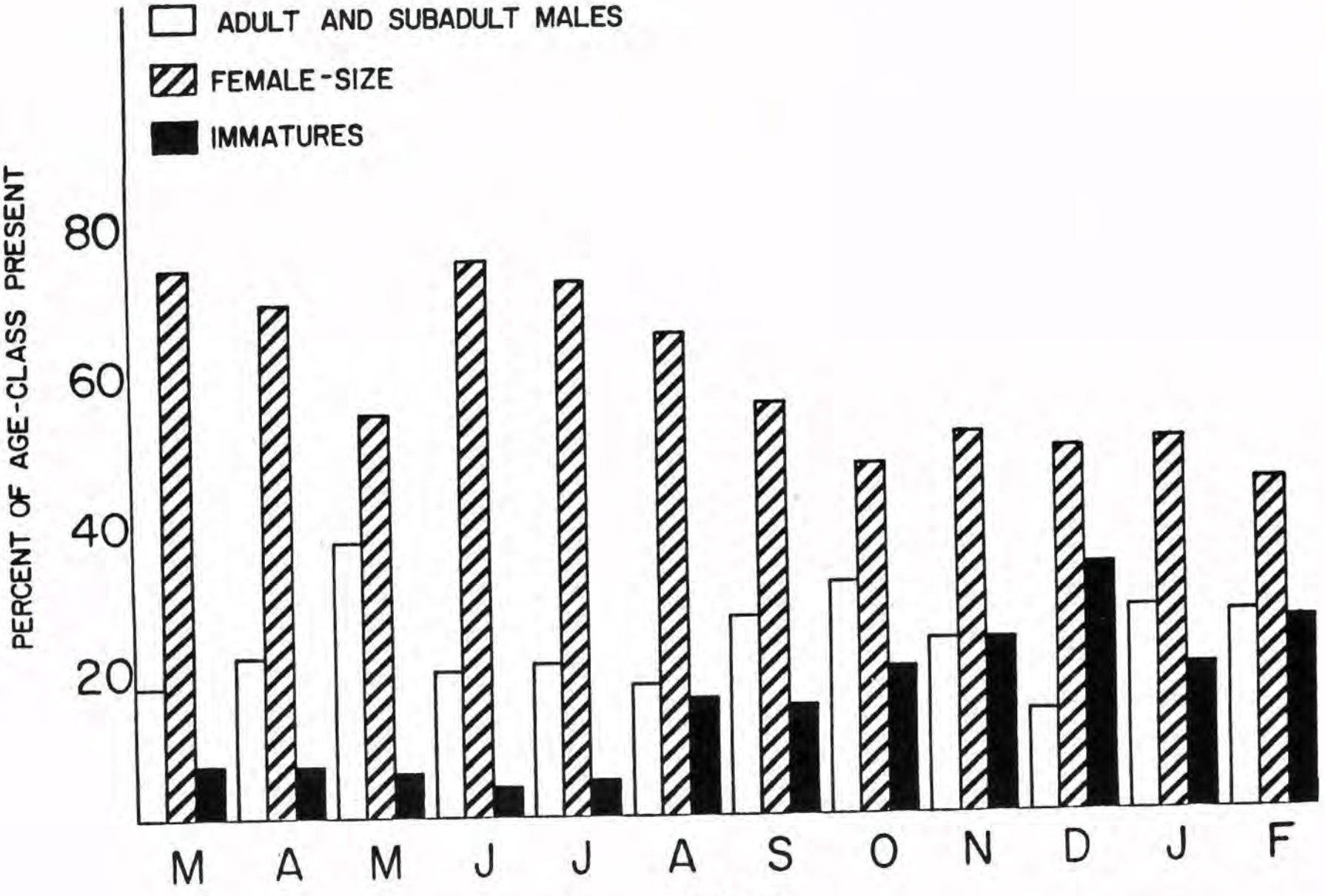
FIGURE 12.



AGE CLASSES OF CALIFORNIA SEA LIONS AT THE FARALLONES, 1982-1983

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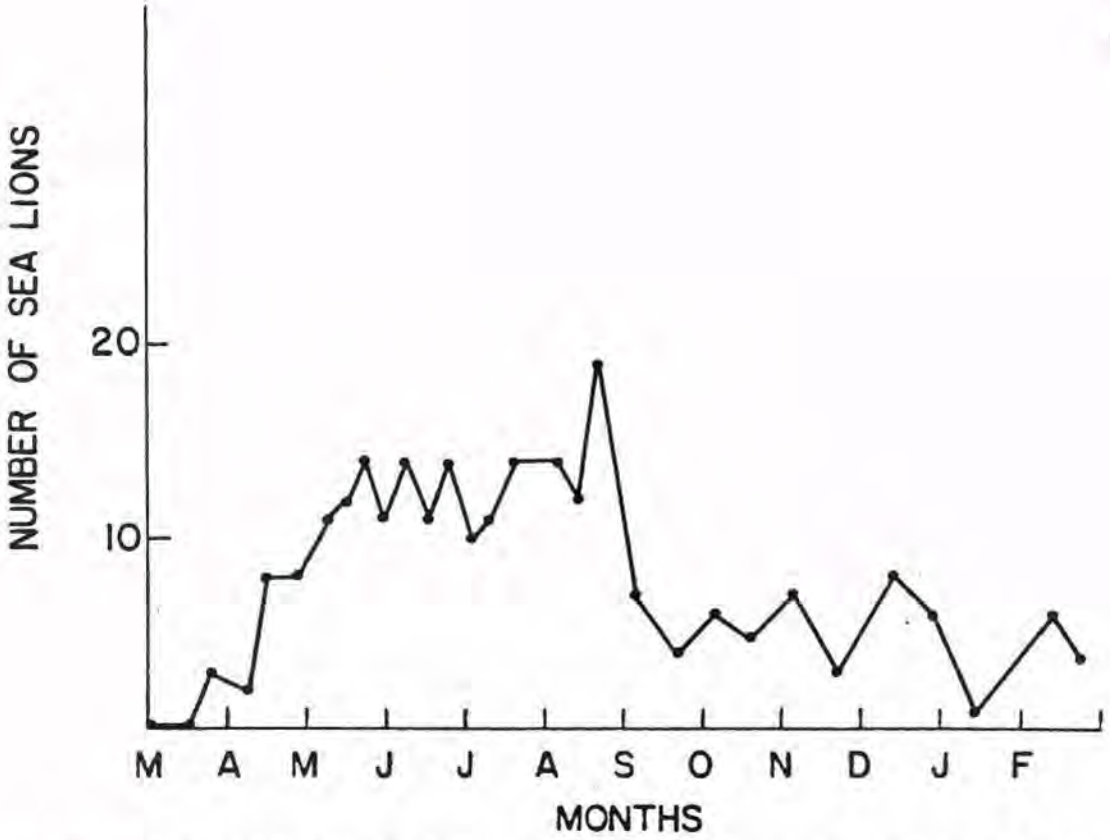
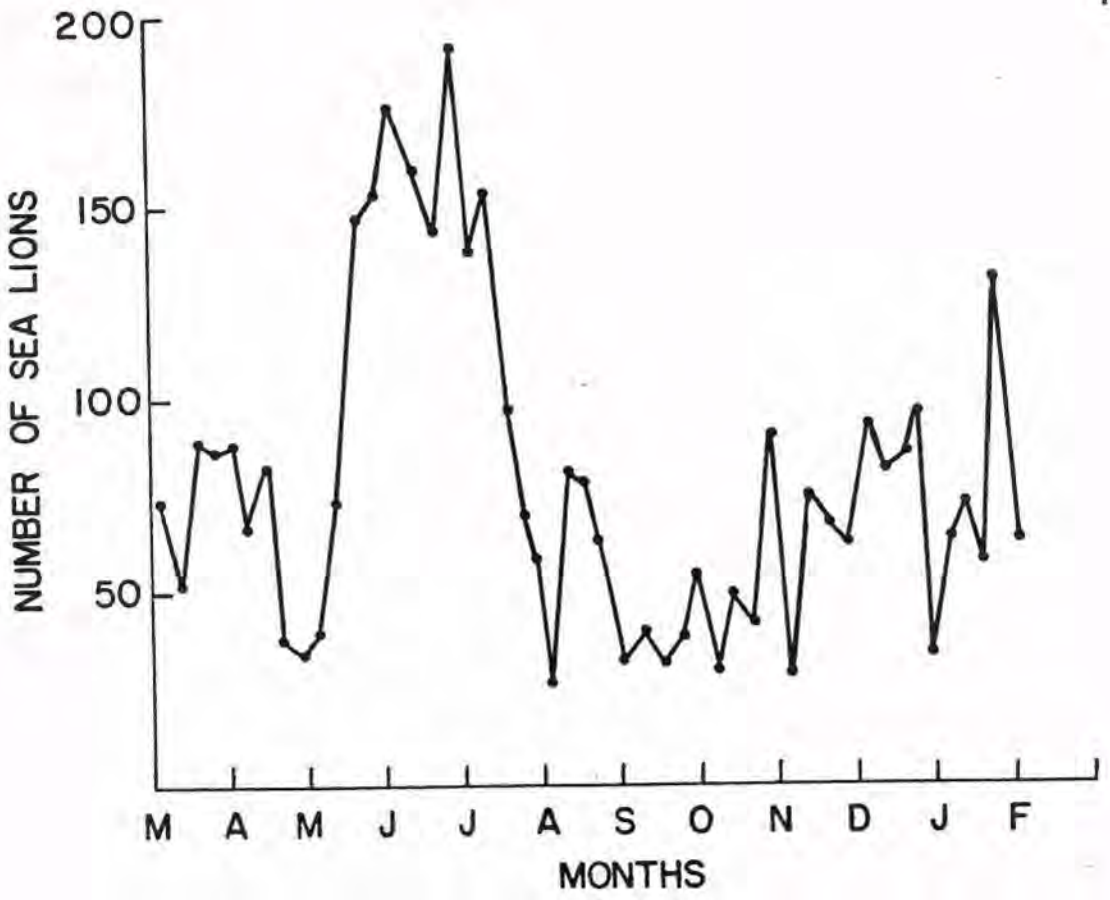
FIGURE 13.



NORTHERN (STELLER) SEA LIONS AT PT. REYES HEADLANDS, 1982-1983

FIGURE 14.



NORTHERN (STELLER) SEA LIONS AT THE FARALLONES, 1982-1983

ASSESSMENT OF PINNIPED/HUMAN INTERACTIONS IN POINT REYES, CALIFORNIA, 1983-84

Sarah G. Allen and Harriet R. Huber

Point Reyes Bird Observatory
4990 Shoreline Hwy.
Stinson Beach, CA 94970

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Final report to the Sanctuary Programs Office,
National Oceanic and Atmospheric Administration
1984.

ABSTRACT

The breeding population of harbor seals in the Point Reyes area, California, is one of the largest in the state and because of its proximity to a large urban area, there is significant potential for human impact. We examined sources for disturbance to seals and the degree to which these sources affect seal behavior at each major haul out site. Recreational fishermen and boats were the major causes for disturbance, and Tomales Bay was the primary area where seals were disturbed. Seals responded to frequent disturbance by using alternative haul out sites and usually rehauled within 30 min. At Tomales Bay, though, a lower proportion of the herd was likely to rehaul in comparison to other locations, and often seals never rehauled. The reproductive rate was depressed and the pup mortality rate was inflated at Tomales Bay compared to more remote haul out areas such as Double Point. Disturbance to California and northern sea lions at Sea Lion Overlook, Point Reyes Headlands, was minimal because of the inaccessibility of the area to hikers and boats. No conflict was observed between pinnipeds and commercial herring fishing activities in Tomales Bay. Commercial gill net fisheries in the area incidentally killed many small marine mammals in 1982, 1983 and 1984.

INTRODUCTION

The breeding population of harbor seals in the Point Reyes area, California, (i.e., the outer coast of Marin County) is one of the largest in the state (Allen and Huber 1983, Miller 1983), and because of proximity to a large urban area, the potential for human impact is great. Much of the outer coast of Marin County is within the Point Reyes National Seashore and the Golden Gate National Recreation Area, and as a consequence, is heavily frequented by tourists. Human activities near harbor seal haul out sites include commercial and recreational boating and fishing, sport diving, flying (military helicoptors, private aircraft), and hiking (birdwatchers, tidepoolers) (Kaza 1984).

Harbor seals, when hauled out on land, are sensitive to the presence of humans, and when disturbed they will characteristically retreat into the water en masse. Seals exposed to frequent and intense levels of human intrusion may change diurnal haul out patterns (Calambokidis et al. 1978, Paulbitski 1975), move to alternative haul out sites (Allen et al. 1984), abandon pups (Johnson and Jefferies 1977, Boulva and McLaren 1979, Slater and Markowitz 1983), or leave an area entirely (Bartholomew 1949, Newby 1971).

The degree to which human activities affect seals in the Point Reyes area has not previously been examined except at Bolinas Lagoon (Allen et al. 1984). At present, the sea lions that haul out at Point Reyes Headland are not breeding there (Allen and Huber 1983) and thus are not as sensitive to disturbance as the harbor seals. Nevertheless, it is still important to

know the degree to which sea lions are affected by human activities because they are as likely as seals to desert haul out areas because of repeated disturbance (Peterson and Bartholomew 1967, Kenyon 1962). Our objective, therefore, was to gather data on the present levels of human/pinniped interactions. From this information, specific management plans can be designed to provide adequate protection for seals and sea lions and informative interpretive programs for park visitors.

METHODS

Visitor use is highest on weekends, and thus, we censused harbor seals one weekend a month from March 1983 to March 1984 at Tomales Bay, Bird Rock, Drakes Estero and Double Point, to determine those locations where seals are most subjected to human disturbance (Figure 1). We chose these areas because they are the primary haul out locations in the Point Reyes region (Allen & Huber 1983). All human/seal interactions were recorded. More than one seal flushed into the water because of nearby human activities was counted as a disturbance. We noted type of disturbance, recovery rate, percent of recovery (proportion of animals rehauling within 1 hr), and the use of alternate haul out sites. During the breeding season, seven additional weekend censuses were made to determime whether disturbance was affecting pup survival.

From March 1983 to March 1984, we also noted any disturbance to California or northern sea lions during weekly censuses at Sea Lion Overlook and semi-monthly censuses at Bodega Rock, identifying the source of

disturbance whenever possible.

Human/pinniped interactions during the herring (Clupea pallasi) spawn in Tomales Bay were observed from December 1983 through February 1984. Seven separate censuses by boat were originally scheduled; the herring fishery, however, failed to materialize and we were able to monitor interactions on only five days.

When analyzing the effects of disturbance on seal and sea lion haul out behavior, we classified disturbance sources as hiker, fisherman (including abalone diver and clam digger), boat (power, non-power), aircraft, dog, natural (landslide, bird), and unknown. The year was divided into three seasons: spring (March through June), summer (July through October), and winter (November through February). The seasonal frequency of disturbance was estimated for each location and expressed as a percentage of the number of days seals were disturbed divided by the total number of census days for each season. The recovery rate for seals at each location was based on the time it took at least 25% of the original herd to rehaul. Excluded from the analyses were times when fewer than 25% rehauled and times when the disturbance source remained for an extended time period. The percent recovery for each location was based on the average proportion of the original members to rehaul within 1 hr. When multiple disturbances occurred, the last disturbance within a sequence was used as the starting time.

As an index of seal sensitivity at different locations, we recorded the number of "head alerts" during five minute intervals within randomly chosen groups of 10 seals. A "head alert", as defined by Sullivan (1979), is a

stereotyped behavior: the seal raises its head and scans from side to side while in a resting posture on land. We then compared the mean number of "head alerts" per minute at each site using one-way analysis of variance with Scheffe's Test for multiple comparisons at $\alpha = 0.05$ (Snedecor and Cochran 1967).

During the breeding season, we also collected information on the number of dead pups and on mother/pup separations precipitated by disturbances. We estimated the mortality rate of pups before weaning for each location based on the proportion of the number of dead to the maximum number of live pups counted for the breeding season.

Information on disturbance collected over eight years, 1976-1983, at Double Point was also analyzed. The frequency of disturbance was expressed as a percentage of the days disturbed divided by the days censused per month for each year, and we then calculated the monthly mean percentage combining all years. Sources for disturbance were categorized as previously described; the frequency for each category combining all years was expressed as a percentage. We then divided the year into three seasons (spring, summer, winter) and determined the seasonal frequency for each disturbance category.

RESULTS

Harbor seals were flushed from haul out sites in Point Reyes on 107 occasions and on 24% of all census days in 1983-84. After combining data from all locations (Table 1), fishermen, including clam diggers, abalone

divers, eel fishermen and crab fishermen, were the primary source of disturbance (41%) (43/107). Hikers and boats (power and non-power) were equally disturbing to seals primarily in Tomales Bay and Drakes Estero. Seals were disturbed more frequently at all locations during the spring (45%) than during either the summer (18%) or winter (19%) (Table 2).

Seals in Tomales Bay experienced the highest level of disturbance for all seasons except winter, and clam diggers were the greatest cause. In a single day, up to 500 people were observed digging for clams on the sand bars preferred by seals between Sand Point and Toms Point. A barge from Lawson's Landing ferried people to the sand bars. Boats passing along the channel bordering haul out sites also disturbed seals. Tomales Bay was the only location in this study where people were observed overtly and maliciously harassing seals. One seal was reported shot with an arrow by people in a boat and on one occasion children were observed harassing a pup left on the beach after the herd was actively flushed by the same children.

At Bird Rock, abalone divers disturbed seals most frequently, while at Drakes Estero they were disturbed equally by fishermen (clam diggers, crab fishermen), boats (power and non-power), and hikers. Hikers were the main disturbance at Double Point. Disturbances from aircraft, dogs, and non-human-related sources (birds, landslides, deer, rain) were incidental at all locations (Table 1).

In most instances, seals rehauled after they were flushed from haul out sites (Table 3). Seals in Tomales Bay, however, were least likely to rehaul during the census time period and most likely to use alternate sand bars on which to rehaul. In many instances, clam diggers in Tomales Bay remained

for entire low tide cycles, thereby precluding the return of seals. In most cases, seals at Drakes Estero, Bird Rock, and Double Point returned to haul out sites and did not move to alternate sites.

The average time, in minutes, for at least 25% of the herd to rehaul after disturbance was similar for all locations:

Tomales Bay $\bar{x}$ = 18.2, SD = 8.5, n = 14

Bird Rock $\bar{x}$ = 29.2, SD = 14.0, n = 6

Drakes Estero $\bar{x}$ = 22.3, SD = 17.9, n = 17

Double Point $\bar{x}$ = 21.7, SD = 11.2, n = 12

The percent of recovery (the proportion of the original herd to rehaul within 1 hr) varied, though, for each location. A lower proportion of the herd was likely to rehaul at Tomales Bay ($\bar{x}$ = 36.0, SD = 38.8, n = 42) than at Bird Rock ($\bar{x}$ = 75.4, SD = 29.0, n = 9), Drakes Estero ($\bar{x}$ = 58.0, SD = 39.5, n = 31), or Double Point ($\bar{x}$ = 66.2, SD = 37.2, n = 16). Furthermore, 42% of the time seals did not rehaul in Tomales Bay (Table 3).

Analysis of the sensitivity of seals at each location based on the number of "head alerts" revealed differences between the areas: seals alerted significantly more often at Tomales Bay (Table 4).

Despite the higher level of disturbance at Tomales Bay, the number of times pups were observed separated from females was equal to that of other locations (Table 3). The number of separations was expectedly higher at Double Point because more pups were present there than at any other location. A survey of pups recovered by the California Marine Mammal Center, however, revealed that a large number of pups (7) were removed by people from Tomales Bay (Lynne Amaya, CMMC, Fort Cronkite, CA, pers.

commun.). This represents 16% (7/45) of the pups counted there in 1983. There are no records of pups removed from the other locations.

Very few dead pups were observed during this survey. The most reliable information on dead pups was gathered at Double Point since distance, poor visibility, and the tide washing pups away precluded accurate counts at other sites. At Double Point the mortality rate was 8.7% (23/264) in 1983.

Observations began at Double Point in 1976, and the level of disturbance there has fluctuated. Nevertheless, a monthly and seasonal pattern is apparent in the sources for and frequency of disturbance relative to the seasonal presence of seals. Disturbance levels were similar for all months except November, when seals were virtually absent (see report Pinniped Assessment 1984 by Allen and Huber) (Table 5). As expected, most disturbances occurred in spring (61% of all disturbances observed) since more censuses were conducted then. However, the proportion of days on which disturbance occurred relative to total census days was similar for all seasons (Table 6).

The primary identifiable reasons for disturbance in spring were hikers, aircraft, and an assortment of non-human causes including landslides, birds alighting too closely to the herd, and wind-whipped debris. Western Gulls (Larus occidentalis) were responsible for many disturbances in their attempts to consume afterbirths of seal pups during spring. Low flying military helicopters as they traveled north or south along the coastline were the main aircraft disturbing to seals. Though abalone are plentiful in this area, we rarely saw abalone fishermen venture as far as Double Point from the Palomarin access trail. During summer, all sources of disturbance

were nearly equal in their effect, but during winter, landslides, rain, and hikers were the main sources. We were unable to identify reasons for disturbance in many instances, but we suspect that non-human-related causes were responsible, such as falling rocks, since slides in this area are common. The marine salvage operation of April 1982 is separated from all other categories because of its unique effect on the seals (see report Pinniped Assessment 1983 Allen and Huber).

During censuses at Sea Lion Overlook and Bodega Rock, northern and California sea lions were flushed into the water ten times (Table 7). The source of disturbance was hiker, abalone diver, sailboat, and low flying helicopter (one occasion each), non-human (four times), and unknown (twice). Most often it was the immature California sea lions which headed into the water and then quickly (within a half hour) rehauled. The percent of days disturbed was 7.7% at Bodega Rock and 12.7% at Sea Lion Overlook. All of the disturbances with known human cause occurred during the spring. Of the non-human disturbances, three were caused by rock slides and one by the resounding splash of a northern sea lion bull as he dove off a rock.

Fishery Interactions

Fishery/pinniped interactions in Tomales Bay during the 1983-84 herring spawning season were minimal because few herring entered the bay to breed. Preliminary data revealed that only 10% of the fishing quota for Tomales Bay was reached in 1983-84 (Pacific Coast Federation of Fisherman's Association, Inc. 1984). On the five occasions when we monitored interactions (December 17, January 12, January 20, February 23, February

24), 5-20 harbor seals and 1-45 California sea lions were observed in the vicinity of fishing boats. Both species were observed actively maneuvering around boats as fishermen pulled nets from the water, but none were observed taking fish from the nets.

The interactions of pinnipeds with commercial gill net fishing operations from May through October 1983 were similar to 1982 (Allen and Huber 1983). We gathered information from various organizations involved in collecting beach-cast marine mammals to determine whether entanglement in set gill nets was incidentally killing marine mammals. Thirty-three dead pinnipeds washed ashore in Marin County between May and October, including 18 harbor seals and 15 California sea lions. More than 75% (14/18) of the dead harbor seals were small, either weaners or immatures, and therefore, more likely to become entangled in the nets since larger animals apparently could break away. Of the total, only three were fresh enough to identify traumas to the head. The others were too decomposed to determine cause of death; they were found, however, in close proximity to other marine mammal carcasses such as harbor porpoises (Phocoena phocoena) which had distinct gill net marks impressed on their skin. Nearly half (7/15) of the California sea lions found washed ashore were immature and four of those were also found in close proximity to other dead marine mammals, indicating death from gill net entanglement.

DISCUSSION

With the exception of Tomales Bay, harbor seals in the Point Reyes area

were not severely disrupted from their normal diurnal or seasonal haul out patterns by human disturbance. Primarily in Tomales Bay, but also in Drakes Estero, however, seals were more frequently disturbed than at coastal sites probably because these estuaries are more accessible to the public and because of the recreational pursuits offered there (Kaza 1984). The low incidence of disturbance to seals at Limantour Spit, normally a popular beach, was an artifact of the beach being temporarily inaccessible to the public during this two year study period. The primary sources for disturbance varied for each location, but, in general, recreational fishermen flushed seals more often than any of the other categories. Double Point was the only exception; here seals were equally disrupted by hikers, aircraft, and non-human causes. Fishing activities by park visitors in the vicinity of seal haul out sites ususally consisted of clam digging in estuaries and abalone diving at Bird Rock. Boats traveling close by haul out sites were the second major source for disturbance. In Tomales Bay, power and sail boats were the main type of craft responsible, and in Drakes Estero, kayaks/canoes and power boats were equally disturbing to seals.

The sources for disturbance observed in the Point Reyes area were much the same as those documented in other studies (Allen et al. 1984, Calambokidis et al. 1978 and 1983, Chapman 1979, Johnson and Jefferies 1977, and Paulbitski 1975, Risebrough et al. 1979). The unique attributes which attracted people to each of the areas studied, as well as the accessibility of each, dictated what activities were most likely to flush seals.

Spring was the time of year seals were most likely to be disturbed at all locations in 1983, even though recreational use of the Point Reyes

National Seashore is consistently heavy throughout the year (National Park Service 1978). Clam digging is legal in Drakes Estero and Tomales Bay year round (National Oceanic and Atmospheric Administration 1980); the level of use in Tomales Bay, though, is greatest from February through June when barges carrying up to 500 people per day run from Lawson's Landing to the sand bars of Toms Point. These are the months also when the tides are most favorable for clam digging. Spring tides are also frequently low enough for people to hike along the rocky shore to Double Point and for sport divers to easily collect abalone at Bird Rock.

The ability of seals to adjust to human activities was similar to findings in a study at Bolinas Lagoon (Allen et al. 1984) where seals sought alternate locations to haul out and usually rehauled within about 30 min. The recovery rate of seals in Tomales Bay, however, was much lower than that of the other sites. We did not conduct night-time censuses in Tomales Bay but would suspect that seal numbers may be higher then because this was the only site in the Point Reyes region with more seals present in the early morning than at mid-day (see report on Pinniped Assessment by Allen and Huber 1984). Paulbitski (1975) also found this to be the case for harbor seals at Strawberry Spit in San Francisco Bay.

Our information suggests that there is a relationship between harbor seal reproductive success and human disturbance. At both Tomales Bay and Drakes Estero, the pupping rates were depressed compared to Double Point and Tomales Point where disturbance levels were lower (see report on Pinniped assessment by Allen and Huber 1984). Slater and Markowitz (1983) also calculated a reduced reproductive rate for a harbor seal population in San

Mateo County compared to an undisturbed one in Santa Cruz County. At Bolinas Lagoon where seals are often disturbed, the reproductive rate was also depressed (Allen et al. 1984). The large percentage of pups removed by humans from Tomales Bay (16%) also compounds the deleterious effects of disturbance on pup survivorship. Many of the pups recovered by the CMMC were most likely separated/abandoned due to disturbance. If these pups are included in calculations, our estimate for the pup mortality rate is 22.2% (10/45) for Tomales Bay. The estimated pup mortality rate at Double Point was 13% in 1982 when an intensive marine salvage operation occurred, compared to 1977 and 1983, when the levels of disturbance were low, and the mortality rates were only 7.4% and 8.7%, respectively (Allen 1980, Allen and Huber 1983).

The sea lions at Sea Lion Overlook are naturally protected in their chosen haul out area since it is inaccessible to hikers because of steep cliffs and to boaters because of hazardous rocks and surf. Nonetheless, several hundred California sea lions stampeded into the water one day at the sound of a loud whistle from a sightseer on the cliffs 200 feet above. The source of most other disturbance (3/7) was small rock slides from crumbly cliffs. Sea lions were disturbed less frequently than harbor seals at all sites.

Fishery/pinniped interactions in Tomales Bay during the herring season were minimal in both 1982 and 1983 because the numbers of seals and sea lions near fishing vessels were low. Miller (1981) also found little interaction between pinnipeds and herring operations in Tomales Bay.

The incidental take of pinnipeds along with other marine mammals in

association with the commercial gill net fishing operations, however, has increased substantially in this area over the past three years. Public concern over this issue has been so great that recent legislation has been passed in California (Senate Bill 2266) to mitigate the adverse effects on marine bird populations. Concern has since increased, though, that measures to lower bird mortality have inadvertently increased mammal mortality (Marine Mammal Commission Annual Meeting, 1984). In general, restrictions were enacted on the length of net, depth of net set (which varies from 10 to 15 fathoms), and the number of fishing permits. The California Department of Fish and Game was authorized to continue a monitoring program to evaluate the effectiveness of these measures. Preliminary analyses of the Marine Mammal Commission and CDFG indicate that harbor seals are equally succeptible to entanglement at depths deeper than 15f and in all types of gear excluding small-mesh monofilament netting (Bishop 1983, Wild 1983). These findings suggest that current legislation is insufficient in curtailing the incidental take of pinnipeds in gill nets. Information is not yet available to determine whether this fishery is adversely affecting local harbor seal and California sea lion populations.

SUMMARY

The qualities that attract seals to Point Reyes to breed in large aggregations are numerous, including habitat and food availability. Likely another important reason is lack of human intrusion because most of these areas have not been developed nor are they readily accessible.

Consequently, reasons for preserving and protecting existing haul out locations are enhanced. Based on this two-year survey and a previous study, we have determined that with the exception of Tomales Bay and Bolinas Lagoon, the seals in Point Reyes presently do not experience levels of disturbance that severely disrupt their normal diurnal or seasonal haul out patterns. Note, however, that we were unable to assess the situation at Limantour because the beach was temporarily inaccessible to humans during this study. To maintain present low levels of human impact, a series of options are possible:

1. Posting of educational and informative signs regarding harbor seal behavior and sensitivity at the access routes of each haul out location. Most human-related disturbances that we observed were non-malicious in intent and were merely the desire to interact with wildlife by persons unaware of adverse effects those interactions might precipitate (e.g. pup abandonment). Signs were placed at the south end of Double Point in 1978 and have proven effective. Access routes would include access by foot and various boat launches in the vicinity of haul out areas, i.e. Lawson's Landing in Tomales Bay and Johnson's Oyster Farm in Drakes Estero.

2. Pamphlets including more detailed information on harbor seal behavior, haul out locations, and the effects of human disturbance could be available at various facilities in the Point Reyes National Seashore frequented by visitors.

3. Restriction of future access to seal haul out areas. This would include plans for boat ramps in Drakes Estero providing increased access for power and non-power boats.

4. Because Tomales Bay has already been identified as a sensitive area, special programs could be instituted there to minimize existing human pressures. We, therefore, recommend more frequent patrolling of this area on weekends during the clam digging season by personnel responsible for the enforcement of the Marine Mammal Protection Act. Another option would be to encourage the owners of Lawson's Landing to transport clam diggers to sand bars other than the primary haul out areas used by seals during the peak pupping season during April and May.

5. Primary haul out sites should be monitored on an annual basis during the pupping season to determine the health of this major population. If censuses were conducted in early May, one could determine whether the reproductive success of the population was similar to or depressed in comparison to this study period.

6. Support continued monitoring efforts by the California Department of Fish and Game of commercial gill net fishing operations in the area, because the potential adverse effects are likely high.

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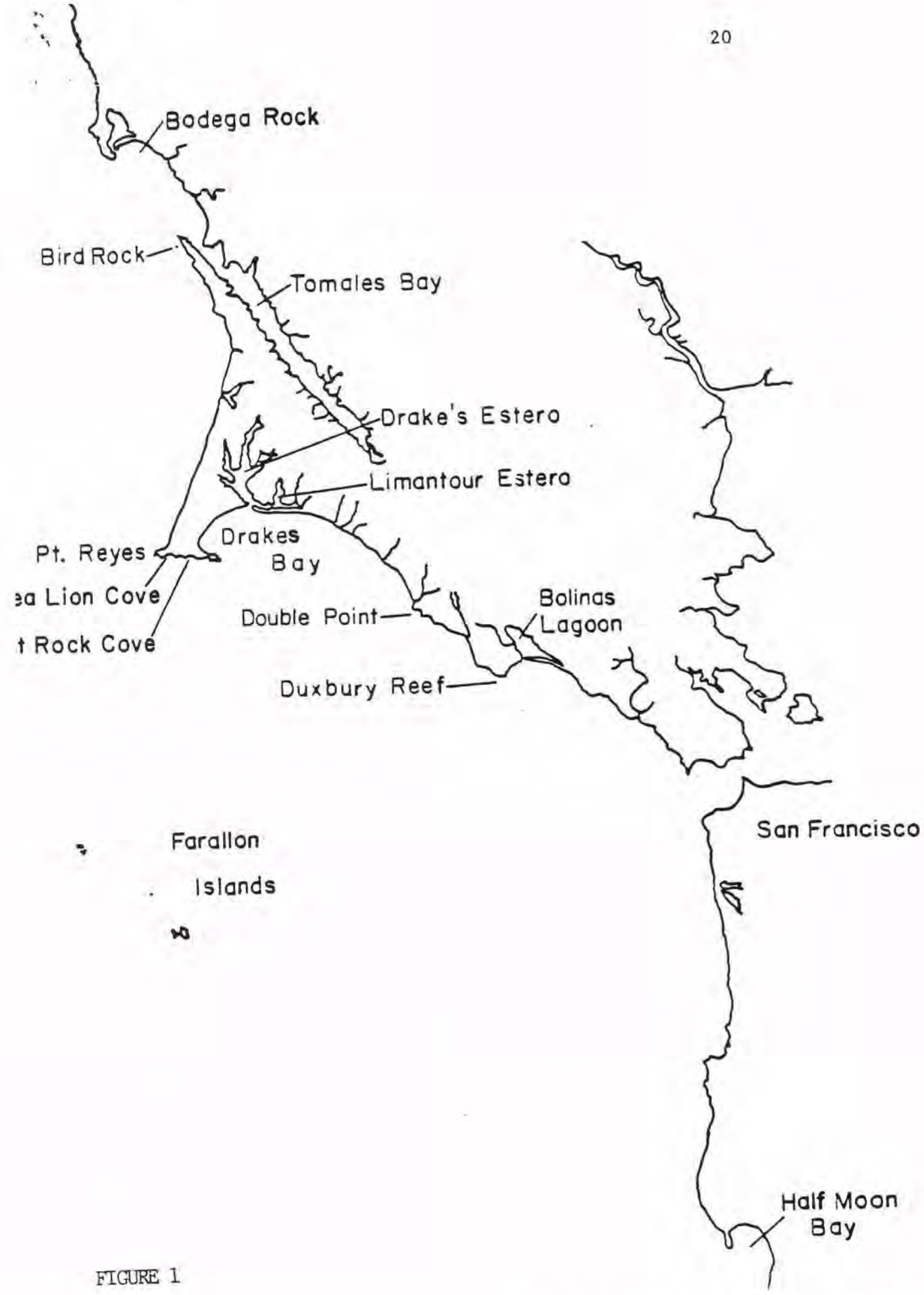
Bodega Rock
Bird Rock
Tomales Bay
Drake's Estero
Limantour Estero
Drakes
Bay
Pt. Reyes
ea Lion Cove
t Rock Cove
Double Point
Bolinas
Lagoon
Duxbury Reef
Farallon
Islands
San Francisco
Half Moon
Bay

FIGURE 1

Table 1. The occurrence of disturbance to harbor seals at four major haul out sites in Point Reyes, March 1983 - March 1984.

	LOCATION					
Sources	Tomales Bay	Bird Rock	Drakes Bay	Limantour	Double Point	All Sites
Hiker	6	1	7	0	9	23
Fisherman	22	8	12	0	1	43
Boat	13	1	9	1	0	24
Aircraft	0	1	0	0	3	4
Dog	2	0	0	0	1	3
Non-human	0	0	3	0	4	7
Unknown	0	0	1	0	2	3
Totals	43	11	32	1	20	107
Days Disturbed	19	9	13	1	15	57
Days Censused	46	44	45	45	59	239
% Days Disturbed	41.3	20.5	28.9	2.2	25.4	24.0

Table 2. The level of disturbance by season to harbor seals at four major haul out sites in Point Reyes, 1983 - 1984.

	LOCATION				
	Tomales Bay	Bird Rock	Drakes Estero	Double Point	Totals
Spring					
Days Disturbed	14	5	8	10	37
Total Census Days	17	19	17	30	83
% Days Disturbed	82.4	26.3	47.1	33.3	45.0
Summer					
Days Disturbed	4	2	2	1	9
Total Census Days	12	11	14	14	51
% Days Disturbed	33.3	18.2	14.2	7.1	18.0
Winter					
Days Disturbed	1	2	3	4	10
Total Census Days	10	14	14	14	52
% Days Disturbed	10.0	14.2	21.4	28.5	19.0

Table 3. A summary of the effects of disturbance on harbor seals in Point Reyes, 1983-84.

	LOCATION				
	Tomales Bay	Bird Rock	Drakes Estero	Double Point	Totals
Total Disturbances	43	11	32	20	106
Times Not Rehaul	18	0	5	3	26
% Times Not Rehaul	42.0	0	15.5	15.0	24.5
% Times Rehaul	58.0	100.0	84.5	85.0	75.5
Times Use Alternate Site	12	3	1	0	16
Times Pups Separated	3	2	3	3	11
Total # Pups Separated	3	2	3	8	16
Total Pups Dead	3	5	2	23	33

Table 4. A comparison of the frequency of "head alerts" per minute at each harbor seal haul out site using one-way analysis of variance with Scheffe's Test for multiple comparisons; df = degrees of freedom, SS = Sums of Squares, MS = Mean Square.

Source	df	SS	MS	F	F-probability
Total	63	8.91			
Alerts/min	3	1.64	0.55	4.51	0.006
Error	60	7.27	0.12		

Area	Mean	Sample Size	Separation
Drakes Estero	.276	17	a
Tomales Point	.350	8	ab
Double Point	.447	19	ab
Tomales Bay	.680	20	b *

* Significant at $\alpha = 0.05$

Table 5. The average monthly percentage of disturbance days to total census days at Double Point combining data from 1976 to 1984; $\bar{x}$ = mean percentage for each month, SD = standard deviation, and N = number of years.

	MONTH											
	J	F	M	A	M	J	J	A	S	O	N	D
$\bar{x}$	34.3	40.7	41.7	53.2	32.9	27.6	40.3	58.3	30.6	26.2	8.3	27.0
SD	41.3	34.5	26.0	27.8	24.9	33.5	33.5	34.6	24.5	38.3	20.4	38.9
N	9	9	9	9	9	8	6	6	6	7	6	6

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Table 6. A summary of disturbances to seals at Double Point by season, 1976 to 1984; TD = total disturbances, TCD = total census days, DD = days seals were disturbed, and %DD = the percentage of disturbance days to total census days.

	SOURCE										
	Hiker	Boat	Fisherman	Aircraft	Non-Human	Unknown	Marine Salvage	TD	TCD	DD	%DD
Spring											
Number	21	2	1	30	20	18	8	100	190	75	39.5
% of Total	21.0	2.0	1.0	30.0	20.0	18.0	8.0	61.4			
Summer											
Number	6	6	3	6	4	20		45	75	29	38.7
% of Total	13.3	13.3	6.7	13.3	8.9	44.4		27.6			
Winter											
Number	6	0	1	1	5	5		18	60	16	26.7
% of Total	33.3	0	5.6	5.6	27.8	27.8		11.0			
Total Disturbances for each category											
Number	33	8	5	37	29	43	8	163	325	120	36.9
% of Total	20.2	5.0	3.1	22.7	17.8	26.3	5.0				

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Table 7. Disturbance to California and northern sea lions at Sea Lion Overlook and Bodega Rock in Point Reyes, March 1983 to March 1984.

Sources	Sea Lion Overlook	Bodega Rock
Hiker	1	0
Fisherman	0	1
Boat	0	1
Aircraft	1	0
Dog	0	0
Non-human	4	0
Unknown	1	1
Days Disturbed	6	2
Days Censused	47	26
% Days Disturbed	12.7	7.7

Harbor Seal Monitoring at

Point Reyes National Seashore
and
Golden Gate National Recreation Area

Annual Report 2005

Prepared by:

Melanie Vanderhoof and Sarah Allen

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Introduction

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped at Point Reyes, California. The Point Reyes seal population represents the largest concentration of harbor seals in the State of California, other than the Channel Islands, accounting for 20% of the mainland breeding population (Lowry and Carretta 2003). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt feed and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999, Allen et al. 2004). The objectives of monitoring are to 1) detect changes in population numbers, 2) detect changes in reproductive success and 3) identify anthropogenic or environmental factors that might affect population status and trends. The monitoring objectives and protocol are described in detail in Hester et al. (draft report). The information presented here is a summary of the data collected during the 2005 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort including adjacent areas (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in 2005 in conjunction with other agencies and organizations are also presented.

Methods

Study Area

The Point Reyes peninsula extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N) and are referred collectively as the Point Reyes sites. Point Bonita in the Marin Headlands is the southern most seal haul out site within the study area, and along with Alcatraz collectively form the Golden Gate NRA sites. Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PORE), Golden Gate National Recreation Area (GOGA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline.

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). Coastal locations regularly surveyed included Tomales Point, Point Reyes Headland, Duxbury Reef, Double Point and Point Bonita; estuarine locations surveyed included Tomales Bay, Drakes and Limantour Esteros complex, and Bolinas Lagoon (Figure 1).

Regional survey sites included colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark's Slough), in Sonoma County (Sea Ranch, South Sonoma sites and Jenner) and in San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons which run from the March 1 to May 30 and June 1 to July 31, respectively.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during two in-class sessions and four field sessions. Many of the volunteers were trained and seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each Point Reyes site a minimum of twice per week, weather and logistics permitting. Point Bonita was also surveyed twice per week. The Point Reyes Headland and the regional survey sites were surveyed once every two weeks on concurrent weekends. Surveys occurred primarily during low to medium tides, the time when the maximum number of seals haul out in the San Francisco Bay region (Fancher 1979, Allen et al. 1982).

Survey periods were designed to last approximately two hours, with counts occurring every half-hour to one hour, depending on location. Each sub-site was surveyed separately, and then summed to give a total for each site. All sub-sites were visible from one location with the exception of Tomales Point, Tomales Bay and Bolinas Lagoon. For each of these sites, each sub-site was counted from two to four times per survey.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two age classes were lumped together. Pups were the young of the year and after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only between March and June 1. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

All actual and potential disturbances to harbor seals were recorded during a period from March 1 through July 20. The analysis of disturbance data was truncated and does not account for disturbance data collected during the entire molt season. The total number of disturbance survey days was 226 (Table 1). Observers recorded the time and the source of the disturbance. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water or unknown. In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time and location of where the seals rehauled were also recorded. In some cases, an unknown disturbance and unknown response was recorded if the disturbance occurred before the survey was started, and so the nature and extent of the disturbance was not directly

observed. The rate of disturbances was calculated based on the number of disturbances per survey period (survey period was usually 2 hours but may have varied by ½ hour). In future reports, disturbance rate will be calculated based on the number of disturbances per survey hour, in order to compare to other disturbance studies.

Regional surveys occurred every two weeks March – July on weekends, Friday – Sunday that had low tides during the morning or mid-day. All of the Point Reyes and Golden gate sites, as well as the San Francisco Bay and Sonoma sites, were surveyed during these weekends. Participants in the region-wide surveys included the GFNMS and FMSA, San Francisco State University, and Stewards of Slavianka, a non-profit conservation group based in Sonoma County.

Results and Discussion

Overall

In 2005, volunteers completed 244 surveys at sites in Marin County at PORE and GOGA between March 1 and July 30. The combined maximum pup counts for all sites during the breeding season was 1,115 pups. This is 13% lower than 2004, but comparable to previous years (Figure 2). Pup numbers, combining all sites, appear to have stabilized since approximately 2000. Drakes Estero and Double Point together produced 56% of the pups (Figure 3). Pup numbers at Double Point have continued to rebound from 2003, when the presence of a northern elephant seal (*Mirounga angustirostris*) reduced the number of seals at Double Point. Numbers were similar at most sites in the past several years, except at Drakes Estero, which has seen a decrease in pup numbers since the 2003 season, as pup numbers rebound at Double Point and when a coyote was seen preying on newborn pups in 2004 at Drakes Estero (Figure 4).

Date of first pup was observed in 2005 was March 6 compared to March 20 in 2004. There was no apparent trend in the date of first pup observed between 2000 and 2005 (Table 4).

The maximum molt count for all of the Point Reyes sites was 4,380 seals. This count is 23% lower than in 2004, but comparable to counts from 2001-2003 (Table 2; Figure 5). Seals from Drakes Estero and Double Point made up 55% of the maximum molt count (Table 1; Figure 6). The maximum molt counts recorded for Tomales Bay and Tomales Point in the 2005 season were low compared to previous years. The constant presence of fog during the peak molt period at Tomales Point reduced the number of surveys completed during this time.

Surveyors recorded 120 disturbances between March 1 and July 20. 107 of these were actual disturbances, while 13 were potential disturbances. The potential disturbances represented 11% of all disturbances. Of these, 39% (5) were motor boats, and 31% (4) were humans. The disturbance data was analyzed using only the disturbances where a reaction by the seals was recorded (107). The average rate of disturbances per survey in 2005 was 0.54. This can be compared to 0.58 disturbances per survey in 2003 and 0.48

disturbances per survey in 2004. Drakes Estero, while having the highest pup and molt numbers, also had the highest rate of disturbance, 1.03 disturbances per survey (Figure 7). Fifty-two percent of the disturbances resulted in seals flushing into the water.

Twenty-four percent of the disturbances were of unknown cause (Figure 9). The largest identifiable causes were humans on foot (22.7%), non-motor boats (16.4%), and aircraft, (14.6%). These major causes are similar to disturbance data collected from 2002-2004 (Table 3). Both motor and non-motor boat disturbances have decreased slightly. Aircraft increased from an average of 5.6% in 2003 and 2004, to 14.6% (Table 3). This increase may be linked to a rising popularity of "ultralights" which have been observed flying low, especially over Tomales Point. Also notable is the reduction in disturbance from dogs. This may be the result of current enforcement of restrictions regarding where dogs are allowed in the park.

There were no major mortality events this year. The Marine Mammal Center reported that harbor seal rescues, primarily of weaned pups, were within the range of normal variability (Marine Mammal Center, pers. comm.). In 2004, surveyors observed coyotes preying on harbor seals in Drakes Estero; however, coyote predation of pups was not directly observed in 2005. On one survey at Drakes Estero, a bobcat was reported on the tidal sandbars where seals haul out but no predation was observed.

During the 2005 season, National Oceanic and Atmospheric Administration (NOAA) reported reduced upwelling and warmer than usual water temperatures for northern California, Oregon and Washington (2005 www.noaa.gov general website). Unusual, warm water species observed at Point Reyes during 2005 included: the Humboldt squid (*Dosidicus gigas),* a Brown Booby (*Sula leucogaster*) and the California grunion (*Leuresthes tenuis*). The reduced upwelling resulted in reduced algal and krill populations, which may have impacted food availability for harbor seals. During the 1998 El Nino event, when upwelling did not occur, there was a dramatic reduction in the number of seals pupping and hauling out in the Point Reyes area (Sydeman and Allen 1999). Such a dramatic reduction was not observed during the 2005 season.

Summary by site

Bolinas Lagoon

46 surveys were completed at Bolinas Lagoon between March 1 and July 31. Bolinas Lagoon had a high pup count of 143 the week of April 18, and a peak molt count of 449 the week of July 4 (Table 1). It had the second highest rate of disturbance, 0.82 disturbances per hour (Figure 7). Humans were the main cause of disturbance, making up 47.1% of the recorded disturbances. Bolinas Lagoon was one of the top sites for disturbances in 2003 and 2004, as well (Figure 8).

Double Point

32 surveys were completed at Double Point between March 1 and July 31. Double Point had a high pup count of 291 the week of April 25, and a peak molt count of 1,126 the week of July 4. Double Point had a disturbance rate of 0.48 disturbances per survey.

78.6% of the disturbances were of unknown cause. The remoteness of this site coupled with being surrounded by high cliffs reduces the exposure to human disturbances and may prevent surveyors from identifying the natural sources for disturbance.

Drakes Estero

37 surveys were completed at Drakes Estero between March 1 and July 31 2005. Drakes Estero had a high pup count of 332 the week of May 2, and a peak molt count of 1,261 the week of July 4. Besides having the largest pup and molt numbers, Drakes Estero had the greatest rate of disturbances observed, with a disturbance rate of 1.03 disturbances per survey. Causes for disturbance at Drakes Estero were variable. Birds (22.2%) were the most frequent cause, followed by non-motor boats (19.4%), humans (16.7%), and aircraft (16.7%).

Duxbury Reef

38 surveys were completed at Duxbury Reef between March 1 and July 31. Duxbury Reef had a high pup count of 10 the week of May 9, and a high adult count of 93 the week of May 9. Disturbance was low at Duxbury Reef. The rate of disturbance was 0.03 disturbances per survey this year.

Point Bonita

28 surveys were conducted at Point Bonita. Point Bonita was added to the annual survey locations initially in 2004; however, logistics were not finalized until the 2005 season. Few pups were counted at this site (6); however, the maximum count of seals during the breeding and molt seasons was around 100-130 seals (Tables 1 and 2).
Humans on foot were the major source of disturbance (Table 1).

Point Reyes Headland

Eight surveys were completed at Point Reyes Headland (PRH) between March 1 and July 30 2005. PRH had a high pup count of 44 the week of April 25 and a peak molt count of 456 the week of July 4. Disturbances are low at PRH and no disturbances were recorded in 2005. This haul out site is a primary haul out site for northern elephant seals. The peak count for northern elephant seals between March 15 and July 15 was 1,436 seals on April 29, which coincides with the molt period for elephant seals. Fog limited the number of surveys at PRH.

Tomales Bay

28 surveys were completed at Tomales Bay between March 1 and July 30. Tomales Bay had a high pup count of 188 the week of May 9, and a peak molt count of 549 the week of June 20. The disturbance rate more than doubled in the past year from 0.27 disturbances per hour in 2004 to 0.6 disturbances per hour in 2005. The largest source of disturbances was motor boats, 42.8%. The motor boats were usually clam diggers traveling from the mainland to the sandbars (Mary Ellen King, pers. comm.). Clammers, once on the sandbars and on foot, did not appear to be a source of disturbance. There were no recorded instances of clammers on foot disturbing the seals during the 2005 season.

Tomales Point

26 surveys were completed at Tomales Point between March 1 and July 30. Tomales Point had a high pup count of 101 the week of April 25, and a peak molt count of 378 the week of June 27. The disturbance rate was 0.42 disturbances per survey and the primary source of disturbances was aircraft, which made up 36.4% of the disturbances. Abalone divers are also assumed to be a primary disturbance source at Tomales Point. Often they were present upon arrival of surveyors, and so we were unable to determine the extent of their impact. Abalone collecting season begins in April and overlaps with part of the harbor seal breeding season.

Regional Sites

11 regional surveys were completed, starting on March 4, and ending July 29, at 20 locations. The seasonal peak for pups was during the week of April 30th and the peak for molting seals was during the week of July 10. The maximum number of seals during the breeding season was 3,306 and the average was 2689. The maximum number of seals during the molt was 4,691, with an average of 4,106 (Table 5). Point Reyes had the highest concentration of seals with Double Point and Drakes Estero accounting for 45% of adults during the breeding season, 49% of pups produced, and 50% of molting seals. The maximum count of pups was 1,272 and the first pups were identified at Castro Rocks and Fitzgerald Marine Reserve on March 6th. Of the 20 areas surveyed, only six produced >100 pups (Tomales Bay, Tomales Point, Drakes Estero, Double Point, Bolinas Lagoon, and Mowry Slough). Within San Francisco Bay, Mowry Slough accounted for the majority of seals, followed by Castro Rocks. Sonoma County coast haul out sites were composed of a number of small sites with larger concentrations at Sea Ranch and Jenner. San Mateo County coast sites were also composed of a number of small sites adding up to larger concentrations at Pebble Beach and Fitzgerald Marine Reserve. Only four seals were counted during one survey at Bean Hollow during the entire season. Cowell Ranch Beach and Fitzgerald Marine Reserve accounted for most of the seals counted in the county, but few pups were recorded there.

Disturbances during surveys ranged from northern elephant seal attacking harbor seals at Jenner to people on foot, tide pooling at Point Bonita. The primary sources for disturbance at San Francisco Bay were vehicles at Castro Rocks, aircraft and motor boats at Yerba Buena Island and no disturbances were noted at Mowry Slough.

Collaboration

Point Reyes National Seashore and Golden Gate National Recreation Area collaborated with multiple government agencies and non-profits on projects related to the harbor seal population. The parks collaborated with NOAA on a Tomales Bay stewardship program called SEALS. Park rangers ferried docents on boats out onto the mud flats in Tomales Bay to educate visitors and clam diggers about seals on week ends during low tides. The National Marine Fisheries Service (NMFS) conducted an aerial survey of harbor seal haul out sites along the California Coast, on the 24th and 25th of June 2005. NMFS counted 3,826 harbor seals from Point Reyes to Point Bonita, and 621 harbor seals were counted in San Francisco Bay (Lowry et al., draft report). Regional surveys were conducted in

collaboration with Stewards of Slavianka, Bodega Bay Marine Lab, GFNMS, San Francisco State University, the California Department of Transportation, Joe Mortenson and Mary Ellen King. The Marine Mammal Center released rehabilitated pinnipeds at Chimney Rock at PRNS. We also collaborated with the San Francisco State University study on sightings of satellite and radio tagged seals observed at PRNS. One satellite tagged adult female successfully raised a pup at Double Point in 2005.

Summary

Counts of pups and molting seals at the PORE and GOGA sites were lower in 2005 than the 2004 season. They are comparable to previous years and within the normal range of variation, but the maximum pup count for 2005 was the lowest recorded since 1999, and the peak molt count was the lowest since 2001. The number of disturbances recorded by surveyors remains similar to previous years and no trends are detected. Disturbances were site specific; however, hikers and boaters remain the two most frequent sources of disturbance across all sites.

Harbor seal haul out at Point Reyes Headland.

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In addition we are grateful to the Rangers and Law Enforcement staff at Point Reyes, Point Reyes National Seashore Association, the Cox Family Fund, the San Francisco Bay Area Inventory and Monitoring Program, the Marin Conservation Corps/Americorps Program, Christie and Steve Anastasia, Dale Roberts, Dave Press, and Dawn Adams for all of their help and support.

Volunteer training at Drakes Estero.

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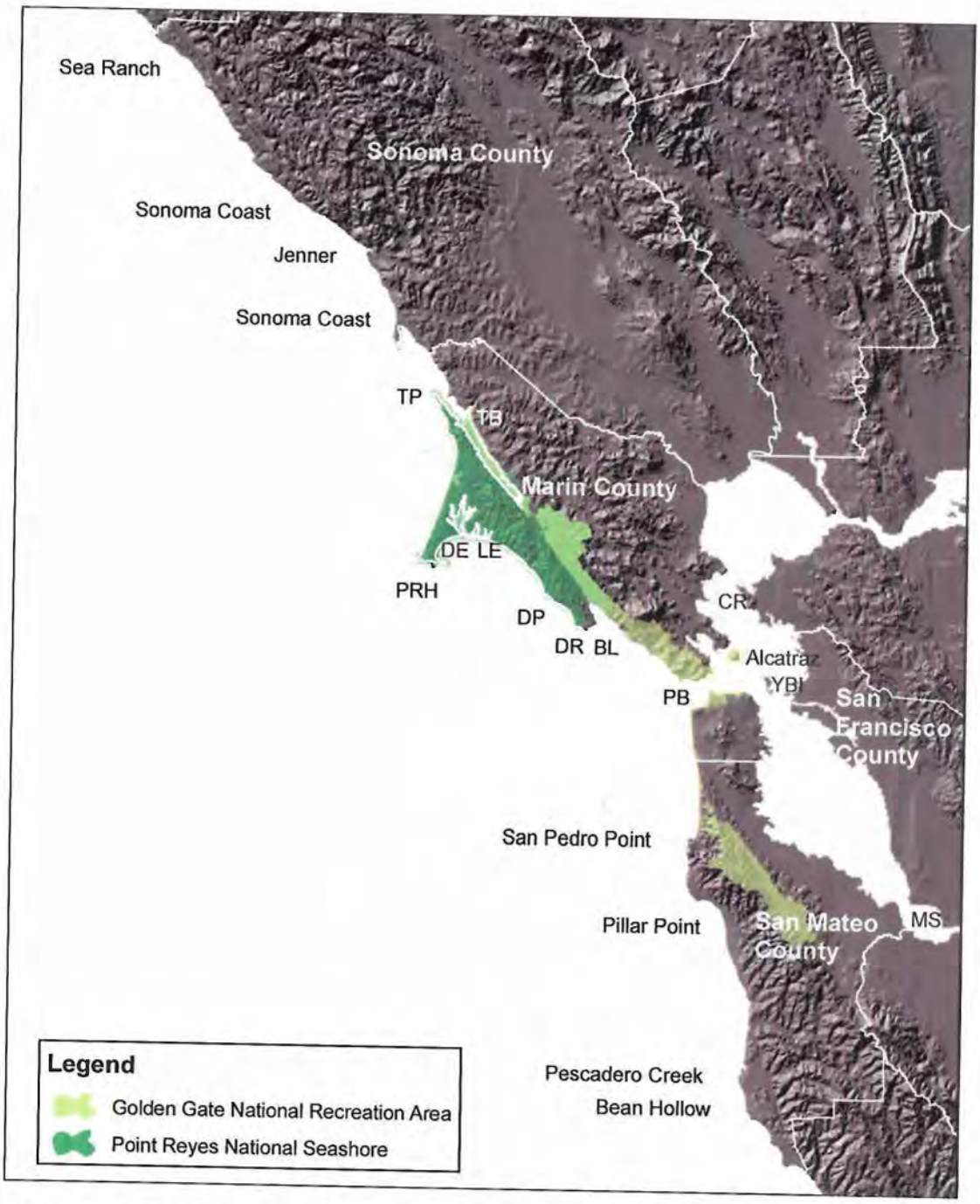

Figure 1. Harbor seal haul out sites in Marin County and San Francisco Bay, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Table 1. Summary data of harbor seal colonies for the 2005 season. All reported numbers reflect the maximum number seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 1 to May 31. Max # Molt =all age classes during the molting season, June 1 to July 30. The percent of red seals is a percentage of the maximum total number of seals during the molt season of each site. The number of surveys and disturbances are from March 15 to July 30.

Site	Max # Breed	Max # Pups	Max #Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Bolinas Lagoon	318	143	449	Weekday: 29 Weekend: 9	Weekday: 29 Weekend: 2	10	2.5%	2	1
Double Point	639	291	1126	Weekday: 20 Weekend: 9	Weekday: 13 Weekend: 1	8	1.1%	2	5
Drakes Estero	754	332	1261	Weekday: 23 Weekend: 12	Weekday: 22 Weekend: 14	15	1.4%	2	2
Duxbury Reef	93	10	64	Weekday: 29 Weekend: 8	Weekday: 1 Weekend: 0	1	1.1%	0	0
Point Reyes Headlands	84	44	456	Weekday: 8 Weekend: 0	Weekday: 0 Weekend: 0	2	1.6%	0	0
Tomales Bay	532	188	549	Weekday: 13 Weekend: 12	Weekday: 9 Weekend: 5	13	1.9%	0	0
Tomales Point	313	101	378	Weekday: 16 Weekend: 10	Weekday: 5 Weekend: 6	14	3.7%	0	1
Point Bonita	133	6	97	28	---	3	3.1%	0	1
2005 Total:	**2,866**	**1,115**	**4,380**	**226**	**107**				

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Table 2. Summary of survey data for 1997-2005, combining all sites at Point Reyes (excluding Point Bonita for comparison between years). Maximum # of Breed and Molt, and Average # Breed include all age classes. Number of surveys and disturbances are the number completed or recorded in the entire year.

YEAR	Max # Breed	Average # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Disturbances Per Survey
1997	3,268	1,830.50	983	NA	Weekday: 44	Weekday: 9	0.2
		SE = 379			Weekend: 29	Weekend: 37	1.3
		N =4			Total: 73	Total: 46	
1998	2,481	1,744.60	528	3,070	Weekday: 79	Weekday: 24	0.3
		SE = 122.5			Weekend: 64	Weekend: 46	0.7
		N = 8			Total: 143	Total: 70	
1999	3,325	1,779.90	1,068	2,863	Weekday: 139	Weekday: 71	0.5
		SE = 173.5			Weekend: 69	Weekend: 54	0.8
		N = 10			Total: 208	Total: 125	
2000	3,506	2,511.10	1,342	3,108	Weekday: 106	Weekday: 78	0.7
		SE = 224.4			Weekend: 91	Weekend: 116	1.3
		N = 7			Total: 197	Total: 194	
2001	3,485	2,218.80	1,247	3,769	Weekday: 112	Weekday: 57	0.5
		SE = 244.8			Weekend: 119	Weekend: 107	0.9
		N = 4			Total: 231	Total: 164	
2002	4,180	2651.3	1193	4297	Weekday: 123	Weekday: 67	0.5
		SE = 119.7			Weekend: 144	Weekend: 102	0.7
		N = 8			Total: 267	Total: 169	
2003	3820	2280	1117	4534	Weekday: 172	Weekday: 86	0.5
		SE = 303.9			Weekend: 115	Weekend: 83	0.7
		N = 9			Total: 287	Total: 169	
2004	4534	2518.3	1267	5633	Weekday: 161	Weekday: 52	0.3
		SE = 348.6			Weekend: 97	Weekend: 53	0.5
		N = 10			Total: 258	Total: 105	
2005	2,733	2182.3	1,109	4,283	Weekday: 166	Weekday: 80	0.5
		SE = 195.1			Weekend: 78	Weekend: 29	0.4
		N= 11			Total: 244	Total: 109	

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Table 3. Causes for disturbance during 2002-2005 for Point Reyes sites; percent is of total disturbances for a given year.

Year	Type of Disturbance								
	Motor boat	Non-motor boat	Vehicle	Dog	Aircrafts	Human pedestrian	Bird	Unknown	Other
2002	13%	16%	6%	0.5%	11%	24%	6%	21%	2%
2003	13%	20%	2%	0%	9%	21%	7%	23%	6%
2004	5%	10%	8%	2%	3%	39%	7%	25%	2%
2005	8%	13%	1%	0%	15%	25%	9%	23%	6%

Table 4. Date of first pup by year at Point Reyes, including all sites.

Year	Date
2000	14 March
2001	16 March
2002	03 March
2003	27 March
2004	20 March
2005	06 March

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Table 5. Regional surveys of harbor seals in central California, March through July 2005. Eleven surveys were conducted, 7 during the breeding season and 4 during the molt.

Location	Breeding Season				Molt Season		
	Average	SE	Total* Max	Pup* Max	Average	SE	Total Max
Sonoma County							
Sonoma Coast	160.9	62.2	230	56	194.5	37.4	237
Jenner	78.4	73.3	152	7	268.5	--	285
Marin County							
Tomales Bay	331.0	24.3	532	188	358.5	53.9	549
Tomales Point	161.8	18.1	313	101	255.5	40.9	378
Point Reyes Headland	63.4	8.2	84	44	367	45.6	456
Drakes Estero/Limantour	516.8	26.9	754	332	796.8	81.3	1261
Double Point	370.1	27.2	639	291	663.1	80.2	1126
Duxbury Reef	42.4	4.6	93	10	26.5	4.7	64
Bolinas Lagoon	170.7	14.0	318	143	287.5	27.7	449
Point Bonita	60.7	50.4	133	6	76.8	13.2	89
San Francisco Bay							
Castro Rocks	212.8	68.4	339	43	191.25	16.1	213
YBI	91.9	33.0	151	9	158.3	47.6	194
Newark Slough	7.1	4.6	13	5	2.0	2.0	4
Mowry Slough	86.3	34.6	139	108	123.3	60.3	210
San Mateo County							
San Pedro Point	7.6	13.1	37	0	43.5	--	75
Bean Hollow	--	--	0	0	--	--	4
Cowell Ranch Beach	70.7	23.8	114	22	130.5	--	135
Pescadero	18.3	9.3	26	5	34.0	--	48
Pebble Beach	77.0	36.9	149	20	162.5	--	170
Fitzgerald Marine Reserve	152.3	17.6	188	19	147.3	17.2	163
GRAND TOTALS	2,668.7	507.7	3,102	1,272	4,105.8	726.9	4,778

*Based on the total for a single day.

Figure 2. Maximum pup counts at PRNS from 1997-2005. See text for methods.

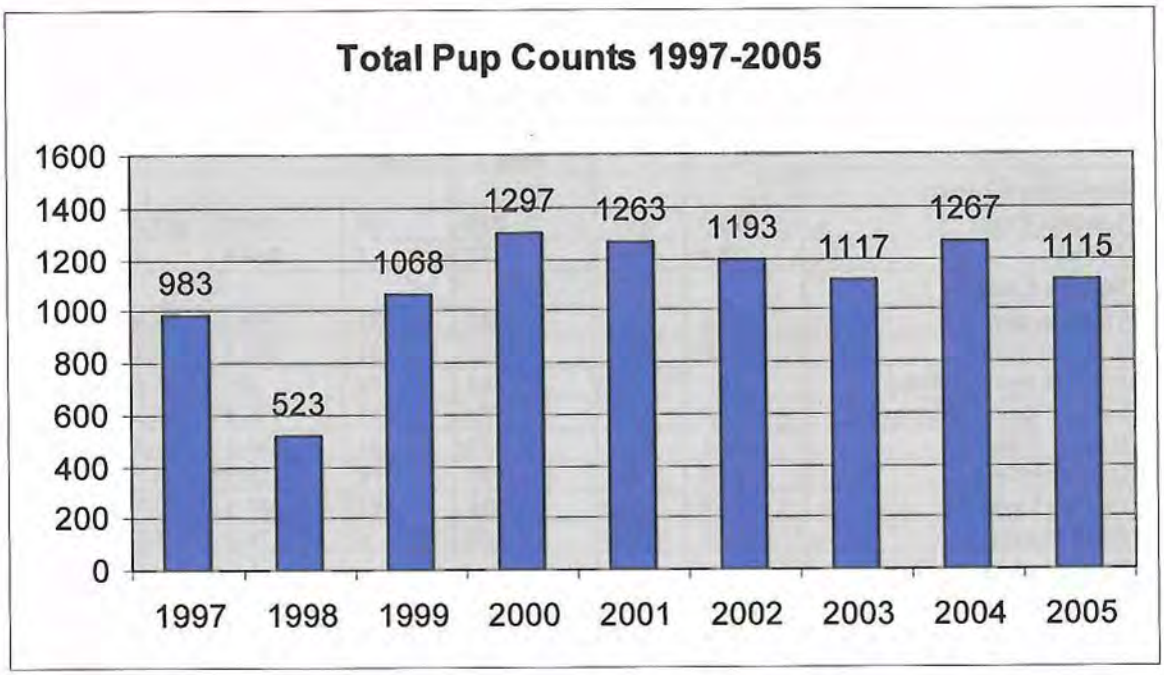


Figure 3. Maximum pup counts by site at PRNS during the 2005 season. See text for methods.

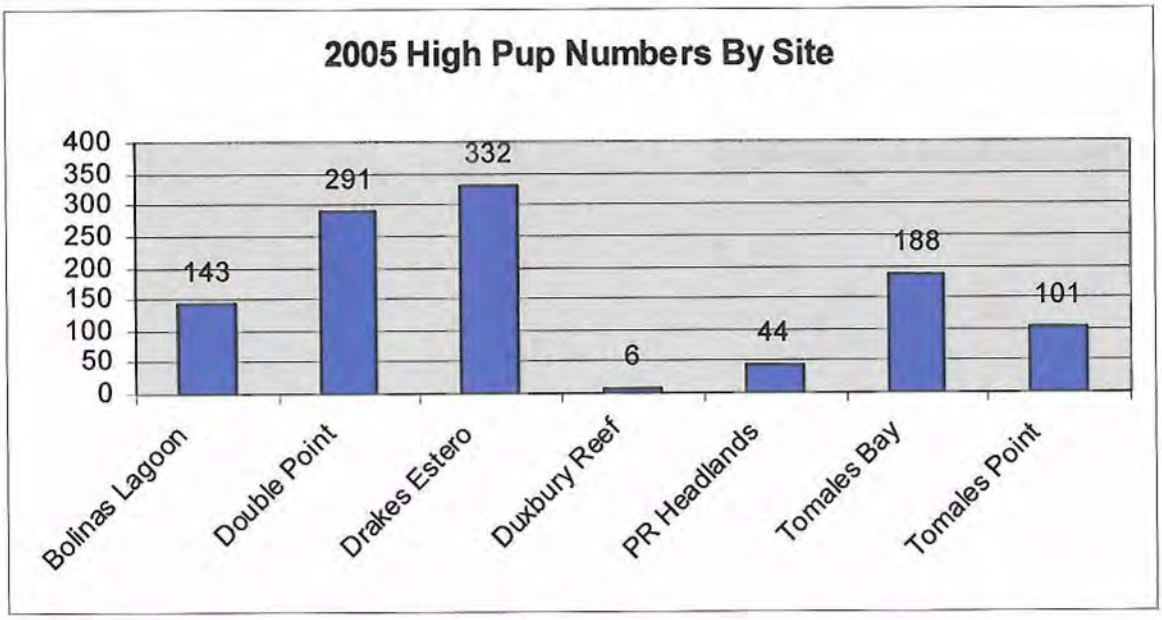


Figure 4. Maximum pup counts by site at Point Reyes, 2002-2005. See text for methods.

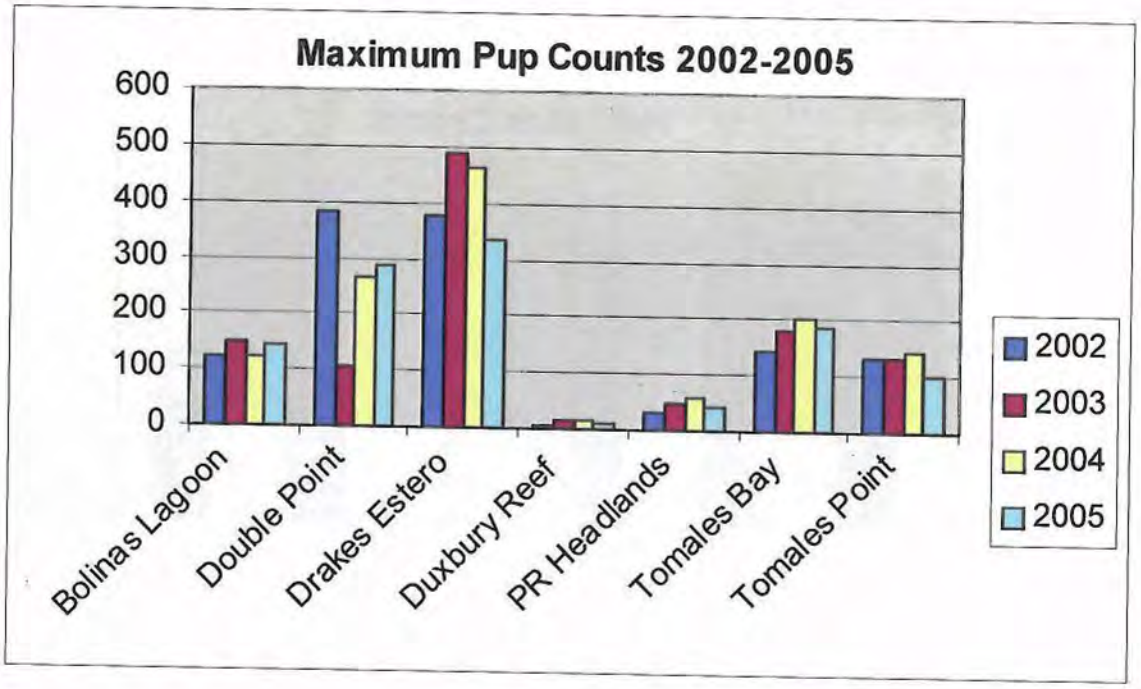


Figure 5. Maximum molt counts for Point Reyes, 1998-2005. See text for methods.

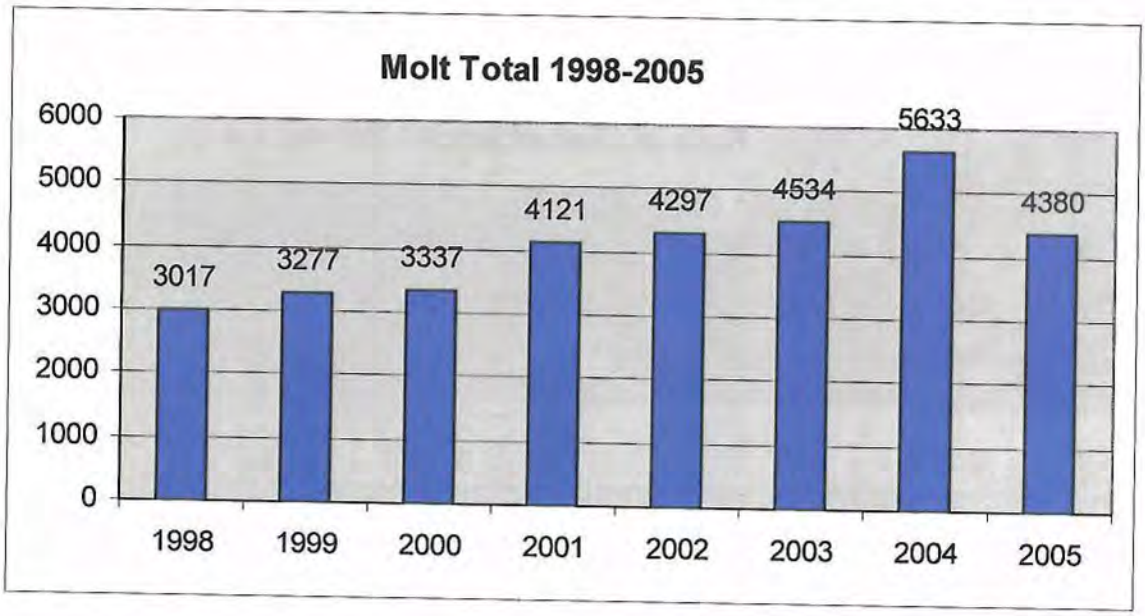


Figure 6. Maximum molt counts for the sites at Point Reyes during the 2005 season. See text for methods.

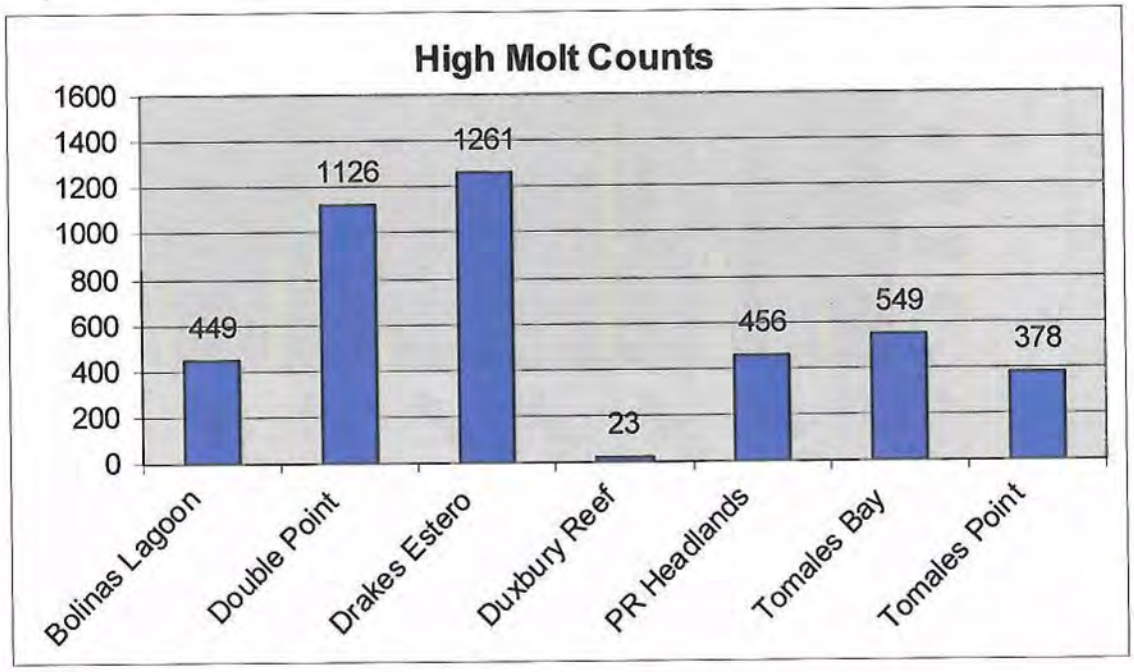


Figure 7. Average number of disturbances per survey, by site at Point Reyes, 2005. See text for methods.

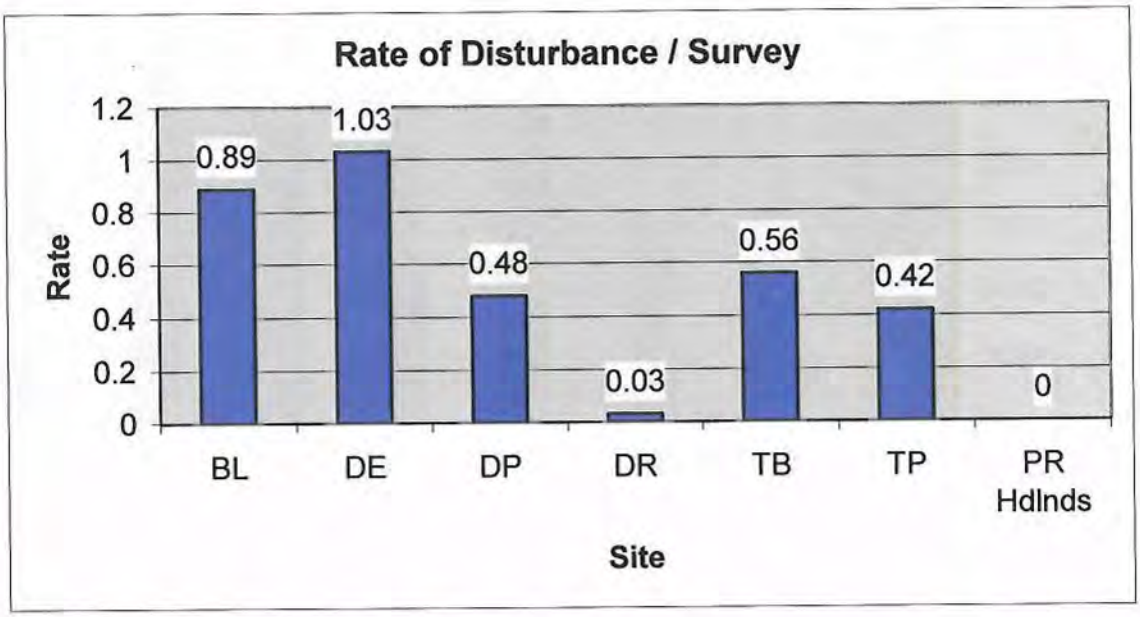


Figure 8. Average number of disturbances per survey, by site at Point Reyes for 2003-2005. See text for methods.

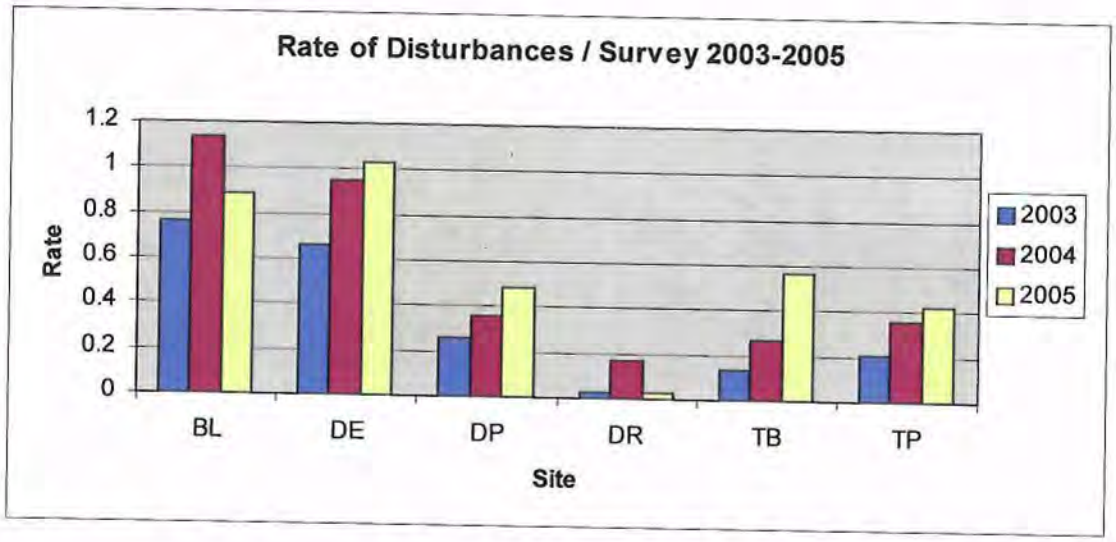
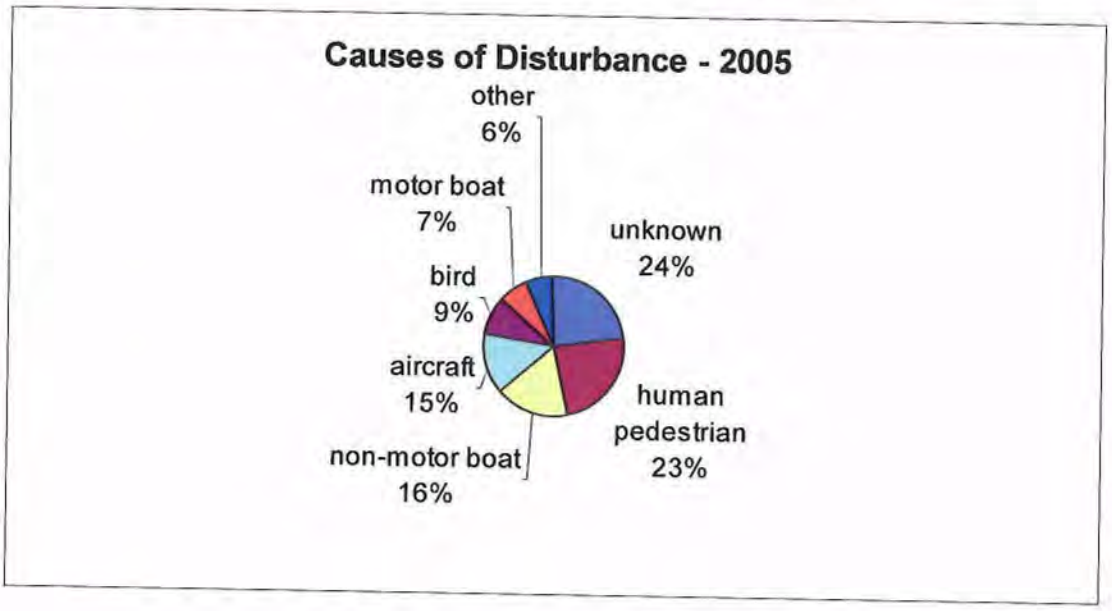


Figure 9. Causes for disturbance by percent for all of Point Reyes sites in 2005.



Harbor Seal Monitoring

San Francisco Bay Area

Annual Report
National Park Service
2006

Prepared by:

Jeannine Manna, Dale Roberts, Dave Press, and Sarah Allen

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In addition, we are grateful to the Park Rangers at Point Reyes for transporting volunteers by boat to sand bars in Tomales Bay, and to Christie and Steve Anastasia, Ben Becker, Bill Merkle, Marcus Koenen, and Dawn Adams for their programmatic support. We are also thankful to Kristen Truchinski for updating the regional survey data. Finally, we are grateful for the generous contributions from the Point Reyes National Seashore Association, the Cox Family Fund, the San Francisco Bay Area Inventory and Monitoring Program, and the Marin Conservation Corps/Americorps Program.

Volunteer training at Double Point.

Introduction

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped in the San Francisco Bay Area, California. Within the San Francisco Bay Area, the population at Point Reyes represents the largest concentration of harbor seals in the State of California, other than the Channel Islands, accounting for 20% of the mainland breeding population (Lowry and Carretta 2003). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999, Allen et al. 2004, Vanderhoof and Allen 2005). The objectives of monitoring are to 1) detect changes in population numbers, 2) detect changes in reproductive success, and 3) identify anthropogenic or environmental factors that might affect population status and trends. The monitoring objectives and protocol are described in detail in Hester et al. (draft protocol). The information presented here is a summary of the data collected in Point Reyes National Seashore and Golden Gate National Recreation Area during the 2006 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort including adjacent areas, (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in conjunction with other agencies and organizations for 2006, are also presented.

Methods

Study Area

The study area extends from Tomales Point south to San Francisco Bay. The Point Reyes peninsula extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N) and is referred collectively as the Point Reyes sites. Point Bonita, in the Marin Headlands, is the southern most seal haul out site within the study area and is located at the mouth of San Francisco Bay in Golden Gate National Recreation Area. Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, Bolinas Lagoon, and San Francisco Bay. The Point Reyes National Seashore (PORE), Golden Gate National Recreation Area (GOGA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline.

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). Coastal locations regularly surveyed included Tomales Point, Point Reyes Headland, Duxbury Reef, Double Point, and Point Bonita; estuarine locations surveyed included Tomales Bay, Drakes and Limantour Esteros, and Bolinas Lagoon (Figure 1).

Regional survey sites included colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark's Slough), Sonoma County (Sea Ranch, South Sonoma sites, Fort Ross, and Jenner) and San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach (Figure 1).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons, which run from March 1st to May 30th and June 1st to July 31st, respectively.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during two in-class sessions and four field sessions. Many of the volunteers were previously trained and seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each Point Reyes site a minimum of once per week, twice during the peak of the breeding and molting seasons, weather and logistics permitting. Point Bonita was also surveyed according to the same schedule. The Point Reyes Headland and the regional survey sites were surveyed once every two weeks on concurrent weekends. Surveys occurred primarily during low to medium tides, the time when the maximum numbers of seals haul out in the San Francisco Bay region (Fancher 1979, Allen et al. 1982).

Harbor seals at Tomales Bay.

Survey periods were designed to last approximately two hours, with counts occurring at half-hour intervals, depending on location. Each sub-site was surveyed separately, and then summed to give a total for the site at each time interval. All sub-sites were visible from one location with the exception of Tomales Point and Bolinas Lagoon. For each of these sites, each sub-site was counted from two to four times per survey, due to driving or hiking distance between the sub-sites.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two age classes were lumped together. Pups were the young of the year and after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only between March and June 1. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

All actual and potential disturbances to harbor seals were recorded during surveys from the period of March 1st to July 31st. The total number of surveys where disturbances were recorded was 221 (Table 1). Observers recorded the time and the source of the disturbance. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water, or unknown. In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time when the seals rehauled was also recorded. In some cases, an unknown disturbance and unknown response was recorded if the disturbance occurred before the survey had started, and so the nature and extent of the disturbance was not directly observed. The rate of disturbances was calculated based on the number of disturbances per survey period (survey period was usually 2 hours but may have varied by ½ hour). In future reports, disturbance rate will be calculated based on the number of disturbances per survey hour, in order to compare to other disturbance studies.

Regional surveys occurred every two weeks March through July on weekends, Friday – Sunday that had low tides around mid-day. All of the PORE and GOGA sites, as well as the San Francisco Bay and Sonoma sites, were surveyed during these weekends. Participants in the region-wide surveys included the GFNMS and FMSA, San Francisco State University, US Fish and Wildlife Service, Stewards of Slavianka, a non-profit conservation group based in Sonoma County, the Marine Mammal Center and Fitzgerald Marine Reserve.

Results and Discussion

Overall

In 2006, volunteers completed 221 surveys at sites in Marin County at PORE and GOGA between March 1st and July 31st. The combined maximum pup count total for all sites during the breeding season was 1,056 pups (Table 1). The maximum pup count total for just PORE sites, excluding Point Bonita pup numbers in order to compare to previous years, was 1,042 (Table 2). The 2006 pup count is only 6% lower than 2005. Pup numbers appeared to decrease since 2004, and 2006 was the lowest pup count recorded since 1998; however, we did not test for statistical significance (Figure 2). Drakes Estero and Double Point continue to show the highest numbers of pups, together producing 56% of the pups seen for 2006 at PORE and GOGA (Table 1; Figure 3).

The first pup observed in 2006 was on March 9 compared to March 6 in 2005. There is no apparent trend in the date of first pup observed between 2000 and 2006 or in location (Table 4).

The decline in the overall number of pups produced in 2006 compared to the previous five years may be related to changes in marine conditions. Upwelling was much reduced in 2006 and similar to 2005, resulting in reduced krill, which in turn may have affected food availability for harbor seals.

Many, but not all, haul out sites experienced a decline in pup numbers. Pup numbers at Tomales Bay decreased 43% compared to 2005 and were much lower when compared to the mean over the past 4 years. The maximum pup count for Tomales Bay in 2006 fell well below the range of one standard deviation from the five-year mean (Figure 5). Bolinas Lagoon and Drakes Estero, though, both had an increase in pup numbers in 2006, most likely resulting from the decrease in pups at Double Point. Similar fluctuations between these sites have been seen in previous years, such as in 2003 when a northern elephant seal (*Mirounga angustirostris*) disrupted the colony at Double Point resulting in an increase in the number of pups at Drakes Estero and Bolinas Lagoon (Figure 4).

The maximum total count of all seals during the molt season for all sites at PORE and GOGA was 4,709 seals (Table 1). For just PORE sites, the maximum count was 4,560. This count is 6% higher than in 2005 (Table 2). The 2006 molt count total was the highest in the past nine years except for in 2004 when the count was 5,633 (Figure 6). Seals from Drakes Estero and Double Point accounted for 49% of the maximum molt count for PORE and GOGA combined (Table 1; Figure 7).

At PORE, surveyors recorded 135 disturbances between March 1st and July 31st. 120 of these were actual disturbances (disturbances that resulted in a seal response), while 15 were potential disturbances (4% of all disturbances). Of these potential disturbances, 47% (7) were human, 20% (3) were clammers, 20% (3) were motorboats, and 13%(2) were barking dogs. The average rate of actual disturbances per survey in 2006 for PORE sites was 0.76 disturbances per survey. This can be compared to 0.54 disturbances per survey in 2005. Tomales Bay and Tomales Point colonies had the most significant increase in disturbances when compared to previous years (Figure 9). Bolinas Lagoon had the highest rate of disturbance (1.3 disturbances per survey), followed by Tomales

Bay (1.2 disturbances per survey; Figure 8). In 2005, Drakes Estero had the highest rate of disturbance, 1.03 disturbances per survey (Figure 9). Forty-three percent (52) of all disturbances in 2006 resulted in seals flushing into the water.

Twenty-one percent of the actual disturbances in 2006 were caused by humans (Figure 10). Other identifiable disturbances were from non-motorboats (13%), motor boats (11%), and birds (10%). Nineteen percent of disturbances were from unknown sources. These percentages were similar to disturbance data collected from 2002-2005. There was an increase in 2006 in disturbances from motorboats and vehicles and a decrease in disturbances from aircrafts compared to 2005. This decrease is related to a decline in disturbances from "ultralights," low flying aircrafts, in 2006. No aircraft disturbances from 2006 were from "ultralights." Sources of disturbance that produced an increase in the "other" category included construction noise at a residence near Bolinas Lagoon and coyotes on the sandbars at Drakes Estero (Table 3).

There were no observed major mortality events in 2006. Pup numbers declined at Double Point after rebounding from a northern elephant seal disturbance in 2002-2003. The decline in numbers at Double Point mid-season were not explained from field surveys; however, law enforcement rangers reported that a person was rescued by helicopter adjacent to Double Point during the time that the seal numbers declined. Tomales Bay and Bolinas Lagoon pup numbers were the only sites found to have maximum counts significantly different then their average range when compared to the past 5 years.

Two harbor seals pups were picked up by park visitors at Point Reyes in 2006, mistaking the pups for being abandoned. Both pups were picked up from McClurres Beach, one on 4/13/06 and the other on 4/19/06. The pups were taken to the Marine Mammal Center for care. The Marine Mammal Center also released 3 harbor seal pups at Point Reyes at Chimney Rock, one on 7/1/06 and 2 on 6/03/06.

Pup nursing at Point Reyes.

Summary by site

Bolinas Lagoon

29 surveys were completed at Bolinas Lagoon between March 1st and July 31st. Bolinas Lagoon had a high pup count of 174 the week of May 8th, and a peak molt count of 448 the week of July 10th (Table 1). Due to Bolinas Lagoon's close proximity to a highway, the seals are very exposed to humans and traffic and had the highest rate of disturbance this year, 1.3 disturbances per survey (Figure 8). Forty-six percent (17) of disturbances were caused by humans. On more than one occasion, humans were seen walking on the mudflats where seals haul out and one time four children were seen running along the mudflats chasing seals into the water. Twenty-two percent (8) of disturbances were caused by birds. Two of these were from large flocks of Brown Pelicans (*Pelecanus occidentalis*). Bolinas Lagoon had a maximum Brown Pelican count of 1,350 in 2006 which is more than double the number seen in 2005 when the max count was 553. Sixteen percent of disturbances were from vehicles, all being motorcycles. There was construction going on at a nearby residence causing a few of the disturbances early in the season. Although this site had the highest level of disturbance, maximum pup and molt counts did not seem to be affected.

Double Point

30 surveys were completed at Double Point between March 1st and July 31st. Double Point had a high pup count of 247 the week of April 17th, and a peak molt count of 1,086 the week of July 3rd (Table 1). Double Point had one of the lowest disturbance rates, 0.33 disturbances per survey (Figure 8). The remoteness of this site coupled with being surrounded by high cliffs reduces the exposure to human disturbances and may prevent surveyors from identifying the natural sources for disturbance. 40% of the disturbances were from unknown causes and the other few were from aircrafts and motorboats far offshore. The peak pup count in 2006 is one week earlier than all previous years at Double Point, and likely the colony experienced a major disturbance related to a helicopter rescue at the fourth week of April, resulting in seals moving to Bolinas Lagoon (which was much higher in 2006) and Drakes Estero. Unfortunately, no observers were present to document the likely disturbance.

Drakes Estero

33 surveys were completed at Drakes Estero between March 1st and July 31st. Drakes Estero had a high pup count of 347 the week of May 1st, and a peak molt count of 1,228 the week of July 3rd (Table 1). Drakes Estero had the highest pup and molt numbers, and one of the highest levels of disturbance, 0.97 disturbances per survey (Figure 8). Park regulations allow kayaks and canoes back in Drakes Estero after July 1st. After that date 50% of disturbances were a result of these non-motorboats. Prior to July 1st most disturbances were of unknown cause, 47%. Surveyors documented a bobcat and a coyote disturbing seals on sandbars in Drakes Estero. Other sources included low flying large birds such as turkey vultures, hikers and clam diggers on Limantour and Drakes Beaches, and kayaks after July at the end of the seasonal closure.

Duxbury Reef

25 surveys were completed at Duxbury Reef between March 1st and July 31st. Duxbury Reef had a high pup count of 17 the week of May 15th, and a peak molt count of 75 the

week of July 24th (Table 1). Duxbury Reef had one of the lowest rates of disturbance, 0.12 disturbances per survey (Figure 8). The only recorded disturbance that resulted in seals flushing into the water was when two dogs ran out to the haul out site chasing all the seals into the water.

Point Bonita

44 surveys were conducted at Point Bonita. Point Bonita was added to the study area in 2005. The high pup count was14 which is much higher than the previous year's data and the maximum molt count was 149 (Tables 1). Disturbance data was compiled at GOGA and will be analyzed in future reports.

Point Reyes Headland

17 surveys were completed at Point Reyes Headland (PRH) between March 1st and July 31st. PRH had a high pup count of 44 the week of May 8th and a peak molt count of 462 the week of July 17th (Table 1). PRH had the lowest rate of disturbance, 0.06 with only one disturbance recorded, the source of which was a researcher (Figure 8). This haul out site is a primary colony for northern elephant seals. The peak count for northern elephant seals between March 1st and July 31st was 896 the second week of May, which coincides with the peak molt period for elephant seals (PRNS, unpubl. data). The headland is often enshrouded in fog, and consequently, surveys are limited.

Tomales Bay

22 surveys were completed at Tomales Bay (TB) between March 1st and July 31st. Tomales Bay had a high pup count of 108 during the week of May 1st, and a peak molt count of 681 the week of July 17th (Table 1). The disturbance rate doubled in the past year from 0.6 disturbances per survey in 2005 to 1.2 disturbances per survey in 2006 which is significantly greater than the average range of disturbances over the past 4 years (Figure 8; Figure 9). This site also had a significant decrease in pup numbers as well (Figure 5). 38% of disturbances were from motorboats, and represents the most motorboat incidences seen over the season. 23% of the disturbances were from non-motorboats. Other disturbance sources include clammers, aircrafts, and birds.

Tomales Point

21 surveys were completed at Tomales Point (TP) between March 1st and July 31st. Tomales Point had a high pup count of 105 the week of April 17th, and a peak molt count of 580 the week of July 5th (Table 1). The disturbance rate was 0.62 disturbances per survey (Figure 8). 54% of these disturbances were caused by humans, either hikers on the beach or abalone divers. The rate of disturbance continues to increase at Tomales Point, this year being significantly higher than the average range of previous years (Figure 9). The point is often enshrouded in fog, and consequently, surveys are limited.

Regional Sites

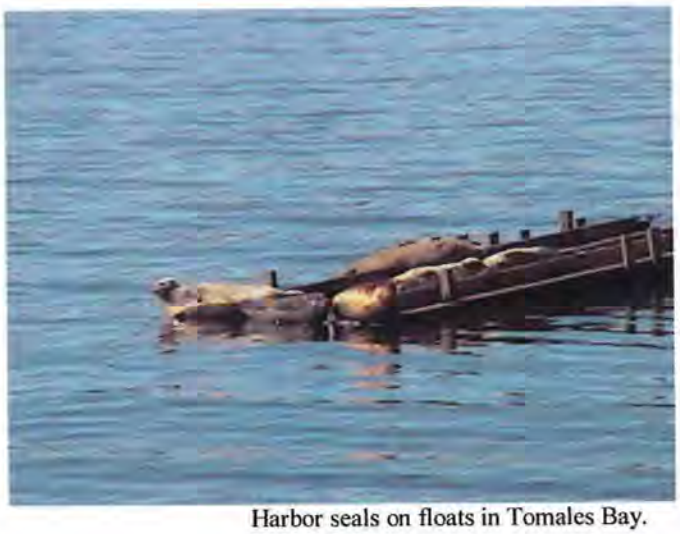
Twelve regional surveys were completed, starting on March 4, and ending July 29, at 22 locations. The seasonal peak for pups was during the week of May 6 and the peak for molting seals was during the week of July 15. The maximum number of seals during the breeding season was 5,101 and the average was 3209.2. The maximum number of seals during the molt was 5,285, with an average of 4,152.8 (Table 5). Point Reyes had the highest concentration of seals with Double Point and Drakes Estero accounting for 35%

of adults during the breeding season, 46% of pups produced, and 37% of molting seals. The maximum count of pups was 1,157 and the first pups were identified at Double Point on March 4th. Of the 22 areas surveyed simultaneously, only 3 produced >100 pups (Tomales Point, Drakes Estero, and Double Point). Within San Francisco Bay, Castro Rocks accounted for the majority of seals, followed by Mowry Slough, a reversal of last year's surveys. Sonoma County coast haul out sites were composed of a number of small sites with larger concentrations at Sea Ranch and Jenner. San Mateo County coast sites were also composed of a number of small sites adding up to larger concentrations at Pebble Beach and Fitzgerald Marine Reserve. No seals were counted during surveys at Bean Hollow during the entire season. Cowell Ranch Beach and Fitzgerald Marine Reserve accounted for most of the seals counted in the county, but few pups were recorded there (45).

Disturbances during surveys ranged from a male northern elephant seal attacking harbor seals at Jenner to people on foot, tide pooling at Point Bonita. Seals at Double Point were disturbed by a helicopter during a cliff rescue of a park visitor, resulting in reduced pupping at this site compared to the previous year. The primary sources for disturbance at San Francisco Bay were loud vehicles on the Richmond San Rafael Bridge at Castro Rocks, aircraft and motor boats at Yerba Buena Island.

Collaboration

Point Reyes National Seashore and Golden Gate National Recreation Area collaborated with multiple government agencies, non-profit organizations and individuals on projects related to the harbor seal population of central California. The parks collaborated with NOAA on a Tomales Bay stewardship program called SEALS. Park rangers ferried docents on boats out onto the mud flats in Tomales Bay to educate visitors and clam diggers about seals twice during the pupping season. The parks also collaborated with the Marine Mammal Center on a study of harbor seal health that will be initiated in 2007 at Tomales and San Francisco Bays.



Harbor seals on floats in Tomales Bay.

Summary

Compared to 2005, the total pup numbers at PORE and GOGA were lower in 2006 and the molt numbers were higher. The numbers for both seasons were comparable to previous years and within the normal range of variation, but the maximum pup count for 2006 was the lowest recorded since 1998. The pup counts at PORE sites appear to be decreasing since 2004; however, we did not test the statistical significance of this decline. The molt counts for 2006 were the highest recorded in the last nine years other than in 2004. The rate of disturbances per survey on the weekends at PORE sites have increased since 2005. Disturbances were site specific; however, humans on foot and boaters remain the two most frequent sources of human related disturbance across all sites.

Harbor seal haul out at Tomales Point

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Table 1. Summary data of harbor seal colonies for the 2006 season. All reported numbers reflect the maximum number seen during a single census over the entire season, March 1 to July 31. Max # Breed = adults, immatures and pups during the breeding season, March 1 to May 31. Max # Molt =all age classes during the molting season, June 1 to July 30. The percent of red seals is a percentage of the maximum total number of seals recorded at each site the day the red seal count was at a maximum. The number of surveys and disturbances are from March 1 to July 31, only disturbances that caused a response were used.

Site	Max # Breed	Max # Pups	Max #Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Bolinas Lagoon	361	174	448	Weekday: 18 Weekend: 11	Weekday: 9 Weekend: 28	14	6 %	4	4
Double Point	579	247	1086	Weekday: 19 Weekend: 11	Weekday: 6 Weekend: 4	5	.6 %	3	3
Drakes Estero	784	347	1228	Weekday: 18 Weekend: 15	Weekday: 22 Weekend: 10	13	1.5 %	3	3
Duxbury Reef	72	17	75	Weekday: 17 Weekend: 8	Weekday: 1 Weekend: 2	0	0 %	0	1
Point Reyes Headlands	129	44	462	Weekday: 15 Weekend: 2	Weekday: 1 Weekend: 0	1	1.4 %	0	1
Tomales Bay	503	108	681	Weekday: 8 Weekend: 14	Weekday: 10 Weekend: 16	12	2.9 %	2	1
Tomales Point	362	105	580	Weekday: 9 Weekend: 12	Weekday: 6 Weekend: 5	5	.9 %	0	1
Point Bonita	114	14	149	Weekday: 34 Weekend: 10	Weekday: 45 Weekend: 7	3	2.5 %	1	0
2006 Total:	**2,904**	**1,056**	**4,709**	**221**	**172**	**53**		**13**	**14**

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Table 2. Summary of survey data for 1997-2006, combining all sites at Point Reyes (excluding Point Bonita for comparison between years). Maximum # of Breed and Molt, and Average # Breed include all age classes. Number of surveys and disturbances are the number completed or recorded from the start of the year (Jan 01 to July 31).

YEAR	Max # Breed	Average Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Disturbances Per Survey
1997	3,268	1,830.50	983	NA	Weekday: 44	Weekday: 9	0.2
		SE = 379			Weekend: 29	Weekend: 37	1.3
		N =4			Total: 73	Total: 46	
1998	2,481	1,744.60	528	3,070	Weekday: 79	Weekday: 24	0.3
		SE = 122.5			Weekend: 64	Weekend: 46	0.7
		N = 8			Total: 143	Total: 70	
1999	3,325	1,779.90	1,068	2,863	Weekday: 139	Weekday: 71	0.5
		SE = 173.5			Weekend: 69	Weekend: 54	0.8
		N = 10			Total: 208	Total: 125	
2000	3,506	2,511.10	1,342	3,108	Weekday: 106	Weekday: 78	0.7
		SE = 224.4			Weekend: 91	Weekend: 116	1.3
		N = 7			Total: 197	Total: 194	
2001	3,485	2,218.80	1,247	3,769	Weekday: 112	Weekday: 57	0.5
		SE = 244.8			Weekend: 119	Weekend: 107	0.9
		N = 4			Total: 231	Total: 164	
2002	4,180	2651.3	1193	4297	Weekday: 123	Weekday: 67	0.5
		SE = 119.7			Weekend: 144	Weekend: 102	0.7
		N = 8			Total: 267	Total: 169	
2003	3820	2280	1117	4534	Weekday: 172	Weekday: 86	0.5
		SE = 303.9			Weekend: 115	Weekend: 83	0.7
		N = 9			Total: 287	Total: 169	
2004	4534	2518.3	1267	5633	Weekday: 161	Weekday: 52	0.3
		SE = 348.6			Weekend: 97	Weekend: 53	0.5
		N = 10			Total: 258	Total: 105	
2005	2,733	2182.3	1,109	4,283	Weekday: 166	Weekday: 80	0.5
		SE = 195.1			Weekend: 78	Weekend: 29	0.4
		N= 11			Total: 244	Total: 109	
2006	2,790	2316.8	1,042	4,560	Weekday: 130	Weekday: 56	0.5
		SE = 225			Weekend: 76	Weekend: 66	0.9
		N= 12			Total: 206	Total: 122	

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Table 3. Causes for disturbance during 2002-2006 for Point Reyes sites; percent is of total actual disturbances from March 1st to July 31st.

Year	Type of Disturbance								
	Motor boat	Non-motor boat	Vehicle	Dog	Aircrafts	Human pedestrian	Bird	Unknown	Other
2002	13%	16%	6%	0.50%	11%	24%	6%	21%	2%
2003	13%	20%	2%	0%	9%	21%	7%	23%	6%
2004	5%	10%	8%	2%	3%	39%	7%	25%	2%
2005	8%	13%	1%	0%	15%	25%	9%	23%	6%
2006	11%	13%	5%	1%	7%	21%	10%	19%	13%

Table 4. Date of first pup by year at Point Reyes, including all sites.

Year	Date
2000	14-Mar
2001	16-Mar
2002	3-Mar
2003	27-Mar
2004	20-Mar
2005	6-Mar
2006	9-Mar

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Table 5. Regional surveys of harbor seals in central California, March 1 through July 31 2006. Twelve surveys were scheduled, 7 during the breeding season and 5 during the molt, but some sites could not be surveyed all dates because of logistics or weather. ND=nod data.

Location	Breeding Season				Molt Season		
	Average	SE	Total* Max	Pup* Max	Average	SE	Total Max
Sonoma County							
Sonoma Coast	140.50	93.96	248	71	239.50	47.59	302
Fort Ross	49.00	28.93	97	14	ND		
Jenner	78.80	62.77	179	30	294.50	174.66	418
Marin County							
Tomales Bay	418.25	64.05	503	88	584.25	97.60	681
Tomales Point	264.13	123.02	462	105	399.00	153.85	540
Point Reyes Headland	85.63	64.39	219	35	363.75	134.74	462
Drakes Estero/Limantour	657.50	240.81	1002	288	850.25	132.70	975
Double Point	506.50	123.05	723	237	680.25	231.76	904
Duxbury Reef	43.25	16.88	73	17	35.75	29.08	75
Bolinas Lagoon	189.50	66.65	286	82	360.00	111.30	448
Point Bonita	46.25	35.50	106	13	77.75	32.44	119
San Francisco Bay							
Alcatraz	4.17	1.94	6	0	1.00	ND	1
Castro Rocks	202.40	94.46	339	37			
YBI	61.50	10.71	81	4	140.33	64.08	190
Newark Slough	18.20	14.70	38	11	2.25	4.50	9
Mowry Slough	112.00	74.38	229	58	124.25	30.70	161
San Mateo County							
Point San Pedro	15.00		15	0	ND		
Cowell Ranch	73.60	27.37	112	20	ND		
Pescadero	28.80	21.99	55	6	ND		
Pebble Beach	59.20	15.59	82	25	ND		
Bean Hollow	0.00	0.00	0	0	ND		
Fitzgerald Marine Reserve	155.00	81.96	246	16	ND		
ALL SITES	3209.17		5101	1157	4152.83		5285

*Based on the total for a single day.

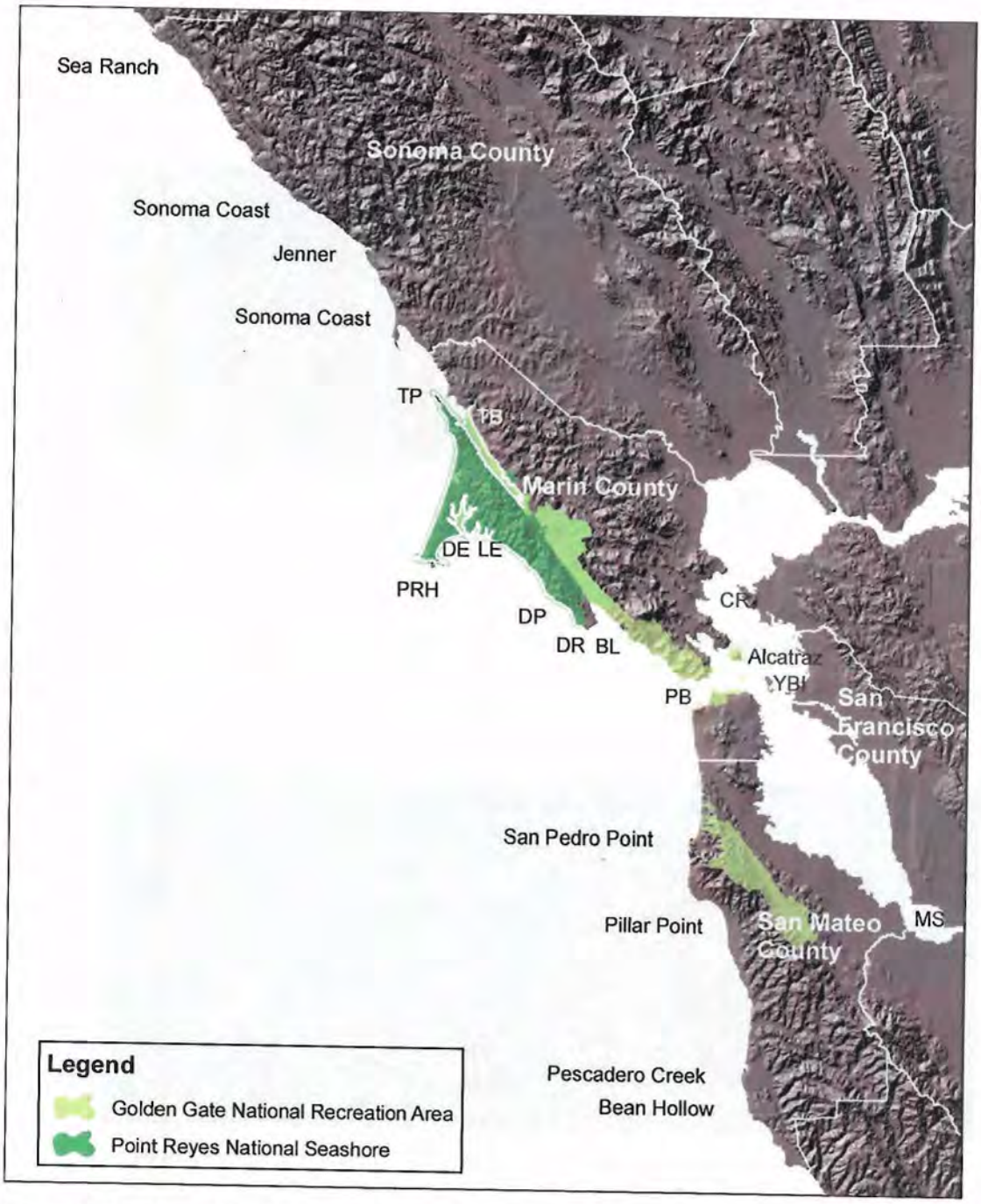


Figure 1. Harbor seal haul out sites in Marin County and San Francisco Bay, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Figure 2. Total Pup Counts at PORE (excluding Point Bonita) from 1997-2006 seasons. See text for methods.

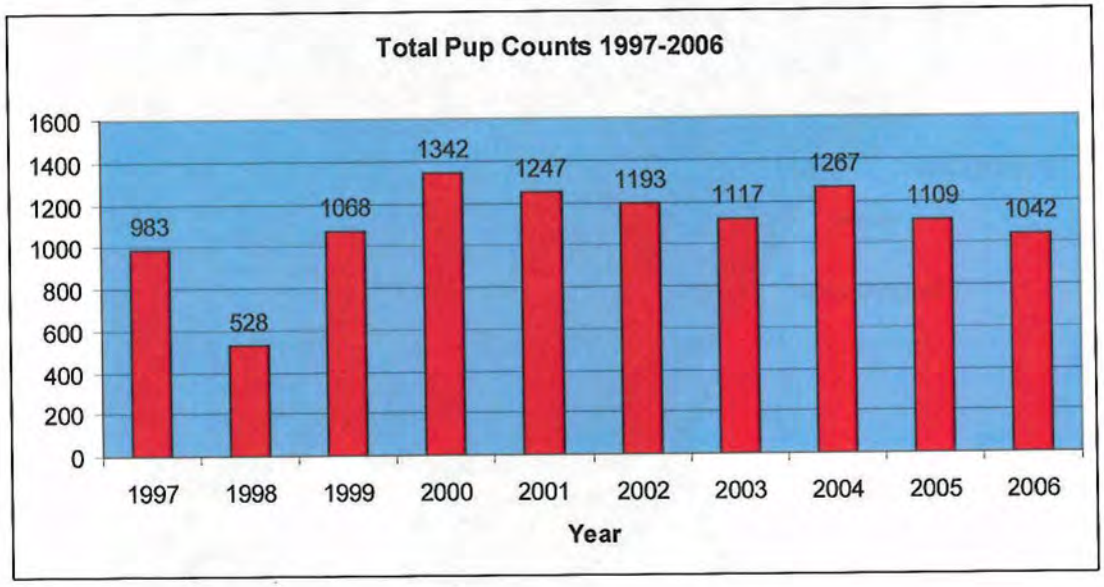


Figure 3. Maximum pup counts by site at PORE and GOGA during the 2006 season. See text for methods.

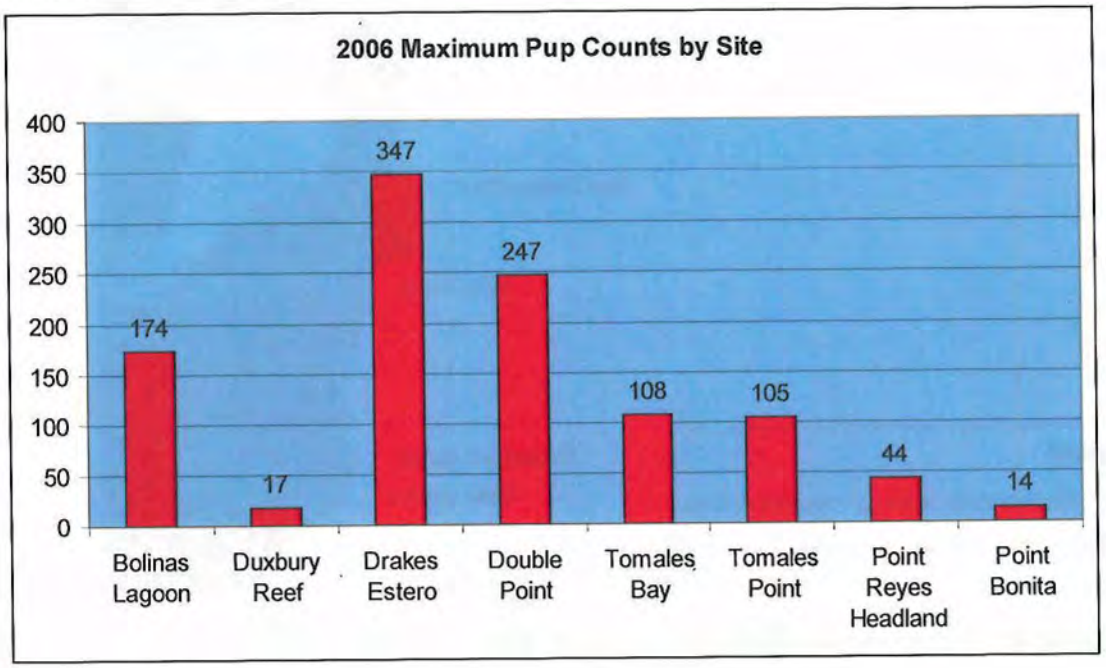


Figure 4. Maximum pup counts by site at PORE, 2002-2006 seasons. See text for methods.

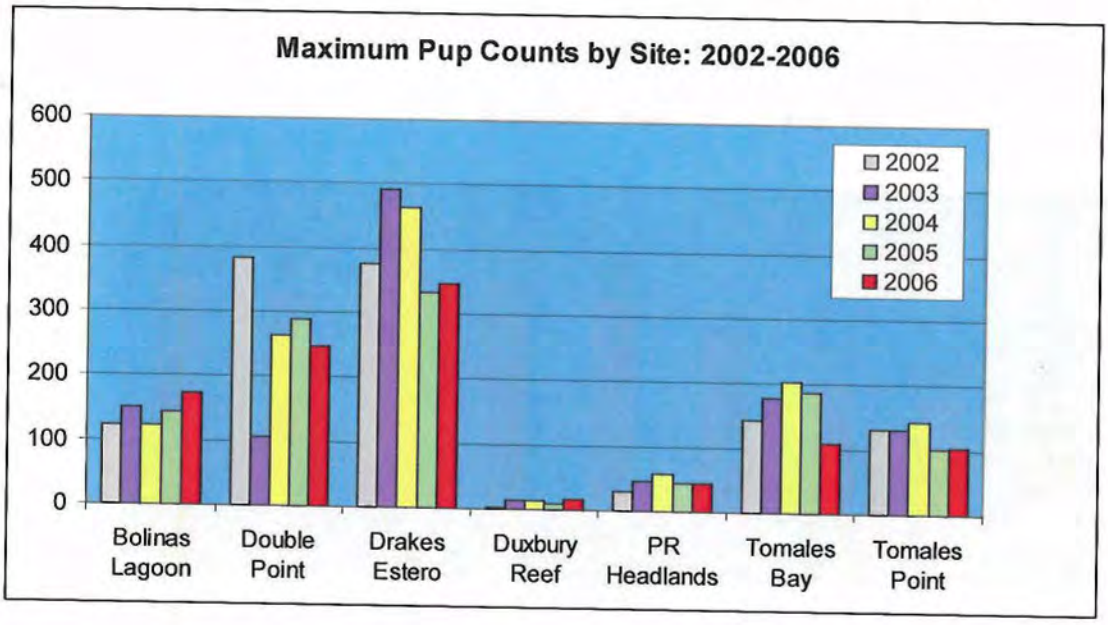


Figure 5. Maximum pup counts for Tomales Bay 2002-2006 showing a range of (mean ± one standard deviation). See text for methods.

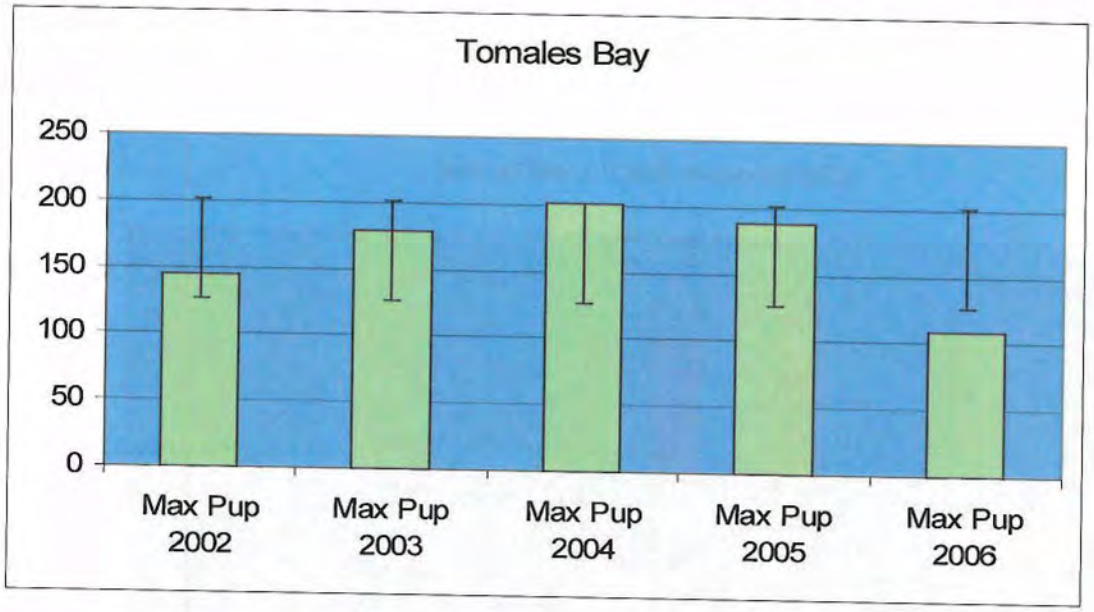


Figure 6. Total molt counts for PORE (excluding Point Bonita) from 1998-2006 seasons. See text for methods.

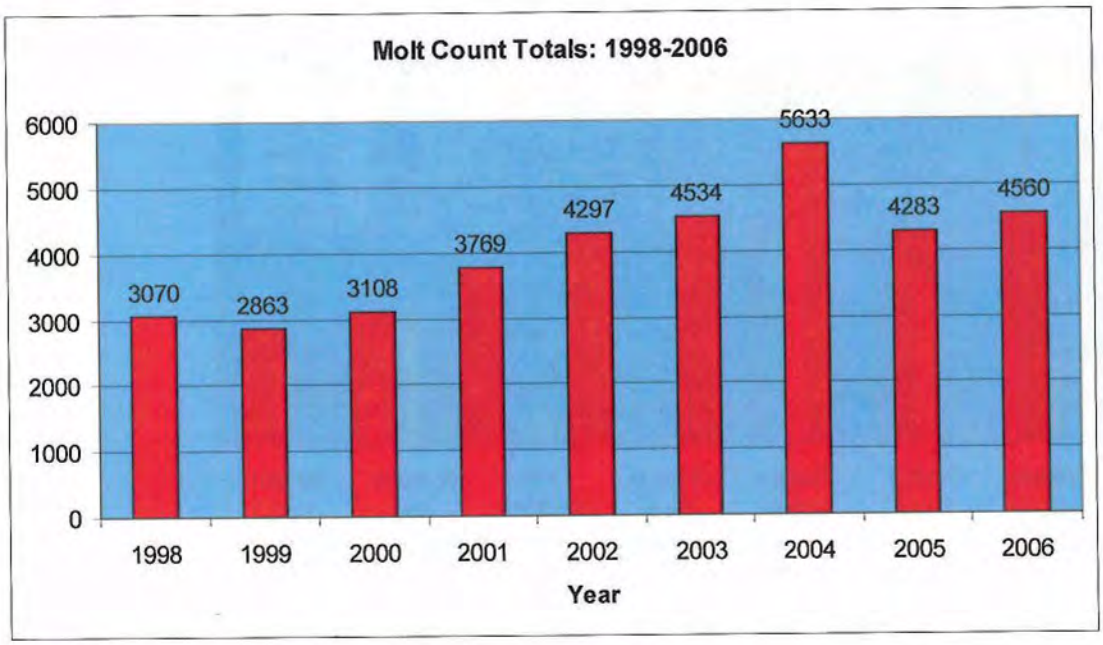


Figure 7. Maximum molt counts by site for PORE and GOGA during the 2006 season. See text for methods.

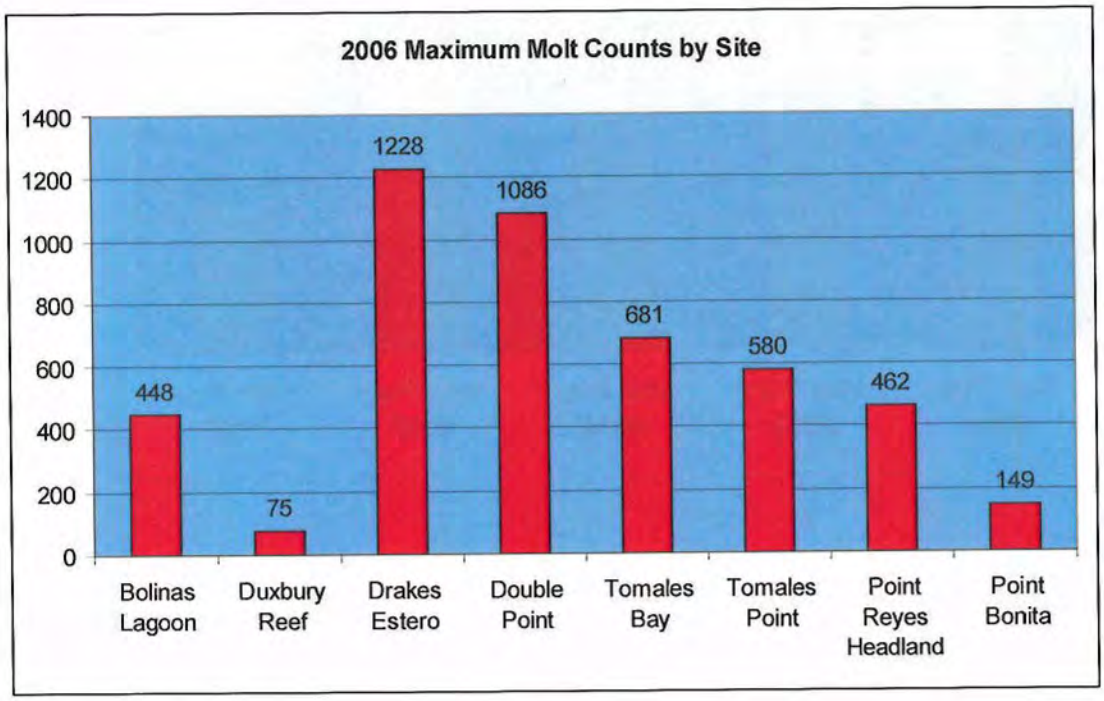


Figure 8. Average number of disturbances per survey, by site at Point Reyes, 2006. See text for methods.

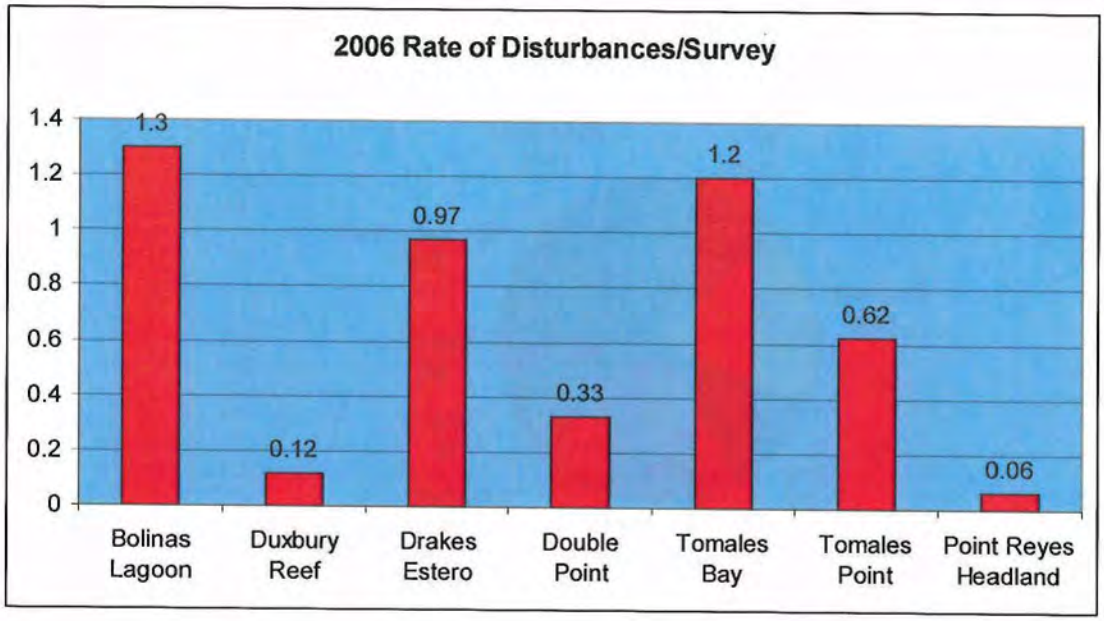


Figure 9. Average number of disturbances per survey, by site at Point Reyes for 2003-2006. See text for methods.

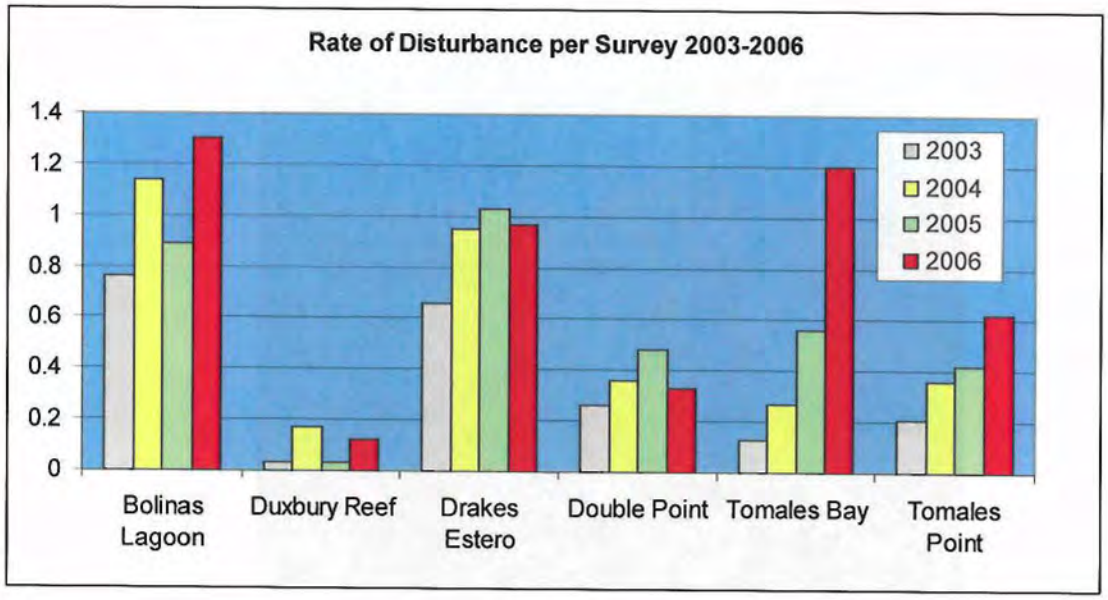
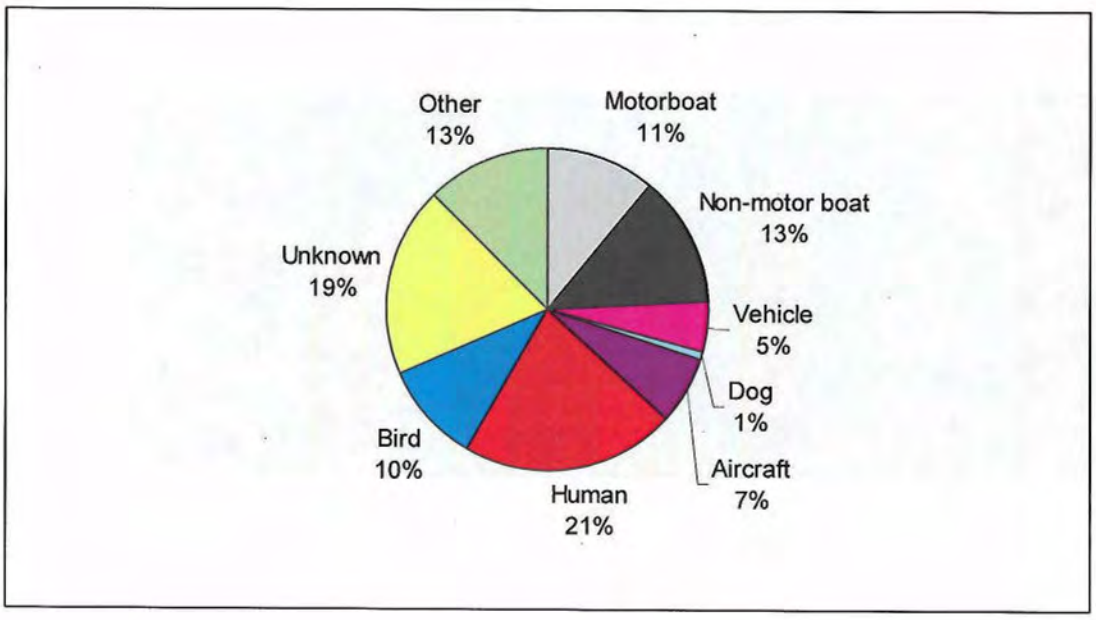
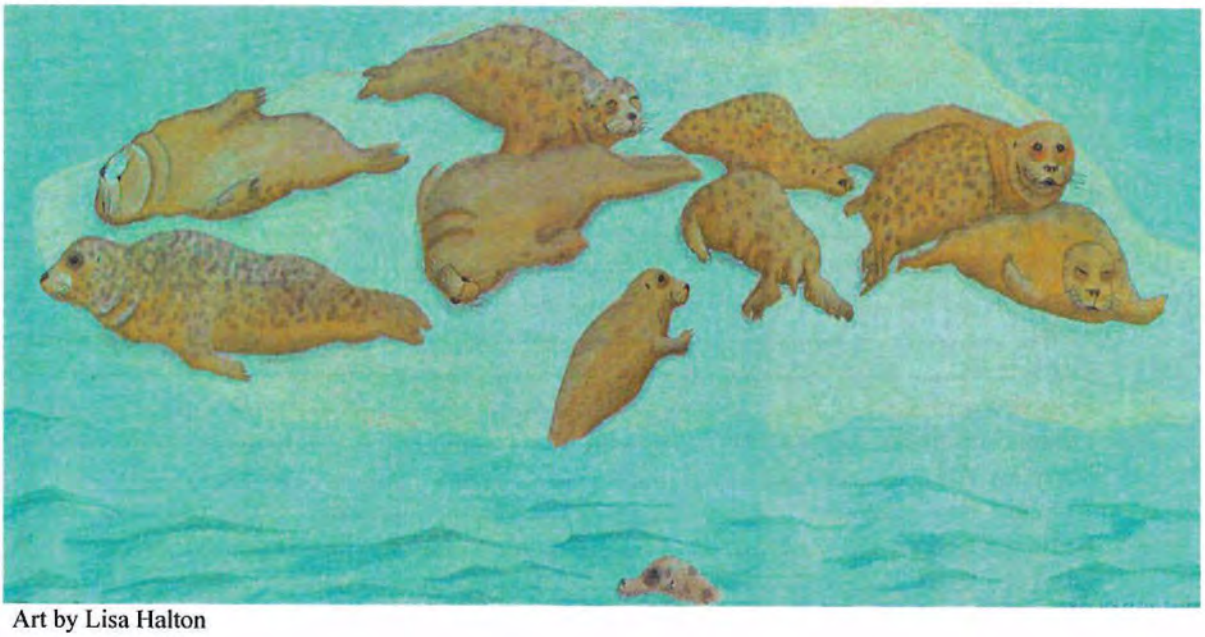


Figure 10. Causes for disturbance by percent for all of Point Reyes sites in 2006.



Volunteer training at Drakes Estero.



Art by Lisa Halton

LONG-TERM MONITORING OF HARBOR SEALS AT POINT REYES, CALIFORNIA

5-YEAR ANNUAL REPORT 1997-2001

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Point Reyes National Seashore

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Introduction

Harbor seals are the dominant and only resident pinniped at Point Reyes, California. The Point Reyes population also represents the largest concentration of harbor seals in the State of California other than the Channel Islands, accounting for 20% of the mainland breeding population (Sydeman and Allen 1999). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent habitat for seals to rest, molt and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999) in order to 1) detect changes in population numbers, 2) detect changes in reproductive success and 3) identify anthropogenic or environmental factors that might affect population status. In the past, significant increases in the population of harbor seals at Point Reyes have been documented at most colonies, except at Tomales Bay where there was substantial human activity (Allen et al. 1989, Allen and King 1993) and at Point Reyes Headland where northern elephant seals are expanding (Sydeman and Allen 1999).

The information presented here is an update on the status and trend of the harbor seal population at Point Reyes. It represents a five-year summary of data collected prior to, during and three years following the 1998 El Nino Southern Oscillation (ENSO) event. We have also included two years of information from adjacent areas (San Francisco Bay and Sonoma County) where surveys were conducted in conjunction with other agencies and organizations as part of a region-wide survey effort.

Methods

Study Area

The Point Reyes coastline extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N). Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PRNS), Golden Gate National Recreation Area (GGNRA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game and the California Water Resources Control Board as Areas of Special Biological Significance because of their unique biological attributes and now reclassified as State Water Quality Protection Areas in 2003 (Chan 1979; SWQPA).

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987).

Coastal locations include Tomales Point, Point Reyes Headland, and Double Point; estuarine locations include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon (Figure 1a).

Because of its agricultural character, much of this coastline has remained largely undeveloped, even prior to inclusion in the 1960's and 70's in PRNS and GGNRA. The inaccessibility of much of the area has historically afforded protection from human disruption during the seals' terrestrial resting periods; however, prior to the Marine Mammal Protection Act (MMPA) of 1972, harbor seals at Point Reyes were commonly hunted by fishermen and ranchers (S. Allen, pers. comm.). After passage of the MMPA, the colonies at Point Reyes grew significantly (Allen et al. 1989). Currently, human disturbances may be on the rise with increased recreational use of public lands. From 1997-2000 PRNS alone recorded close to 2.4 million visitors annually (Monthly Statistical Report, PRNS, 2000).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons of 1997-2001, which respectively run from 15 March to 15 June and 15 June to 15 July. Regular survey sites included Double Point, Drakes Estero and Limantour Estero, Tomales Point (2 sites), Tomales Bay (3 sites), Point Reyes Headland, and Bolinas Lagoon. Duxbury Reef was added to the survey area in 1999.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during one in-class session and four field sessions. Many of the volunteers were seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each site a minimum of twice per week, weather and logistics permitting. Surveys occurred primarily during low to medium tides, the time when the maximum number of seals hauled out in the San Francisco Bay region (Allen 1980, Fancher 1979, Risebrough 1978).

Survey periods were designed to last at least two hours, with counts occurring every half-hour. Each sub-site was surveyed separately, and added to other sub-sites making a grand total for the site. All sub-sites were visible from one location with the exception of Tomales Point and Tomales Bay. The Tomales Point and Tomales Bay sub-sites were a considerable distance from each other, and were usually counted twice during a survey.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two groups were lumped together. Pups were the young of the year and difficult to distinguish after weaning from yearling seals. Consequently, pup numbers were reliable only between the first day of March and June. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

Data are presented as maximum for the seasons, both breeding and molt. Summary statistics, including means and standard errors, are also provided for the breeding season 1997-2001 and the molt season 2000-2001.

All actual and potential disturbances to harbor seals were recorded. Actual disturbance was defined as any activity that resulted in behavior change by the seals such as moving towards or entering the water. Potential disturbance was defined as an activity that occurred within a ¼ mile area that had the potential to alter the behavior of the seals. For example, a plane flying below 1000 feet had the potential to disturb seals. Observers recorded the time, source of the disturbance, and the distance of the source from the seals. Distance measurement was not estimated consistently between sites or observers, and consequently was dropped from analyses. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water or unknown (Allen et al. 1985). In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time and location of where the seals rehauled were also recorded. In some cases, an unknown response was recorded if the disturbance occurred before the survey was started, and so the extent of the disturbance was not directly observed. An example would be a tight group of seals seen in the water off the haul out site and many fresh seal tracks on the haul out site.

Surveys in 1998 and 1999 incorporated seal numbers from a larger scale harbor seal census for the San Francisco Bay area and adjacent waters. Other regional haul out sites were Jenner, the Sonoma coastline, Sea Ranch, the San Mateo coastline, South Bean Hollow, the Fitzgerald Marine Reserve, the Richmond Bridge, Yerba Buena Island, and Mowry Slough (Figure 1b). Participants in the region-wide survey included the Gulf of the Farallones National Marine Sanctuary Association, San Francisco State University, and Stewards of Slavianka, a non-profit conservation group based in Sonoma County. Additionally, a region-wide aerial survey was conducted in May 1999 by NPS biologists on an airplane provided by the California Department of Transportation. Photographs (8x10" color prints) were taken of each site, and biologists from San Francisco State University counted seals from photographs.

Results

Overview

The population trend in harbor seals at Point Reyes appears stable between 1997 and 2001. Annual maximum counts for the breeding season ranged between 2,481 and 3,506, and annual average counts ranged from 1,744.6 and 2,511.1 (range of SE = 122.5 to 379.0; Table 1a-g). The lower numbers for maximum totals and annual averages were associated with the 1998 ENSO. The difference in the adult/immature population of harbor seals, excluding Duxbury Reef, was minimal between 1997 and 2001 (Lambda = +0.06) but the difference between the pup numbers was notable (Lambda = +0.27; Table 1a). The maximum numbers of adult/immature seals and pups were higher in 1997 and 2001 than those observed in 1998 (1998 Lambda = -0.46 and 2001 Lambda = +1.36). Pup and adult numbers were lower at all haul out sites in 1998. Maximum counts for the

molt also were reduced during the 1998 ENSO, and also in 1999 but not noteworthy. Similarly, maximum numbers during the breeding and molt seasons were stable by location (Tables 1b-g), except for 1998. The number of surveys in 1997 was insufficient in the molting season to report a maximum count. The number of red seals at Point Reyes is very low compared to San Francisco Bay, representing less than 5% of the population. Of note, though, was the larger number of red-pelaged seals in Drakes Estero, reaching a maximum of 27 in 1999 (Table1e). In general, far fewer red seals were observed at coastal haul out sites than the estuarine ones.

Regardless of year, most disturbances occurred at Drakes and Limantour Esteros, followed by Tomales Bay, and were induced by humans (Table 2a-e). Seal response to disturbance ranged from a simple head alert to flush into the water. By year, the percent of seals flushed into the water combining all sites ranged from 43% to 74% with the highest percentage of flushes occurring in 1997 (Tables 3a-e). The average disturbance per hour, combining all sites, for 2000 was 0.39 (SD = 0.63; n = 197) and for 2001 was 0.38 (SD = 0.94; n = 231; Table 4a-b). The highest number of disturbances per hour occurred at Drakes Estero/Limantour in 2000 (0.83 disturbances/hr) and at Tomales Bay in 2001 (1.3 disturbances/hr). People on foot were the major source for disturbance at Limantour Estero, and motorboats were for Tomales Bay. Motorboats were also a source for disturbance at Double Point due to commercial fishing near the haul out site (Table 2a-e). In general for all sites, seals were more disturbed on weekends (range 0.4-1.3 disturbances per survey) than weekdays (0.1-0.8 disturbances per survey; Table 4a-b). Double Point also had elevated disturbances in 2001 related to an aggressive male northern elephant seal (Table 5b). Bolinas Lagoon seals experienced elevated disturbances in 2001 related to non-motor boats, particularly kayaks (Table 9b).

Double Point

Double Point is a pocket beach marked by two prominent points and includes several subsites. Double Point is a primary pupping site at Point Reyes and numbers of pups and adults/immatures are fairly consistent during the breeding season from year to year. Surveyors counted seals at Double Point from 19 to 52 times per year between 1997-2001 (Table 5a). The highest total number of seals occurred between the last week of April and second week of May (Figure 2), ranging from 708-960. The maximum pup counts consistently occurred during the first week of May (Figure 3) ranging between 187 during 1998 to 416 in 2000. Pup counts in 1998 were nearly half of what occurred in 1997. The maximum counts during the molting season ranged between 677 and 1145 and occurred between early June and mid July (Figure 2); however, there was inconsistent coverage of the site in 1997. Seal numbers were low during the ENSO in 1998 and also during the molt in 1999.

Seals at Double Point usually were disturbed less often than at other haul out sites at Point Reyes, averaging from 0.2-1.0 disturbances per survey between 1997 and 2001 (Table 5a-d). Weekday disturbances were similar to weekend disturbances except in 2000 when disturbances reached 1.4 per weekend survey. The hourly average number of disturbances on weekends was 0.6 (SD=0.7, n=39) in 2000 and 0.3 in 2001 (SD = 0.4, n=13; Table 5d).

Sources for disturbance varied by year at Double Point (Table 5b). Overall, people on foot were the primary known source for disturbances (19%), although unknown sources disturbed seals (29%). Commercial fishing boats have increasingly disturbed seals over the past 3 years (13%) and an aggressive male northern elephant seal was the primary source for disturbance in 2001 (10%). When seals were disturbed at Double Point they were more likely to flush into the water, flushing > 50% of the times disturbed, regardless of year (Table 5c).

Drakes and Limantour Esteros

Drakes and Limantour Esteros consist of a number of tidal sandbars. This location is one of the primary pupping sites at Point Reyes. Seals were surveyed at Drakes and Limantour Esteros from 26 to 45 times per year between 1997-2001 (Table 6a). The highest total number of seals occurred between the first and second week of May (Figure 4). The maximum pup counts consistently occurred between the third week of April and the first week of May (Figure 5). The maximum counts during the molting season ranged between 817 and 1292 and occurred between mid June and mid July (Figure 4).

Seals at Drakes and Limantour Esteros were disturbed more than at any other haul out location at Point Reyes, averaging from 1.0-1.3 disturbances per survey between 1997 and 2001 (Table 6a-d). Weekday disturbances reached as high as 1.5 disturbances per day in 2000 but usually were around 0.9 disturbances per day; this contrasts to the regional maximum of 0.7. The hourly average number of disturbances was 0.8 (SD = 0.4, n = 18) in 2000 and 0.5 in 2001 (SD = 0.7, n = 21; Table 6d).

People on foot were the primary source for disturbance (47%), although unknown sources also disturbed seals (19%), as did birds (12%; Table 6b). Kayaks and motorboats are restricted in Drakes Estero during the breeding season and likely this explains the low rate of disturbance from these sources. When seals were disturbed at Drakes and Limantour Esteros, they were more likely to flush into the water, flushing > 50% of the times disturbed, regardless of year (Table 6c).

Tomales Point

Tomales Point consists of several subsites extending along the shoreline extending to Bird Rock. Tomales Point is one of the more difficult sites to survey because of distance to travel and weather. The area is consistently foggy during the spring and summer. Seals were surveyed at Tomales Point from 9 to 34 times per year between 1997-2001 (Table 7a). There was no consistency between years when the maximum adult/immature count occurred (Figure 6). The maximum pup counts occurred between the third week of April and the third week of May, except in 1997; however, the numbers ranged widely between 74 in 1998 to 194 in 2001 (Figure 7). The wide swing in numbers is likely related to both disturbance and seals shifting between nearby Tomales Bay, which also demonstrated coincidental swings in numbers. Seasonal molt counts are unreliable and spotty due to weather.

Seals at Tomales Point were disturbed moderately compared to other haul out sites at Point Reyes, averaging from 0.2-0.9 disturbances per survey between 1997 and 2001 (Table 7a-d). Weekend and weekday disturbances were more frequent in 2000 and 2001 than earlier years. The hourly average number of disturbances on weekends was 0.3 in 2000 (SD = 0.2, n = 13) and 0.4 in 2001 (SD = 0.4, n = 18; Table 7d).

People on foot were the primary source for disturbance (52%), although sport and commercial motorboats also disturbed seals (19%; Table 7b). Tomales Point is a popular sport abalone fishing area, and the sport-fishing season coincides with the harbor seal pupping season. When seals were disturbed at Tomales Point, the percentage of seals flushing into the water varied by year (Table 7c).

Tomales Bay

Tomales Bay consists of three haul out sites (Seal Island, Clam Island and Hog Island); however, seals infrequently haul out at Hog Island. Tomales Bay was surveyed from 9 to 34 times per year between 1997-2001 (Table 8a). The highest total number of seals occurred between late April and second week of May, ranging from 290 in 1998 to 625 in 1999 (Figure 8). The maximum pup counts ranged widely from year to year, ranging from 34 in 1998 to 190 in 1999; however, coverage of the site was spotty due to logistics and weather (Figure 9). The maximum counts during the molting season were more consistent, ranging between 290 and 347 (Figure 8).

As with Drakes Estero, there were a larger number of red seals than occurred in the outer coastal areas with a maximum of 17 observed in 1999 and 2000 (Table 8a).

Recreational activities in Tomales Bay are numerous, and seal use of Hog Island has declined dramatically over the past 15 years. Nevertheless, disturbances per survey only ranged from 0-1.5 between 1997 and 2001 (Table 8a). Weekend disturbances were higher in 2000 and 2001 than during weekdays. Weekend disturbances were 0.4 disturbances per hour in 2000 (SD = 0.6, n = 13) and 1.3 in 2001 (SD = 2.5, n = 19; Table 8d).

People in motorboats were the primary source for disturbance (52%), although recreational clam diggers also disturbed seals (13%; Table 8b). Up to 1000 people were present at a time digging for clams during low tide cycles on the weekends; however, the NOAA SEALS program reduced disturbance by clam diggers with an onsite education program. The main seal haul out area is near the primary access channel for boats in the bay, and so recreationists are naturally attracted to the seals hauled out. When seals were disturbed at Tomales Bay, they were less likely to flush into the water, flushing < 55% of the times disturbed, regardless of year (Table 8c).

Bolinas Lagoon

The Bolinas Lagoon location consists of several tidal sand bars. Seals were surveyed at Bolinas Lagoon from 3 to 35 times per year between 1997-2001 (Table 9a). The maximum counts at Bolinas were distributed throughout the breeding season in contrast to other colonies, but during the molt season a distinct peak occurred during the first two weeks of July, ranging from 267 to 401 (Figure 10). The maximum pup counts consistently occurred between the first and second week of May, excluding 1997, and ranged from 51 to 123 (Figure11). This colony is the only one that appears to be growing; pup production more than doubled in three years between 1999 and 2001. As with all sites, pup production was down during 1998, and numbers of seals hauled out were also reduced.

Seals at Bolinas Lagoon were disturbed moderately in comparison to other haul out sites at Point Reyes, averaging from 0 to 1.1 disturbances per survey between 1997 and 2001 (Table 9a-d). Weekend and weekday disturbances varied from year to year. The hourly average number of disturbances on weekends was 0.3 (SD = 0.4, n = 9) in 2000 and 0.6 in 2001 (SD = 0.5, n = 18; Tables 9d). The NOAA SEALS program reduced disturbance by recreationists with an onsite education program starting in 1997.

Kayaks were the primary source for disturbance (24%), although unknown sources also disturbed seals (24%), as did birds (18%; Table 9b). When seals were disturbed at Bolinas Lagoon, they were more likely to flush into the water, flushing > 50% of the times disturbed, most years (Table 9c).

Duxbury Reef

Duxbury Reef was added as a survey site in 1999. This site is adjacent to Bolinas Lagoon and often serves as an alternate site to those in the Lagoon. Seals were surveyed from 8 to 32 times between 1999 and 2001 (Tables 10a). Annual maximum ranged from 71 to112 (Figure 12) including from 10 to 20 pups during the breeding season (Figure 13). We had insufficient data during the molt until 2001 when the maximum count was 99 (Figure 12).

Seals were rarely disturbed at Duxbury Reef, likely due to the difficulty of accessing the site except at very low tides. Humans on foot were the primary source for disturbance (88%; Table 10b). During the weekends, disturbances averaged 0.3 per hour (SD = 0.8, n = 7) in 2000 and 0.4 per hour (SD = 1.1, n = 17) in 2001 (Table 10d).

Point Reyes Headland

Point Reyes Headland location consists of a series of pocket beaches that is used also by a large northern elephant seal colony. As with Tomales Point, surveys at Point Reyes Headland were limited due to weather conditions. Annual surveys ranged between 7 and

31 (Tables 11a); several scheduled surveys were canceled on foggy days. Annual maximum counts during the breeding season ranged between 131 and 168 between 1997 and 2001 (Figure 14). Point Reyes Headland is not a significant pupping site, and the maximum pup counts ranged between 24 and 51 (Figure 15). During the molt, seal numbers were much higher, ranging between 276 and 466, because this site is used more by migrating harbor seals (Figure 14; S. Allen, pers. obs.).

Point Reyes Headland is the most remote and least disturbed site at Point Reyes, with annual disturbance days ranging between 0.0 and 0.1, regardless of day of week. The average hourly disturbance rate in 2000 on weekdays was 0.04 (SD=0.1, n=19) and in 2001 on weekends was 0.04 (SD=0.07, n=8, Table 11d).

Motorboats (40%) and planes (40%) were the only sources for disturbance (Table 11b). Nevertheless, seal spatial use of the site has changed significantly over the past 20 years as the northern elephant seal colony has grown.

San Francisco Bay Area Survey

Summary of harbor seal surveys for the San Francisco Bay Area and adjacent waters are summarized in Tables 12a-b. The maximum total harbor seal count during the 1998 breeding season was 2,595 seals on 6 May and the maximum pup count was 485. During the molting season, 3,235 seals were counted on 28 June 1998. The average maximum count for the region, combining both seasons was 2,467.0 (n=5, x=2,467, SD=507.6; Table 12a). In 1999 the highest count for all sites occurred during the aerial survey on May 10 with 3,634, including 876 pups. During the molting season, 3,011 seals were counted on 17 July 1999. The average regional count combining breeding and molt seasons in 1999 was 2,272.2 (n=9, SD=670.8; Table 12b). Three sites (Double Point, Drakes and Limantour Esteros and Tomales Point) accounted for the majority of the total number of seals (69.6%) and pups (79.2%) counted in 1998, but in 1999, Double Point, Drakes and Limantour Esteros and Tomales Bay accounted for the majority of the total count (60%) and of the pup count (62%). This change implied a shift of seals from Tomales Point to Tomales Bay in 1999.

Regional surveys for 2000 through 2001 were summarized in the NOAA annual reports (see Mortenson et al. 2000 and 2001).

Unusual Mortality Event

During the 1997 breeding and molt seasons, biologists and park visitors identified dead adult and immature harbor seals in Point Reyes. Tomales Bay was the first location where a sick adult seal was picked up by the Marine Mammal Center (TMMC, F. Gulland, pers. com.). Reports of dead and dying seals were next recorded at Double Point and Bolinas Lagoon in April and May and then at Drakes/Limantour Esteros and Point Reyes Headland from June through August. The NMFS Stranding Network (Point Reyes National Seashore, unpubl. data) documented a total of 91 dead seals. Of those seals that were identified by sex and age, the majority of seals were adults (79%; AD =

72, SA = 7, PUP = 7, UNK = 5), and of those identified to sex, the majority was males (33%; M = 30, F = 17, UNK = 44). Tissues were collected from several fresh dead or dying seals by the TMMC. A fibrinous hemorrhagic pneumonia with marked bacterial colonization was evident in all of the fresh specimens. The lesions resembled that of acute *Pasteurella* pneumonia in cattle, which is often predisposed by viral infection (L. Lowenstine, U.C. Davis, pers. com.). Nineteen live harbor seals were subsequently captured at Point Reyes Headland and blood was taken for further analyses. Preliminary findings indicate the presence of antibodies to a previously unidentified virus (F. Gulland, pers. com.).

In 2000, another unusual stranding event occurred at Point Reyes, and was investigated by the stranding network including TMMC, Museum of Vertebrate Zoology Berkeley and the National Park Service. The epicenter of this event was Tomales Point haul out sites where around 25 dead seals were found. Tissues, blood and urine were collected from five very fresh specimens. All seals tested negative for biotoxins or morbillivirus. *Pseudomonas* bacteria were found in all specimens, and an unidentified virus was found in one very fresh (<2 hrs dead) specimen. Preliminary evidence indicated that seals died acutely, since blubber layers were normal; lymph nodes were engorged with fluid (F. Gulland, Marine Mammal Center, unpubl. data).

Discussion

Harbor seals in central California represent a significant proportion of the state population. Surveys of harbor seals in the San Francisco Bay Area and adjacent waters in 1998 and 1999 reveal that large numbers of harbor seals are concentrated in north-central California, particularly at Point Reyes. Double Point and Drakes/Limantour Esteros account for more than 50% of total seals in Point Reyes counted during both the breeding and molt seasons. The pups produced at these two sites accounted for more than 55% of the total pups produced at Point Reyes annually. Substantial numbers of seals also haul out in small groups along the Sonoma and San Mateo counties' coastline and in San Francisco Bay.

Surveys conducted at Point Reyes between 1997 and 2001 showed annual differences, likely related to the 1998 El Nino event. However, trends may also reflect increased effort between years as the volunteer monitoring program was fully implemented. In addition, there was not consistent effort between weekend and weekday surveys. This is important in analyzing the disturbance data, since we would expect more disturbances on weekends when recreational use is higher.

Nonetheless, significantly fewer seals were breeding in 1998 than 1997 (-24%). Pup production was also lower, (-46%). Factors potentially influencing the breeding population at Point Reyes between 1997 and 1998 were the harbor seal die off during and after the breeding season of 1997 and the 1998 El Nino event. The 1999 number of seals breeding was substantially higher than that of 1998 but only slightly higher than the 1997 breeding season. Pup production was also elevated from 1998 by 49%, but only by 8% from the 1997 season. El Nino effects were also documented in other pinnipeds in

California in 1998 (DeLong et al. 1999); however, no other unusual stranding event was noted for harbor seals in California in 1998 (J. Cordaro, NMFS, pers. com.).

Although disturbances were recorded at all colonies, Drakes and Limantour Esteros had the highest number of disturbances recorded, regardless of year. Nevertheless, the site remained one of the largest colonies in the region, accounting for 29% of the total number of seals counted in 2001. Humans mostly caused disturbances but the type of disturbance varied by location. Boats were the primary cause for disturbance to seals in Tomales Bay but humans on foot were in Drakes/Limantour Esteros. In 1998 the Lawson Landing barge that transported more than 100 people at a time to dig for clams in Tomales Bay was terminated. The number of seals using the bay increased in 1999 from the 1997 (+18%) and 1998 (+116%) maximum numbers. The Farallones Sanctuary SEALS program had implemented a protection program for the seals to educate the public and divert clam diggers from the resting seals, and likely the combination of reduced usage and education by the SEALS program contributed to the increased presence of seals in Tomales Bay.

The occurrence of the two unusual stranding events within this five-year monitoring period is of particular interest. The only other mass stranding event of harbor seals in California was noted in 1985 at Drakes Estero and Double Point. A virus was also noted as the likely cause for that stranding event (S. Allen, pers. com.). No other stranding event for harbor seals has been documented in California over the past 20 years (J. Cordaro, NMFS, pers. com.).

The long-term monitoring program for harbor seals of Point Reyes has provided important information to guide management. Actions guided by the results of these surveys have included:

1) The initiation of a baseline study of diseases in harbor seals in conjunction with the Marine Mammal Center;
2) Continued annual restriction of kayaks and other watercraft in Drakes Estero during the breeding season March 15 - June 30;
3) A study of the dispersal of weaned pups and the feeding habits of harbor seals at Point Reyes in collaboration with Moss Landing Marine Lab;
4) Proposed delineation of marine protected areas at Point Reyes.

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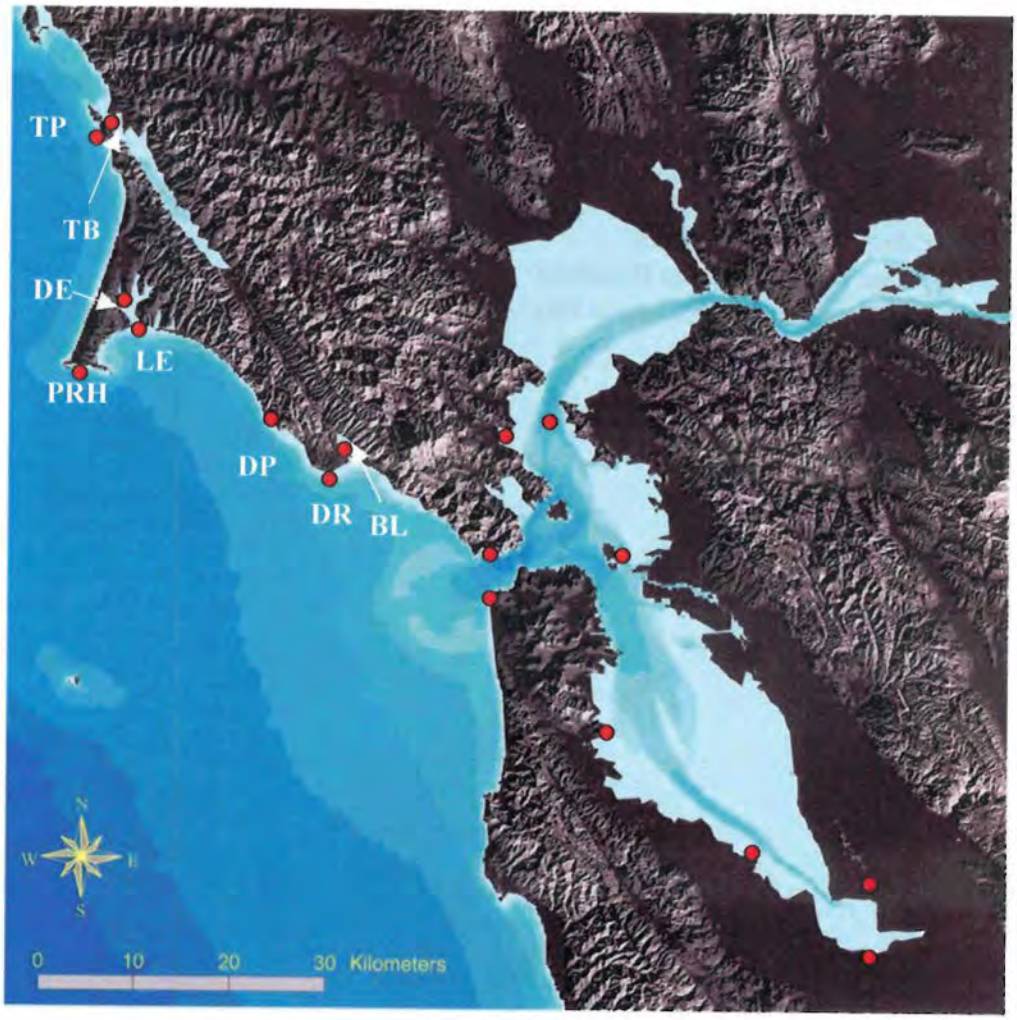

Figure 1a. Harbor seal haul out sites at Point Reyes and adjacent areas.

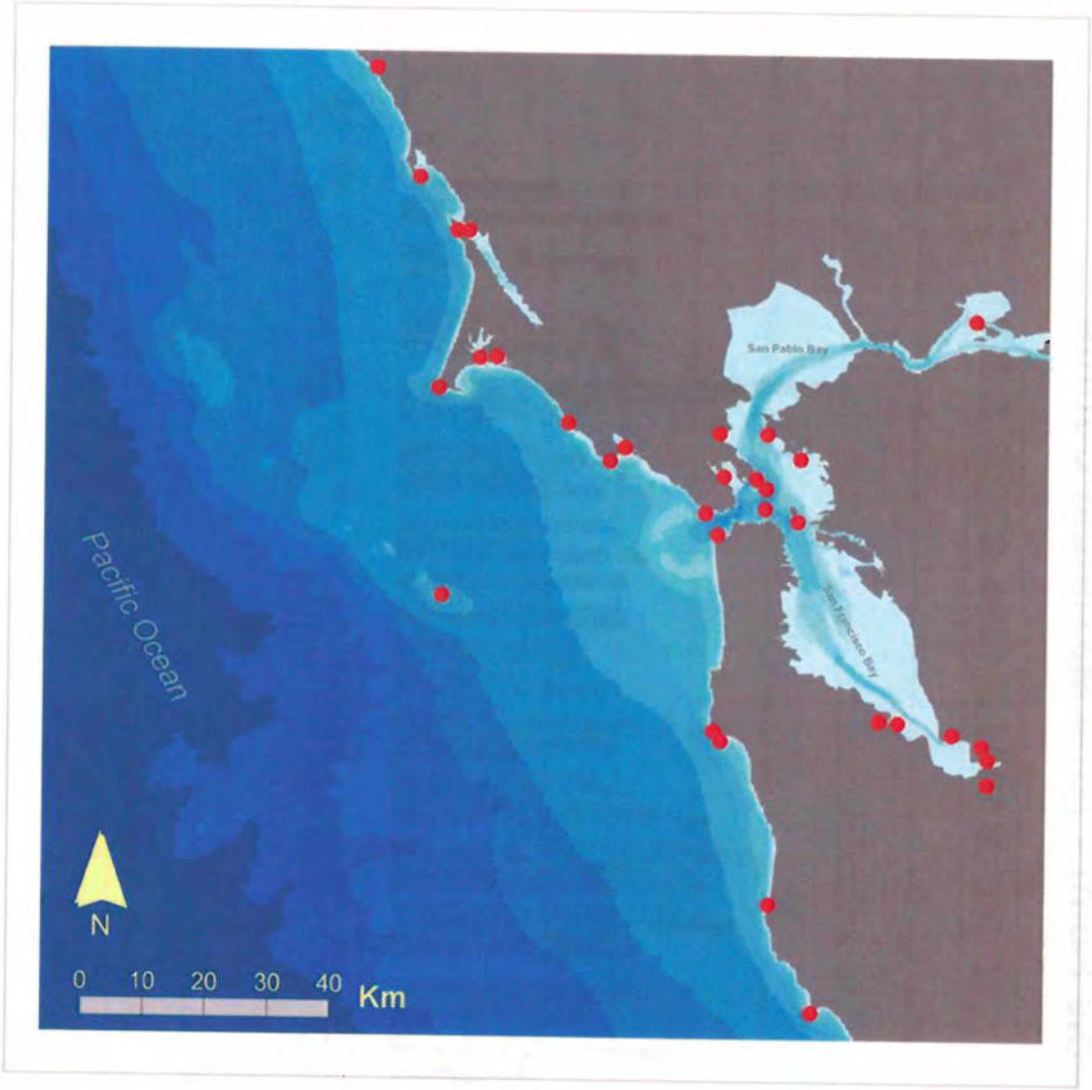

Figure 1b. Harbor seal haul out sites in central California.

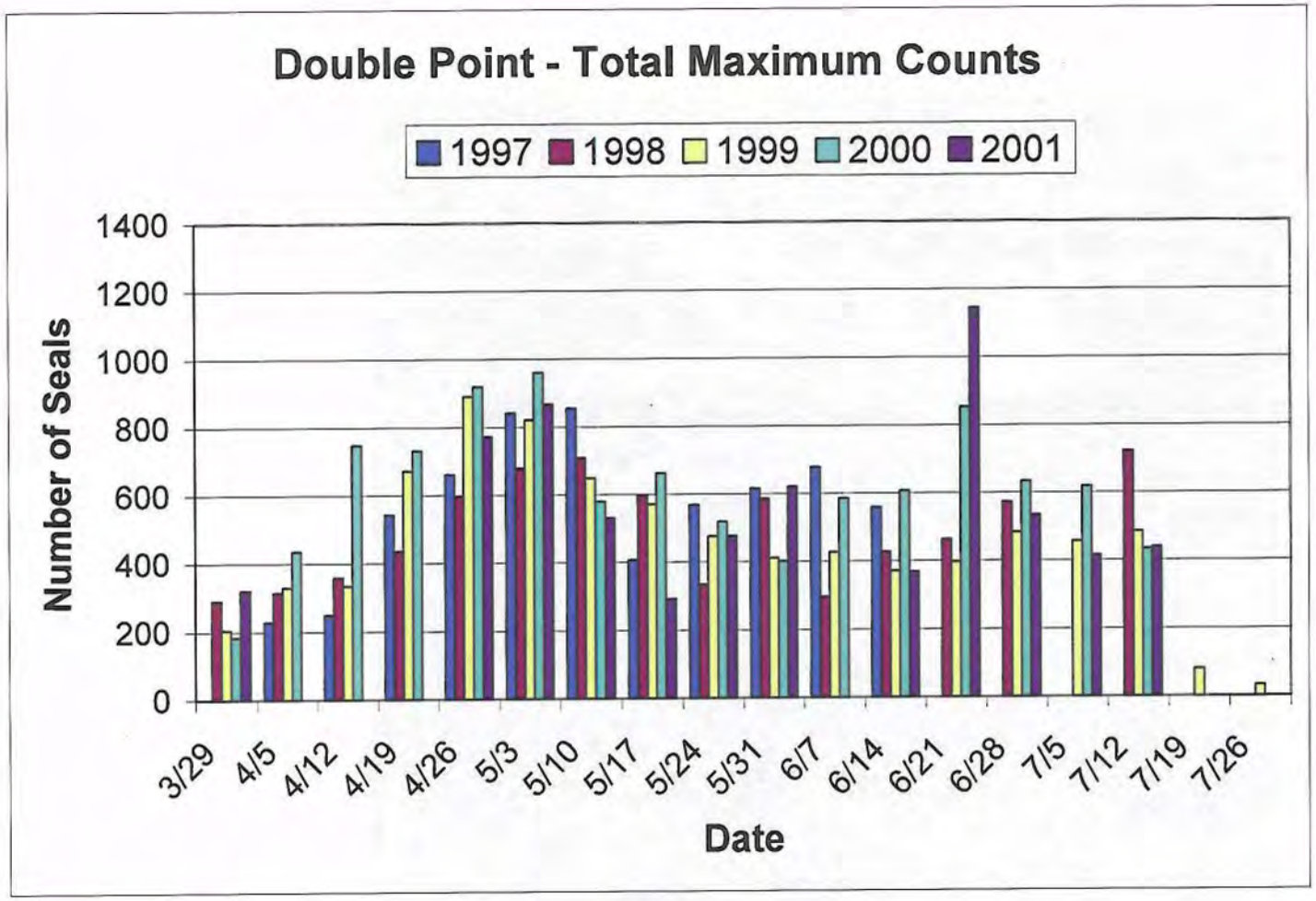

Figure 2. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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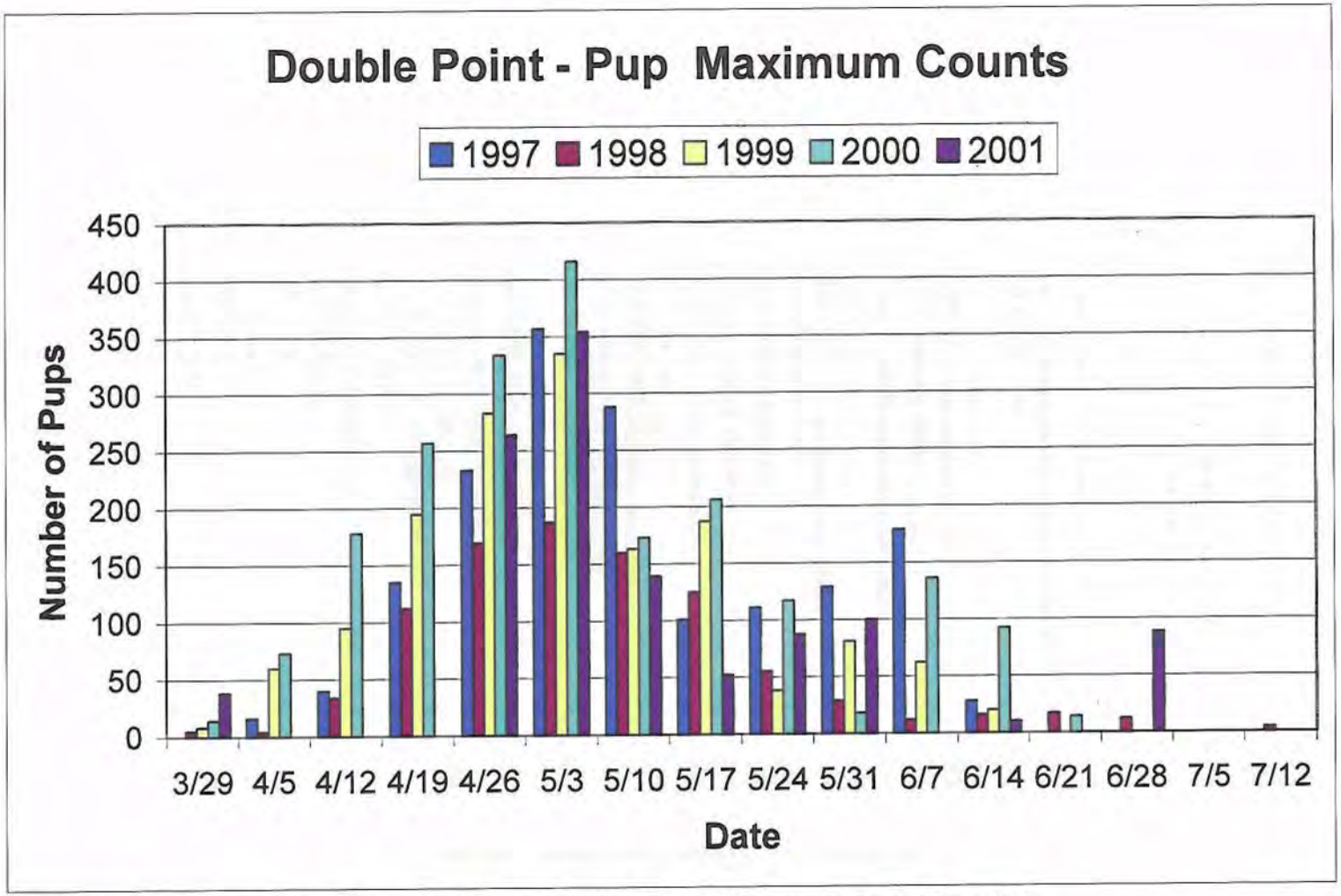

Figure 3. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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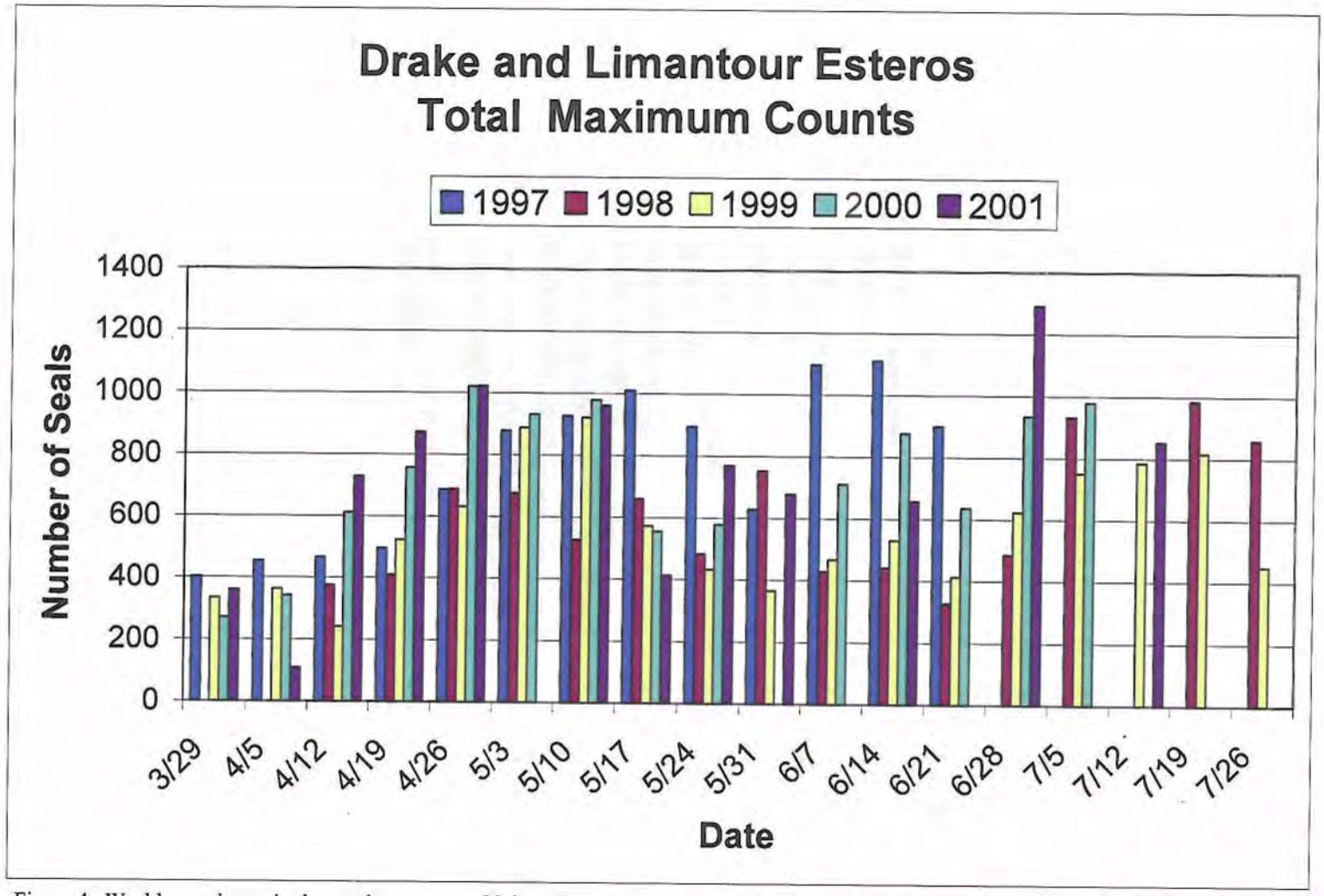

Figure 4. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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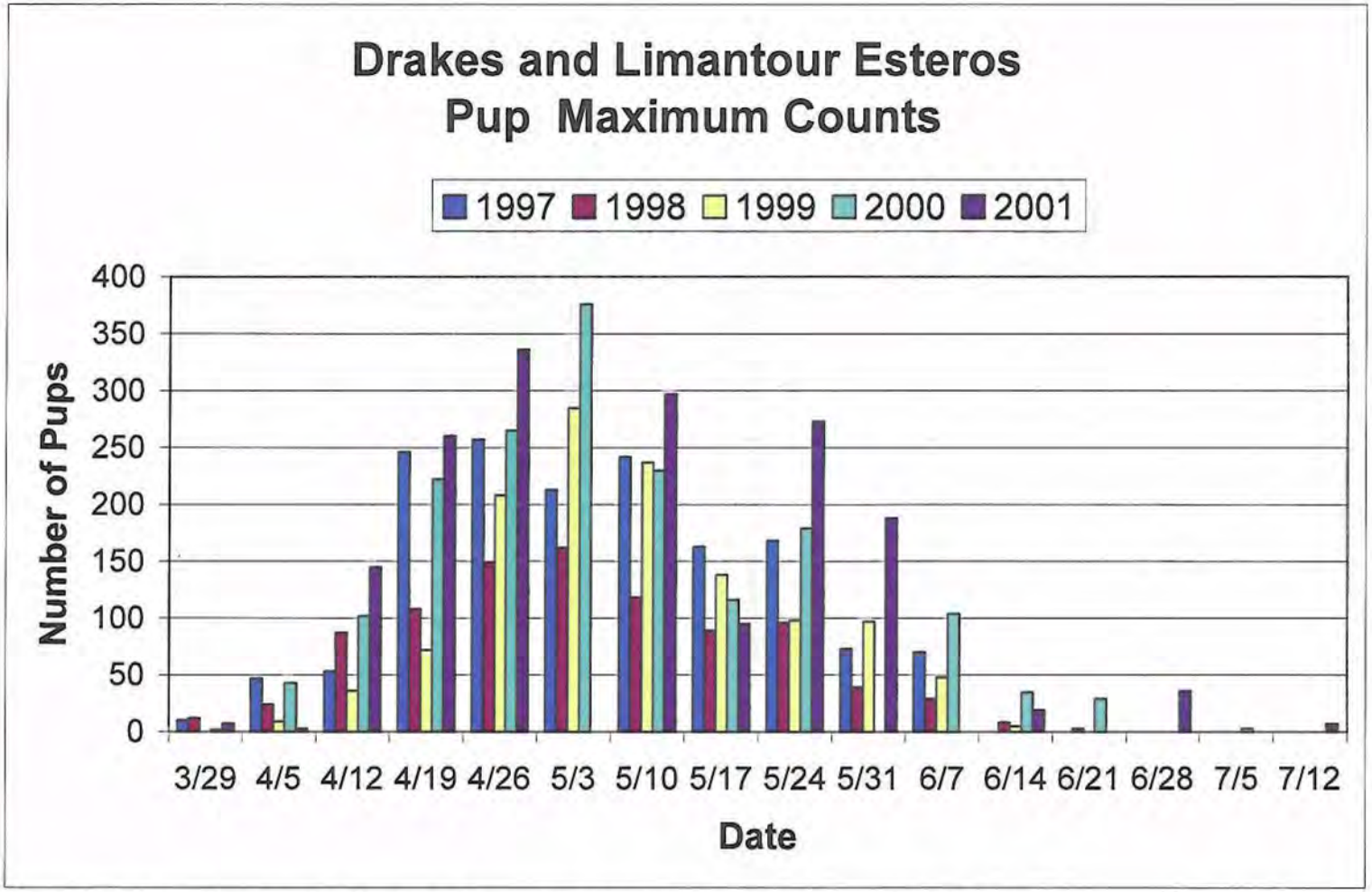

Figure 5. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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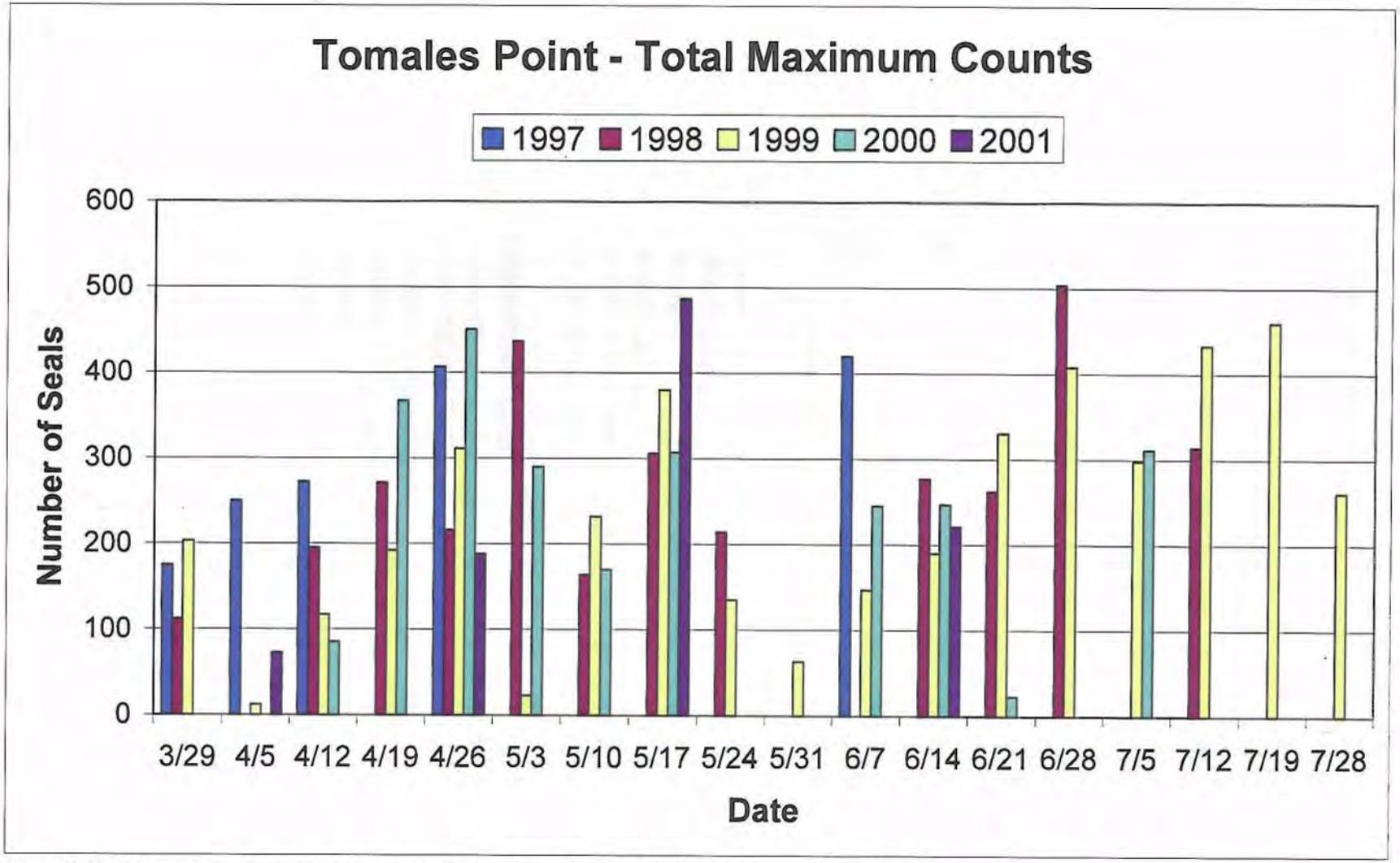

Figure 6. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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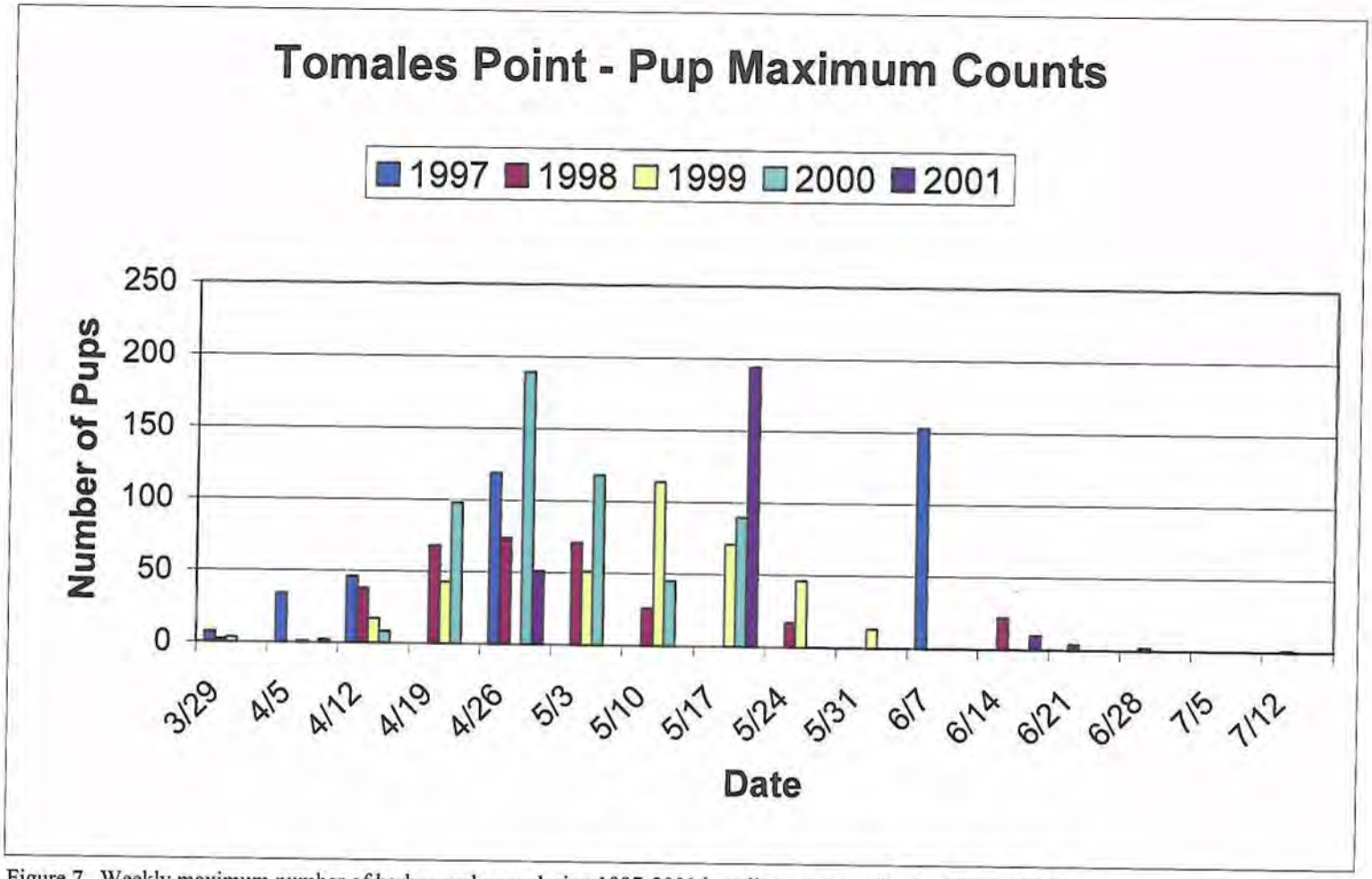

Figure 7. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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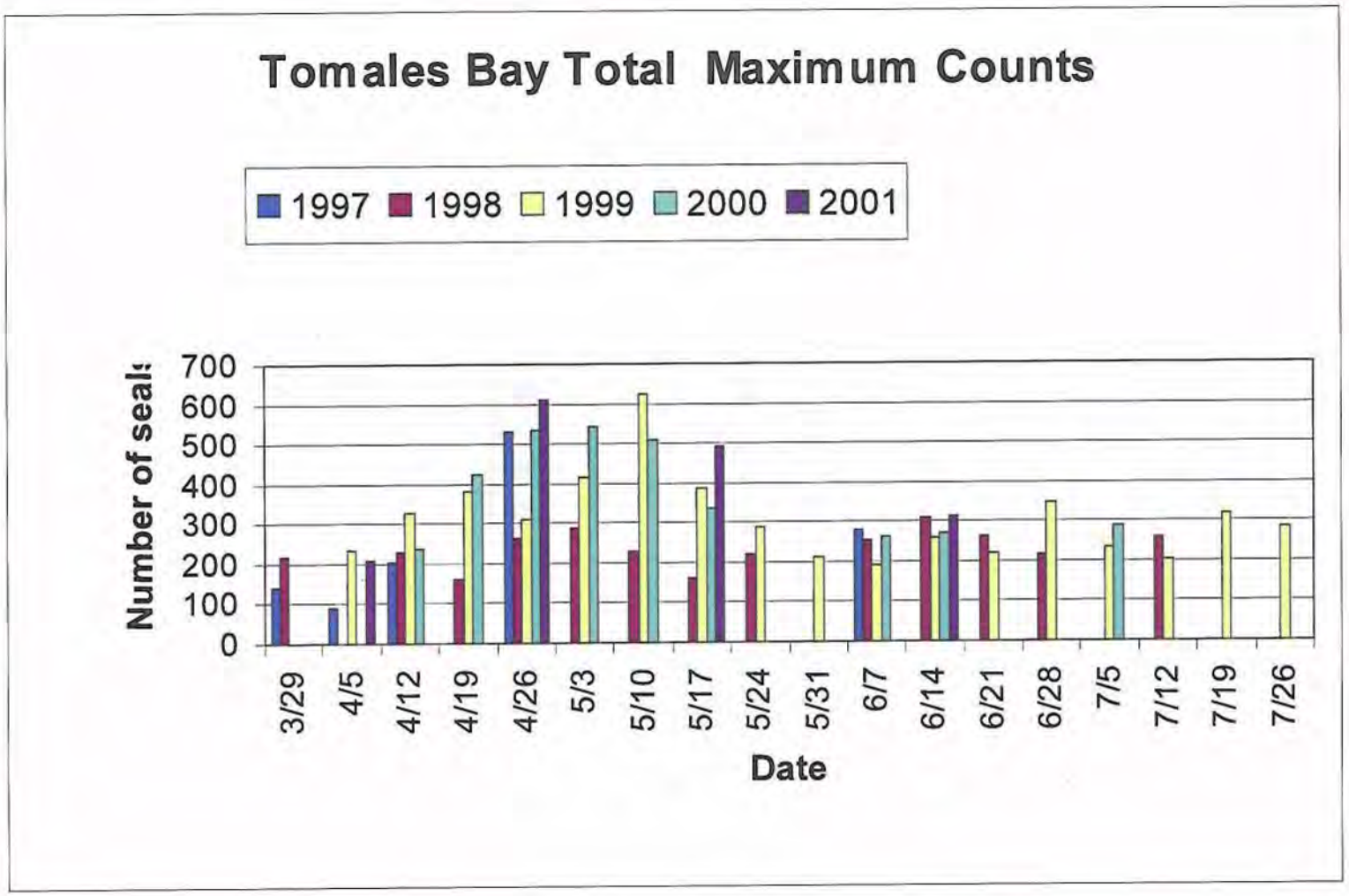

Figure 8. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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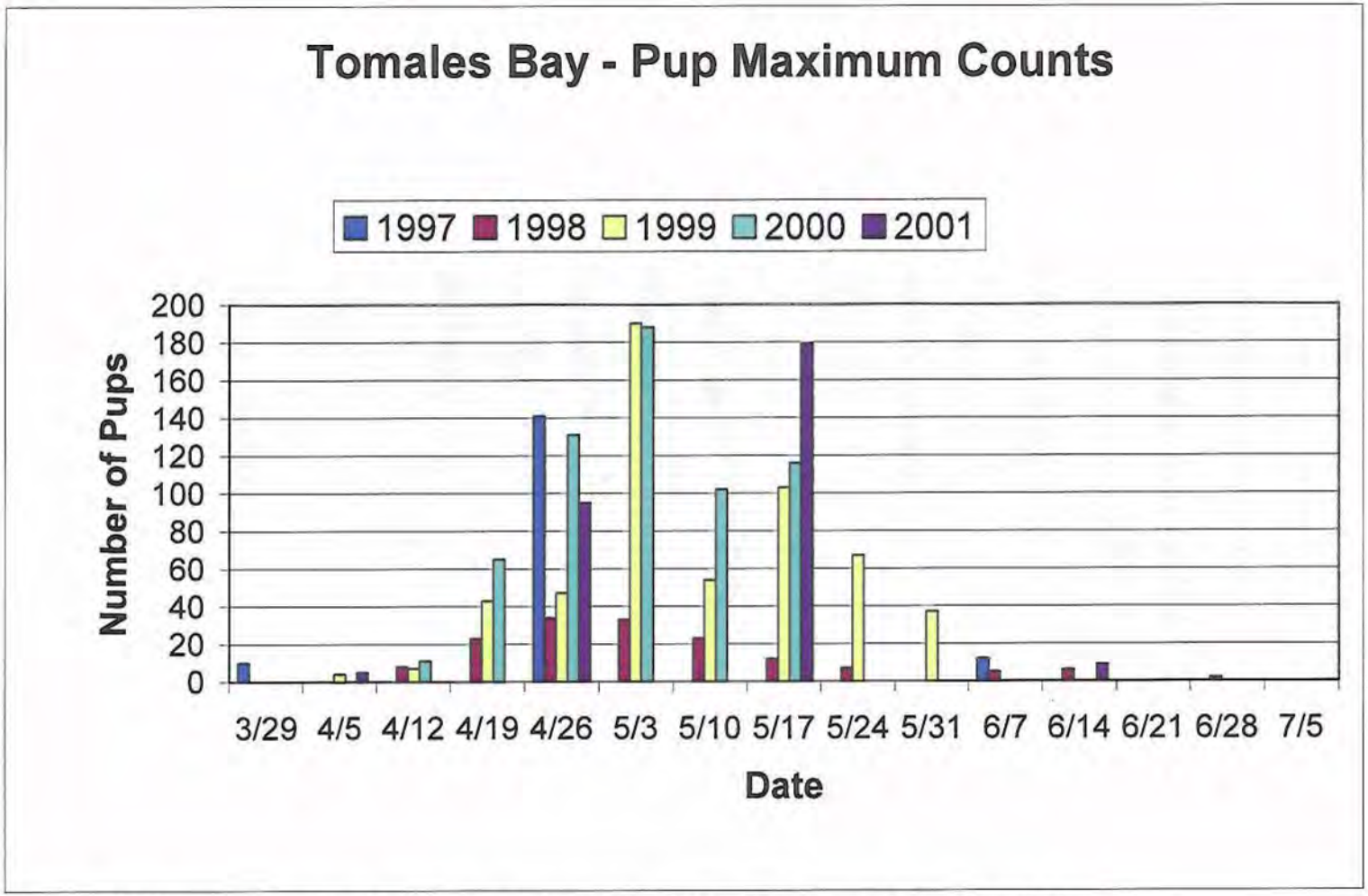

Figure 9. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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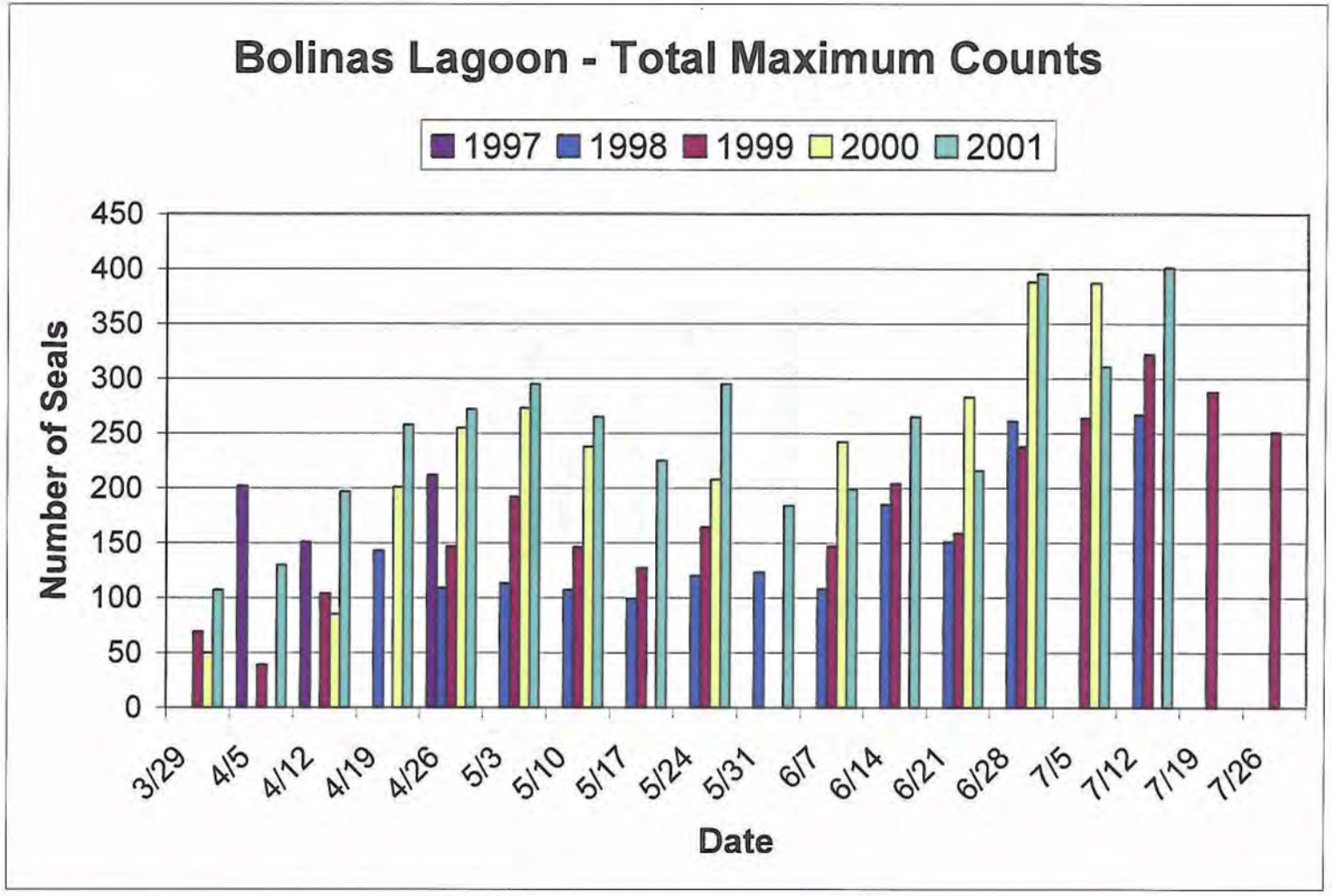

Figure 10. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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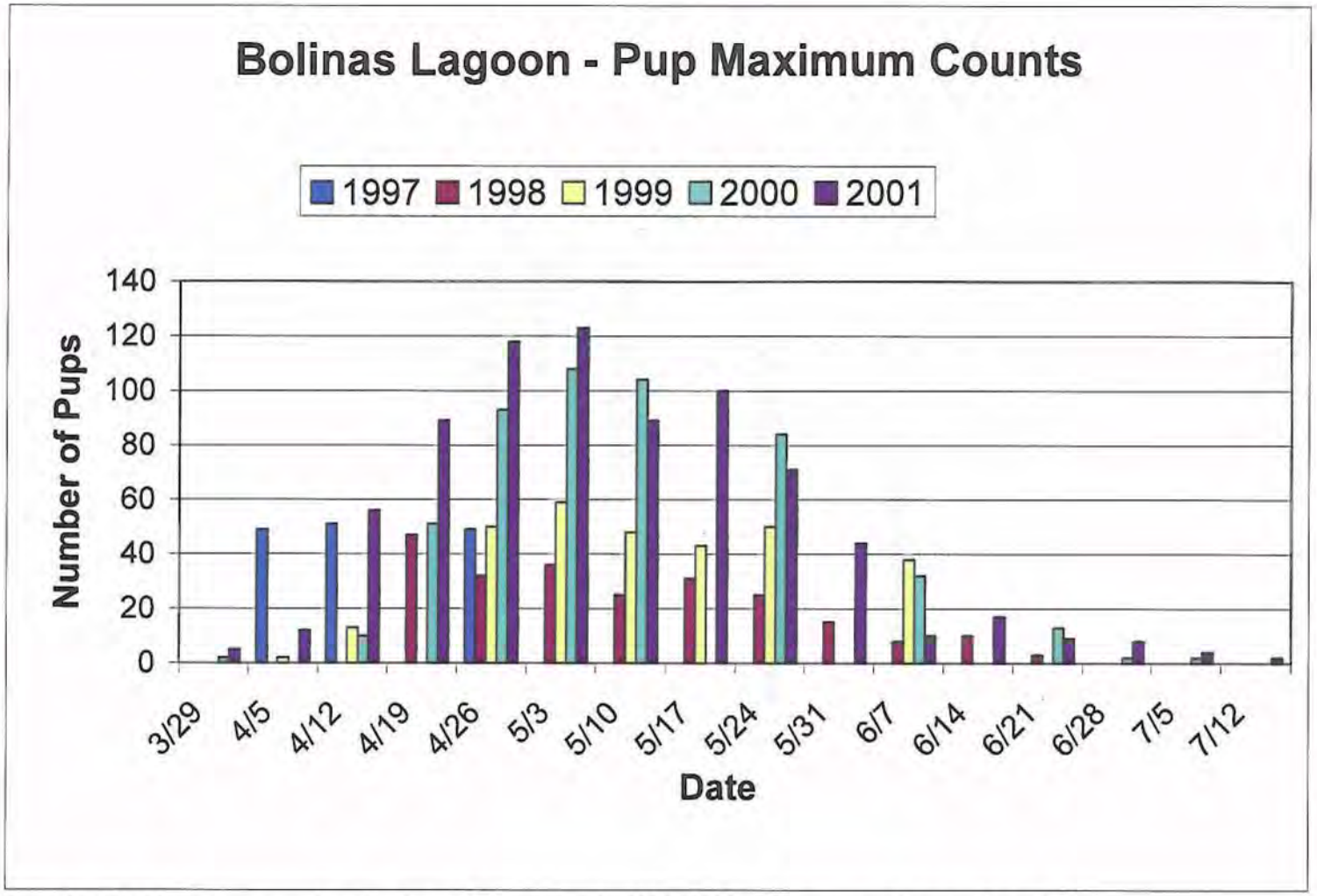

Figure 11. Weekly maximum number of harbor seal pups during the 1997-2001 breeding seasons. See text for methods.

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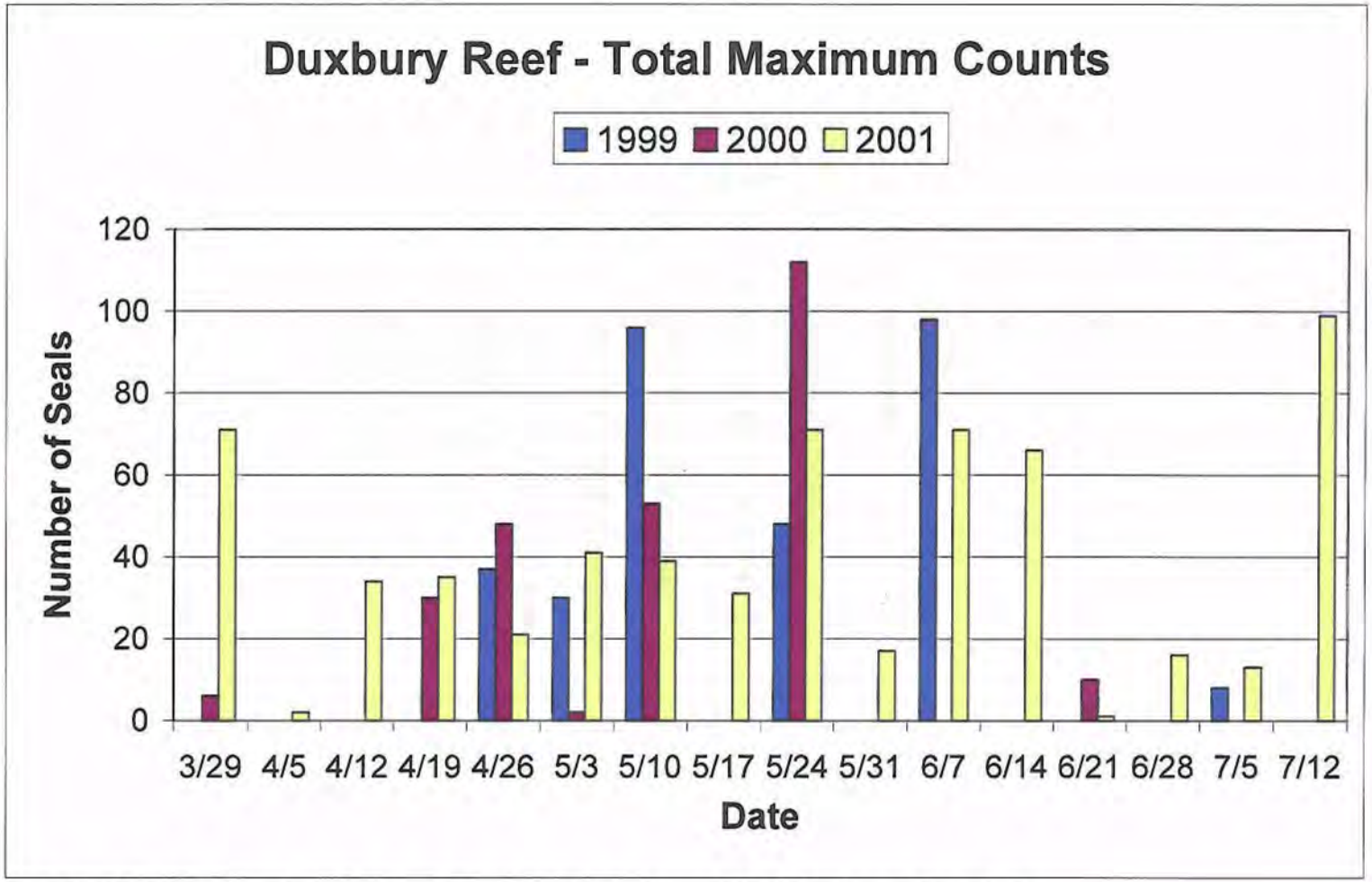

Figure 12. Weekly maximum harbor seal counts, combining all age classes, 1999 - 2001. See text for methods.

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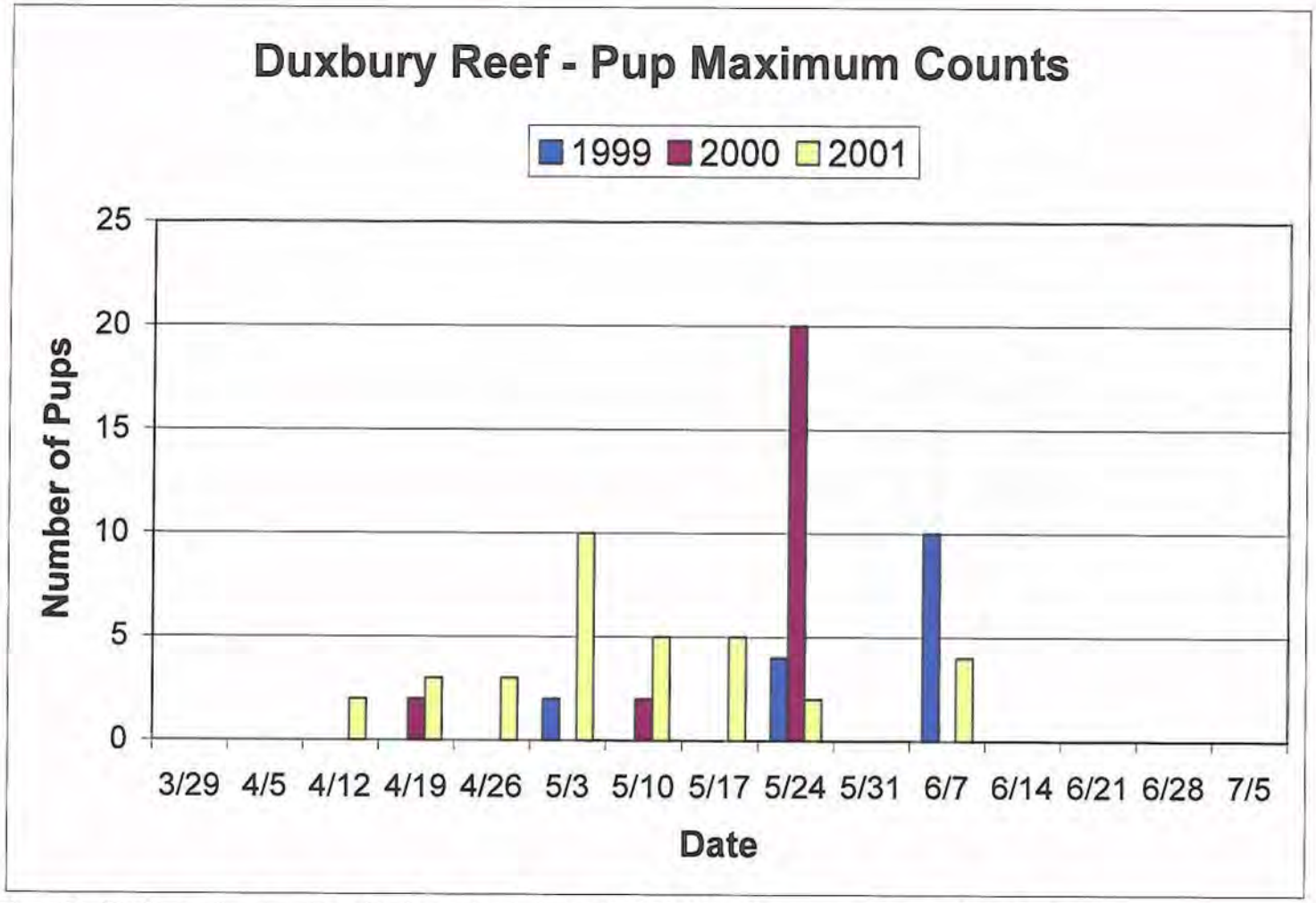

Figure 13. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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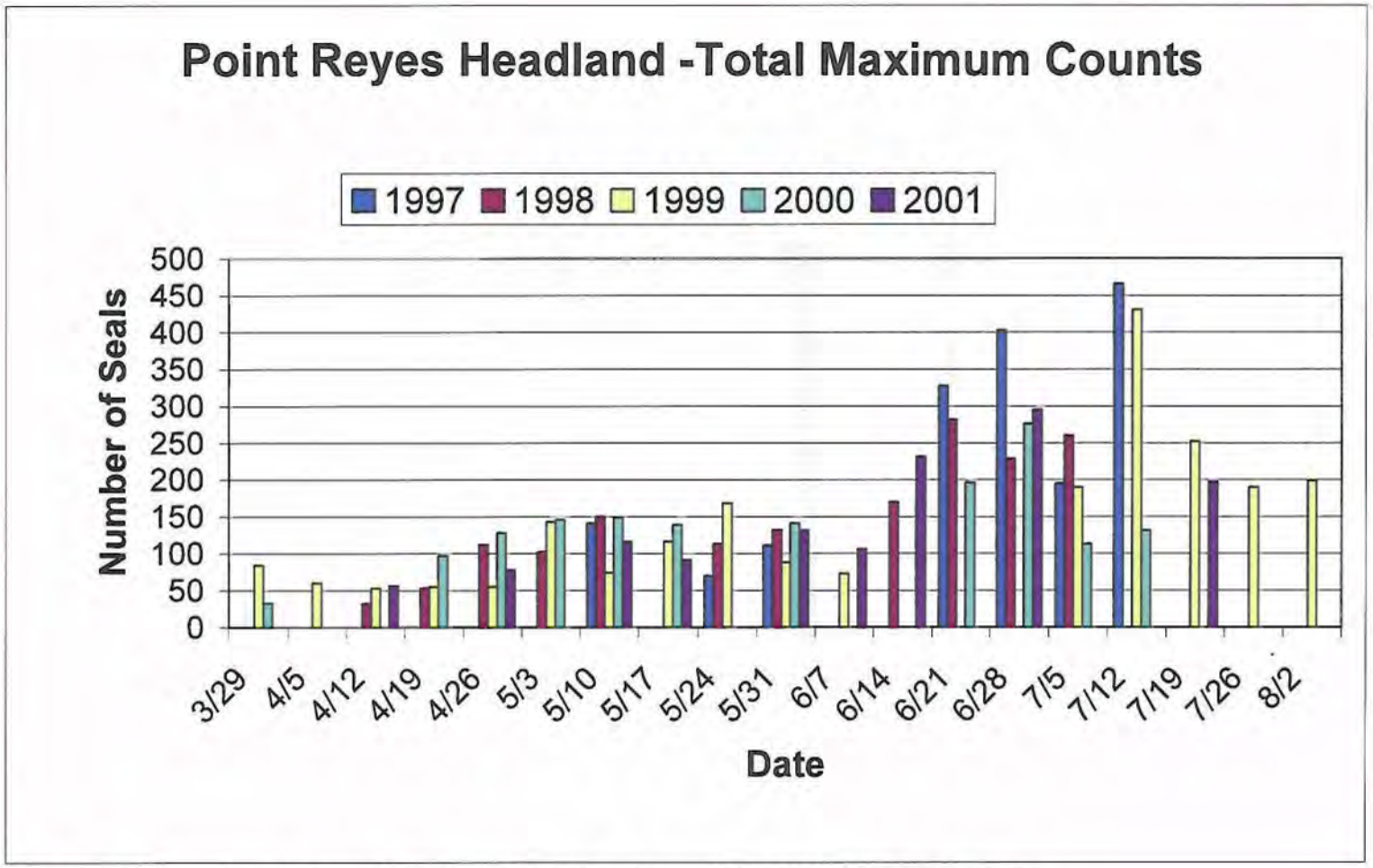

Figure 14. Weekly maximum harbor seal counts, combining all age classes, 1997 - 2001. See text for methods.

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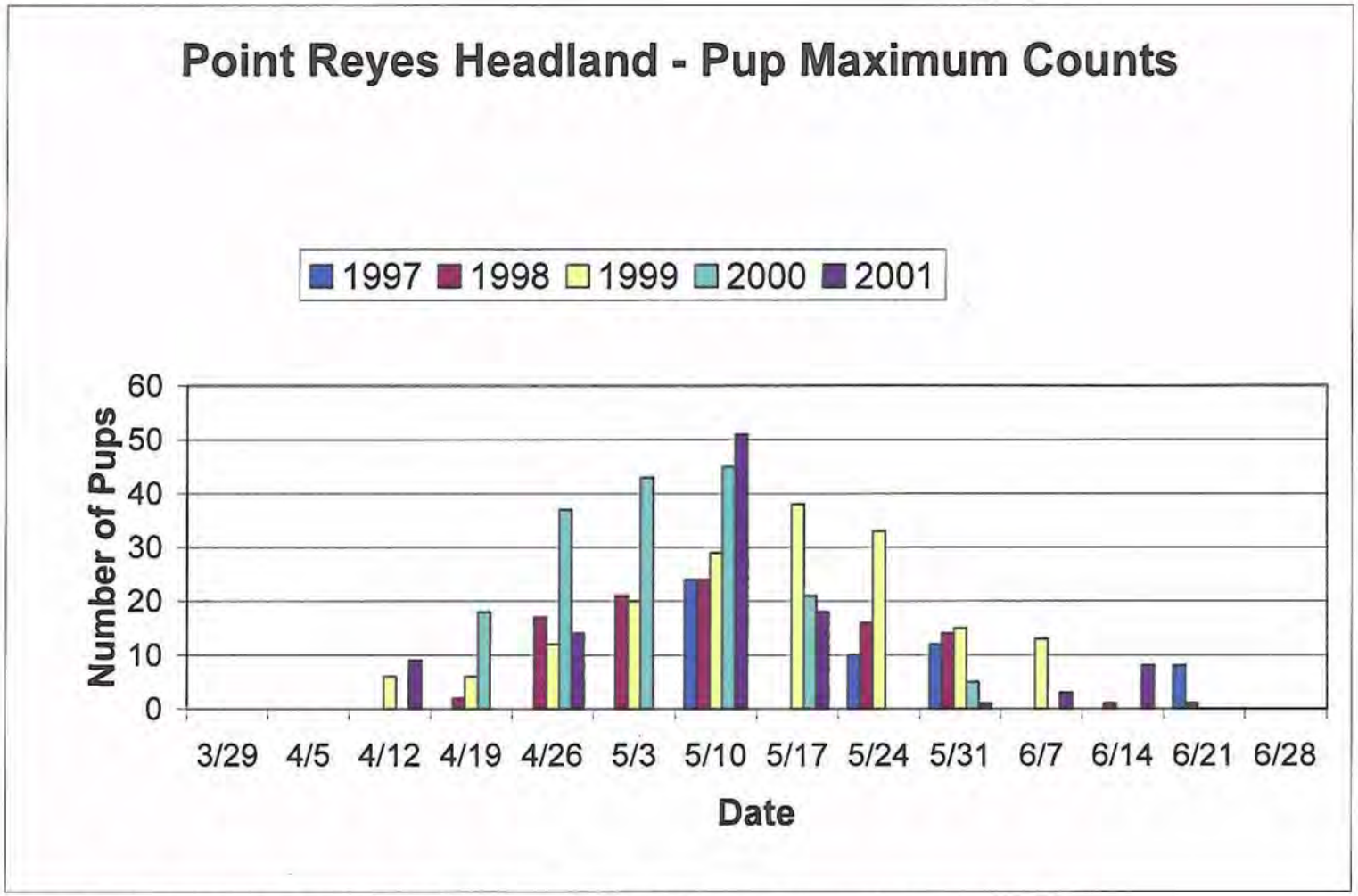

Figure 15. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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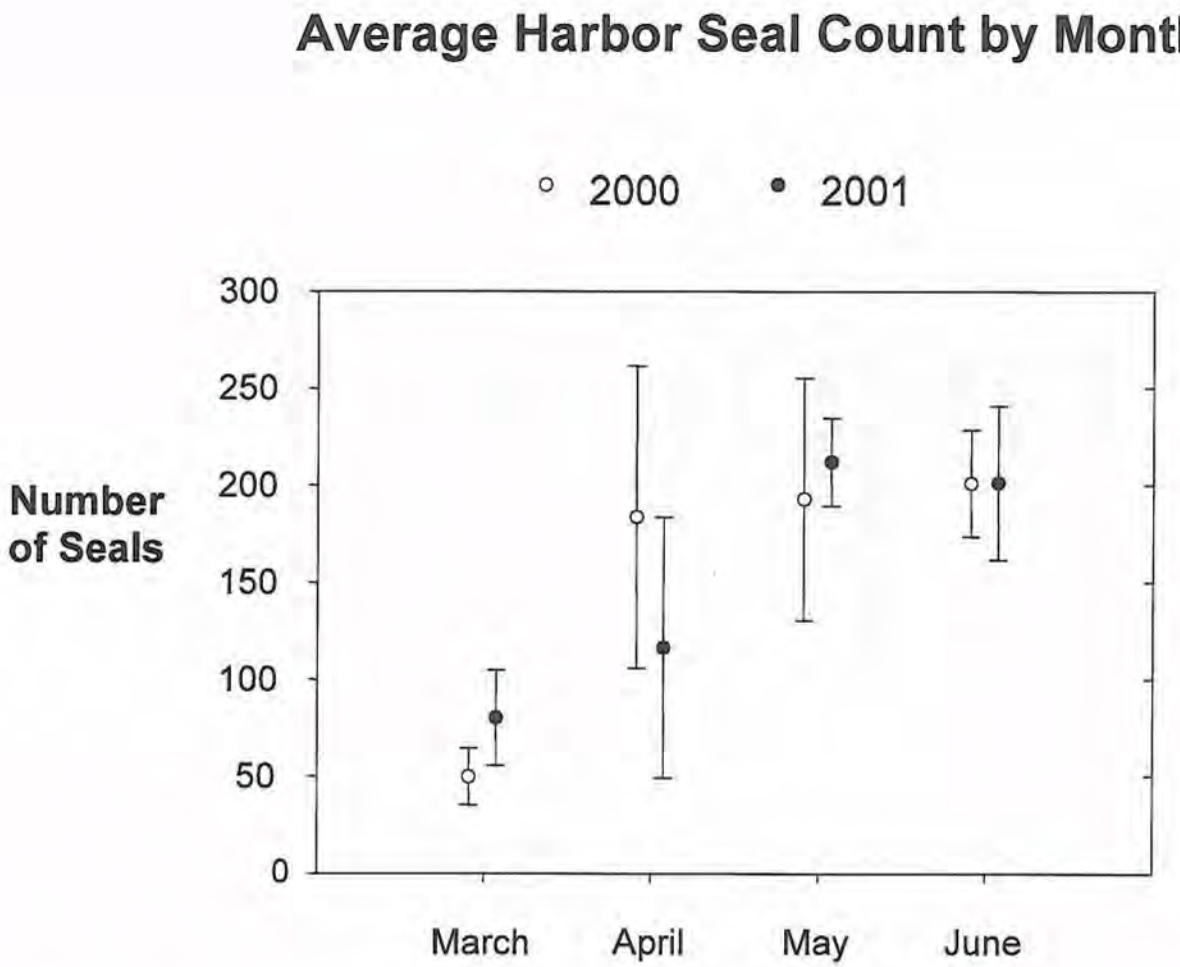

Figure 16. Harbor seal average count and standard deviation, combining all age classes and all sites, by month during the breeding season for 2000 and 2001.

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Table 1a. Summary of the survey data for the1997-2001 seasons, combining all sites at Point Reyes. Maximum # of Breed and Molt, and Average Breed include all age classes.

YEAR	Max # Breed	Average Breed	Max # Pups	Max # Molt	#Surveys	# Disturbances	Disturbances Per Survey	Dead Pups
1997	3,268	1,830.5 SE = 379 N =4	983	NA	Weekday: 44 Weekend: 29 Total: 73	Weekday: 9 Weekend: 37 Total: 46	0.2 1.3	7
1998	2,481	1,744.6 SE = 122.5 N = 8	528	3,070	Weekday: 79 Weekend: 64 Total: 143	Weekday: 24 Weekend: 46 Total: 70	0.3 0.7	15
1999	3,325	1,779.9 SE = 173.5 N = 10	1,068	2,863	Weekday: 139 Weekend: 69 Total: 208	Weekday: 71 Weekend: 54 Total: 125	0.5 0.8	9
2000	3,506	2,511.1 SE = 224.4 N = 7	1,342	3,108	Weekday: 106 Weekend: 91 Total: 197	Weekday: 78 Weekend: 116 Total: 194	0.7 1.3	11
2001	3,485	2,218.8 SE = 244.8 N= 4	1,247	3,769	Weekday: 112 Weekend: 119 Total: 231	Weekday: 57 Weekend: 107 Total: 164	0.5 0.9	7

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Table 1b. Summary of the average number of adult/immature seals combining the breeding and molting seasons at Point Reyes, California, 1997-2001, by location; SE = standard error and N= sample size.

Year	Double Point	Drakes Estero & Limantour	Tomales Point	Tomales Bay	Bolinas Lagoon	Point Reyes Headland
1997	564.0	754.3	304.8	241.0	188.3	107.3
SE	62.0	75.8	47.3	99.0	18.9	20.57
N	11	12	5	4	3	3
1998	468.7	453.9	243.6	233.8	123.0	108.0
SE	44.99	70.9	31.4	15.2	8.8	16.4
N	12	12	9	10	9	8
1999	513.1	523.1	167.1	329.4	133.9	88.09
SE	60.5	60.5	31.65	36.8	16.3	11.6
N	12	12	12	11	10	11
2000	636.1	693.9	270.3	389.8	194.0	119.0
SE	59.9	75.3	39.9	45.3	28.9	15.79
N	12	11	8	8	8	7
2001	**531.1**	**657.4**	**242.0**	**406.3**	**224.3**	**115.6**
SE	**74.3**	**90.6**	**87.7**	**89.88**	**17.9**	**21.4**
N	**8**	**10**	**4**	**4**	**12**	**7**

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Table 1c. Survey summary data for 1997. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt =all age classes during the molting season, June 15 to July 15. NA = data not available.

	Max # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	854	357	NA	Weekday: 12 Weekend: 7	Weekday: 4 Weekend: 6	11	1.3%	3	3
Drakes Estero & Limantour	1111	257	NA	Weekday: 10 Weekend: 16	Weekday: 3 Weekend: 30	13	1.2%	3	1
Tomales Point	420	153	NA	Weekday: 8 Weekend: 1	Weekday: 2 Weekend: 1	3	0.7%	2	1
Tomales Bay	530	141	NA	Weekday: 8 Weekend: 1	Weekday: 0 Weekend: 0	14	2.6%	0	1
Bolinas Lagoon	212	51	NA	Weekday: 1 Weekend: 2	Weekday: 0 Weekend: 0	5	2.4%	0	1
Point Reyes Headland	141	24	466	Weekday: 5 Weekend: 2	Weekday: 0 Weekend: 0	0	0%	NA	0
1997 Total	3268	983	NA	73	46	-	-	-	-

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Table 1d. Summary data for 1998. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt =all age classes during the molting season, June15 to July 15.

	Max # Breed	Max # Pups	Max Molt #	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	708	187	722	Weekday: 18 Weekend: 12	Weekday: 1 Weekend: 5	6	0.8%	6	6
Drakes Estero & Limantour	753	162	985	Weekday: 11 Weekend: 18	Weekday: 8 Weekend: 24	22	2.9%	2	1
Tomales Point	437	74	504	Weekday: 13 Weekend: 16	Weekday: 3 Weekend: 6	5	1.1%	3	3
Tomales Bay	290	34	310	Weekday: 12 Weekend: 14	Weekday: 7 Weekend: 11	8	2.8%	2	1
Bolinas Lagoon	143	47	267	Weekday: 12 Weekend: 0	Weekday: 5 Weekend: 0	8	5.6%	2	1
Point Reyes Headland	150	24	282	Weekday: 13 Weekend: 4	Weekday: 0 Weekend: 0	4	2.7%	1	3
1998 Total	2481	528	3070	143	70	-	-	-	-

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Table 1e. Summary data for 1999 season. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max #Molt =all age classes during the molting season, June15 to July 15.

	Max # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	890	335	486	Weekday: 23 Weekend: 13	Weekday: 11 Weekend: 10	11	1.2%	4	5
Drakes Estero & Limantour	922	285	817	Weekday: 26 Weekend: 19	Weekday: 24 Weekend: 35	27	2.9%	4	2
Tomales Point	430	151	460	Weekday: 19 Weekend: 15	Weekday: 5 Weekend: 0	10	2.3%	3	1
Tomales Bay	625	190	347	Weekday: 19 Weekend: 15	Weekday: 11 Weekend: 4	17	2.7%	1	1
Bolinas Lagoon	192	59	322	Weekday: 18 Weekend: 2	Weekday: 18 Weekend: 4	7	3.6%	0	0
Duxbury Reef	98	10	NA	Weekday: 7 Weekend: 1	Weekday: 0 Weekend: 1	1	1.0%	0	0
Point Reyes Headland	168	38	431	Weekday: 27 Weekend: 4	Weekday: 2 Weekend: 0	2	1.2%	0	0
1999 Total	3325	1068	2863	208	125	-	-	-	-

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Table 1f. Summary data for 2000. The maximum numbers were seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers with 2 or more years of experience. Avg # Breed= adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers of all experience levels. Max # Molt =all age classes during the molting season, June 15 to July 15, recorded by observers with two or more years of experience. Avg # Molt = all age classes during the molting season, June 15 to July 15, recorded by all observers. se =standard error

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	#Disturbances	Red Seals	Shark Bites	Dead Pups
Double Point	960	507.70 se 40.24	416	853	657.28 se 57.39	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	5	4	5
Drakes Estero & Limantour	1020	525.43 se 44.06	376	980	740.83 se 100.58	Weekday: 27 Weekend: 18	Weekday: 43 Weekend: 38	11	2	1
Tomales Point	451	206.41 se 30.42	189	311	210.33 se 40.61	Weekday: 14 Weekend: 13	Weekday: 12 Weekend: 11	5	1	0
Tomales Bay	541	354.75 se 31.40	188	290	280.50 se 6.10	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	17	0	2
Bolinas Lagoon	273	163.10 se 31.41	108	388	352.66 se 35.48	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	9	1	2
Duxbury Reef	112	31.66 se 12.01	20	10	5.00 se 5.05	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	2	0	0
Point Reyes Headland	149	113.62 se 14.84	45	276	179.25 se 36.81	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	2	0	1
2000 Total	3506	-	1342	3108	-	197	194	-	-	-

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Table 1g. Summary data for 2001. The maximum numbers were seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers with 2 or more years of experience. Avg # Breed= adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers of all experience levels. Max # Molt =all age classes during the molting season, June 15 to July 15, recorded by observers with two or more years of experience. Avg # Molt = all age classes during the molting season, June 15 to July 15, recorded by all observers. se=Standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Red Seals	Shark Bites	Dead Pups
Double Point	867	536.20 se 42.12	354	1145	553.12 se 112.83	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	8	3	4
Drakes Estero & Limantour	1023	594.73 se 44.86	336	1292	727.00 se 90.13	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	18	2	1
Tomales Point	487	196.25 se 28.98	194	221	329.14 se 31.06	Weekday: 14 Weekend: 18	Weekday: 6 Weekend: 17	1	0	0
Tomales Bay	611	353.38 se 26.96	179	316	176.57 se 31.81	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	12	0	1
Bolinas Lagoon	295	197.90 se 14.12	123	401	307.57 se 29.58	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	9	2	1
Duxbury Reef	71	32.85 se 4.91	10	99	37.50 se 15.63	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	2	0	0
Point Reyes Headland	131	88.22 se 10.6	51	295	238.00 se 31.67	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	2	0	0
2000 Total	3485	-	1247	3769	-	231	164	-	-	-

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Table 2a. Sources of potential and actual disturbances during 1997.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Total
Double Point	1	-	-	1	-	1	2	5	**10**
Drakes Estero & Limantour	6	-	-	-	1	18	3	5	**33**
Tomales Point	-	-	-	-	-	2	-	1	**3**
Tomales Bay	-	-	-	-	-	-	-	-	**0**
Bolinas Lagoon	-	-	-	-	-	-	-	-	**0**
Point Reyes Headland	-	-	-	-	-	-	-	-	**0**
Total	7	0	0	1	1	21	5	11	**46**

Table 2b. Sources of potential and actual disturbances during the 1998 field seasons.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Total
Double Point	-	-	-	-	1	-	3	2	**6**
Drakes Estero & Limantour	-	1	-	-	-	26	1	4	**32**
Tomales Point	3	-	-	-	-	4	-	2	**9**
Tomales Bay	6	4	-	-	1	4	-	3	**18**
Bolinas Lagoon	-	-	3	-	-	1	1	-	**5**
Point Reyes Headland	-	-	-	-	-	-	-	-	**0**
Total	9	5	3	0	2	35	5	11	**70**

Table 2c. Sources of potential and actual disturbances during the 1999 field seasons.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
Double Point	6	-	-	-	3	5	2	3	2	**21**
Drakes Estero & Limantour	1	5	-	-	5	23	11	11	3	**59**
Tomales Point	1	-	-	-	-	2	1	-	1	**5**
Tomales Bay	7	-	-	1	-	2	2	2	1	**15**
Bolinas Lagoon	-	2	-	3	1	3	6	6	-	**21**
Duxbury Reef	-	-	-	-	-	1	-	-	-	**1**
Point Reyes Headland	2	-	-	-	-	-	-	-	-	**2**
Total	**17**	**7**	**0**	**4**	**9**	**36**	**22**	**22**	**7**	**124**

Table 2d. Sources of potential and actual disturbances during the 2000 field season.

	Motor boat	Non-motor boat	Clammer	Plane	Human	Bird	Unknown	Other	Total
Double Point	4	-	-	7	12	6	18	4	**51**
Drakes Estero & Limantour	-	6	2	9	30	13	19	2	**81**
Tomales Point	8	-	-	4	6	-	4	1	**23**
Tomales Bay	15	2	6	1	-	-	-		**24**
Bolinas Lagoon	-	5	-	-	-	3	3	-	**11**
Duxbury Reef	-	1	-	-	1	-	-	-	**2**
Point Reyes Headland	-	-	-	1	-	-	1	-	**2**
Total	**27**	**14**	**8**	**22**	**49**	**22**	**45**	**7**	**194**

Table 2e. Sources of potential and actual disturbances during the 2001 field season.

	Motor boat	Non-motor boat	Clammer	Plane	Human	Bird	Unknown	Other	Total
Double Point	3	-	-	1	3	1	4	13	**25**
Drakes Estero & Limantour	-	4	-	3	20	4	10	2	**43**
Tomales Point	-	-	-	3	19	-	1	-	**23**
Tomales Bay	17	5	6	-	1	-	-	-	**29**
Bolinas Lagoon	-	12	-	1	6	4	13	2	**38**
Duxbury Reef	-	-	-	-	6	-	-	-	**6**
Point Reyes Headland	-	-	-	1	-	-	-	-	**1**
Total	**20**	**21**	**6**	**9**	**55**	**9**	**28**	**17**	**165**

Table 3a. Summary of seal responses to disturbances during 1997. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	2	-	7	1	70%
Drakes Estero &Limantour	9	-	24	-	73%
Tomales Point	-	-	3	-	100%
Tomales Bay	-	-	-	-	0%
Bolinas Lagoon	-	-	-	-	0%
Point Reyes Headland	-	-	-	-	0%
Total	11	0	34	1	74%

Table 3b. . Summary of seal responses to disturbances during 1998. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	1	2	3	-	50%
Drakes Estero & Limantour	11	6	15	-	47%
Tomales Point	1	1	7	-	78%
Tomales Bay	8	5	5	-	28%
Bolinas Lagoon	3	1	-	1	0%
Point Reyes Headland	-	-	-	-	0%
Total	24	15	30	1	43%

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Table 3c. Summary of seal responses to disturbances during 1999. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	2	4	11	-	65%
Drakes Estero & Limantour	19	4	31	1	56%
Tomales Point	-	-	3	1	75%
Tomales Bay	2	5	3	1	27%
Bolinas Lagoon	5	-	15	1	71%
Duxbury Reef	-	-	-	1	0%
Point Reyes Headland	-	1	-	1	0%
Total	28	14	63	6	57%

Table 3d. Summary of seal responses to disturbances during 2000. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	3	5	24	10	57%
Drakes Estero & Limantour	15	4	38	13	54%
Tomales Point	3	3	3	10	16%
Tomales Bay	4	1	9	3	53%
Bolinas Lagoon	-	-	11	-	100%
Duxbury Reef	-	-	-	2	0%
Point Reyes Headland	-	1	-	1	0%
Total	25	14	85	39	52%

Table 3e. Summary of seal responses to disturbances during 2001. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	1	1	18	2	82%
Drakes Estero & Limantour	7	1	24	3	69%
Tomales Point	1	-	6	13	30%
Tomales Bay	4	2	11	3	55%
Bolinas Lagoon	5	1	31	-	84%
Duxbury Reef	-	-	3	3	50%
Point Reyes Headlands	1	-	-	-	0%
Total	**19**	**5**	**93**	**24**	**66%**

Table 4a. Average number of disturbances per hour during 2000. Hours of direct observation represent the total amount of time that researchers were observing the animals. The number of disturbances represents the total of all potential and actual disturbances. See methods for definition of potential and actual disturbances.

Location	Number of Surveys	Number of Disturbances	# Of Hours of Direct Observation	Average # of Disturbances per Hour	Standard Deviation
Double Point	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	45.5 62.5	0.26 0.62	0.37 0.71
Drakes Estero & Limantour	Weekday: 27 Weekend: 18	Weekday: 43 Weekend: 38	53.5 45.3	0.80 0.83	1.04 0.42
Tomales Point	Weekday: 14 Weekend: 13	Weekday: 12 Weekend: 11	46.5 43.8	0.26 0.25	0.43 0.24
Tomales Bay	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	42.0 43.8	0.12 0.43	0.24 0.56
Bolinas Lagoon	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	17.9 22.5	0.23 0.31	0.25 0.36
Duxbury Reef	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	3.0 6.0	0 0.33	0 0.79
Point Reyes Headland	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	50.3 9.0	0.04 0	0.12 0
All Sites Combined Total	Weekday:106 Weekend: 91 197	Weekday: 78 Weekend:116 194	258.5 232.8 491.3	0.30 0.50 0.39	0.66 0.57 0.63

Table 4b. Average number of disturbances per hour during 2001. Hours of direct observation represent the total amount of time that researchers were observing the animals. The number of disturbances represents the total of all potential and actual disturbances. See methods for definition of potential and actual disturbances.

Location	Number of Surveys	Number of Disturbances	# Of Hours of Direct Observation	Average # of Disturbances per Hour	Standard Deviation
Double Point	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	42.0 39.5	0.29 0.33	0.58 0.40
Drakes Estero & Limantour	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	41.5 45.0	0.48 0.49	0.61 0.71
Tomales Point	Weekday:14 Weekend: 18	Weekday: 6 Weekend: 17	34.0 41.5	0.18 0.41	0.34 0.43
Tomales Bay	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	13.3 20.3	0.23 1.28	0.41 2.52
Bolinas Lagoon	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	42.0 45.5	0.33 0.55	0.34 0.50
Duxbury Reef	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	8.3 9.0	0.24 0.44	0.70 1.12
Point Reyes Headland	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	21.5 27.3	0 0.04	0 0.07
All Sites Combined Total 2001	Weekday: 112 Weekend:119 231	Weekday :57 Weekend: 107 164	202.6 228.1 430.7	0.28 0.47 0.38	0.51 1.20 0.94

Table 5a. Summary data for Double Point, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg. # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	854	NA	357	NA	NA	Weekday: 12 Weekend: 7	Weekday: 4 Weekend: 6	11	1.3%	3	3
1998	708	NA	187	722	NA	Weekday: 18 Weekend: 12	Weekday: 1 Weekday: 5	6	0.8%	6	6
1999	890	NA	335	486	NA	Weekday: 23 Weekend: 13	Weekday: 11 Weekend: 10	11	1.2%	4	5
2000	960	507.70 se 40.24	416	853	657.28 se 57.39	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	5	0.5%	4	5
2001	867	536.20 se 42.12	354	1145	553.12 se 112.83	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	8	0.9%	3	4

Table 5b. Sources of potential and actual disturbances at Double Point during 1997 through 2001. NA= data not available.

	Motor boat	Non-motor boat	Elephant seal	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	1	-	NA	1	-	1	2	5	-	**10**
1998	-	-	NA	-	1	-	3	2	-	**6**
1999	6	-	NA	-	3	5	2	3	2	**21**
2000	4	-	1	-	7	12	6	18	3	**51**
2001	3	-	11	-	1	3	1	4	2	**25**

Table 5c. Summary of seal responses to disturbances at Double Point during 1997 through 2001. See methods for a description of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	2	-	7	1	70%
1998	1	2	3	-	50%
1999	2	4	11	-	65%
2000	3	5	24	10	57%
2001	1	1	18	2	82%

Table 5d. Summary of the average numbers of disturbances per hour observed at Double Point during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 24	Weekday: 12	45.5	0.26	0.37
	Weekend: 28	Weekend: 39	62.5	0.62	0.71
2001	Weekday: 22	Weekday: 12	42.0	0.29	0.58
	Weekend: 18	Weekend: 13	39.5	0.33	0.40

Table 6a. Summary data for Drakes Estero and Limantour Estero, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg# Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	1111	NA	257	NA	NA	Weekday: 10 Weekend: 16	Weekday: 3 Weekend: 30	13	1.2%	3	1
1998	753	NA	162	985	NA	Weekday: 11 Weekend: 18	Weekday: 8 Weekend: 24	22	2.9%	2	1
1999	922	NA	285	817	NA	Weekday: 26 Weekend: 19	Weekday: 24 Weekend: 35	27	2.9%	4	2
2000	1020	525.43 se 44.06	376	980	740.83 se 100.58	Weekday: 27 Weekend: 18	Weekday: 43 Weekend: 18	11	1.1%	2	1
2001	1023	594.73 se 44.86	336	1292	727.00 se 90.13	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	18	1.8%	2	1

Table 6b. Sources of potential and actual disturbances at Drakes Estero and Limantour Estero during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	6	-	-	-	1	18	3	5	-	**33**
1998	-	1	-	-	-	26	1	4	-	**32**
1999	1	5	-	-	5	23	11	11	3	**59**
2000	-	6	-	-	9	32	13	19	2	**81**
2001	-	4	1	-	3	20	4	10	2	**44**

Table 6c. Summary of seal responses to disturbances at Drakes Estero and Limantour Estero during 1997 through 2001. Unknown is a disturbance which occurred prior to survey, and the response level is unknown.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	9	-	24	-	73%
1998	11	6	15	-	47%
1999	19	4	31	1	56%
2000	15	4	38	13	54%
2001	7	1	24	3	69%

Table 6d. Summary of the average numbers of disturbances per hour observed at Drakes Estero and Limantour Estero during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 27	Weekday: 43	53.5	0.80	1.04
	Weekend: 18	Weekend: 38	45.3	0.83	0.42
2001	Weekday: 22	Weekday: 20	41.5	0.48	0.61
	Weekend: 21	Weekend: 22	45.0	0.49	0.71

Table 7a. Summary data for Tomales Point, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	420	NA	153	NA	NA	Weekday: 8 Weekend: 1	Weekday: 2 Weekend: 1	3	0.7%	2	1
1998	437	NA	74	504	NA	Weekday: 13 Weekend: 16	Weekday: 3 Weekend: 6	5	1.1%	3	3
1999	430	NA	151	460	NA	Weekday:19 Weekend: 15	Weekday: 5 Weekend: 0	10	2.3%	3	1
2000	451	206.41 se 30.42	189	311	210.33 se 40.61	Weekday: 14 Weekend: 13	Weekday: 12 Weekend: 11	5	1.1%	1	0
2001	487	196.25 se 28.98	194	221	329.14 se 31.06	Weekday: 14 Weekend: 18	Weekday: 6 Weekend: 17	1	0.2%	0	0

Table 7b. Sources of potential and actual disturbances at Tomales Point during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	2	-	1	-	**3**
1998	3	-	-	-	-	4	-	2	-	**9**
1999	1	-	-	-	-	2	1	-	1	**5**
2000	8	-	-	-	4	6	-	4	1	**23**
2001	-	-	-	-	3	19	-	1	-	**23**

Table 7c. Summary of seal responses to disturbances at Tomales Point during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey, and the response level is unknown.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	3	-	100%
1998	1	1	7	-	78%
1999	-	-	3	1	75%
2000	3	3	3	10	16%
2001	1	-	6	13	30%

Table 7d. Summary of the average number of disturbances per hour observed at Tomales Point during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 14:	Weekday: 12	46.5	0.26	0.43
	Weekend: 13	Weekend: 11	43.8	0.25	0.24
2001	Weekday: 14	Weekday: 6	34.0	0.18	0.34
	Weekend: 18	Weekend: 17	41.5	0.41	0.43

Table 8a. Summary data for Tomales Bay, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	530	NA	141	NA	NA	Weekday: 8 Weekend: 1	Weekday: 0 Weekend: 0	14	2.6%	0	1
1998	290	NA	34	310	NA	Weekday: 12 Weekend: 14	Weekday: 7 Weekend: 11	8	2.8%	2	1
1999	625	NA	190	347	NA	Weekday: 19 Weekend: 15	Weekday: 11 Weekend: 4	17	2.7%	1	1
2000	541	354.75 se 31.40	188	290	280.50 se 6.10	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	17	3.1%	0	2
2001	611	353.38 se 26.96	179	316	176.57 se 31.81	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	12	2.0%	0	1

Table 8b. Sources of potential and actual disturbances at Tomales Bay during 1997 through 2001.

	Motor boat	Non-motor boat	Clammer	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	6	4	-	-	1	4	-	3	-	**18**
1999	7	-	-	-	-	3	2	2	1	**15**
2000	15	2	6	-	1	-	-	-	-	**24**
2001	17	5	6	-	-	1	-	-	-	**29**

Table 8c. Summary of seal responses to disturbances at Tomales Bay during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey and the response level is unknown. See methods on definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	8	5	5	-	28%
1999	2	5	3	1	27%
2000	4	1	9	3	53%
2001	4	2	11	3	55%

Table 8d. Summary of the average numbers of disturbances per hour observed at Tomales Bay during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 12	Weekday: 5	42.0	0.12	0.24
	Weekend: 13	Weekend: 19	43.8	0.43	0.56
2001	Weekday: 15	Weekday: 3	13.3	0.23	0.41
	Weekend: 19	Weekend: 26	20.3	1.28	2.52

Table 9a. Summary data for Bolinas Lagoon, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	212	NA	51	NA	NA	Weekday: 1 Weekend: 2	Weekday: 0 Weekend: 0	5	2.4%	0	1
1998	143	NA	47	267	NA	Weekday: 12 Weekend: 0	Weekday: 5 Weekend: 0	8	5.6%	2	1
1999	192	NA	59	322	NA	Weekday: 18 Weekend: 2	Weekday: 18 Weekend: 4	7	3.6%	0	0
2000	273	163.10 SE 31.41	108	388	352.66 SE 35.48	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	9	3.3%	1	2
2001	295	197.90 SE 14.12	123	401	307.57 SE 29.58	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	9	3.1%	2	1

Table 9b. Sources of potential and actual disturbances at Bolinas Lagoon during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	-	-	3	-	-	1	1	-	-	**5**
1999	-	2	-	-	1	4	6	6	3	**22**
2000	-	5	-	-	-	-	3	3	-	**11**
2001	-	12	-	1	1	6	4	13	2	**39**

Table 9c. Summary of seal responses to disturbances at Bolinas Lagoon during 1997 through 2001. Unknown is a disturbance which occurred prior to survey and the response level is unknown. See methods for definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	3	1	-	1	0%
1999	5	-	15	1	71%
2000	-	-	11	-	100%
2001	5	1	31	-	84%

Table 9d. Summary of the average numbers of disturbances per hour observed at Bolinas Lagoon during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 6	Weekday: 4	17.8	0.23	0.25
	Weekend: 9	Weekend: 7	22.5	0.31	0.36
2001	Weekday: 17	Weekday: 14	42.0	0.33	0.34
	Weekend: 18	Weekend: 24	45.5	0.55	0.50

Table 10a. Summary data for Duxbury Reef, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1999	98	NA	10	NA	NA	Weekday: 7 Weekend: 1	Weekday: 0 Weekend: 1	1	1%	0	0
2000	112	31.66 se 12.01	20	10	5 se 5.05	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	2	1.8%	0	0
2001	71	32.85 se 4.91	10	99	37.50 se 15.63	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	2	2.8%	0	0

Table 10b. Sources of potential and actual disturbances at Duxbury Reef during 1999 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other
1999	-	-	-	-	-	1	-	-	1
2000	-	1	-	-	-	1	-	-	2
2001	-	-	-	-	-	6	-	-	6

Table 10c. Summary of seal responses to disturbances at Duxbury Reef during 1999 through 2001. Unknown is a disturbance which occurred prior to a survey, and the response level is unknown. See methods for definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1999	-	-	-	1	0%
2000	-	-	-	2	0%
2001	-	-	3	3	50%

Table 10d. Summary of the average numbers of disturbances per hour observed at Duxbury Reef during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 4	Weekday: 0	3.0	0	0
	Weekend: 7	Weekend: 2	6.0	0.33	0.79
2001	Weekday: 15	Weekday: 2	8.3	0.24	0.70
	Weekend: 17	Weekend: 4	9	0.44	1.12

Table 11a. Summary data for Point Reyes Headland, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	141	NA	24	466	NA	Weekday: 5 Weekend: 2	Weekday: 0 Weekend: 0	0	0	NA	0
1998	150	NA	24	282	NA	Weekday: 13 Weekend: 4	Weekday: 0 Weekend: 0	4	2.7%	1	3
1999	168	NA	38	431	NA	Weekday: 27 Weekend: 4	Weekday: 2 Weekend: 0	2	1.2%	0	0
2000	149	113.62 se 14.84	45	276	179.25 se 36.81	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	2	1.3%	0	1
2001	131	88.22 se 10.64	51	295	238.00 se 31.67	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	2	1.5%	0	0

Table 11b. Sources of potential and actual disturbances at Point Reyes Headland during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	-	-	-	-	-	-	-	-	-	**0**
1999	2	-	-	-	-	-	-	-	-	**2**
2000	-	-	-	-	1	-	-	1	-	**2**
2001	-	-	-	-	1	-	-	-	-	**1**

Table 11c. Summary of seal responses to disturbances at Point Reyes Headland during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey and the response level is unknown. See methods for a description of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	-	-	-	-	0%
1999	-	1	-	1	0%
2000	-	1	-	1	0%
2001	1	-	-	-	0%

Table 11d. Summary of the average numbers of disturbances per hour observed at Point Reyes Headland during 2000 and 2001 sons. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 19	Weekday: 2	50.3	0.04	0.12
	Weekend: 3	Weekend: 0	9	0	0
2001	Weekday: 7	Weekday: 0	21.5	0	0
	Weekend: 8	Weekend: 1	27.3	0.04	0.07

Table 12a. Harbor seal census summary for the San Francisco Bay Area during the 1998 breeding season. NA = data not available.

Date	Location	Total Count	Pups
4/19/98	Jenner	140	5
	Tomales Bay	135	10
	Tomales Point	239	68
	Point Reyes Headlands	49	3
	Drakes/Limantour	499	67
	Double Point	412	71
	Bolinas Lagoon	106	31
	Fitzgerald Marine Reserve	107	7
	San Mateo Co.	65	10
	Sonoma Co.	0	0
	Sea Ranch	108	29
	South Bean Hollow	NA	NA
	Richmond Bridge	NA	NA
	Yerba Buena	NA	NA
	Mowry Slough	NA	NA
	Grand Total	**1,860**	**301**
5/3/98	Jenner	249	12
	Tomales Bay	290	11
	Tomales Point	192	52
	Point Reyes Headlands	62	20
	Drakes/Limantour	583	126
	Double Point	551	160
	Bolinas Lagoon	88	0
	Fitzgerald Marine Reserve	NA	NA
	San Mateo Co.	155	25
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	68	7
	Richmond Bridge	NA	NA
	Yerba Buena	NA	NA
	Mowry Slough	NA	NA
	Grand Total	**2,238**	**413**
5/6/98	Jenner	NA	NA
	Tomales Bay	290	30
	Tomales Point	437	48
	Point Reyes Headlands	102	18
	Drakes/Limantour	661	192
	Double Point	708	144
	Bolinas Lagoon	113	36
	Fitzgerald Marine Reserve	NA	NA
	San Mateo Co.	NA	NA
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	61	7
	Richmond Bridge	113	8
	Yerba Buena	110	2
	Mowry Slough	NA	NA
	Grand Total	**2,595**	**485**
5/30/98	Jenner	NA	NA
	Tomales Bay	218	14
	Tomales Point	214	17
	Point Reyes Headlands	113	14
	Drakes/Limantour	429	96
	Double Point	585	13
	Bolinas Lagoon	120	25
	Fitzgerald Marine Reserve	217	6
	San Mateo Co.	NA	NA
	Sonoma Co.	183	16
	Sea Ranch	NA	NA
	South Bean Hollow	68	10
	Richmond Bridge	121	4
	Yerba Buena	129	4
	Mowry Slough	10	0
	Grand Total	**2,407**	**219**
6/28/98	Jenner	NA	NA
	Tomales Bay	218	2
	Tomales Point	504	2
	Point Reyes Headlands	282	1
	Drakes/Limantour	932	3
	Double Point	573	12
	Bolinas Lagoon	151	3
	Fitzgerald Marine Reserve	102	2
	San Mateo Co.	134	27
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	89	1
	Yerba Buena	122	0
	Mowry Slough	128	0
	Grand Total	**3,235**	**53**

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Table 12b. (Page 1 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
4/18/99	Tomales Bay	187	23
	Tomales Point	103	9
	Point Reyes Headlands	53	6
	Drakes/Limantour	458	74
	Double Point	558	123
	Bolinas Lagoon	104	13
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	114	21
	Yerba Buena	72	3
	Mowry Slough	243	78
	Grand Total	**1892**	**350**
4/25/99	Tomales Bay	308	47
	Tomales Point	35	0
	Point Reyes Headlands	55	12
	Drakes/Limantour	615	208
	Double Point	890	283
	Bolinas Lagoon	147	40
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	108	18
	Yerba Buena	113	4
	Mowry Slough	135	62
	Grand Total	**2406**	**674**
5/10/99	Tomales Bay	625	143
	Tomales Point	232	75
	Point Reyes Headlands	74	29
	Drakes/Limantour	922	237
	Double Point	648	163
	Bolinas Lagoon	146	48
	San Mateo Co.	512	89
	Russian River.	208	24
	South Bean Hollow	NA	
	Richmond Bridge	111	21
	Yerba Buena	NA	NA
	Corte Madera	7	1
	Brooks Island	17	3
	Mowry Slough	132	43
	Grand Total	**3634**	**876**
5/16/99	Tomales Bay	260	55
	Tomales Point	380	71
	Point Reyes Headlands	116	38
	Drakes/Limantour	463	138
	Double Point	738	325
	Bolinas Lagoon	NA	NA
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	108	12
	Yerba Buena	95	7
	Mowry Slough	76	18
	Grand Total	**2236**	**664**

Table 12b. continued next page

00033002 NPS-PWR-B04-00007-000009 Page 64 of 66

Table 12b. (Page 2 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
5/30/99	Tomales Bay	214	35
	Tomales Point	63	13
	Point Reyes Headlands	88	15
	Drakes/Limantour	293	45
	Double Point	411	81
	Bolinas Lagoon	164	50
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	127	5
	Yerba Buena	110	0
	Mowry Slough	55	7
	Grand Total	**1525**	**251**
6/6/99	Tomales Bay	192	NA
	Tomales Point	147	NA
	Point Reyes Headlands	73	13
	Drakes/Limantour	297	31
	Double Point	428	62
	Duxbury Reef	98	10
	Bolinas Lagoon	142	38
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	139	7
	Yerba Buena	144	1
	Mowry Slough	92	8
	Grand Total	**1752**	**170**

Date	Locations	Total Count	Pups
6/30/99	Tomales Bay	347	0
	Tomales Point	209	0
	Point Reyes Headlands	FOG	FOG
	Drakes/Limantour	624	0
	Double Point	483	0
	Bolinas Lagoon	NA	NA
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	117	2
	Yerba Buena	181	2
	Mowry Slough	203	0
	Grand Total	**2164**	**4**
7/17/99	Tomales Bay	319	-
	Tomales Point	460	-
	Point Reyes Headlands	431	-
	Drakes/Limantour	995	-
	Double Point	300	-
	Duxbury Reef	NA	-
	Bolinas Lagoon	288	-
	San Mateo Co.	NA	-
	Russian River	NA	-
	South Bean Hollow	NA	-
	Richmond Bridge	83	2
	Yerba Buena	NA	NA
	Mowry Slough	135	0
	Grand Total	**3011**	**2**

Table 12b. continued next page

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Table 12b. (page 3 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
7/28/99	Tomales Bay	284	0
	Tomales Point	261	0
	Point Reyes Headlands	190	0
	Drakes/Limantour	451	0
	Double Point	32	0
	Bolinas Lagoon	251	0
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	107	0
	Yerba Buena	137	0
	Mowry Slough	117	0
	Grand Total	**1830**	**0**

United States Department of the Interior

NATIONAL PARK SERVICE

Pacific West Region
Pacific Great Basin Support Office
1111 Jackson Street, Suite 700
Oakland, California 94607

IN REPLY REFER TO:
D5031 (WR-OM)
XU425 02.106

February 21, 2007

Memorandum

To: Superintendent, Point Reyes National Seashore

From: CDR Paul G. Robinson, Regional Public Health Consultant, PWR-FM

Subject: Drakes Bay Oyster Employee Housing Evaluations

A public health evaluation of three employee housing units at the Drakes Bay Oyster Company was conducted at Point Reyes National Seashore on February 13, 2007. Kevin McKay, Special Park Uses Coordinator, represented the park and assisted with the evaluation. The owner of Drakes Bay Oyster Company, Kevin Lunny, was also present.

Findings

All three units are manufactured homes. One is in fair condition. The other two are in very poor condition. Rather than catalog the numerous structural health and safety deficiencies for each home, I've compiled them into a single list below. Many of the conditions were found in multiple units, and oftentimes multiple times in one unit. I've also included photos illustrating these conditions.

Conditions observed:

1. Multiple leaks in the roofs.
2. Water stained and cracked ceiling tiles.
3. Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering.
4. Rotting and water damaged wall paneling.
5. Rotting and water damaged window sills.
6. Poorly fitting windows.
7. Poorly fitting doors with malfunctioning or no latch or locking mechanism.
8. Poor skirting around the base of the trailers.
9. Debris and garbage accumulating in the crawl spaces below the trailers.
10. Deteriorating floor insulation falling off the bottom of the trailers in the crawl space.
11. Pervasive interior water damage and severely deteriorated flooring, especially in bathrooms around sinks, toilets, bathtubs, and shower stalls.
12. Poorly installed and leaking plumbing fixtures and drains.
13. Light bulb sockets without light bulbs.
14. Partially installed bathroom sinks.
15. Dilapidated kitchen and bathroom cabinetry.
16. Evidence of recent rodent activity.

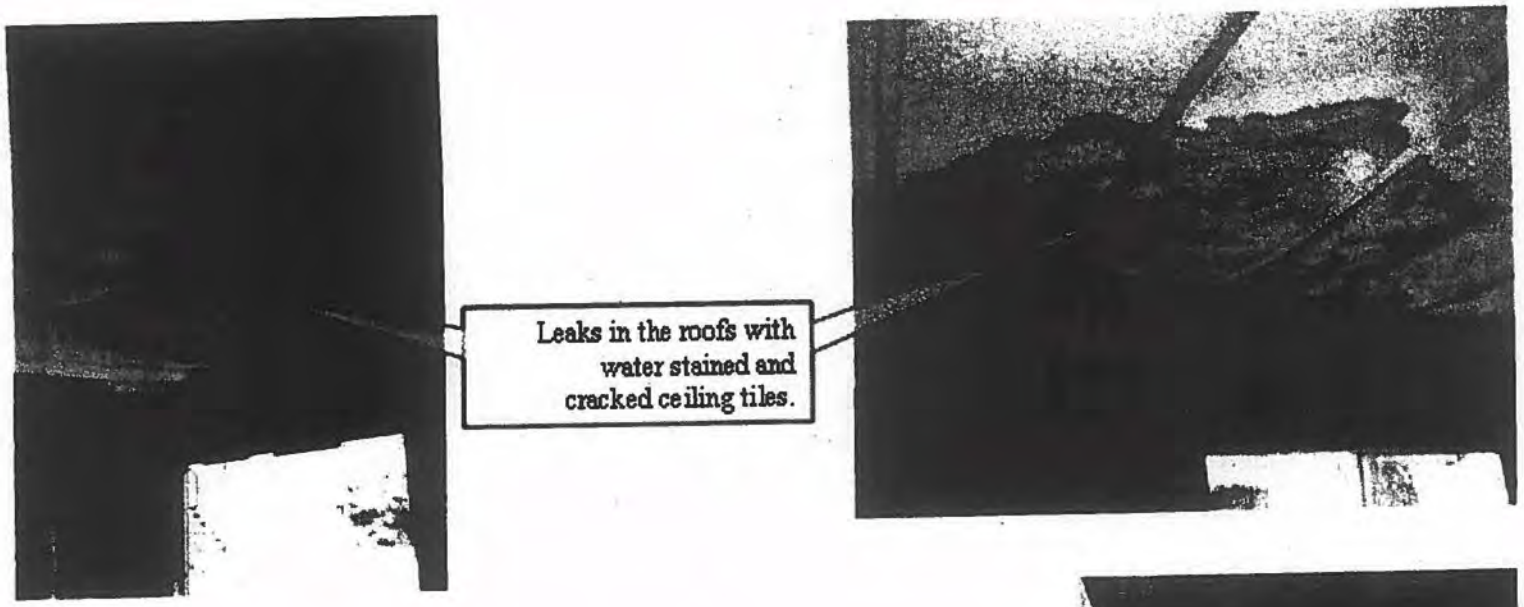
17. Damaged or missing floor heat vents.
18. Severely damaged back porch perched over the lagoon.
19. Missing water heater closet door, exposing water heater to weather and physical damage.
20. Gas cook tops that were not connected or were not functioning.

Recommendations

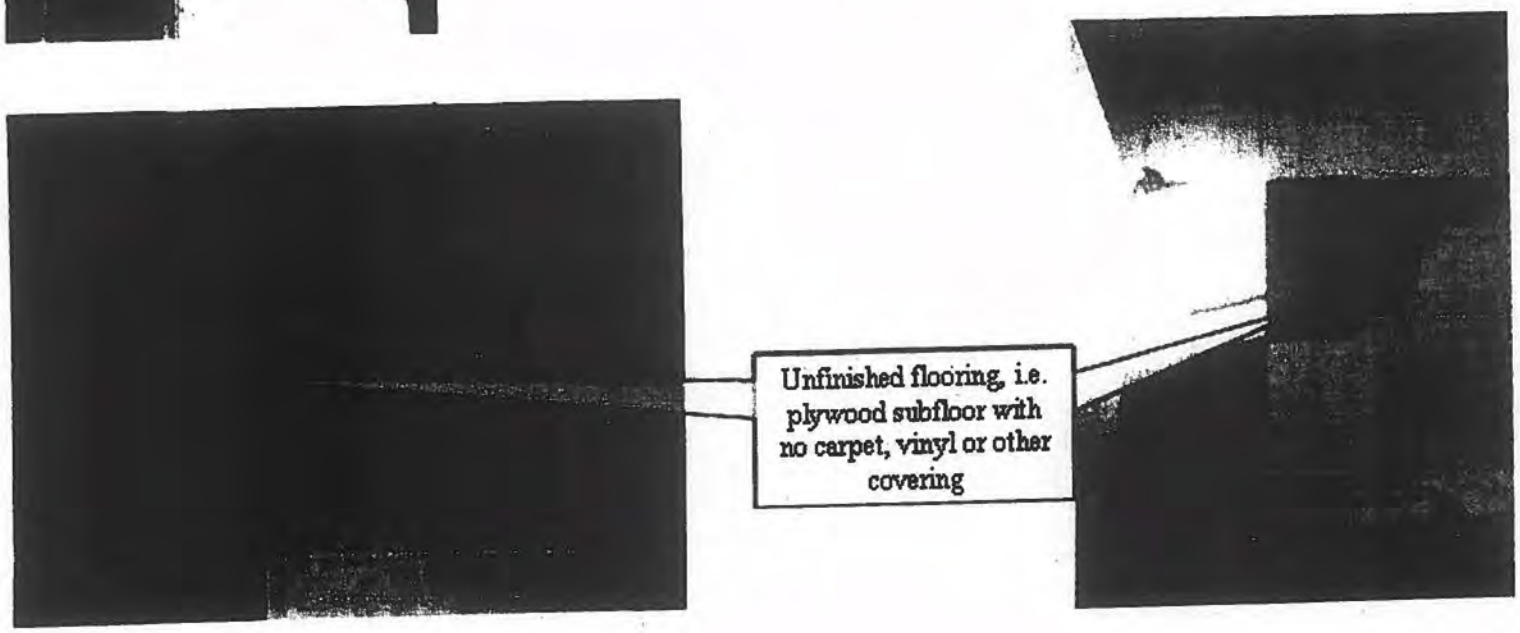
Two of the manufactured homes were in an advanced state of disrepair and would require a great deal of work to rehabilitate them. The evidence of multiple leaks throughout these structures and severely water damaged floors, walls and ceilings, suggests a prolonged period of exposure to water. Replacing flooring, and wall and ceiling panels will not address the probable extensive structural damage to framing, etc., but will only cover it up for a time. The structural components of these two units should be inspected by someone knowledgeable structural engineering to determine the severity and extent of the damage. Any work done without taking this step should be considered a temporary, short-term fix.

The blue house (Luis') was in the best condition of the three inspected. It appears to have sustained minimal interior water damage. Ceilings were not water stained. No significant rot was apparent in the walls, especially under the window sills were moisture from condensation tends to accumulate. Measures to rehab this structure should not be as extensive.

Cc: Colin Smith, Chief Ranger, PORE
Kevin McKay, Special Park Uses Coordinator, PORE
CAPT Charles Higgins, Director, NPS Public Health Program, WASO

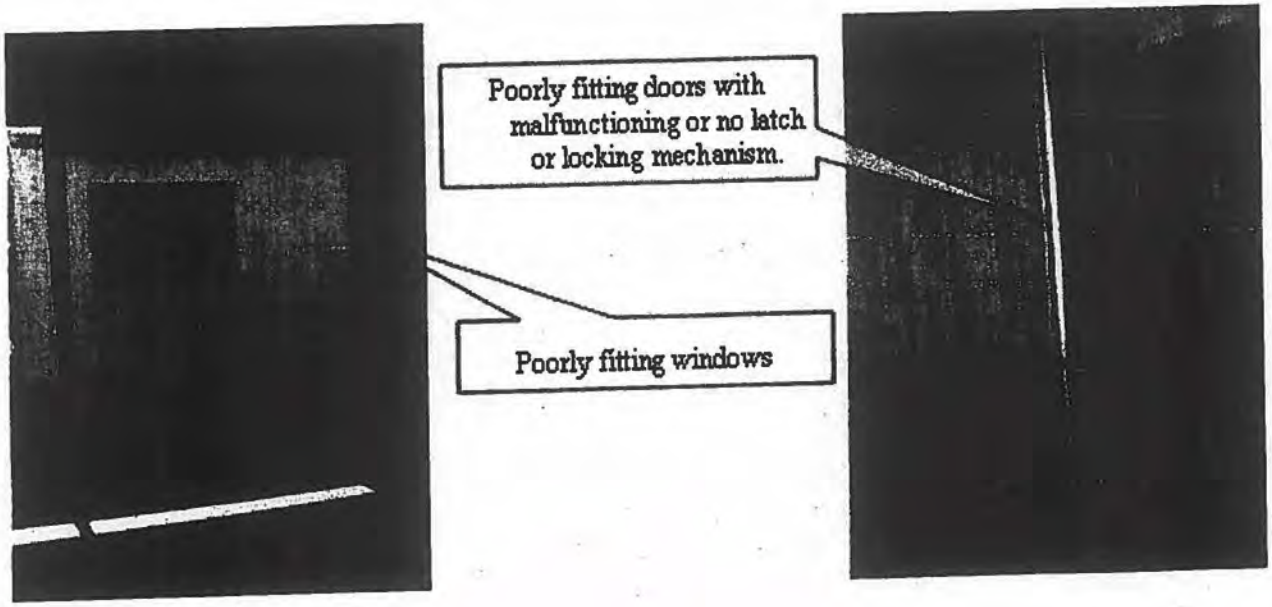


Leaks in the roofs with water stained and cracked ceiling tiles.



Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering

00033002 NPS-PWR-B04-00012-000001 Page 3 of 8



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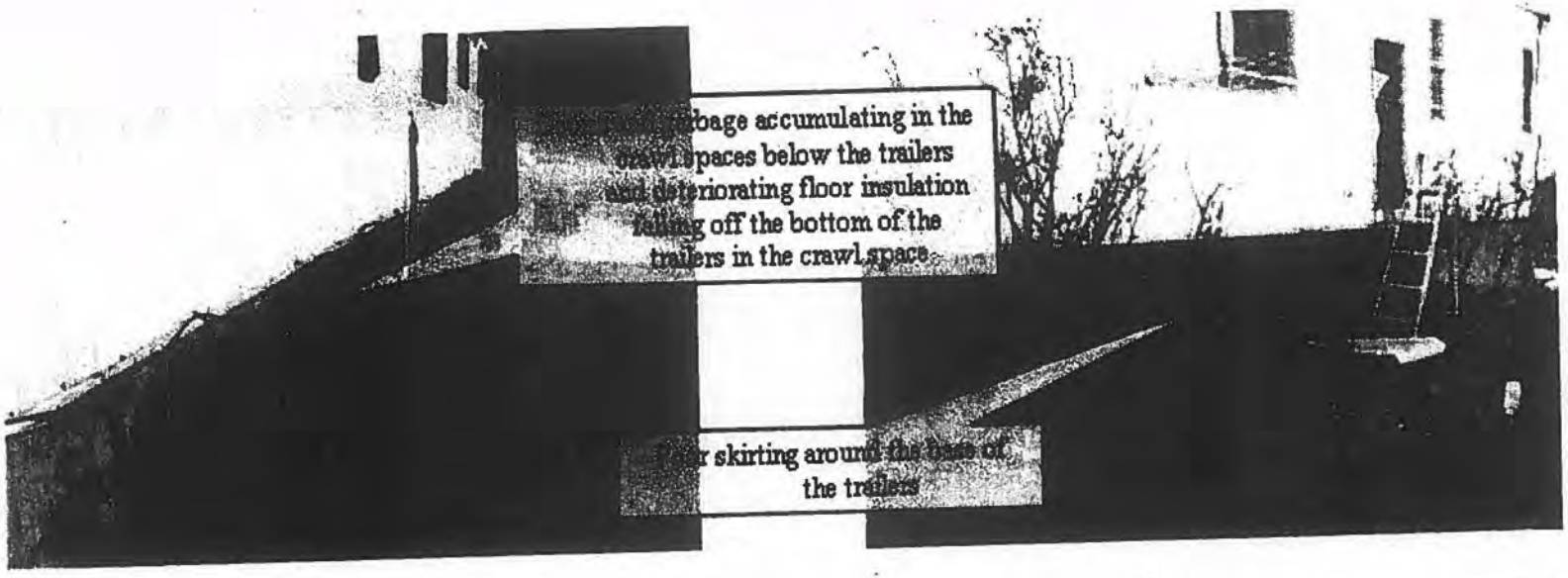

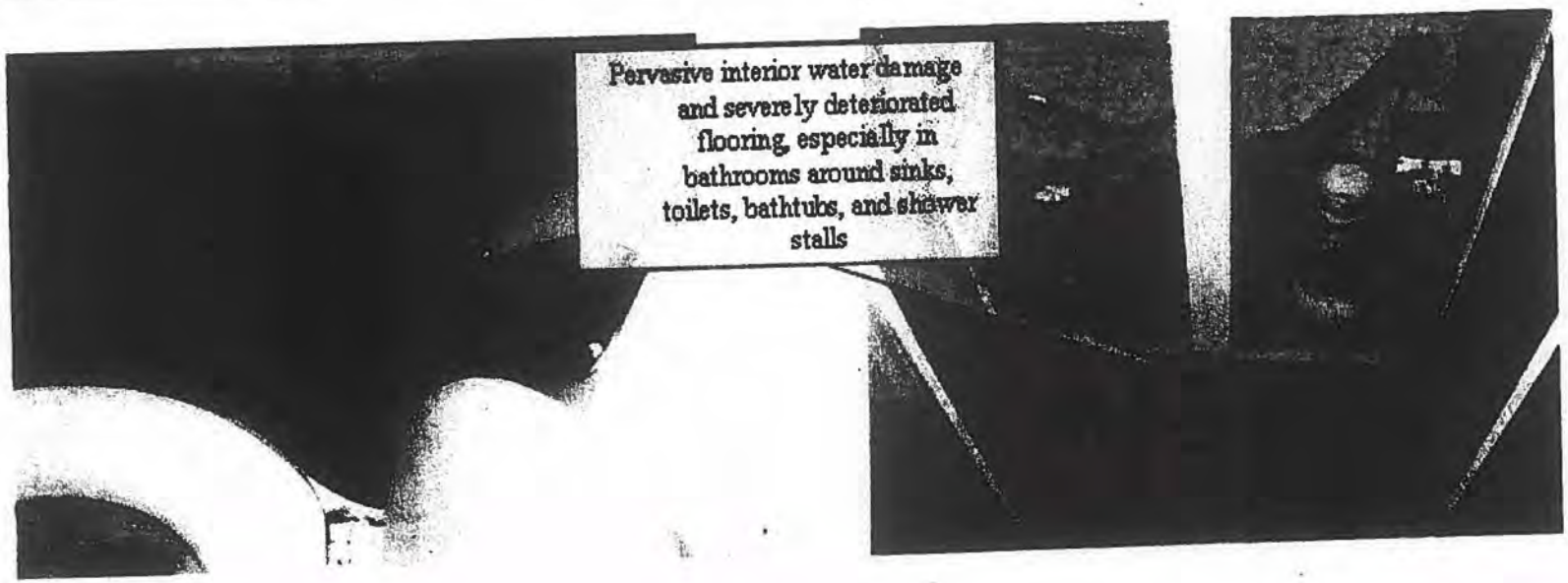

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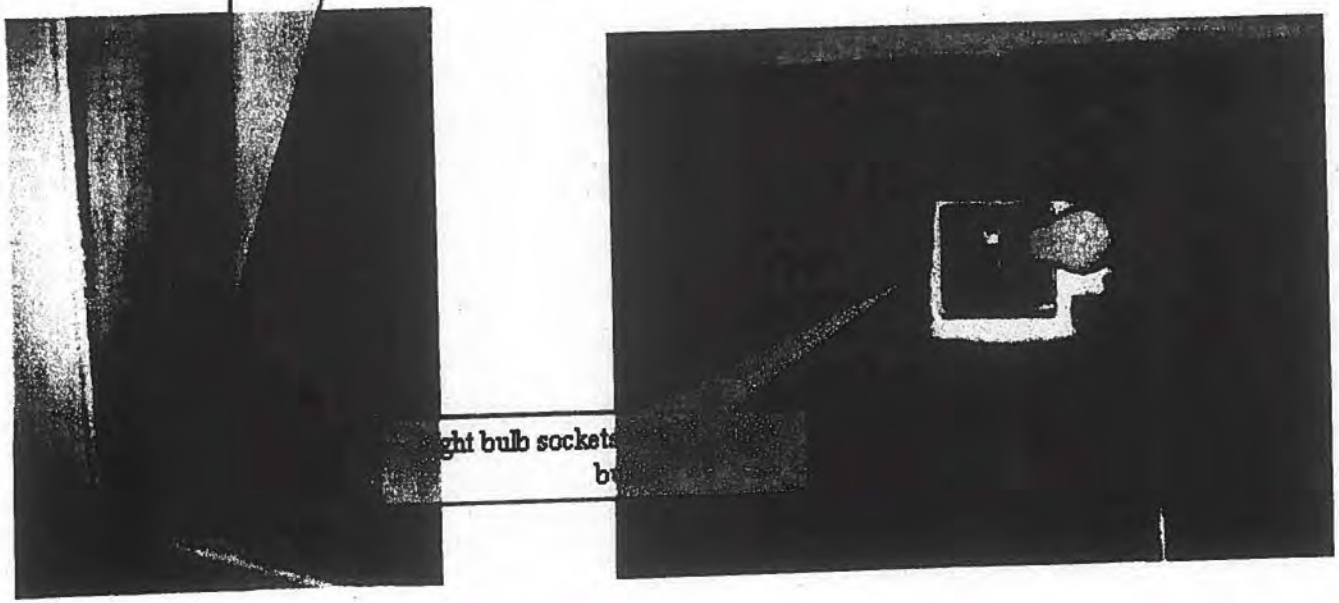
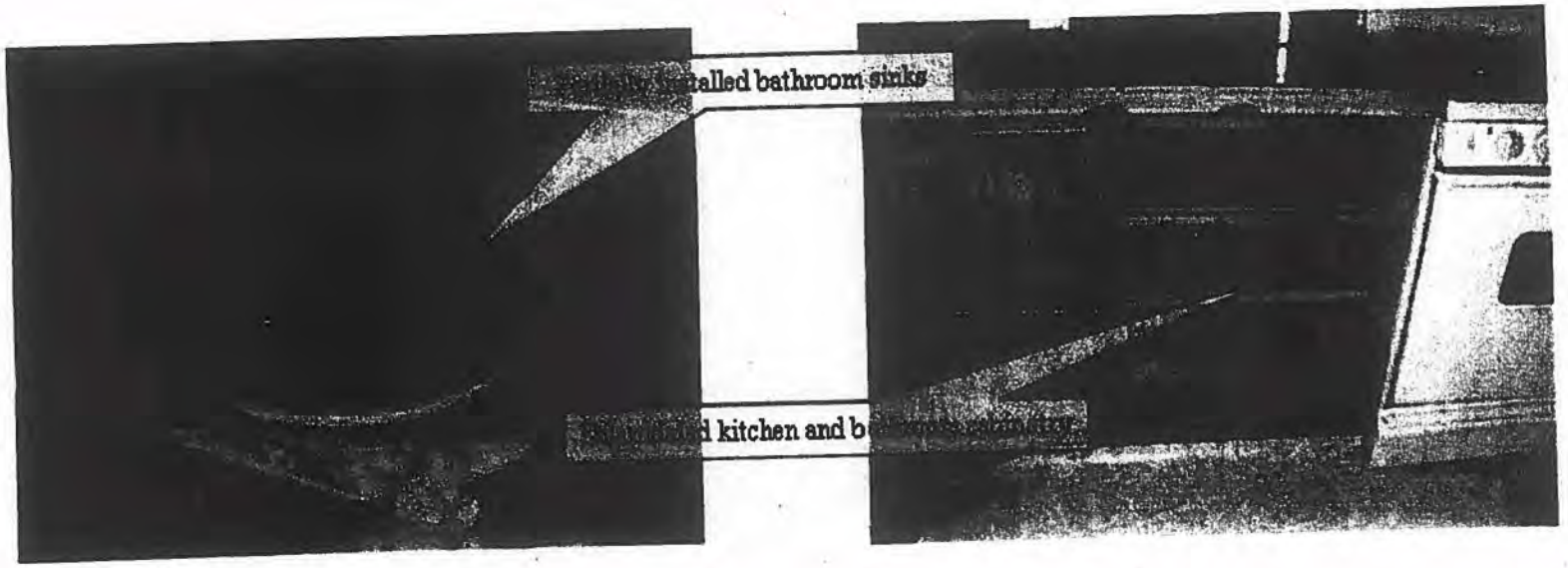
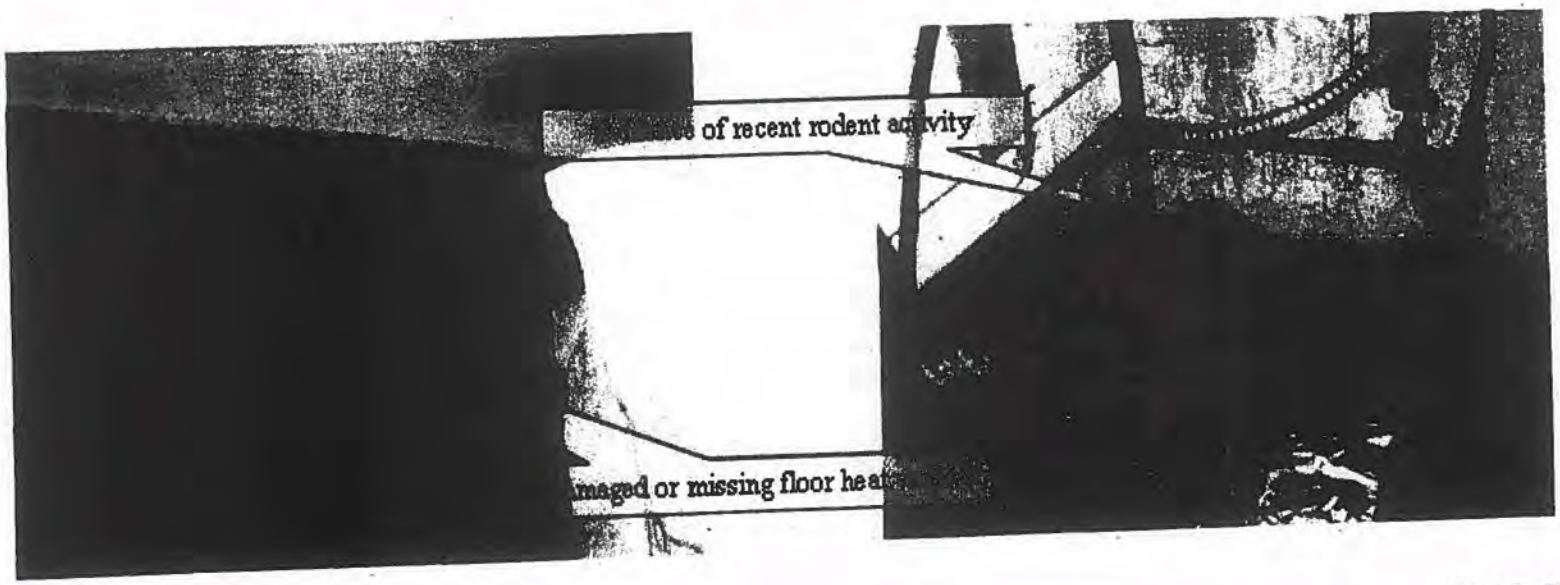
Poorly installed and leaking
plumbing fixtures and drains



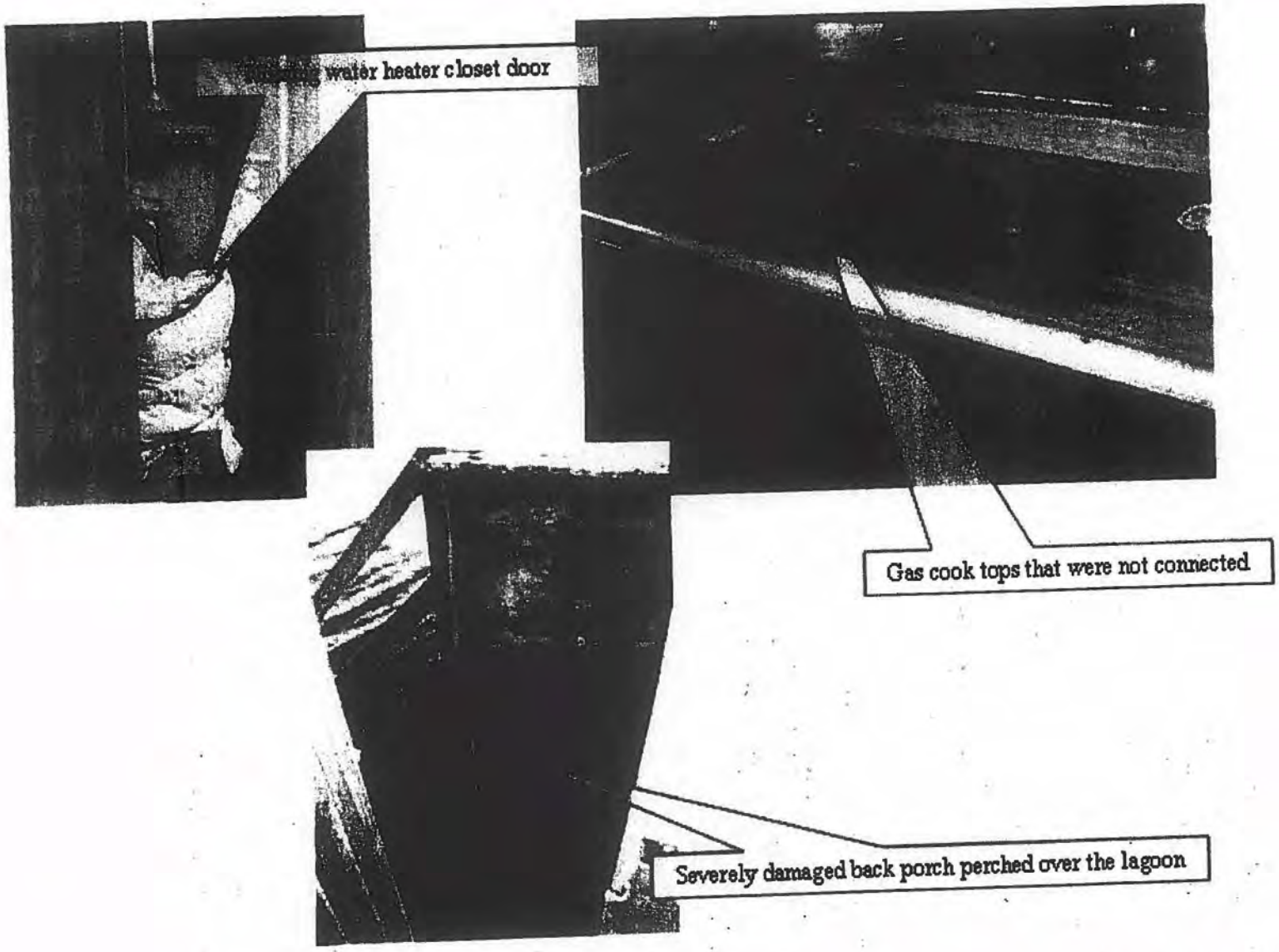
ght bulb sockets
b

00033002 NPS-PWR-B04-00012-000001 Page 6 of 8





00033002 NPS-PWR-B04-00012-000001 Page 7 of 8



00033002 NPS-PWR-B04-00012-000001 Page 8 of 8

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L3019

November 16, 2004

Tom Johnson
Johnson Oyster Company
P. O. Box 69
17171 Sir Francis Drake Blvd.
Inverness, CA 94937

Dear Tom:

As we discussed at our meeting on October 15, 2004, Paul Robinson from the Public Health Service will be conducting a public health inspection of your operation including employee housing. This inspection will occur November 23, 2004 at 10:00 am.

Mr. Robinson will be accompanied by Chief Ranger Colin Smith and will inspection the residences for safety issues. At the conclusion of the inspection, he will provide you with a list of any deficiencies and recommendations for corrective action.

If you have any questions, please contact Chief Ranger Smith at (415) 464-5175.

Sincerely,

Don L. Neubacher
Superintendent

Cc: Kevin Lunny

Don Neubacher
11/17/2004 02:42 PM
PST

To: Paul Robinson/OAKLAND/NPS@NPS
cc: Colin Smith/PORE/NPS@NPS, Ann Nelson/PORE/NPS@NPS, Don Neubacher/PORE/NPS@NPS
Subject: Re: PORE: Johnson Oyster Farm Residence Inspection/Clem Miller Food Safety Eval

Paul,

We want you to inspect the JOC retail facilities if you can . They are not that large in size; one building really. Colin sent you that Dept. of Health Service Report.

don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
Paul Robinson

Paul Robinson
11/17/2004 02:17 PM
PST

To: PORE Superintendent
cc: Colin Smith/PORE/NPS@NPS
Subject: PORE: Johnson Oyster Farm Residence Inspection/Clem Miller Food Safety Eval

Hello Don,

As Colin may have already told you, I plan to be at Point Reyes on Tuesday Nov 23 to inspect the residences at the Johnson Oyster Farm. I will also conduct a food safety evaluation at the Clem Miller Ed Center. On completion of my activities, I will prepare and forward a report of my findings to you.

Please don't hesitate to contact me if you have any questions.

Paul

****

Paul G. Robinson, P.E.
Regional Public Health Consultant
Pacific West Regional Office
1111 Jackson Street
Oakland, CA 94607
510 817-1375
****

2007-00509
2007-496

United States Department of the Interior

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Pacific West Region
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Oakland, California 94607-4807

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INTERP.
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MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

IN REPLY REFER TO:
D5031 (PWR-FM)

November 30, 2004

Memorandum

To: Superintendent, Point Reyes National Seashore

From: Paul Robinson, Regional Public Health Consultant, PWR-FM

Subject: Clem Miller Education Center Food Safety Evaluation and Johnson Oyster Company Residential and Commercial Facility Inspection

On November 23, 2004 I conducted a public health evaluation of the employee housing and commercial facilities at the Johnson's Oyster Company. I also performed a food safety evaluation at the Clem Miller Education Center kitchen. Colin Smith, Chief Ranger, represented the park and assisted with the evaluations.

JOHNSON'S OYSTER COMPANY

Inspection of the employee housing at Johnson's Oyster Company included observing the structural condition of the residences and examining the water and wastewater systems. The commercial oyster harvesting and processing facility was also evaluated.

I strongly recommend that the homes be revisited in 30 to 45 days to ensure that deficiencies are corrected in a timely manner.

Main House

1. The electrical outlets in the kitchen within four feet of the sink must be GFCI protected.
2. Provide a battery for the smoke detector. Consider installing smoke alarms in all bedrooms.
3. Install a GFCI protected electrical outlet in the bathroom.

House on the Hill

1. Check the kitchen window sill for rain water leakage and repair if necessary.
2. Repair the severe water damage observed around the bathtub.
3. Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
4. Install a GFCI protected electrical outlet in the bathroom.
5. Install plate on living room light switch.

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Trailer

1. This entire structure is in a poor state of repair and would require major work to bring it up to acceptable standards. Water damage was apparent in numerous places in the ceiling and around windows throughout the trailer. Window glass was broken in several windows. The front entry porch consists of rotting wood boards.
2. Check the kitchen window sill for leakage and repair if necessary.
3. Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
4. While the gas stove burners worked, the knobs to each burner were extremely difficult to turn. These should be repaired.
5. Repair the light fixture in the bedroom.
6. Install another hinge on the bedroom door so that it can open properly.
7. Replace the missing glass in the bedroom window.
8. The shower was severely water damaged requiring extensive repair.
9. Install plates on electrical outlets in the living room.
10. Replace the missing glass in the blue bedroom window.
11. Repair the leaking shower fixture.

Water and Wastewater Systems

The water system provides potable water to the residences and the packing house. It consists of a drilled well located on the slope above the residences, a hydropneumatic tank, and distribution piping. The well is reported to have an adequate sanitary seal, and there are no apparent sources of contamination within a 50 foot radius. Chlorination of the water is not done. Periodic bacteriological testing is done, with no positive results reported.

A communal wastewater system serves the residences and the packing house toilet. The packing house currently does not have a means of disposing process waste, so no processing is done on-site. The wastewater system consists of gravity sewage collection lines, five septic tanks, two lift stations, forcemain, and gravity fed leachfield. Sewage flows by gravity from the homes to the septic tanks where solids are removed. The effluent is then pumped from the lift stations via forcemain to the leachfield. The leachfield consists of four separate sections. Flow to the sections is controlled by a series of diversion valves that are manually operated periodically to ensure equal distribution of sewage effluent to all leachfield sections. The capacity of the wastewater system is more than adequate since it was designed to serve 28 bedrooms where it currently serves only the three homes.

1. The well cap has an open hole with a rope passing through it. This hole does not exclude insects and other contaminants from entering the well, thereby potentially contaminating the drinking water. Seal the hole and install a screened vent should on the casing.
2. Chlorination is not provided in the water system. As a result, there is no residual maintained in the distribution piping to protect water quality from contamination resulting from leaks, backflow, or other causes. Install chlorination equipment to ensure adequate disinfection. This would require additional modifications to the system since a minimum chlorine contact time is required before the first point of use in the distribution system.
3. The lift stations are not equipped with a high liquid level alarm. Should one or both of the pumps fail, raw sewage would surface creating a public health hazard. Consider installing a visual/audible high liquid level alarm.

Oyster Harvesting/Processing Facility

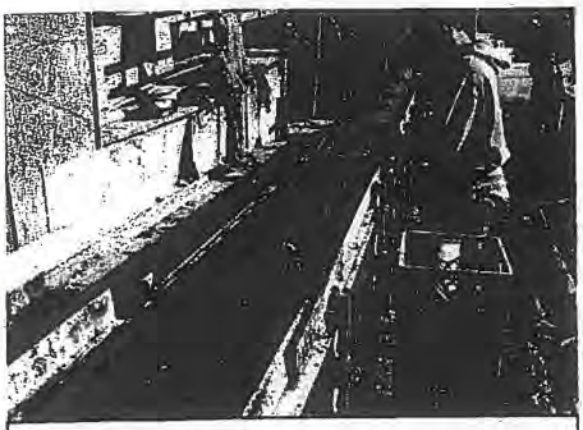


Figure 1: Conveyor belt for cleaning and separating

found that seven individuals reported illness after eating oysters purchased from Johnson's. The FDB suspected the illnesses were most likely caused by temperature abuse resulting from significant time periods between harvest and

Figure 3: Oysters stored in walk-in refrigerator

belt where they are cleaned and separated (Fig 1). Single oysters are bagged and placed in a walk-in refrigerator (Fig 3) before being sold directly to the public at the facility. During this visit, bags of oysters were sitting on the processing dock at ambient temperature (Fig 2). There was no indication how long they had been there. Most of

shelled oysters are taken to a processing facility off-site where they are shucked and canned. The processed and canned oysters are then transported

The commercial oyster harvesting and processing facility was inspected at the request of the park superintendent. It resulted from a foodborne illness outbreak that occurred in July 2004 as a result of visitors eating contaminated oysters purchased at Johnson's. An outbreak investigation ensued, conducted by the California Department of Health Food and Drug Branch (FDB). The investigation

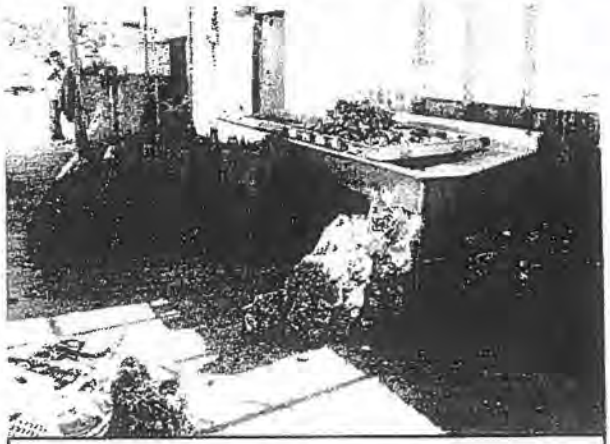


Figure 1: Shelled Oysters on the Dock

placement of the oysters under time/temperature control.

The facilities consist of harvesting beds, conveyor belt for separating the oysters, a walk-in refrigerator, packing facilities, and a refrigerated display case. The oysters are harvested, placed on the conveyor

Figure 4: Refrigerated Display Case

the

back to Johnson's where it is kept in a refrigerated display case (Fig 4) and sold to the public. This display case had a window missing and appeared to be in a state of disrepair. One of the window panes in the unit was broken and had subsequently been covered by a piece of cardboard to keep cold air from escaping. The temperature inside the unit was about 37F, less than the minimum required.

Oysters were at one time processed and packed at this facility. However, due to the recent foodborne illness outbreak and the fact that the plant has no approved wastewater disposal system, oysters are no longer shucked and processed here.

Additional time is required for the NPS Public Health Program to sort out the various regulatory and public health issues. A more detailed evaluation will be provided to the park at a future date.

CLEM MILLER EDUCATION CENTER

This was the second visit to the Clem Miller Education Center using the new systems-based approach in evaluating food safety. While requiring more time to complete the evaluation, this process provides a much more in-depth assessment of the food safety practices of the operation.

The Clem Miller Education Center is an unusual operation in that it is not a commercial food service establishment serving food to customers or park visitors. The Ed Center kitchen operates under two different modes depending on the season. During the summer months, the Ed Center staffs the kitchen with three workers who purchase and prepare meals for the science camp residents that come on five-day programs throughout the summer. In the off-summer months, independent school groups use the facility, bringing and preparing their own food. The Ed Center does not provide kitchen staff during this period. The Ed Center manager briefs group members who are assigned to prepare meals for the group on arrival. The briefing involves a mixture of lecture, demonstration, and hands-on activities to train these group food handlers on the basics of food safety.

The Ed Center kitchen received a Satisfactory score. No violations of the Food Code were observed. I was impressed with the very high degree of control the operation had over their food preparation processes. The main areas of concern in this type of operation are cross contamination from barehand contact and raw meats to ready-to-eat foods, and cooking temperatures. During my three hours observing food preparation, I did not see a single incident of barehand contact or cross contamination. The food preparers were very conscientious, taking care to wear gloves and to wash hands between glove changes, which occurred with most changes of activity. Cooking temperatures were also above minimum required. This approach to training food handlers was very effective and could possibly serve as a model for similar operations in this and other parks.

Cc via email:
Colin Smith, Chief Ranger, PORE
Terry Ewing, Concessions Management Specialist, PWRO
CAPT Chuck Higgins, Director, NPS Public Health Program, WASO
LCDR Jason Thomas, Deputy Director, NPS Public Health Program, WASO

Paul Robinson
11/30/2004 10:36 AM
PST

To: PORE Superintendent
cc: Colin Smith/PORE/NPS@NPS, Charles Higgins/WASO/NPS@NPS, Jason Thomas/Partner/NPS@NPS, Terry Ewing/OAKLAND/NPS@NPS
Subject: PORE: Johnson's Oyster Company/Clem Miller Ed Center Inspections.

Hello Don,

Attached is a summary report of the food safety evaluation of the Clem Miller Education Center kitchen and a facility inspection of the Johnson Oyster Company oyster packing facility I conducted at Point Reyes on November 23, 2004. I have also mailed this report to you under separate cover. Copies of the Food Safety Report has been mailed to Colin Smith for his records. The report provides preliminary findings at Johnson's Oyster Company. A more in-depth report on Johnson's will be forthcoming.

Please do not hesitate to contact me with any questions you may have.

Sincerely,

Paul

POREClemMiller1104.dc

****
Paul G. Robinson, P.E.
Regional Public Health Consultant
Pacific West Regional Office
1111 Jackson Street
Oakland, CA 94607
510 817-1375
****

L1425
02-106

December 7, 2004

Mr. Tom Johnson
Johnson Oyster Company
P. O. Box 69
Inverness, CA 94937

Dear Mr. Johnson:

On November 23, 2004, US Public Health Service consultant Paul Robinson conducted a public health evaluation of the employee housing and commercial facilities at the Johnson Oyster Company. Chief Ranger Colin Smith represented the Point Reyes National Seashore and assisted with the evaluation.

Inspection of the employee housing at Johnson's Oyster Company included observing the structural condition of the residences and examining the water and wastewater systems. The commercial oyster harvesting and processing facility was also evaluated. Mr. Robinson strongly recommend that the homes be revisited in 30 to 45 days to ensure that deficiencies are corrected in a timely manner.

Main House

1. The electrical outlets in the kitchen within four feet of the sink must be GFCI protected.
2. Provide a battery for the smoke detector. Consider installing smoke alarms in all bedrooms.
3. Install a GFCI protected electrical outlet in the bathroom.

House on the Hill

1. Check the kitchen window sill for rain water leakage and repair if necessary.
2. Repair the severe water damage observed around the bathtub.
3. Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
4. Install a GFCI protected electrical outlet in the bathroom.
5. Install plate on living room light switch.

Trailer

1. This entire structure is in a poor state of repair and would require major work to bring it up to acceptable standards. Water damage was apparent in numerous places in the ceiling and around windows throughout the trailer. Window glass was broken in several windows. The front entry porch consists of rotting wood boards.
2. Check the kitchen window sill for leakage and repair if necessary.
3. Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
4. While the gas stove burners worked, the knobs to each burner were extremely difficult to turn. These should be repaired.

5. Repair the light fixture in the bedroom.
6. Install another hinge on the bedroom door so that it can open properly.
7. Replace the missing glass in the bedroom window.
8. The shower was severely water damaged requiring extensive repair.
9. Install plates on electrical outlets in the living room.
10. Replace the missing glass in the blue bedroom window.
11. Repair the leaking shower fixture.

Thank you for your attention to these matters.

Sincerely,

Don L. Neubacher
Superintendent

PRobinson:an 12/07/04

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

May 9, 2005

Dear Rancher:

During the period of May 24, 2005 through May 26, 2005 Paul Robinson with the United States Public Health Service will be conducting on site inspections of employee residential units on ranches situated within Point Reyes National Seashore. National Park Service Staff will accompany Mr. Robinson. You will be contacted in advance and informed of their scheduled time of arrival.

Inspections will last approximately one or two hours. If you have questions please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111.

On another subject, as we agreed in one of the last meetings, any change in land use (diversification, etc. such as small row crop areas) must be approved in writing before implementation on a case by case basis. This is a condition of your current permit and we want to make sure all approvals and environmental compliance documents are in place. In addition, because this is being done in many cases for economic reasons, we are asking ranchers to produce a brief business plan to ensure the new activity makes economic sense. Finally, if the activity is approved, the rancher will be required to restore the area when the diversification effort ceases (if needed).

We appreciate your cooperation and please contact me or Mark Homrighausen, (415) 464-5172, if you have any questions.

Sincerely,

Don L. Neubacher
Superintendent

KMCKAYkem:05/09/05

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031
XN425 02.106
July 5, 2005

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service (USPHS) recently conducted inspections of ranch employee housing units in Point Reyes National Seashore, June 7, 2005 through June 9, 2005. Point Reyes National Seashore Ranger Gus Conde and Kevin McKay, Special Park Uses Coordinator, accompanied Mr. Robinson. The inspection of employee housing at Drakes Bay (formerly Johnson's) Oyster Company revealed the following items requiring attention. Comments marked with an asterisk (*) indicate recommendations made in previous surveys that remain uncorrected.

Drakes Bay (formerly Johnson's) Oyster Company

Water and Wastewater Systems

The water system provides potable water to the residences and the packing house. It consists of a drilled well located on the slope above the residences, a hydropneumatic tank, and distribution piping. The well is reported to have an adequate sanitary seal, and there are no apparent sources of contamination within a 50 foot radius. Chlorination of the water is not done. Periodic bacteriological testing is done, with no positive results reported.

A communal wastewater system serves the residences and the packing house toilet. The packing house currently does not have a means of disposing process waste, so no processing is done on-site. The wastewater system consists of gravity sewage collection lines, five septic tanks, two lift stations, forcemain, and gravity fed leachfield. Sewage flows by gravity from the homes to the septic tanks where solids are removed. The effluent is then pumped from the lift stations

Water damage was apparent in numerous places in the ceiling and around windows throughout the trailer. Window glass was broken in several windows. The front entry porch consists of rotting wood boards. The owner is considering removing and replacing this trailer.

1. * Check the kitchen windowsill for leakage and repair if necessary.
2. * Install at least one smoke alarm in the house. Consider installing smoke alarms in all bedrooms.
3. * While the gas stove burners worked, the knobs to each burner were extremely difficult to turn. These should be repaired.
4. * Install another hinge on the bedroom door so that it can open properly.
5. * Replace the missing glass in the bedroom window.
6. * The shower was severely water damaged requiring extensive repair.
7. * Replace the missing glass in the blue bedroom window.
8. Check outlets by kitchen and bathroom sinks for GFCI.
9. Repair leak in ceiling.
10. Repair kitchen sink plumbing.
11. Repair the exposed electrical junction box in the hallway.
12. Repair the bathroom shower stall.

Repair the hole in the living room floor by the sliding door.

In order to ensure that deficiencies are corrected in a timely manner, the USPHS has suggested that Point Reyes National Seashore Staff revisit the inspected sites within 30 to 45 days following this notice. You will be contacted regarding scheduling of this visit. Please notify Kevin McKay, (415) 464-5111, if you have questions or concerns. Thank you for your continued cooperation.

Sincerely,

Don L. Neubacher
Superintendent

KMCKAYkem:7/5/05

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

February 24, 2006

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

In anticipation of the annual ranch employee residential unit inspections conducted by the United States Public Health Service, Point Reyes National Seashore Staff will be conducting ranch employee residential unit inspections during the period from March 14, 2006 through March 16, 2006. These inspections will focus on locations where deficiencies were noted in the 2005 Public Health Service Evaluation in order to ensure an improved 2006 evaluation. Inspections will last approximately one or two hours and assess general structural condition in addition to previously noted maintenance items.

You will be contacted in advance and informed of a scheduled time of arrival. If you have questions please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. Thank you for helping us keep Point Reyes National Seashore Ranches safe and healthy.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 2/24/06

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

May 1, 2006

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service has scheduled to conduct on site inspections of employee residential units situated within Point Reyes National Seashore on May 15, 2006 and May 16, 2006. The inspections will last approximately one or two hours and will include an evaluation of water and wastewater systems. National Park Service Staff will accompany Mr. Robinson during the inspections.

You will be contacted prior to May 15, 2006 and informed of a scheduled time of arrival. If you have questions or concerns please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. Thank you for helping to keep Point Reyes National Seashore safe.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 5/1/06

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

July 27, 2006

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service has scheduled to conduct on site inspections of ranch employee residential units situated within Point Reyes National Seashore on August 28, 2006 and August 29, 2006. The inspections will last approximately one or two hours and will include an evaluation of ranch water and wastewater systems. National Park Service Staff will accompany Mr. Robinson during the inspections.

You will be contacted prior to August 28, 2006 and informed of a scheduled time of arrival. If you have questions or concerns please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. Thank you for helping to keep Point Reyes National Seashore Ranches safe.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 7/25/06

D5031

September 8, 2006

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service (USPHS) recently conducted inspections of ranch employee housing units in Point Reyes National Seashore on August 28, 2006 and August 29, 2006. Point Reyes National Seashore Special Park Uses Coordinator, Kevin McKay, accompanied Mr. Robinson on the inspections. As we noted in our recent letter, Mr. Robinson was very impressed with the efforts that many ranchers have made to improve the quality of ranch employee housing. We truly appreciate those efforts and believe that through continued attention, safe and healthy employee housing can be maintained.

The inspection of employee housing at the Drakes Bay Oyster Company Site revealed the following items requiring attention. Comments marked with an asterisk (*) indicate recommendations made in previous surveys that remain uncorrected and additional asterisks indicate the number of years a deficiency has appeared in the inspection report.

Drakes Bay Oyster Company:

Water and Wastewater Systems

The water system provides potable water to the residences and the packing house. It consists of a drilled well located on the slope above the residences, a hydropneumatic tank, and distribution piping. The well is reported to have an adequate sanitary seal, and there are no apparent sources of contamination within a 50 foot radius. Chlorination of the water is not done. Periodic bacteriological testing is done, with no positive results reported.

A communal wastewater system serves the residences and the packing house toilet. The packing house currently does not have a means of disposing process waste, so no processing is done on-site. The wastewater system consists of gravity sewage collection lines, five septic tanks, two lift stations, forcemain, and gravity fed leachfield. Sewage flows by gravity from the homes to the septic tanks where solids are removed. The effluent is then pumped from the lift stations via forcemain to the leachfield. The leachfield consists of four separate sections. Flow to the sections is controlled by a series of diversion valves that are manually operated periodically to ensure equal distribution of sewage effluent to all leachfield sections. The capacity of the wastewater system is more than adequate since it was designed to serve

28 bedrooms where it currently serves only the three homes (12 bedrooms).

1. * The well cap vent is plugged. Remove plug and install a screened casing vent.
2. ** Chlorination is not provided in the water system. As a result, there is no residual maintained in the distribution piping to protect water quality from contamination resulting from leaks, backflow, or other causes. Install chlorination equipment to ensure adequate disinfection. This would require modifications to the system since a minimum chlorine contact time is required before the first point of use in the distribution system.
3. ** The lift stations are not equipped with a high liquid level alarm. Should one or both of the pumps fail, raw sewage would surface creating a public health hazard. Consider installing a visual/audible high liquid level alarm.
4. A pipe in the well pumphouse was leaking. This should be repaired as soon as possible.

Main House

1. * Install a GFCI protected electrical outlet in the bathroom.

House on the Hill

1. Install battery in smoke detector.
2. Repair dry rot by bath tub floor.
3. Fix the gap between entrance door and threshold.

Trailer

This will undergo a complete renovation in the near future. The current tenants will be moved to Luis' house, which is currently being renovated.

Luis' House

This house is currently undergoing a complete renovation and should be finished in the near future.

In order to ensure that deficiencies are corrected in a timely manner, the USPHS has suggested that Point Reyes National Seashore Staff revisit the inspected sites within 30 to 45 days following this notice. You will be contacted regarding progress on repairs and scheduling of a follow up visit. Please notify Kevin McKay, (415) 464-5111, if you have questions or concerns. Thank you for your continued efforts and cooperation.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 9/8/06

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

November 28, 2006

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

As was noted in our previous letter conveying the United States Public Health Service (USPHS) findings regarding inspections of ranch employee residential units within the Park, follow-up inspections were recommended. Point Reyes National Seashore Staff will be conducting follow-up ranch employee residential unit inspections on December 20, 2006. The inspections will focus primarily on locations where deficiencies were noted in the recent 2006 Public Health Service Evaluation. Inspections will last approximately one hour and assess general structural condition in addition to noted items in need of maintenance.

You will be contacted in advance to discuss progress on repairs and informed of a scheduled time of arrival. If you have questions or concerns please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. We appreciate your help in keeping Point Reyes National Seashore Ranches safe and healthy.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 11/16/06

D5031
XL3019 B, G + L 4425 02.106

files

Kevin McKay
12/21/2006 07:30 PM
PST

To: Don Neubacher/PORE/NPS@NPS, Colin Smith/PORE/NPS@NPS
cc: Paul Robinson/OAKLAND/NPS@NPS, Gordon White/PORE/NPS@NPS, Gus Conde/PORE/NPS@NPS
Subject: Update on Ranch Employee Housing

Following is a brief update on our inspections conducted December 20, 2006

Gordon White, Gus Conde and I completed follow up inspections of ranch employee housing at G Ranch, Drakes Bay Oyster Company (DBO), B Ranch and L Ranch. A majority of the housing was in good condition with deficiencies noted in the report issued by the Regional Public Health Consultant Paul Robinson addressed or in at least in the process of being addressed.

The housing mentioned in the Email below was included in this Park inspection however it was an initial inspection of the location as the housing was not in use when Paul Robinson and I visited DBO in August. Since the initial contact with Mrs. Porrata we have subsequently learned that the family living in this housing came down with a communicable disease likely related to their occupancy of the residence. The children were sent home from school as a result.

The trailer is in the process of being worked on and improvements have been made since we were initially contacted by Mrs. Porrata. Drakes Bay Oyster reports that they were approached by the occupants and asked to allow them to live in the residence. The occupants volunteered to improve the residence with supplies purchased by DBO and this work is currently in process.

There is another trailer also apparently occupied that requires substantial work. We informed DBO that we would contact Paul Robinson the Regional Public Health Consultant to schedule an inspection of the trailers on the site.

Kevin

Kevin E. McKay
Special Park Uses Coordinator
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5111
Fax (415) 464-5182
—— Forwarded by Kevin McKay/PORE/NPS on 12/21/2006 06:48 PM ——

Colin Smith
11/07/2006 02:56 PM
PST

To: Kevin McKay/PORE/NPS@NPS
cc: Paul Robinson/OAKLAND/NPS@NPS
Subject: Fw: Drakes Estero Oyster Company employee housing complaint

housing issues at Drakes Bay Oysters

Colin

Colin Smith
Chief Ranger
Point Reyes NS
415 464-5175
—— Forwarded by Colin Smith/PORE/NPS on 11/07/2006 02:55 PM ——

Bruce A Dombrowski
11/07/2006 02:21 PM
PST

To: Colin Smith/PORE/NPS@NPS
cc:
Subject: Drakes Estero Oyster Company employee housing complaint

Memo to Chief Ranger Smith :

On 11/07/2006 while on patrol in vicinity of the Drakes Estero Oyster Company I was contacted by Mrs. Rebecca Porrata, a family friend. She is a public health nurse. She told me that she had just been at the former Mark Johnson residence trailer seeing a family, and that the condition of the unit was very bad. She cited examples such as broken plumbing, a non-working bathtub, graffiti on the walls, and possible septic/sanitation hazards. She also stated that small children reside at the residence and that she was extremely concerned. She told me that someone associated with the Oyster Company keeps telling the family that they will fix the place up, but no work has been performed. Rebecca is also worried that the family may lose their jobs at the oyster company over this issue. I told Rebecca that I was unaware that anyone was living in that trailer and I would inform my supervisor of the situation.

Sincerely.

Bruce Dombrowski
USNPS Ranger

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

January 23, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service has scheduled to inspect the employee housing at Drakes Bay Oyster Company on February 13, 2007. This inspection will focus on the trailers that were not included in the last inspection conducted in August of 2006 because one trailer was unoccupied at that time and the other was to be vacated with the tenants relocating to "Luis' House." General items that were noted in need of attention during the follow-up employee housing inspections conducted by Park Staff on December 20, 2006 included the following: 1) in the family occupied trailer - the flooring was in the process of being worked on, the heating method utilized should be evaluated to ensure that it is adequate, the hot water heater had a leak, GFCI electrical outlets are required near sinks or water sources, gaps around entry doors should be sealed and windows need to be evaluated for leaks and rot. 2) In the second trailer – two broken windows were noted, gaps around entry doors should be sealed, GFCI electrical outlets are required near sinks or water sources, the washing machine was leaking water inside of the trailer, the heating available was inadequate, the plumbing in the bathrooms should be evaluated and windows need to be evaluated for leaks and rot.

These are general observations and not intended to be an exhaustive list of deficiencies. A copy of the United States Public Health Service Evaluation will be provided to you after the inspection on February 13, 2007 is completed. You will be contacted in advance and informed of a scheduled time of arrival.

Please find enclosed the requested additional draft copy of a Special Use Permit for Drakes Bay Oyster Company Operations at the former Johnsons Oyster Company site within Point Reyes National Seashore. If you have questions please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure
KEMcKay:kem 1/23/07

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

March 3, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
P.O. Box 69
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service (USPHS) conducted inspections of three trailer housing units at the Drakes Bay (formerly Johnson's) Oyster Company Site within Point Reyes National Seashore on February 13, 2007. Kevin McKay, Special Park Uses Coordinator, accompanied Mr. Robinson. The inspection of these employee housing units produced the following USPHS findings and recommendations.

Findings

All three units are manufactured homes. One is in fair condition. The other two are in very poor condition. Rather than catalog the numerous structural health and safety deficiencies for each home, I've compiled them into a single list below. Many of the conditions were found in multiple units, and oftentimes multiple times in one unit. I've also included photos illustrating these conditions.

Conditions observed:

1. Multiple leaks in the roofs.
2. Water stained and cracked ceiling tiles.
3. Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering.
4. Rotting and water damaged wall paneling.
5. Rotting and water damaged window sills.
6. Poorly fitting windows.
7. Poorly fitting doors with malfunctioning or no latch or locking mechanism.
8. Poor skirting around the base of the trailers.
9. Debris and garbage accumulating in the crawl spaces below the trailers.
10. Deteriorating floor insulation falling off the bottom of the trailers in the crawl space.
11. Pervasive interior water damage and severely deteriorated flooring, especially in bathrooms around sinks, toilets, bathtubs, and shower stalls.

12. Poorly installed and leaking plumbing fixtures and drains.
13. Light bulb sockets without light bulbs.
14. Partially installed bathroom sinks.
15. Dilapidated kitchen and bathroom cabinetry.
16. Evidence of recent rodent activity.
17. Damaged or missing floor heat vents.
18. Severely damaged back porch perched over the lagoon.
19. Missing water heater closet door, exposing water heater to weather and physical damage.
20. Gas cook tops that were not connected or were not functioning.

Recommendations

Two of the manufactured homes were in an advanced state of disrepair and would require a great deal of work to rehabilitate them. The evidence of multiple leaks throughout these structures and severely water damaged floors, walls and ceilings, suggests a prolonged period of exposure to water. Replacing flooring, and wall and ceiling panels will not address the probable extensive structural damage to framing, etc., but will only cover it up for a time. The structural components of these two units should be inspected by someone knowledgeable (about) structural engineering to determine the severity and extent of the damage. Any work done without taking this step should be considered a temporary, short-term fix.

The blue house (Luis') was in the best condition of the three inspected. It appears to have sustained minimal interior water damage. Ceilings were not water stained. No significant rot was apparent in the walls, especially under the window sills where moisture from condensation tends to accumulate. Measures to rehab this structure should not be as extensive.

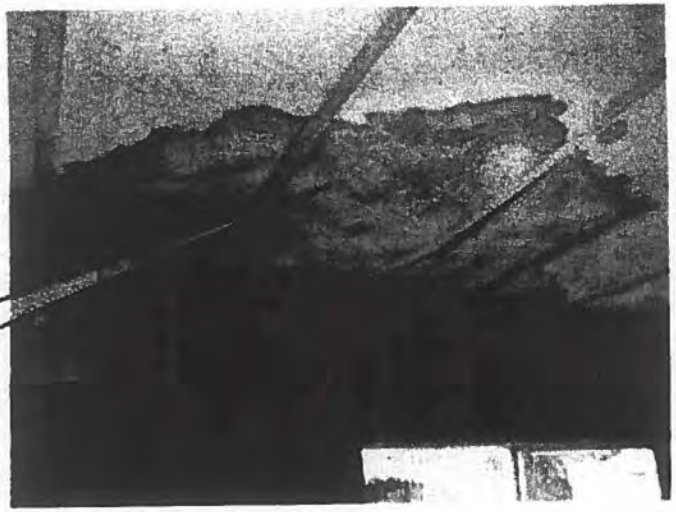
These findings and recommendations should be addressed immediately. Please notify Kevin McKay, Special Park Uses Coordinator, when the recommendations have been addressed and repairs have been completed so that a follow up inspection can be arranged with the USPHS. Kevin can be contacted at (415) 464-5111. We have enclosed the pictures that were submitted with the report.

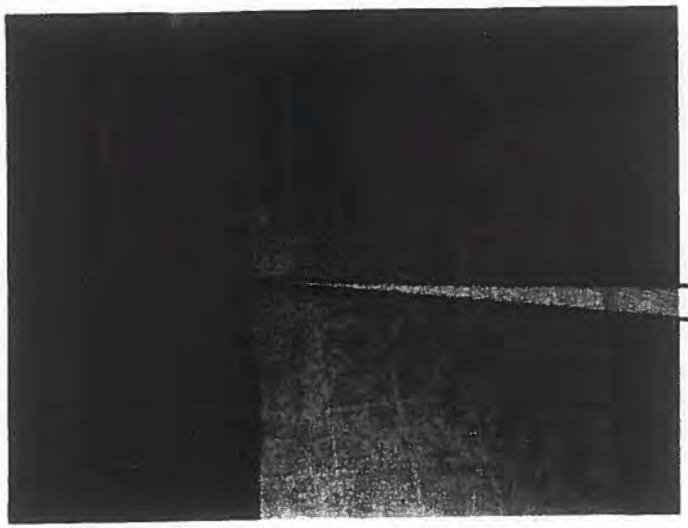
Sincerely,

Don L. Neubacher
Superintendent

Enclosure

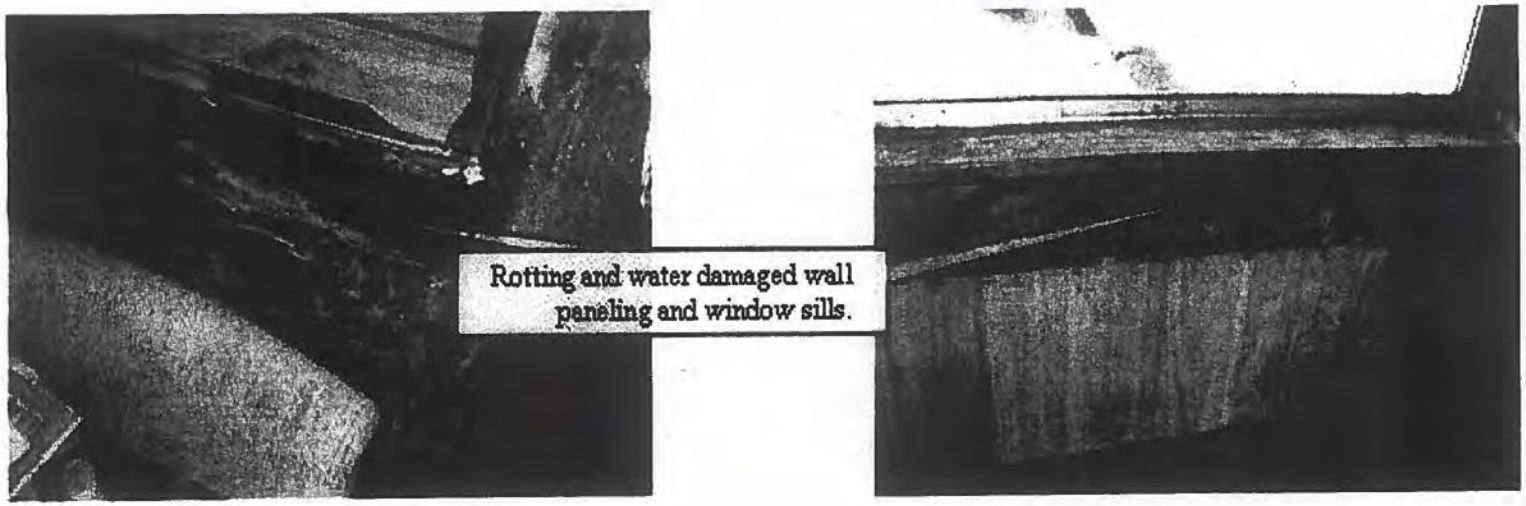
Leaks in the roofs with water stained and cracked ceiling tiles.

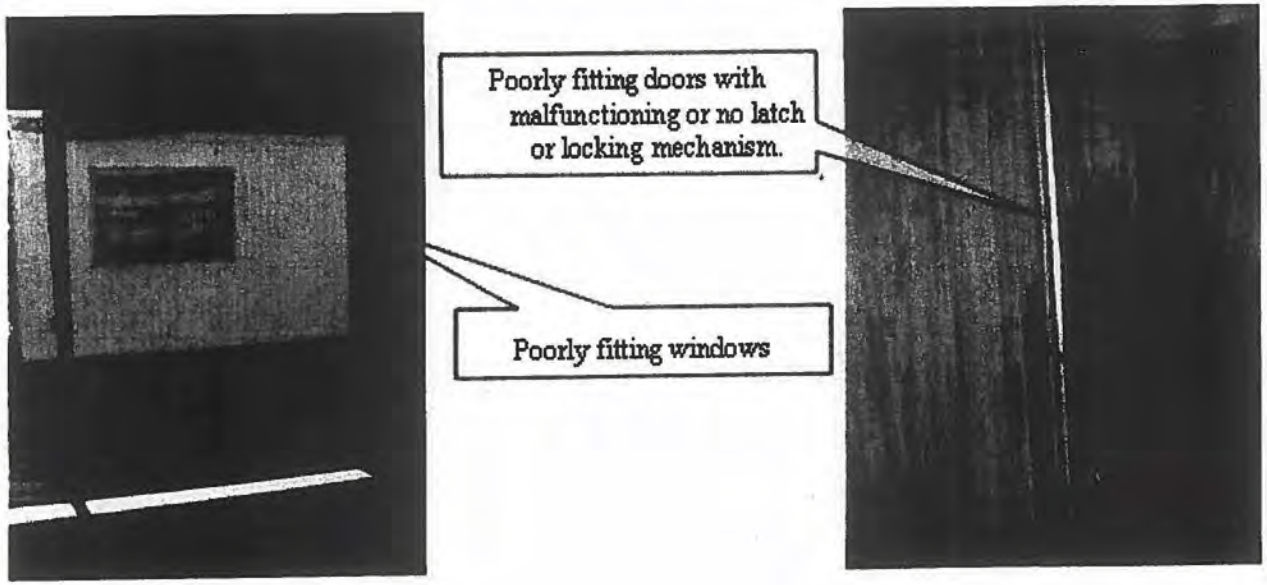




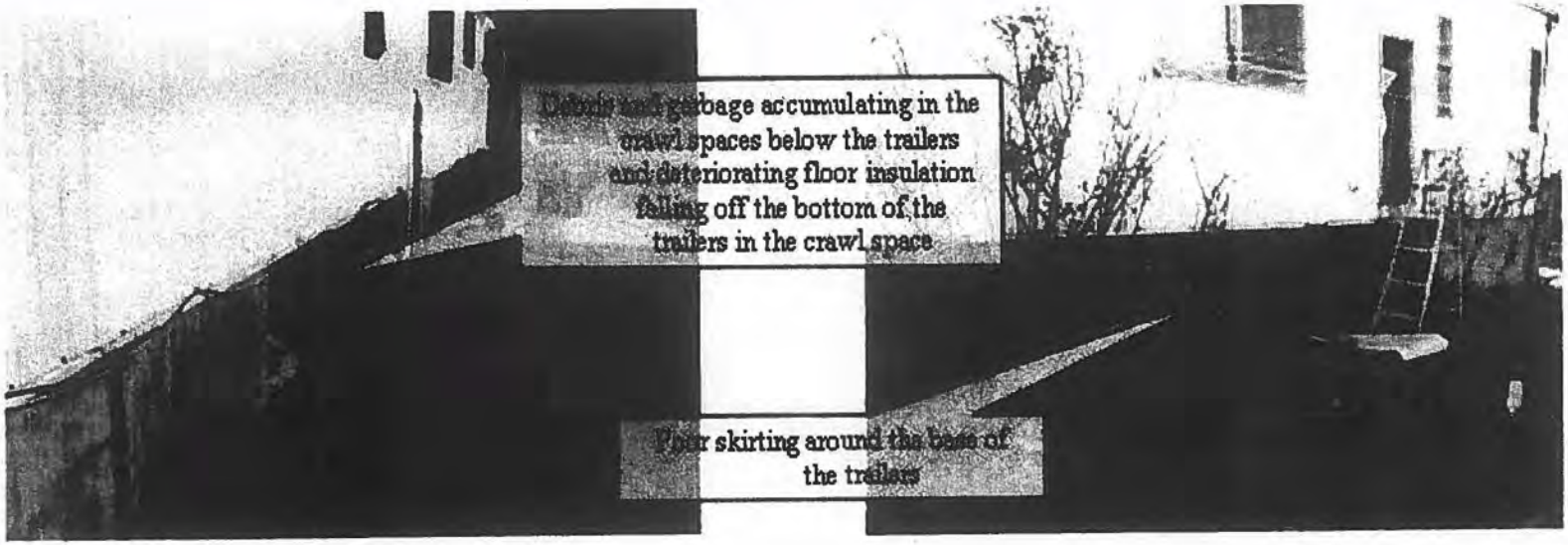
Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering

00033002 NPS-PWR-B04-00013-000001 Page 24 of 239





00033002 NPS-PWR-B04-00013-000001 Page 25 of 239



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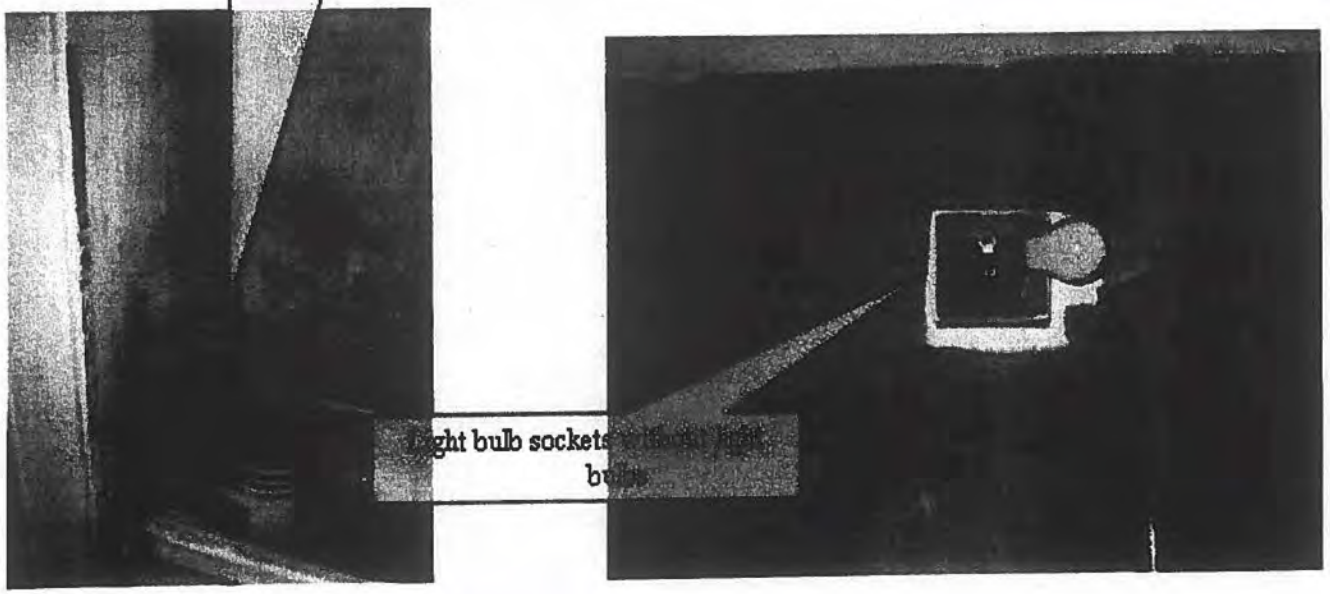
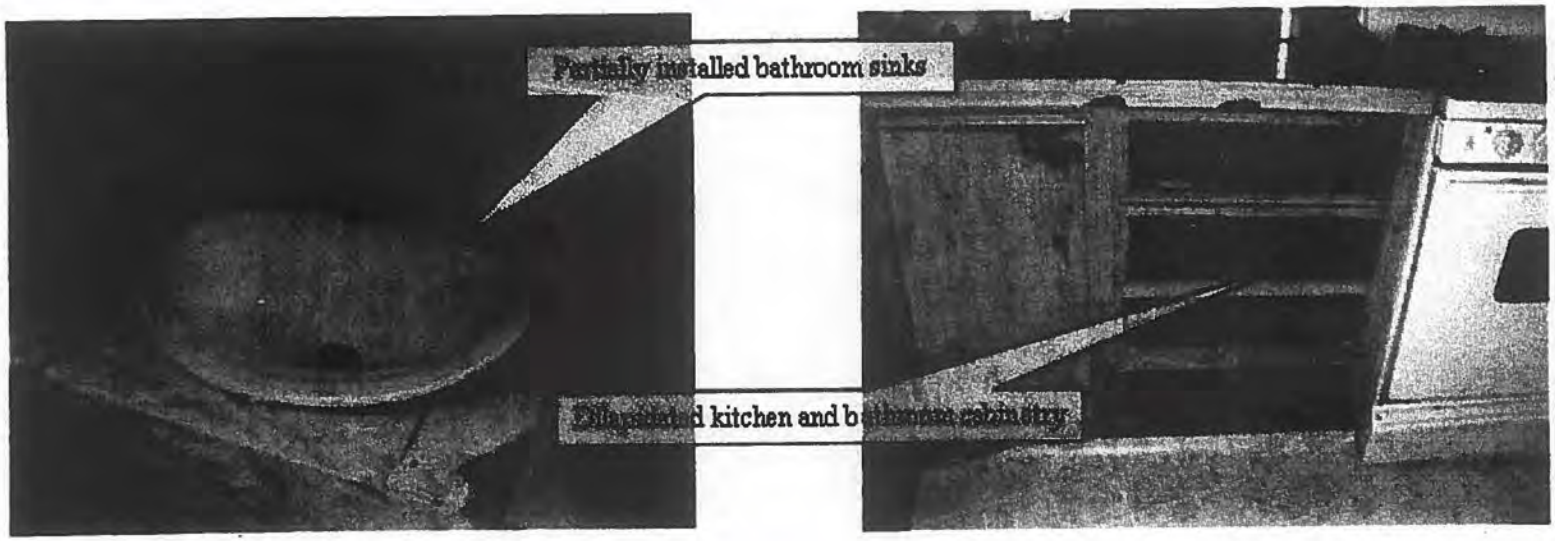
Poorly installed and leaking plumbing fixtures and drains

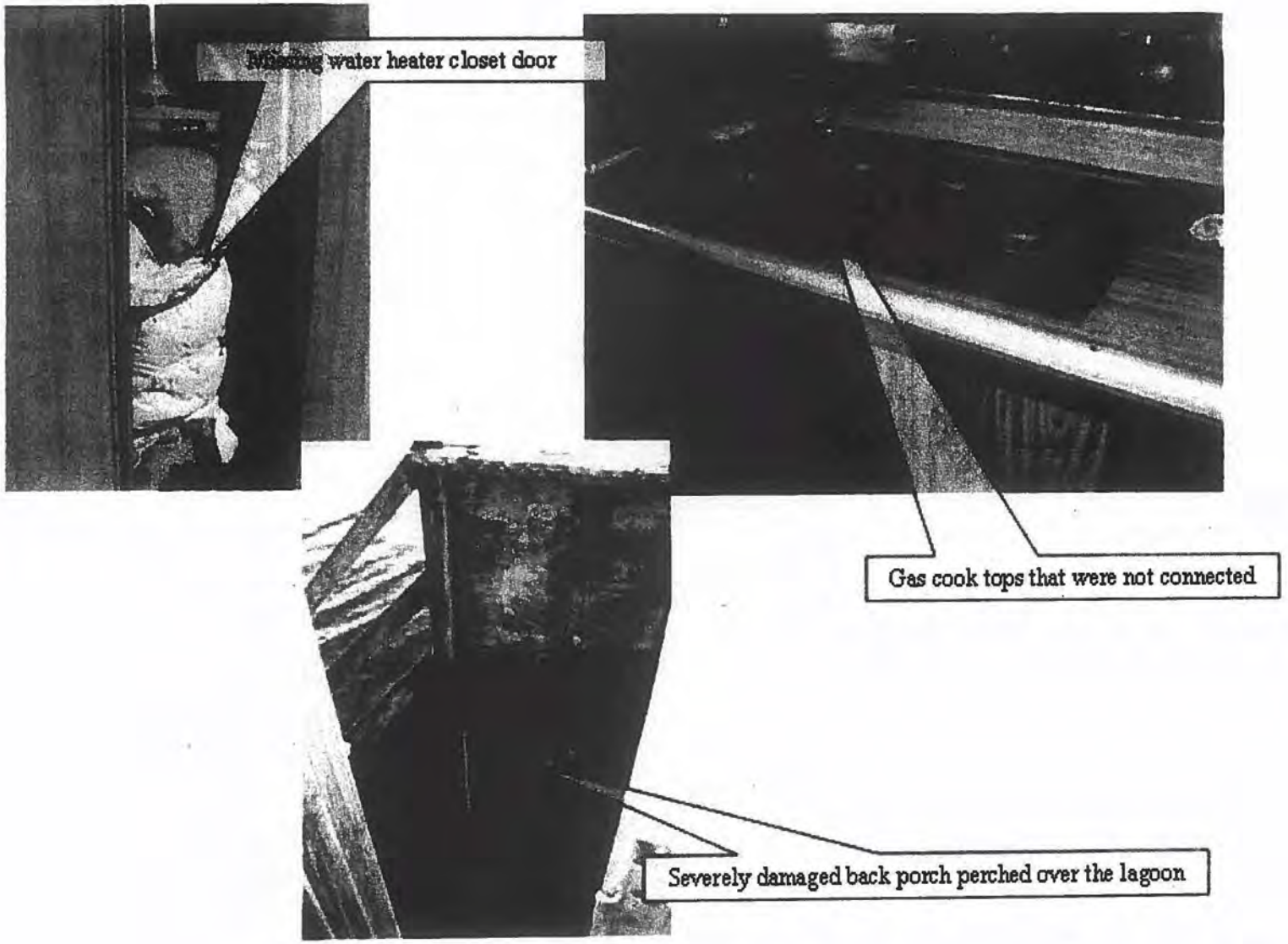


ght bulb sockets
bu

00033002 NPS-PWR-B04-00013-000001 Page 27 of 239



00033002 NPS-PWR-B04-00013-000001 Page 28 of 239



00033002 NPS-PWR-B04-00013-000001 Page 29 of 239

United States Department of the Interior

NATIONAL PARK SERVICE

Pacific West Region
Pacific Great Basin Support Office
1111 Jackson Street, Suite 700
Oakland, California 94607

IN REPLY REFER TO:
D5031 (WR-OM)
X4425 02.106

February 21, 2007

Memorandum

To: Superintendent, Point Reyes National Seashore

From: CDR Paul G. Robinson, Regional Public Health Consultant, PWR-FM

Subject: Drakes Bay Oyster Employee Housing Evaluations

A public health evaluation of three employee housing units at the Drakes Bay Oyster Company was conducted at Point Reyes National Seashore on February 13, 2007. Kevin McKay, Special Park Uses Coordinator, represented the park and assisted with the evaluation. The owner of Drakes Bay Oyster Company, Kevin Lunny, was also present.

Findings

All three units are manufactured homes. One is in fair condition. The other two are in very poor condition. Rather than catalog the numerous structural health and safety deficiencies for each home, I've compiled them into a single list below. Many of the conditions were found in multiple units, and oftentimes multiple times in one unit. I've also included photos illustrating these conditions.

Conditions observed:

1. Multiple leaks in the roofs.
2. Water stained and cracked ceiling tiles.
3. Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering.
4. Rotting and water damaged wall paneling.
5. Rotting and water damaged window sills.
6. Poorly fitting windows.
7. Poorly fitting doors with malfunctioning or no latch or locking mechanism.
8. Poor skirting around the base of the trailers.
9. Debris and garbage accumulating in the crawl spaces below the trailers.
10. Deteriorating floor insulation falling off the bottom of the trailers in the crawl space.
11. Pervasive interior water damage and severely deteriorated flooring, especially in bathrooms around sinks, toilets, bathtubs, and shower stalls.
12. Poorly installed and leaking plumbing fixtures and drains.
13. Light bulb sockets without light bulbs.
14. Partially installed bathroom sinks.
15. Dilapidated kitchen and bathroom cabinetry.
16. Evidence of recent rodent activity.

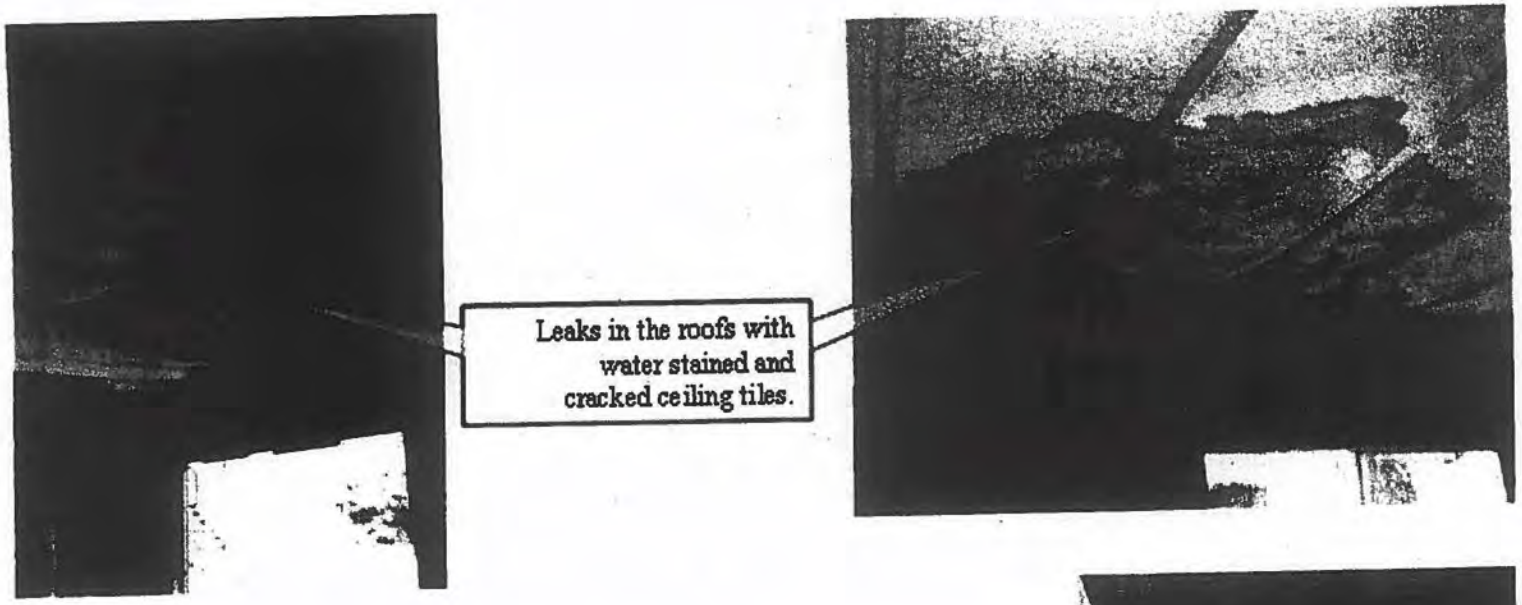
17. Damaged or missing floor heat vents.
18. Severely damaged back porch perched over the lagoon.
19. Missing water heater closet door, exposing water heater to weather and physical damage.
20. Gas cook tops that were not connected or were not functioning.

Recommendations

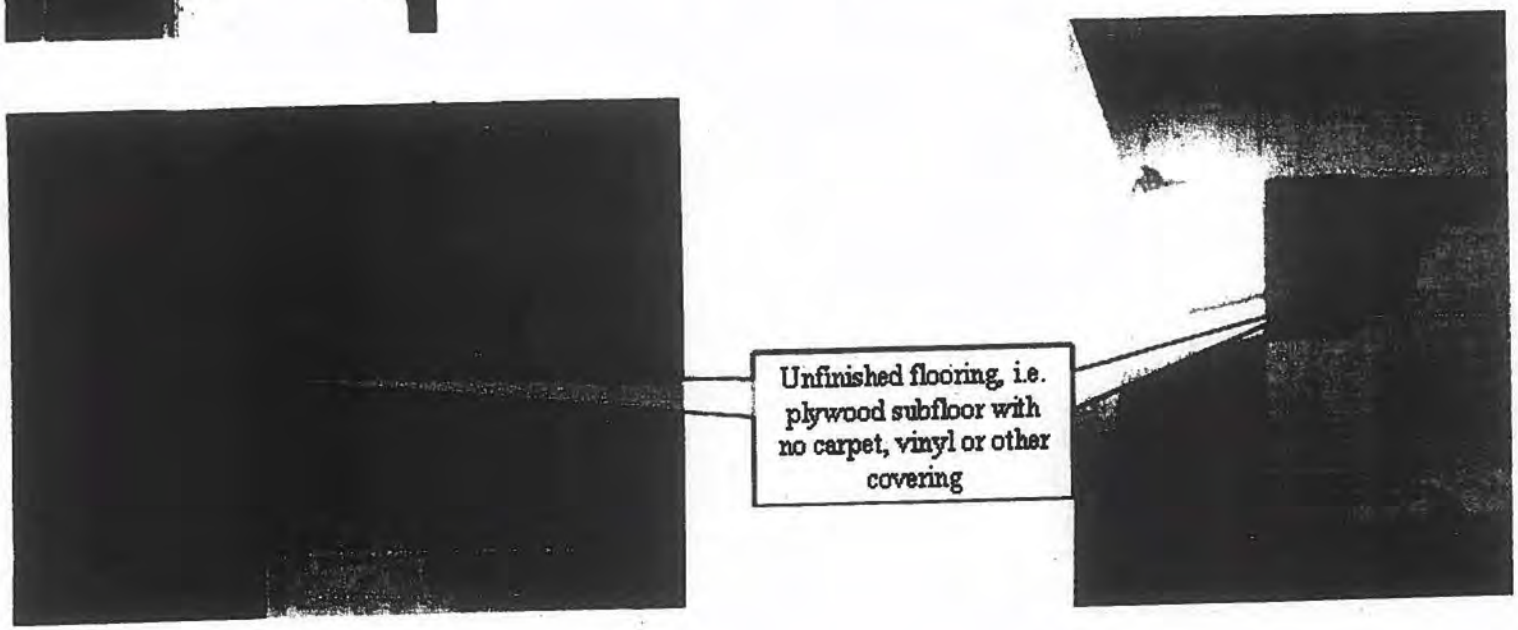
Two of the manufactured homes were in an advanced state of disrepair and would require a great deal of work to rehabilitate them. The evidence of multiple leaks throughout these structures and severely water damaged floors, walls and ceilings, suggests a prolonged period of exposure to water. Replacing flooring, and wall and ceiling panels will not address the probable extensive structural damage to framing, etc., but will only cover it up for a time. The structural components of these two units should be inspected by someone knowledgeable structural engineering to determine the severity and extent of the damage. Any work done without taking this step should be considered a temporary, short-term fix.

The blue house (Luis') was in the best condition of the three inspected. It appears to have sustained minimal interior water damage. Ceilings were not water stained. No significant rot was apparent in the walls, especially under the window sills were moisture from condensation tends to accumulate. Measures to rehab this structure should not be as extensive.

Cc: Colin Smith, Chief Ranger, PORE
Kevin McKay, Special Park Uses Coordinator, PORE
CAPT Charles Higgins, Director, NPS Public Health Program, WASO

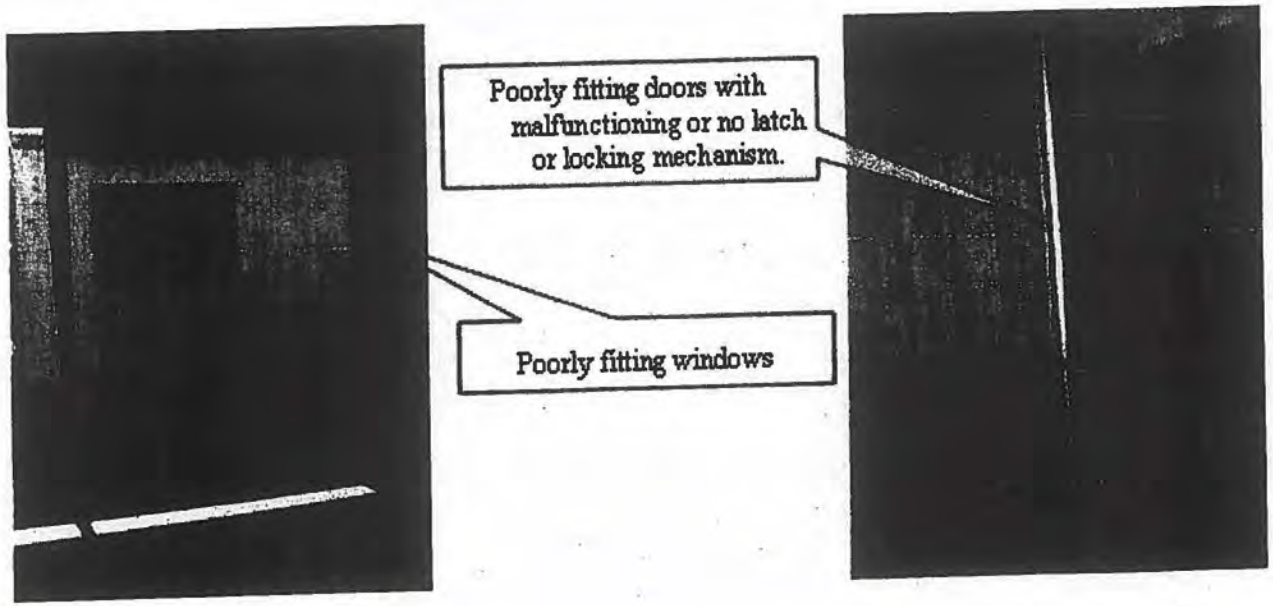


Leaks in the roofs with water stained and cracked ceiling tiles.



Unfinished flooring, i.e. plywood subfloor with no carpet, vinyl or other covering

00033002 NPS-PWR-B04-00013-000001 Page 32 of 239



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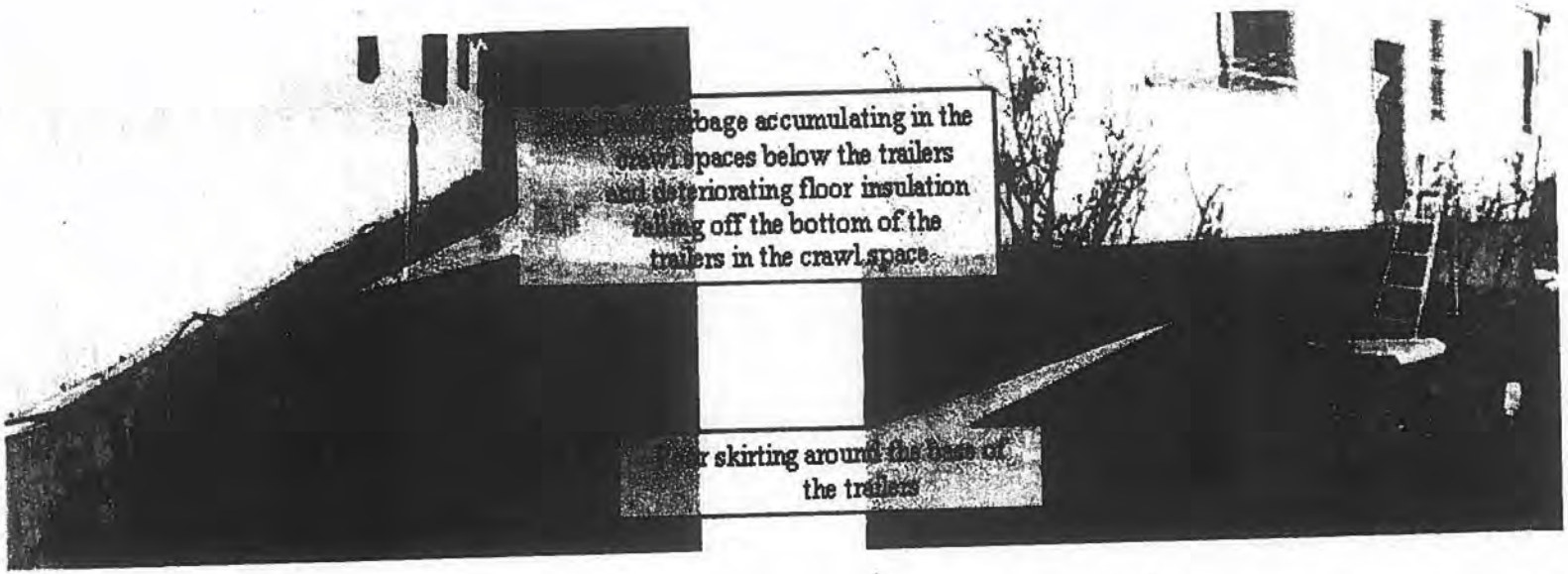
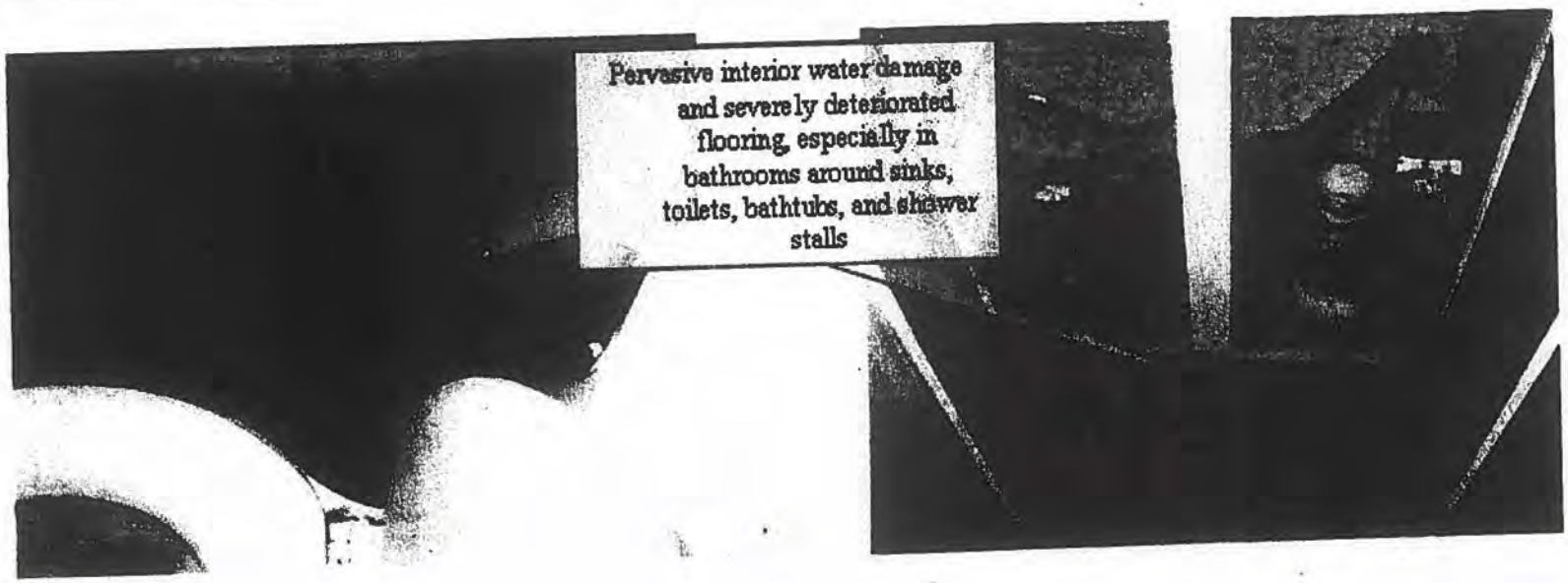
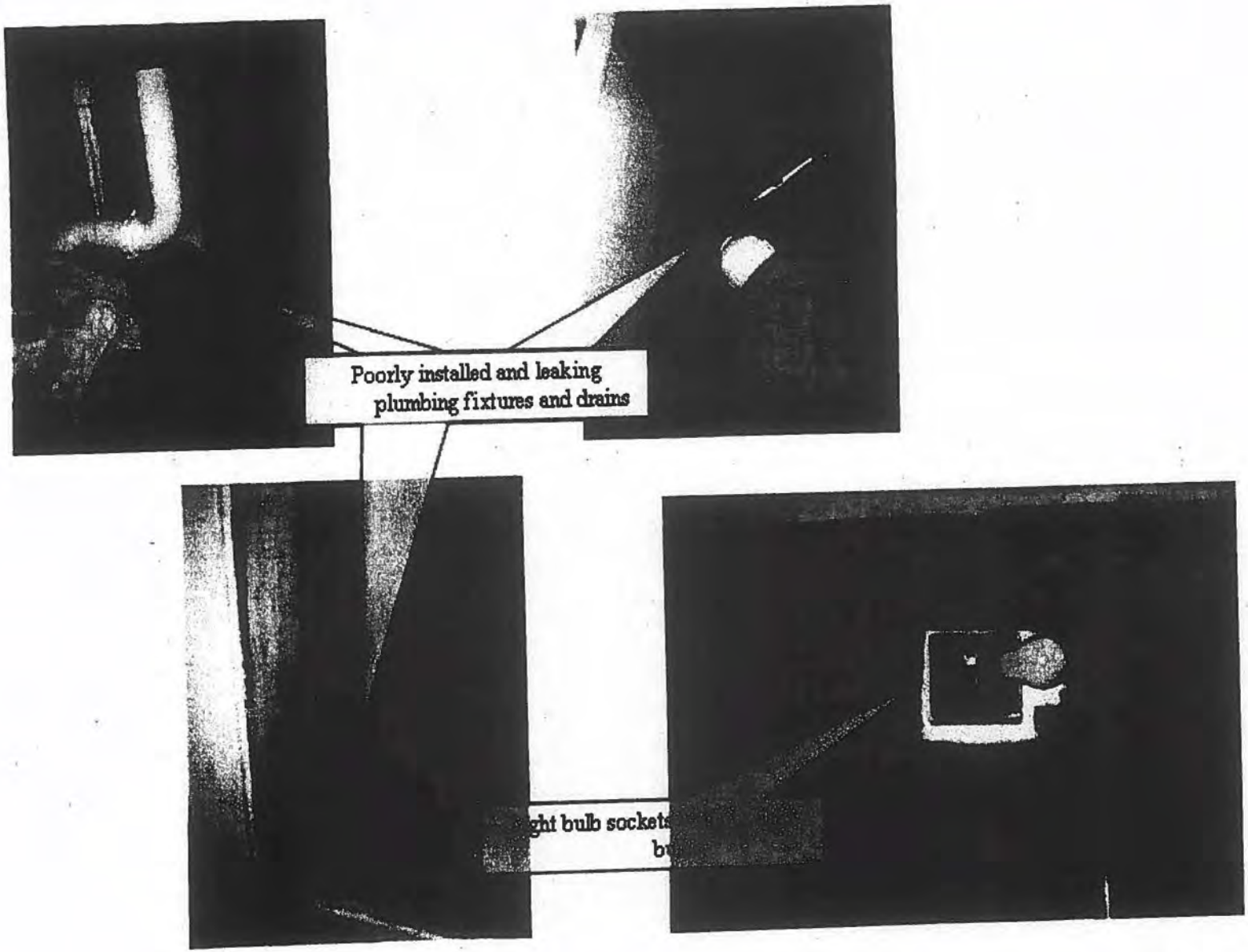
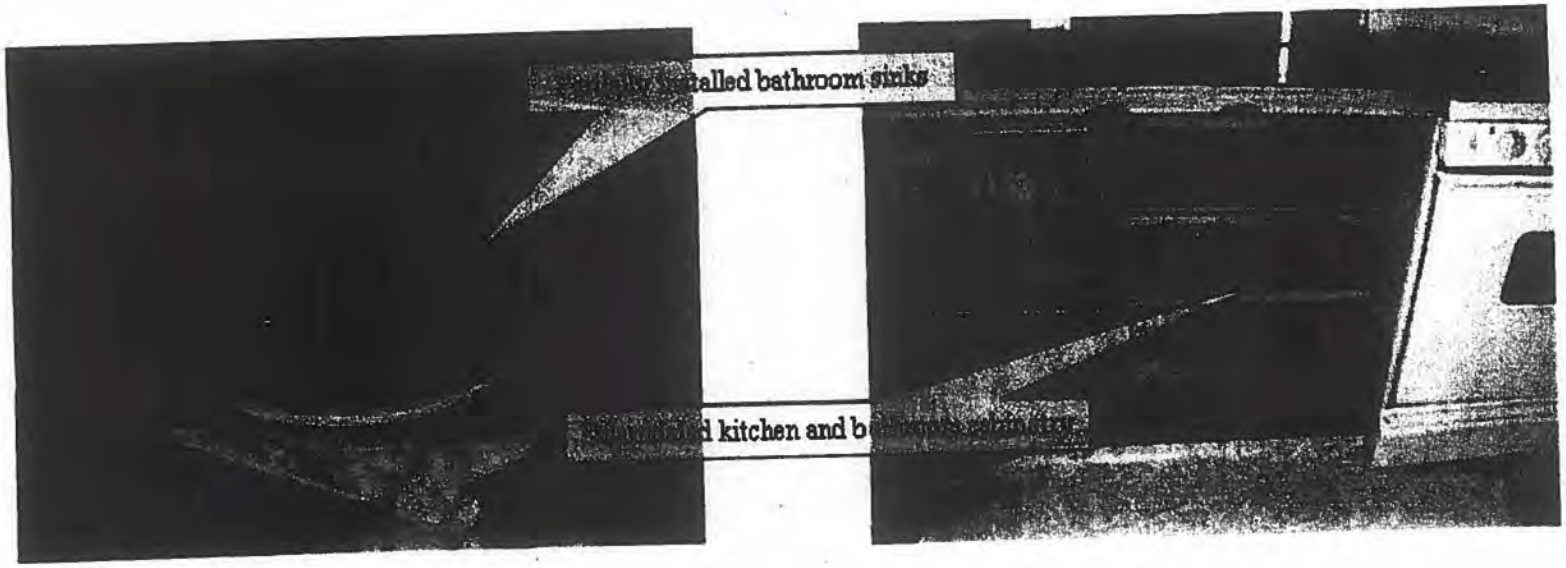


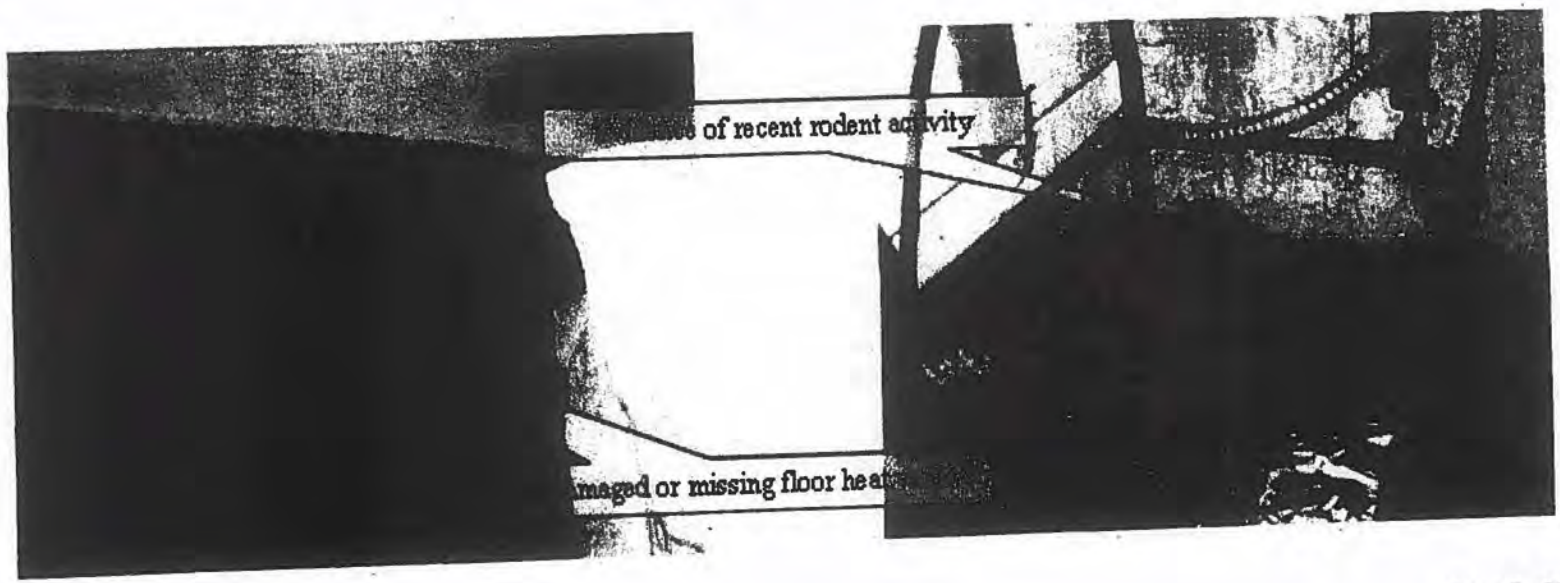


00033002 NPS-PWR-B04-00013-000001 Page 34 of 239

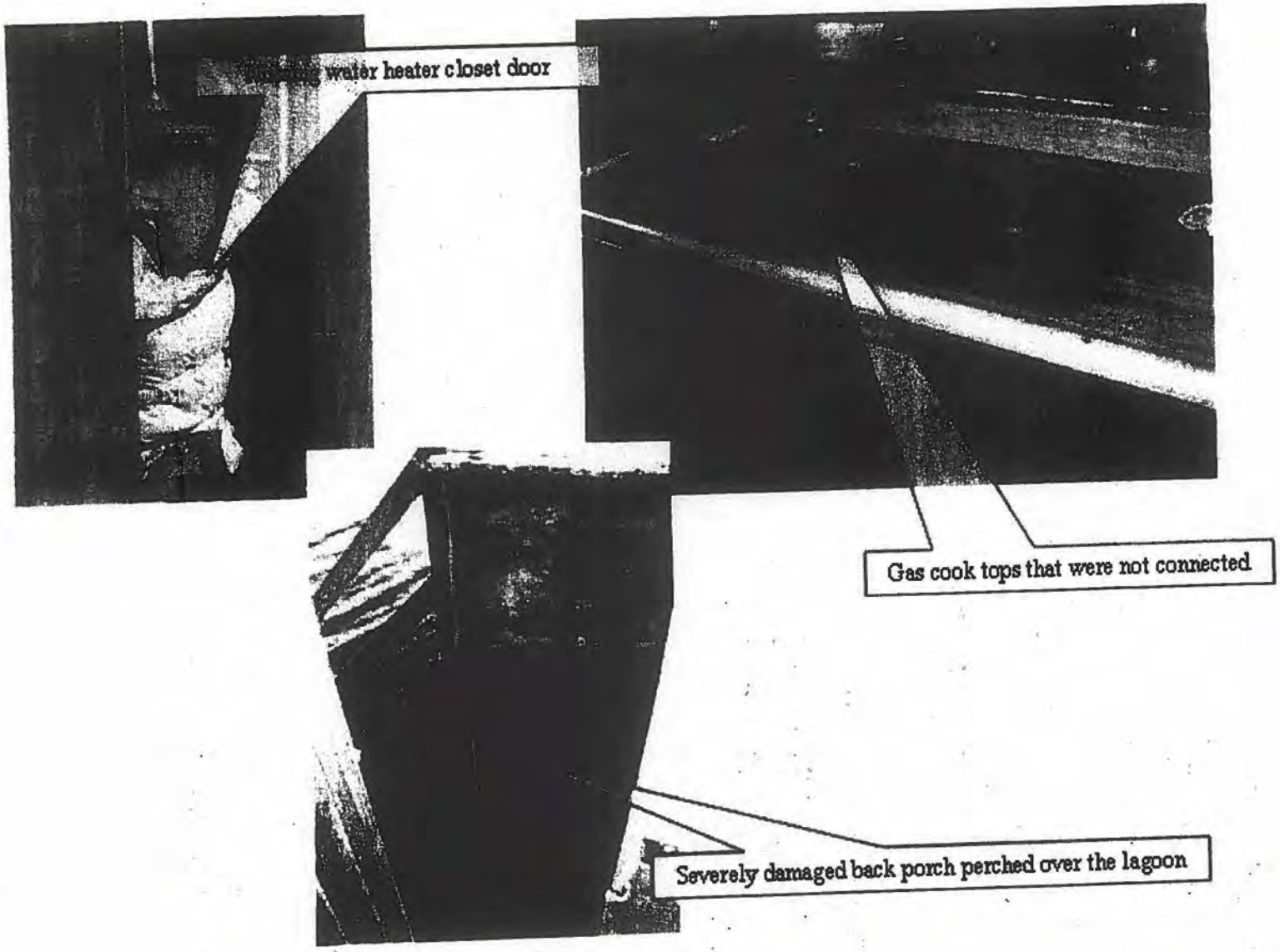


00033002 NPS-PWR-B04-00013-000001 Page 35 of 239





00033002 NPS-PWR-B04-00013-000001 Page 36 of 239



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United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

D5031

May 23, 2007

Mr. Kevin Lunny
17171 Sir Francis Drake
Inverness, CA 94937

Dear Kevin:

Paul Robinson with the United States Public Health Service has scheduled to conduct on site inspections of ranch employee residential units situated within Point Reyes National Seashore on June 13, 2007 and June 14, 2007. The inspections will last approximately one or two hours and will include an evaluation of water and wastewater systems. National Park Service Staff will accompany Mr. Robinson during the inspections.

You will be contacted prior to June 13, 2007 and informed of a scheduled time of arrival. If you have questions or concerns please contact Kevin McKay, Special Park Uses Coordinator, at (415) 464-5111. Thank you for helping to keep Point Reyes National Seashore Ranches safe.

Sincerely,

Don L. Neubacher
Superintendent

KEMcKay:kem 5/22/07

Actual inspection reports not received as of 8/3/07.

L3019

February 27, 1984

Mr. Robert Studdert
Attorney at Law
36 Professional Center Parkway
San Rafael, CA 94903

Dear Mr. Studdert:

Relative to Mr. Johnson's request to locate an additional 30 foot house trailer on the reserved premises of the Johnson Oyster Company, the staff is concerned with the ability of the current septic system to handle an additional unit. Consequently, we suggest that Mr. Johnson provide an engineering report on the current systems ability to handle an additional unit so that we can discuss the report with the Department of Public Health.

We will also need to determine whether the proposed trailer location meets the fuel storage safety codes and, additionally, you should furnish us with a Federal Consistency Certificate from the California Coastal Commission. Ms. Liz Fuchs, staff member of the Commission, telephone number (415) 543-8555, will be glad to assist you.

If these conditions are met, we can properly consider approving the request.

Please let us know if you have additional questions.

Sincerely,

John L. Sansing
Superintendent

JLSansing:kr 2/27/84

L3019

December 21, 1984

Ms. Jeanne McLean, Planner
Marin County Planning Department
Civic Center
San Rafael, CA 94903

Dear Ms. McLean:

Thank you for the opportunity to comment on the addition of a new mobile home at the Johnson Oyster Company (Use Permit #84-74).

The Johnson Oyster Company is located within the boundaries of Point Reyes National Seashore. The sewer system which services the facility has been of interest to Seashore managers for a number of years. Our continuing concern focuses on its demonstrated poor reliability. Mr. Bob Hultquist, District Engineer for the Sanitary Engineering Branch of the California Department of Heath Services has been working with Mr. Johnson for sometime in an effort to correct this situation. Furthermore, we understand that Mr. Hultquist has recently expressed concern as to whether the existing leach field is adequate to handle an additional unit.

In light of the above, it is our recommendation to withhold approval of Mr. Johnson's request until:

1. Mr. Hultquist has made an on-site inspection of the sewer system and can confirm its reliability, and

2. Mr. Johnson has furnished to the Department of Health Services the necessary documentation to ensure that the existing leach field is adequate to handle an additional unit.

Thank you for considering our recommendations and we look forward to hearing from you soon.

Sincerely,

John L. Sansing
Superintendent

bc:
North District
Ranger Files

RLesko:an 12/21/84

L3019

August 29, 1989

Charlie Johnson
Johnson's Oyster Farm
Inverness, CA 94937

Dear Charlie:

We have been advised that you are in the process of constructing an addition to your oyster sales area at the Oyster Farm. On August 22, 1989, the North District Ranger staff met with you to discuss notification requirements for new construction as well as the extent of the construction.

We understand that you have dismantled the pre-existing sales building which was in poor condition and propose to construct a new building in its place and add approximately 300 square feet of floor space. Two restrooms, one for employees and another for visitors, will be included along with an enlarged and modernized sales area. We also understand the State Health Department requires the addition of the two separate restrooms and have inspected and approved the construction site. The restrooms will use the new septic system you recently constructed. Once completed, the outhouse will be removed.

Please let me reiterate that you are required under the terms of your Reservation (Exhibit C, Item 7) to obtain approval from the National Park Service prior to erecting any new structure, sign, or other improvement, permanent or temporary. Since this structure should improve the appearance and efficiency of the operation, we agree the "improvements" fall within the management goals and objectives of the Seashore.

As a reminder, you are responsible for obtaining all other required permits related to this construction. Please ensure that the Park Interpretive sign which was removed for the construction be replaced in a suitable location.

Sincerely yours,

John L. Sansing
Superintendent

CYoung:at:8/28/89

bcc: North District

Pea Vhs:
Pea Felicia; copy of this letter sent to Jean McLean 10/27/89
mc Planning

L3019
JOHNSON OYSTER CO.

Marin County
Planning Department
Mark J. Riesenfeld, AICP, Director

'90

CERTIFIED

March 2, 1990

Pre-Citation Warning Letter

Mr. Charlie Johnson
Johnson Oyster Company
17171 Sir Francis Drake Boulevard
Inverness, CA 94937

RE: Assessor's Parcel #109-130-17
Illegal Construction/Mobile Homes

Dear Mr. Johnson:

On **November 30, 1989** you were informed of a zoning violation on the subject property. Specifically, the violation is **the enlargement of Johnson's Oyster sales room area and the installation of mobile homes without a Use Permit, Design Review and Coastal permit in a C-OA district,** which is contrary to Section **22.56.040, 22.57.132(2) and 22.82.020** of the Marin County Code (Zoning). A follow-up inspection reveals that the violation still exists.

Please be advised that the violation must be corrected by **March 9, 1990** or this office will issue a Citation for this offense. Should the violation be repeated at any time within one (1) year of this date, a Criminal Citation requiring cash bond and possible court appearance may be issued without further notice. If a Criminal Citation is issued, you may be liable for a fine of $50 for the first offense, $100 for the second, and $250 for the third offense - and a possible court trial.

Very truly yours,

Debbi Poiani.

Debbi Poiani
Senior Planning Technician

DP:ll/deb:Johnson

cc: John Sansing, U.S. Department of the Interior, National Park Service
Environmental Health Services
Building Inspection
California Coastal Commission, Fred Felice

Reference: California Government Code 25132
California Penal Code 836.5
Marin County Code 22.06.035, 22.06.040

L1425
Tract 02-106

September 6, 1990

Mr. Debbi Poiani
Senior Planning Technician
Marin County Planning Department
Civic Center
San Rafael, CA 94903

Dear Ms. Poiani:

In reply to your August 16 letter relative to the Johnson Oyster Company, we are enclosing a copy of the "reservation" document Exhibit C which is part of the deed. Although the Assessor's tax rolls list the United States as the property owner, Mr. Johnson's 40-year reservation means that the United States will not obtain full fee title until the year 2012. Consequently, it would seem that abatement proceedings could be undertaken against Mr. Johnson's interest in the property. We should also add that none of the trailers are owned by the United States.

Also, please note Condition 1 of the reservation which requires Mr. Johnson to meet County health and safety standards, and Condition 7 which requires written approval from the National Park Service prior to erection of any temporary or permanent structure. In this connection, any approvals we have given required that he obtain the necessary County and State permits.

We suggest that you furnish us with copies of the correspondence to Mr. Johnson which indicate his violations of the County regulations. With those copies we will inform Mr. Johnson that he is in violation of his reservation conditions which could result in termination of the reservation if the proper corrections are not undertaken.

In the meantime we suggest you begin the abatement proceedings against his remaining interest in the property or the house trailers which are in his ownership.

Please let us know if you have any questions.

Sincerely,

John L. Sansing
Superintendent

bc:
Chief Ranger
North District Ranger

JLSansing:an 9/6/90

L1425
Tract 02-106

October 4, 1990

Mr. Tom Johnson, President
Johnson Oyster Company
17171 Sir Francis Drake
Inverness, CA 94937

Dear Tom:

As we discussed by telephone some weeks ago, the Marin County Planning Department has advised that the Johnson Oyster Company is in violation of several County regulations. Copies of two of the County letters with attachments are enclosed.

If you will recall our letter of approval for the new construction required that you obtain all other required permits. Apparently, according to the County correspondence this has not been accomplished. In this case, it appears you are in violation of your reservation conditions.

We would suggest that you resolve your difficulties with the County of Marin. If you persist in a breach of conditions our legal staff indicates that you may be in violation of your reservation and subject to revocation.

We will appreciate your prompt attention.

Sincerely,

John L. Sansing
Superintendent

Enclosures

bc w/o encs:
Chief Ranger
North District Ranger

JLSansing:an 10/3/90

02-106

RECEIVED
Point Reyes
National Seashore
APR 17 '91
SUPT.
ADM. OFF.
INTERPRETATION
MAINTENANCE
PROTECTION
HORSE RANCH
RESEARCH
FILED
PERMIT
RESOURCE FILE
GENERAL FILES

Marin County
Planning Department

Mark J. Riesenfeld, AICP, Director

April 15, 1991

Mr. Tom Johnson
Johnson's Oyster Beds
P.O. Box 69
Inverness, CA 94937

RE: 17171 Sir Francis Drake Boulevard, Inverness
Assessor's Parcel No. 109-130-17
L1425/Tract 02-106

Dear Mr. Johnson:

This letter is to notify you that enlargement of the sales area and the operation of a mobile home park remains in violation of Marin County Code. At our last meeting you indicated that you would pursue an application for additional area from the National Park Service by January 31, 1991 and that you would submit applications for legalization to the Planning Department by February 28, 1991. You have not met either of these deadlines and have not contacted me with your progress.

I was notified of this violation in November of 1989, to date you have not made the necessary effort to correct these violations in a timely manner.

Should I not hear from you with a progress report by April 30, 1991, I will be forced to refer your case to County Counsel for legal action.

Sincerely,

Debbi Poiani

Debbi Poiani
Senior Planning Technician

cc: Supervisor Giacomini
John Sansing, U.S. Department of Interior, Pt. Reyes National Seashore, Pt. Reyes 94956
Laurel Riek, Environmental Health Services
Dana Ansari, Building Inspection
Richard Weinert, State Department of Housing and Community Development,
P.O. Box 1407, Sacramento, CA 95812-1407
Fred Felice, California Coastal Commission
631 Howard Street, 4th Floor, San Francisco, CA 94105
F. Robert Studdert, 36 Professional Parkway Center, San Rafael, CA 94903

L1425
Tract 02-106

July 2, 1991

Ms. Debbie Poiani
Senior Planning Technician
Marin County Planning Department
Civic Center
San Rafael, CA 94903

Dear Ms. Poiani:

Thank you for sending us a copy of the State of California Housing Activities Report relating to the Johnson Oyster Company operation. We also appreciated the copy of Mr. Tom Johnson's June 15 letter about his progress with the leach field corrections.

For your information, we may be able to issue a permit for some additional land for a leach field expansion. However, we have no intention of doing so unless he clears his housing violations and Planning Department violations. We might add that his Reservation of Use and Occupancy Condition 7 requires written approval from the Park Superintendent before any permanent or temporary structure, sign or other improvement can be erected on the premises. According to our records there are at least four mobile houses in the area without such approval.

It would seem that the Johnson Oyster Company may not need additional land for a leach field if the company maintained the approved number of mobile homes. It would seem also that the Company should consider establishing a trailer village on private land outside the park boundaries providing they can obtain County permission. In summary, we cannot allow an endless expansion of the trailer village and we expect the Company to meet the requirements of the reservation conditions. If all else fails, we will be forced into court action to enforce the terms and conditions of the reservation.

We certainly appreciate your efforts and assistance. Hopefully, we can resolve the deficiencies without going to Federal District Court.

Sincerely,

John L. Sansing
Superintendent

bc:
Chief Ranger
North District Ranger

JLSansing:an 7/2/91

Marin County
Planning Department

Mark J. Riesenfeld, AICP, Director

RECEIVED
Point Reyes
National Seashore
JUN 7 '91
SUPT.
ADM. OFF.
INTERPRETATION
MAINTENANCE
PROTECTION
HORSE RANCH
RESEARCH
EEO
LIBRARY
READING FILE
CENTRAL FILES

June 5, 1991

Mr. John Sansing
U.S. Department of the Interior
National Park Service
Pt. Reyes National Seashore
Pt. Reyes Station, CA 94956

RE: Johnson Oyster Beds - 17171 Sir Francis Drake Boulevard, Inverness
Assessor's Parcel No. 109-130-17
L1425/Tract 02-106

Dear Mr. Sansing:

Attached are the State Department of Housing reports relating to the labor camp at Johnson Oyster Beds.

Following our conversation, I did talk to Dave Mesagno of Environmental Health Services regarding their septic system plans. Dave was on the site with Rich Lincoln, the Johnson's engineer, just two weeks ago. Dave indicated that they will need to lease more land in order to put in a 7,000 to 10,000 gallon system, which is what would be required.

Also, attached is another letter to Johnson.

Sincerely,

Debbi Poiani

Debbi Poiani
Senior Planning Technician

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITY REPORT

AREA OFFICES
Northern Area ☑ 1800 Third Street Sacramento, CA 95814 P.O. Box 1407 Sacramento, CA 95812-1407 Tel. (916) 445-0135
Southern Area ☐ 2038 Iowa Avenue Bldg. B, Suite 102 Riverside, CA 92507-2435 Tel. (714) 782-4420

Date 5-14-91 Report by R. WEINERT/M. SALANOA

To: Name JOHNSON OYSTER CO.
Address POB 69, INVERNESS CA. 94937
Activity Site (if other than above) 17171 SIR FRANCIS DRAKE BL. INVERNESS CA. 94937
Owner (if other than above) TOM JOHNSON
Address SAME AS THE ABOVE "ADDRESS"

ASSIGNMENT #

LABOR DATA:
DR ID 71/76 DATE 5-14-91
PCA/ACT CODE ELT-PO AREA N
CO 21 LOC TR MILES 65
TIME: INSP/ACT 3.0 TR 1.5

INSPECTION DATA:
☐ TIME REPORT ONLY
☑ INITIAL INSPECTION ☐ REINSPECTION
HOME/UNIT # FLOORS

VIOLATION DATA:
TOTAL 9 MP TENANT
S F E 2 M P 3 G/O 4 NP

MH ALTERATION TYPE:
AC ☐ ACC ☐ ROOF ☐ FP ☐ O ☐

THIRD-PARTY MONITORING:
QAA @ HO ☐ IP ☐ DL ☐ IS ☐
DAA #PLANS #COMPLY

MP INSPECTION DATA:
BLG/FIX MH LOT RV LOT AS

EH INSPECTION DATA:
☑ ACTIVE ☐ INACTIVE
MAX CAP 22 P CAP 0 OCC 22
SFD 1 DORM MH/RV 7 O

FEE ACCOUNTING:
COL 1467-17

	USED	DUE	ATTACHED
INSPECTION			
INSIGNIA			
OTHER			

ATTACHED FEE I.D.

PURPOSE OF REPORT: (Checked (✓) as appropriate)

☐ INSPECTION RECORD ONLY

☐ INFORMATION ONLY

☑ NOTICE OF VIOLATION AND RELATED INFORMATION: This report provides notice iolations of the California Health and Safety Code, Division 13 or the California Code of Regulations, : 25, Part 1, Chapter 1, Sections indicated. Copies of the regulations may be obtained from the State California, Office of Procurement, Publications Section, P.O. Box 1015, North Highlands, CA 95660-1015.

lations indicated shall be corrected and a written request for further inspection filed with the Area Office icated above on or before 6-14-91. The request for inspection shall be accompanied minimum fee of $ See OE.

permit shall be obtained from the Area Office identified above for work to correct item(s) # _____

ou believe this report has been issued in error or is factually incorrect, please contact the Area Supervisor the Area Office indicated above.

RECEIVED MAY 16 1991 DIVISION OF CODES AND STANDARDS

INSPECTED UNIT IDENTIFICATION: NA

Type of Unit _____ Box Size _____ Overall Size _____ RT Decal No. _____
Manufacturer, Year and Model _____
HUD LABEL or HCD Insignia No. _____ Serial No. or V. I. N. _____

INSPECTION RESULTS OR INFORMATION:

AN Employee Housing Preoccupancy Inspection was conducted at the above site, pursuant to Health & Safety Code section 17020. Tom Johnson the operator was present.

The inspection revealed that the violations noted on Activity Reports (HCD 61) dated on 10-12-90 and 10-22-90 still have not been corrected.

RECEIVED BY _____ TITLE President

DEPARTMENTAL USE ONLY: Action: ☐ Close File ☑ Reinspection Required ☐ Progress Inspection Required
☐ Enforcement Action Needed ☐ Other _____

SEND COPIES TO: ☐ Recipient ☐ Owner ☐ SAA ☐ OL ☒ Other DEBBI POLONI MARIN CO. PLANNING DEPT. 3501 CIVIC CENTER DRIVE SAN RAFAEL CA 949

SUPERVISOR REVIEW _____ DATE _____ COPIES SENT BY _____ DATE _____

HCD-61 (Rev.6/90) 89 55324

Northern Area
1800 Third Street
Sacramento, CA 95814
P.O. Box 1407
Sacramento, CA
95812-1407
Tel (916) 445-0135

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

Southern Area
28 Civic Center Plaza
Room 639
Santa Ana, CA
92701-4024
Tel (714) 558-4161

Date 5-14-91 Inspected by R. WEINERT / M. SALANOA Page 2 of 3

Name JOHNSON OYSTER Co.

Location 17171 SIR FRANCES DRAKE Blvd., INVERNESS

CONTINUATION -

Note - CORRECTIONS ARE PENDING USE PERMIT ISSUANCE FROM MARIN COUNTY.

The following NEW VIOLATIONS REQUIRE CORRECTION AND then REINSPECTION:

1. Replace hallway switch & cover in mobile home #2
T25CCR850

2. Smoke detector inoperative in mobilehomes #6 & #5.
T25 CCR 850
Repair or replace smoke detectors.

3. P-TRAPS were not installed in Kitchen SINK & Bathroom Lavy.
T25CCR 756
INSTALL P-TRAPS on all fixtures, in SFD #5

4. BATHTUB DRAIN INOPERATIVE. Standing water noted in Tub.
T25CCR756
Repair to restore drain flow.

5. The AREA IN and AROUND SFD #5 WAS NOT MAINTAINED IN A CLEAN & SANITARY MANNER
T25 CCR 704 (a) & 736 (e)
MAINTAIN IN A CLEAN and SANITARY MANNER

6. The WATER HEATER IN SFD #5 WAS not SECURED & VENT WAS NOT MAINTAINED IN ALIGNMENT.
T25 CCR 833 (a) & 838.
secure appliance & align the vent.

HCD 63 REV.(8-89)

89 88695

...ern Area
...Third Street
...amento, CA 95814
...Box 1407
...amento, CA
...12-1407
...(916) 445-0135

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

28 Civic Center Plaza
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ACTIVITIES REPORT CONTINUATION

...-14-91 Inspected by R. WEINHART / M. SALANOA Page 3 of 3

JOHNSON OYSTER CO.

...n 17171 SIR FRANCIS DRAKE BLVD., INVERNESS CA.

...SN-TINUATION —

7. The pressure relief valve drain was not installed on water heater for SFD #5.
T25 CCR 834
Install a full size metal piping from valve to exterior of SFD.

8. The water resistant material surrounding showers in Mobilehomes #6 & #8 is deteriorated.
T25 CCR 760(g)
Maintain the shower wall areas with cleanable, non-absorbent material.

9. The kitchen countertop near the sink has deteriorated in Mobilehome #1.
T25 CCR 736(e).
Repair or Replace the countertop with non-absorbent materials.

The above violations shall be corrected within 30 days. A $60.00 Reinspection fee will be required.

...CD 63 REV.(8-89)

89 88695

STATE OF CALIFORNIA
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITY REPORT

Date 10/23/90 Report by R. Weinert

To: Name JOHNSONS OYSTER CO

Location 17171 SIR FRANCIS DRAKE BLVD
INVERNESS CA 94937

Owner (if other than above)

Address PO BOX 69, INVERNESS CA 94937

AREA OFFICES

☑ Northern Area
1800 Third Street
Sacramento, CA 95814
P.O. Box 1407
Sacramento, CA
95812-1407
Tel. (916) 445-0135

☐ Southern Area
28 Civic Center Plaza
Room 639
Santa Ana, CA
92701-4024
Tel. (714) 558-4161

FILE IDENTIFICATION
CPT # _____ FAC. ID# 21-4001
ASSIGNMENT # _____

LABOR DATA:
DR ID 71 DATE 10/22/90
PCA/ACT CODE EH 20 AREA N
CO 21 LOC _____ TR MILES 80
TIME: INSP/ACT 1.5 TR 80

INSPECTION DATA:
☑ TIME REPORT ONLY
☐ INITIAL INSPECTION ☐ REINSPECTION
HOME/UNIT _____ # FLOORS _____

VIOLATION DATA:
TOTAL 19 MP TENANT _____
S __ F __ E 5 M 3 P 6 G/O 5 NP ☐

MH ALTERATION TYPE:
AC ☐ ACC ☐ ROOF ☐ FP ☐ O ☐

THIRD-PARTY MONITORING:
QAA @ HQ ☐ IP ☐ OL ☐ IS ☐
DAA #PLANS _____ #COMPLY _____

MP INSPECTION DATA:
BLG/FIX ____ MH LOT ____ RV LOT ____ AS ____

EH INSPECTION DATA:
☒ ACTIVE ☐ INACTIVE
MAX CAP 22 P CAP 4 OCC 22
SFD 1 DORM ____ MH/RV 7 O ____

FEE ACCOUNTING:
COL# EH 1443-2

	USED	DUE	ATTACHED
INSPECTION			
INSIGNIA			
OTHER			

ATTACHED FEE I.D.

PURPOSE OF REPORT: (Checked (✓) as appropriate)

☐ INSPECTION RECORD ONLY

☐ INFORMATION ONLY

☑ NOTICE OF VIOLATION AND RELATED INFORMATION: This report provides notice violations of the California Health and Safety Code, Division 13 or the California Code of Regulations, e 25, Part 1, Chapter 2, Sections indicated. Copies of the regulations may be obtained from the State California, Office of Procurement, Publications Section, P.O. Box 1015, North Highlands, CA 95660-1015.

lations indicated shall be corrected and a written request for further inspection filed with the Area Office icated above on or before _____. The request for inspection shall be accompanied minimum fee of $ _____.

ermit shall be obtained from the Area Office identified above for work to correct item(s) # _____.

ou believe this report has been issued in error or is factually incorrect, please contact the Area Supervisor he Area Office indicated above.

INSPECTED UNIT IDENTIFICATION:

Type of Unit _____ Box Size _____ Overall Size _____ RT Decal No. _____

Manufacturer, Year and Model _____

HUD LABEL or HCD Insignia No. _____ Serial No. or V. I. N. _____

INSPECTION RESULTS OR INFORMATION:

Addendum to Activity Report of violations found during inspection on 10/11/90. The following violation was left off original report, but is a violation requiring correction and reinspection:

19.) Mobilehomes #3+4 are installed approx. 18" apart (side to side) and #3 is also 3½' from office building. 25 CCR 1330 The min. distance for separation of a mobilehome from a

RECEIVED BY _____ TITLE _____

DEPARTMENTAL USE ONLY: Action: ☐ Close Permit File ☑ Reinspection Required ☐ Progress Inspection Required

☐ Other _____

SEND COPIES TO: ☐ Recipient ☐ Owner ☐ SAA ☐ OL ☒ Other DEBBIE POLANI MARIN CO PLANNING DEPT 3501 CIVIC CENTER DR SAN RAFAEL CA 94903

SUPERVISOR REVIEW _____ DATE _____ COPIES SENT BY _____ DATE _____

HCD-61 (Rev. 4/89)

ID # 21-4001

Northern Area
1800 Third Street
Sacramento, CA 95814
P.O. Box 1407
Sacramento, CA
95812-1407
Tel. (916) 445-0135

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

Southern Area
28 Civic Center Plaza
Room 839
Santa Ana, CA
92701-4024
Tel. (714) 558-4161

Date 10/23/90 Inspected by RVEINHART Page 2 of 2

Name JOHNSONS OYSTER

Location INVERNESS

ITEM #19 CONTINUED

PERMANENT BUILDING SHALL BE 10 FEET, AND FROM SIDE OF ANOTHER MOBILEHOME IS TO BE ALSO 10 FEET . ALSO REFERENCE CHPT 1, SECT 669(C)/452(C)

- MOVE MOBILEHOMES TO MAINTAIN 10 FOOT SEPARATION

REINSPECTION OF ALL ITEMS NOTED FOR CORRECTION TO BE 30 DAYS FROM ORIGINAL INSPECTION, ON 11/13/90

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ASSIGNMENT # _____

ACTIVITY REPORT

RECEIVED BY MIGUEL MEJIA

Date 10.11.90 Report by RICHARD WENERT

To: Name JOHNSONS OYSTER CO

Location 17171 SIR FRANCIS DRAKE BLVD. INVERNESS, CA (PO BOX #69) 94937

Owner (If other than above) _____

Address PO BOX 69, INVERNESS CA 94937

AREA OFFICES

Northern Area
1800 Third Street
Sacramento, CA 95814
P.O. Box 1407
Sacramento, CA
95812-1407
Tel. (916) 445-0135

Southern Area
28 Civic Center Plaza
Room 639
Santa Ana, CA
92701-4024
Tel. (714) 558-4161

LABOR DATA:
DR ID 71 DATE 10.12.90
PCA/ACT CODE EH PO AREA N
CO 21 LOC _____ TR MILES 0
TIME: INSP/ACT 2.0 TR 0

INSPECTION DATA:
☐ TIME REPORT ONLY
☑ INITIAL INSPECTION ☐ REINSPECTION
HOME/UNIT _____ # FLOORS _____

VIOLATION DATA:
TOTAL 18 MP TENANT _____
S __ F __ E 5 M 3 P 6 G/O 4 NP ☐

MH ALTERATION TYPE:
AC ☐ ACC ☐ ROOF ☐ FP ☐ O ☐

THIRD-PARTY MONITORING:
QAA @ HQ ☐ IP ☐ DL ☐ IS ☐
DAA #PLANS _____ #COMPLY _____

MP INSPECTION DATA:
BLG/FIX ____ MH LOT ____ RV LOT ____ AS ____

EH INSPECTION DATA:
☒ ACTIVE ☐ INACTIVE
MAX CAP 22 P CAP 0 OCC 22
SFD 1 DORM ____ MH/RV 7 O ____

FEE ACCOUNTING:
COL# _____

	USED	DUE	ATTACHED
INSPECTION			
INSIGNIA			
OTHER			

ATTACHED FEE I.D. _____

PURPOSE OF REPORT: (Checked (✓) as appropriate)

☐ INSPECTION RECORD ONLY

☐ INFORMATION ONLY

☑ NOTICE OF VIOLATION AND RELATED INFORMATION: This report provides notice lations of the California Health and Safety Code, Division 13 or the California Code of Regulations, 25, Part 1, Chapter 1, Sections indicated. Copies of the regulations may be obtained from the State lifornia, Office of Procurement, Publications Section, P.O. Box 1015, North Highlands, CA 95660-1015.

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I believe this report has been issued in error or is factually incorrect, please contact the Area Supervisor e Area Office indicated above.

INSPECTED UNIT IDENTIFICATION:

Type of Unit _____ Box Size _____ Overall Size _____ RT Decal No. _____

Manufacturer, Year and Model _____

HUD LABEL or HCD Insignia No. _____ Serial No. or V. I. N. _____

INSPECTION RESULTS OR INFORMATION:

CONDUCTED AN OCCUPANCY INSPECTION OF THE EMPLOYEE HOUSING FACILITY WITH CHARLIE JOHNSON

THE FACILITY CONTAINS (7) MOBILEHOMES & (1) SINGLE FAMILY DWELLING FOR 22 EMPLOYEES OCCUPIED ANNUALLY

NOTE: FEES PAID (DOUBLE) BY CHECK # 4096 ON 10/2/90 FOR $598.00

THE FOLLOWING ITEMS REQUIRE CORRECTION & REINSPECTION:

COPY MAILED

RECEIVED BY _____ TITLE _____

DEPARTMENTAL USE ONLY: Action: ☐ Close Permit File ☒ Reinspection Required ☐ Progress Inspection Required

☐ Other _____

SEND COPIES TO: ☐ Recipient ☐ Owner ☐ SAA ☐ OL ☒ Other DEBBIE POIANI MARIN CO PLANNING DEPT. 3501 CIVIC CENTER DR. SAN RAFAEL CA 94903

SUPERVISOR REVIEW _____ DATE _____ COPIES SENT BY _____ DATE _____

CD-61 (Rev.4/89)

Northern Area
1800 Third Street
Sacramento CA 95814
P.O. Box 1407
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95812-1407
Tel: (916) 445-0135

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

ID #

Southern Area
28 Civic Center Plaza
Room 839
Santa Ana, CA
92701-4024
Tel. (714) 558-4161

te 10.11.90 Inspected by RWENDT + MIGUEL MEJIA Page 2 of 7

me JOHNSONS OYSTER CO

ation INUERNESS

ELECTRICAL

1) THE ELECTRICAL SERVICE EQUIPMENT, CONDUCTORS & MATERIALS USED TO SUPPLY ELECTRICITY TO THE MOBILE HOMES IS IN DISREPAIR AND NOT INSTALLED PER THE NATIONAL ELECTRIC CODE, SPECIFICALY:

a) THE CONDUIT SHEILDING CONDUCTORS FROM PANEL MOUNTED ON THE LABRATORY TO THE MOBILEHOMES IS ONLY APPROVED FOR POTABLE WATER, NOT ELECT. CONDUIT. (ALL MH LOTS)

b) THE FEEDER ASSEMBLIES TO MH #1 & 2 ARE NOT APPROVED, OPEN TO DAMAGE AND BUIRED IN EARTH. (6/3 NM CABLE USED)

c) ELECTRICAL SPLICES EXPOSED to the ELEMENTS UNDER MH #1, SFD #5, MH #6 & MH #3

d) ELECTRICAL EQUIPMENT (PANEL-BOXES) ARE NOT SEALED to be WEATHER-proof (OPENINGS NOT PLUGGED) - 25CCR860 MH #1 & #2 & #3 - #7

All ELECTRICAL EQUIPMENT, MATERIALS & DEVICES SHALL be APPROVED for THEIR PURPOSE, CONNECTED & SECURED IN AN APPROVED MANNER 25CCR 854

2) THE ELECTRICAL EQUIPMENT, PANEL BOXES & SERVICE IS NOT GROUNDED. to EARTH BY AN APPROVED MEANS. 25CCR 860 & 854 - MH #1+2 SERVICE PANEL, SFD #6, MH #3+4 & #6 GROUND ALL METAL PARTS OF FIXED ELECTRICAL EQUIPMENT.

3) INSTALL ALL UNDERGROUND FEEDER ASSEMBLIES IN CONDUIT OR OTHER APPROVED MEANS. CONDUIT to BE LISTED FOR ELECTRICAL CONDUCTOR UNDERGROUND USE. 25CCR 854

Northern Area
1800 Third Street
Sacramento, CA 95814
P.O. Box 1407
Sacramento, CA
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DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

ID #

Southern Area
28 Civic Center Plaza
Room 639
Santa Ana, CA
92701-4024
Tel (714) 558-4161

Date 10/11/90 Inspected by R. WEINERT / M. MEJIA Page 3 of 7

Name JOHNSONS OYSTER CO

Location INVERNESS CA

4) a. THE ELECTRICAL CONDUCTORS INSTALLED OVER MH#2 ARE APPROX 3½' OVER ROOF OF THE MOBILEHOME. 25CCR 862(a)

b. THE OVERHEAD CONDUCTORS FROM SFD#5, MH#4 ARE APPROX 4' ABOVE GROUND / WALKWAYS 25CCR 862(b)

- ELEVATE CONDUCTORS ABOVE ROOFS 8' AND ABOVE WALKWAYS 10' AND ABOVE DRIVEWAYS & PARKING AREAS 15'.

5) THE LIGHT FIXTURES ARE BROKEN AND ELECT. CONDUCTORS EXPOSED IN: MH#2 @ DINING ROOM, @ LIGHT SWITCH TO BEDROOM & IN CEILING OVER BED. 25CCR 852

NOTE: ELECTRICAL INSTALLATION / REPAIRS to be PERFORMED UNDER PERMIT WITH MARIN COUNTY BUILDING DEPARTMENT, ON EXTERIOR & UNDERGROUND SERVICES TO MOBILEHOMES AND DWELLING PER 25CCR 1054

PLUMBING

6) THE ABS DRAIN-WASTE & VENT SYSTEM CONNECTING THE MOBILE HOMES to the SEPTIC SYSTEM IS PRIMARILY ABOVE GROUND AND DOES NOT PROVIDE ADEQUATE SLOPE (¼" PER FOOT) BETWEEN MH#1 to MH# 2-3 & 4. 25CCR 792 & 756

NOTE: INSTALLATION STANDARDS OF ABS DRAIN MATERIAL PROHIBIT EXPOSURE to SUN, ELEMENTS.

-PROVIDE PROPER GRADE OF DRAIN AND PROTECTION OF DRAIN MATERIALS

Northern Area
1800 Third Stree:
Sacramento CA 95814
P O Box 1407
Sacramento CA
95812-1407
Tel: (916) 445-0135

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

ID #

Southern Area
28 Civic Center Plaza
Room 635
Santa Ana CA
92701-4024
Tel (714) 558-4161

Date 10-12-90 Inspected by R. WEINERT Page 4 of 7

Name LOWNSON'S OYSTER CO

Location INVERNESS CA

(PLUMBING CONTINUED:)

7.) SUPPORT ABS DRAIN PIPING AT MIN 4' INTERVALS 25CCR 792 & 756

8) THE SYSTEM VENT PIPE STACK, LOCATED NEAR MH# 8 IS APPROX 3' ABOVE GROUND. EXTEND VENT PIPE, USING MATERIAL LISTED FOR EXPOSURE TO SUNLIGHT A MINIMUM OF 10' ABOVE GROUND & SUPPORT WITH 4"X4" POST. 25CCR 756

9) THE WATER HEATER PRESSURE-RELIEF VALVE IS NOT EQUIPED WITH FULL-SIZED HOT WATER PIPING EXTENDING FROM VALVE TO A POINT OUTSIDE OF BUILDING NOT MORE THAN 2' ABOVE GROUND POINTING DOWNWARD. MH# 2 & SFD #5 - 25CCR 834
- INSTALL PIPING TO EA WATER HEATER AS LISTED ABOVE

10) WATER LEAKS WERE NOTICED; UNDER MH# 6, IN BATH. SINK OF ~~M~~ SFD#5 25CCR 770(b)
REPAIR LEAKS

11) THE DRAIN STAND PIPE (WASHER MACHINE) IN SFD #5 IS NOT CAPPED-OFF WITH REMOVABLE CAP OR PLUG. 25CCR 790
INSTALL CAP-PLUG

MECHANICAL SYSTEMS

12.) THE LP STORAGE TANKS LOCATED OUTSIDE MH# 1 - #2 - #7 & #3 ARE NOT LOCATED A MINIMUM OF 10' CLEARANCE TO THE MOBILEHOMES, BUILDING OPENINGS, PROPERTY LINES

Northern Area
1800 Third Street
Sacramento CA 95814
P O Box 1407
Sacramento CA
95812-1407
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DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

ID #

Southern Area
28 Civic Center Plaza
Room 629
Santa Ana, CA
92701-4024
Tel (714) 558-4161

Date 10-12-90 Inspected by R KLEINERT M MEJIA Page 5 of 7

Name JOHNSONS OYSTER CO

Location INVERNESS CA

ITEM #12 CONTINUED:

PER 25 CCR 806(c)
MOVE LP TANKS TO PROVIDE MIN 10' CLEARANCES

13) THE LP STORAGE TANKS LOCATED OUTSIDE MH#1, #4/5, #7 ARE LOCATED CLOSE TO DRIVEWAY & PARKING AREAS SUBJECTING TANKS & VALVES TO POSSIBLE DAMAGE.
- PROVIDE BARRIERS / POSTS AROUND TANKS TO PREVENT DAMAGE OR MOVE FROM DRIVEWAYS 25 CCR 808

14) THE LP TANKS THROUGHT FACILITY DO NOT HAVE NO SMOKING WARNING SIGNS @ GAS TANK LOCATIONS 25 CCR 810
PROVIDE SIGNS @ EACH TANK

GENERAL MAINTENANCE

15) PROVIDE INSECT SCREENING ON ALL MOBILEHOMES & DWELLINGS 25 728 (a) & (b)

16) TRASH & WASTE/RUBBISH LOCATED ON GROUNDS AROUND ALL DWELLINGS AND NOT ENCLOSED / DEPOSITED IN APPROVED COVERED RECEPTACLES . 25 CCR 742
PROVIDE COVERED TRASH RECEPTACLES & CLEAN GROUNDS AREA

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Sacramento CA
95812-1407
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DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

ID #

Southern Area
28 Civic Center Plaza
Room 639
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92701-4024
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Date 10-11-90 Inspected by R. KLEINERT Page 4 of 7

Name JOHNSON'S OYSTER

Location INVERNESS

17) THE FOLLOWING DWELLINGS REQUIRE REPAIR / REPLACEMENT OF STAIRS - DECKS AND PORCHES: MH#3 - SFD#5 - MH#4 MH#8 (AT REAR EXIT DOOR) 25CCR 710

18) THE ROOFS OF MH#3 & #8 SHOW GUIDENCE OF LEAKS. REPAIR ROOF LEAKS 25CCR 710

- ABOVE ITEMS #1-18 TO BE CORRECTED WITHIN 30 DAYS

- REINSPECTION REQUIRED WITH A $40.00 FEE PAYABLE UPON OR PRIOR TO REINSPECTION

Note: PLOT PLAN OF FACILITY & DWELLING NUMBERS ON PAGE #7

- ANY ABOVE ITEMS #1-3 & 6 MAY REQUIRE PERMIT & INSPECTION OF SYSTEMS FROM MARIN COUNTY BUILDING DEPT. THESE ITEMS REQUIRING LOCAL INSPECTION WILL BE VERIFIED PRIOR TO THE DEPARTMENTS PERMIT ISSUANCE

Northern Area
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95812-1407
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DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITIES REPORT CONTINUATION

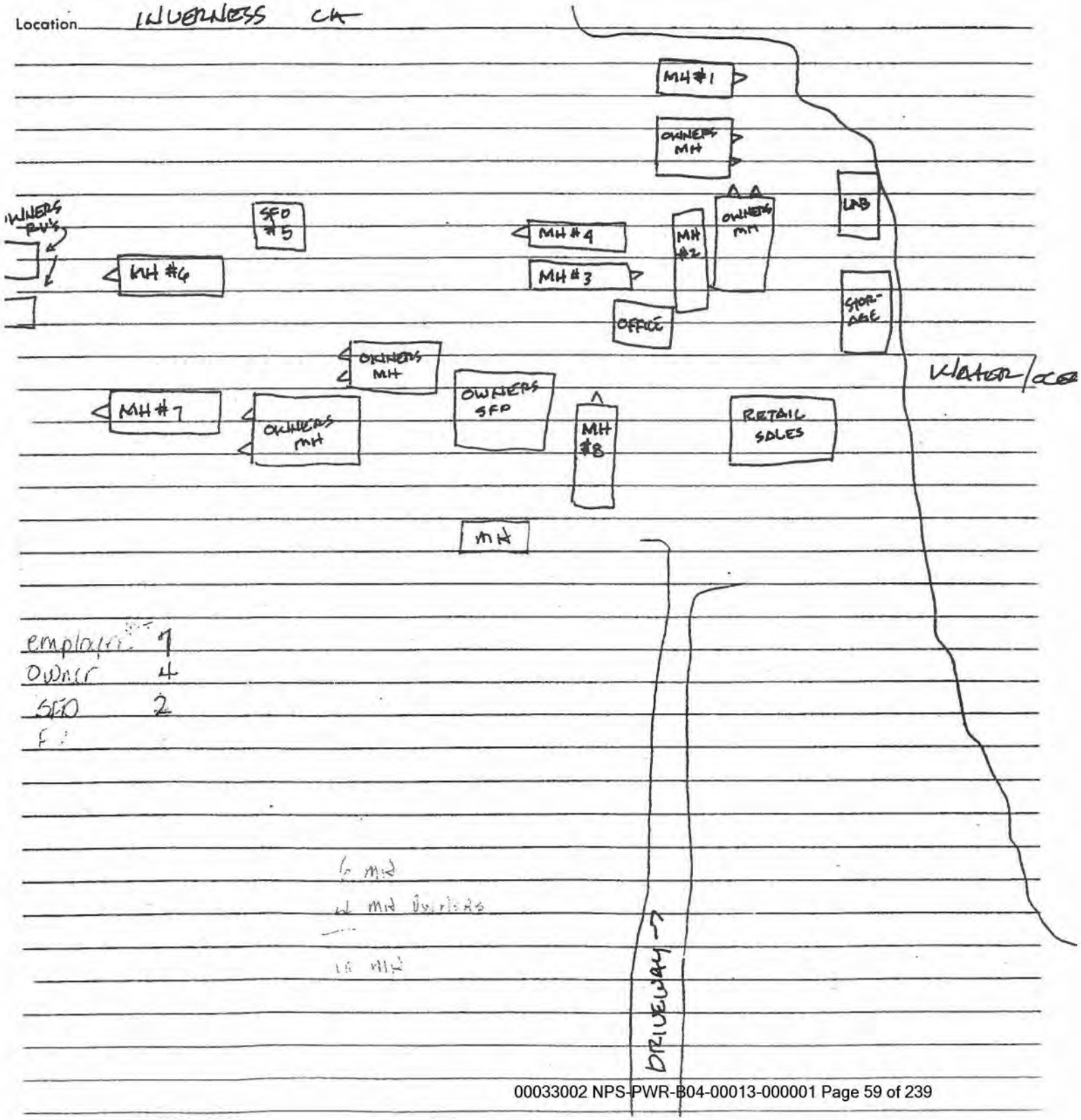
ID #_____

Southern Area
2B Civic Center Plaza
Room 639
Santa Ana, CA
92701-4024
Tel (714) 558-4161

Date 10-11-90 Inspected by R KLEMENT Page 7 of 7

Name JOHNSONS OYSTER CO

Location INVERNESS CA



employees 7
Owner 4
SFD 2
F :

6 MH
4 MH Owners
1 MH

Marin County
Planning Department

Mark J. Riesenfeld, AICP, Director

CERTIFIED

June 5, 1991

Mr. Tom Johnson
Johnson Oyster Beds
P.O. Box 69
Inverness, CA 94937

RE: 17171 Sir Francis Drake Boulevard, Inverness
Assessor's Parcel No. 109-130-17
L1425/Tract 02-106

Dear Mr. Johnson:

Following my April 15, 1991 letter to you, your attorney, Mr. Studdert, contacted me to inform me that you were out of town. I am aware that you have returned and I now need you to contact me regarding your progress on resolving the violations relating to the mobile homes on your property.

Please contact me by June 14, 1991.

Sincerely,

Debbi Poiani

Debbi Poiani
Senior Planning Technician

cc: Tom Johnson (regular mail with proof of service)
Supervisor Giacomini
John Sansing, U.S. Department of Interior, Pt. Reyes National Seashore, Pt. Reyes 94956
Laurel Riek, Environmental Health Services
Dana Ansari, Building Inspection
Richard Weinert, State Department of Housing and Community Development,
P.O. Box 1407, Sacramento, CA 95812-1407
Fred Felice, California Coastal Commission
631 Howard Street, 4th Floor, San Francisco, CA 94105
F. Robert Studdert, 36 Professional Parkway Center, San Rafael, CA 94903

L1425
Tract 02-106

December 18, 1992

Memorandum

To: Regional Director, Western Region

From: Superintendent, Point Reyes National Seashore

Subject: Johnson Oyster Company

For some time we have been aware that the Johnson Oyster Company, in our opinion, is in violation of their reservation agreement. Recently in a telephone conversation with the County Planning Department we were informed that County counsel will not take enforcement action to require JOC to meet County regulations as called for in the reservation. Apparently, the County or State regulations require compliance action to be taken against the landowner, the United States, instead of the reservation holder.

We then asked the County for letters outlining the deficiencies which should be corrected. Copies of those letters are enclosed.

From our view the primary deficiency is the number of extra trailers installed and used by JOC as housing for employees and relatives. Our previous instructions and requests have obviously been ignored and we are concerned not only about the resource impact of the trailers but also the health and safety aspects of such an inappropriate housing area. Adverse publicity will arise if there are complaints about the health and safety aspects of the trailer village and also if the employees are evicted so the excess trailers can be removed.

In January we are planning to meet with JOC representatives to see if we can obtain full or partial compliance without proposing legal action. It would be helpful if a Regional Office representative could attend. This hopefully would indicate our intent to resolve the issue.

We will advise you later of the date proposed for the meeting so we can make final arrangements as to whether a Regional Office representative can attend.

Enclosures

bc w/c encs:
Ralph Mihan, Field Solictor
Dave Cherry, Associate Regional Director

bc w/o encs (already have copies):
Chief Ranger
North District Ranger

JLSansing:an 12/18/92

Marin County
National Seashore
Planning Department
Mark J. Riesenfeld, AICP, Director

RECEIVED
DEC 14 '92
SUPT.
ADM. OFF.
INTERPRETATION
MAINTENANCE
PROTECTION
HORSE RANCH
RESEARCH
EEO
LIBRARY
READING FILE
CENTRAL FILES

December 11, 1992

Mr. John L. Sansing
U.S. Department of the Interior
National Park Service
Point Reyes National Seashore
Pt. Reyes, CA 94956

RE: Johnson' Oyster Bed - 17171 Sir Francis Drake Boulevard, Inverness
Assessor's Parcel Number 109-130-17
L1425/Tract 02-106

Dear Mr. Sansing:

This letter is to inform you that the above mentioned property remains in violation of Marin County Code, due to the installation and habitation of the 9 mobile homes for 22 employees and the enlargement of the retail sales area with out Coastal Permit/Deign Review/Use Permit approval as required by section 22.56.040, 22.57.132(2) and 22.82.020. A we discussed, Mr. Johnson has not had any communications with me since June 15, 1991, at which time he indicated he was working with Environmental Health Services and Rich Lincoln on the septic system and then was to present the plan to you.

Your assistance in resolving these violations of Marin County Code is greatly appreciated. Should you have further questions, please don't hesitate to contact me.

Sincerely,

Debbi Poiani

12/11 - CASE & BROCK HAVE COPIES

Debbi Poiani
Senior Zoning Enforcement Officer

cc: Tom Johnson, Johnson Oyster Beds
P.O. Box 69, Inverness, CA 94937
Supervisor Giacomini
Laurel Riek, Environmental Health Services
Dana Ansari, Building Inspection
Richard Weinert, State Department of Housing and Community Development
P.O. Box 1407, Sacramento, CA 95812-1407
Teresa Vazquez, California Coastal Commission
45 Fremont, Suite 2000, San Francisco, CA 94105-2219
F. Robert Studdert, 36 Professional Parkway Center, San Rafael, CA 94903

L1425
Tract 02-106

February 5, 1993

Mr. Tom Johnson, President
Johnson Oyster Company
P. O. Box 69
Inverness, CA

Dear Tom:

We appreciate your attendance at our meeting yesterday so we could discuss your Reservation of Use and Occupancy in the Seashore. It is our understanding that you will undertake the following actions.

1. You will discuss the sewage system report with your consultant to determine the capacity of your sewage disposal field after it is reconstructed or improved on the site presently under Special Use Permit.

2. This sewage capacity will assist in determining the number of mobile homes which can feasibly remain on your reservation so that we can then discuss the number which we should allow.

3. You will also work toward resolving the County permit deficiencies relative to the remodeled building, sewage disposal corrections, and the number of mobile homes now on the property.

4. You agreed to send us a copy of the State of California follow-up inspections of your employee housing.

5. You agreed to send us a Certificate of Insurance for your operation. We are particularly interested in the liability coverage since our regulations no longer require fire insurance coverage.

6. We will re-issue the Special Use Permit for the 2.2 acres initially authorized under SUP #8530-121 for the period November 15, 1972, through November 14, 1992. Our present information indicates the fee will only be around $500.00 per year for a five-year permit since the area does accommodate visitors aside from those using your facility. This, of course, includes no rental fees for any sites for mobile homes. We understand that all mobile homes will be located on your reservation lands.

7. District Ranger Case agreed to meet with you to discuss removal of debris and other items which when you accomplish will improve the appearance of the area. In the long run, this improvement should assist with the public relations with your company as well as the Seashore.

8. We will obtain a verbal report on March 1, and a formal written report for a meeting around April 1, which will outline the progress of your efforts.

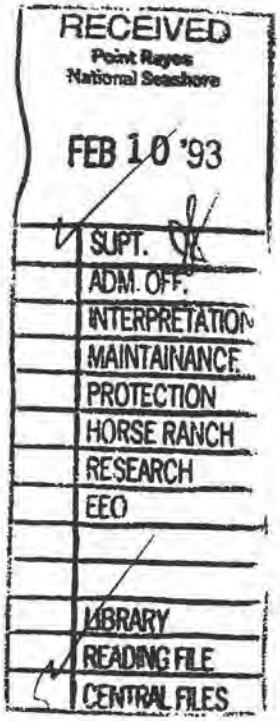
Please let us know if the above is not your understanding of our meeting or if you have additional comments or questions. We appreciate your cooperation and look forward to continuing our excellent working relationship.

Sincerely,

John L. Sansing
Superintendent

bc:
B. J. Griffin, Associate Regional Director
Debbie Poiani, Marin County Planning Department
Chief Ranger
North District Ranger
Chief of Maintenance

JLSansing:an 2/5/93



FEBRUARY 06, 1993

JOHNSON OYSTER CO.
P.O. BOX 69
INVERNESS, CA. 94937

MR. JOHN SANSING, SUPERINTENDENT
PT. REYES NATIONAL SEASHORE
PT. REYES, CA. 94956

DEAR JOHN,

AT OUR RECENT MEETING YOU REQUESTED COPIES OF MY LIABILITY INSURANCE POLICY AND MY MOST RECENT INSPECTION REPORT FROM THE STATE OF CALIFORNIA, DEPARTMENT OF HOUSING.

BOTH OF THESE ITEMS ARE ENCLOSED AS PER YOUR REQUEST.

THANK YOU FOR TAKING THE TIME FOR OUR RECENT MEETING.

SINCERELY,

Tom

TOM JOHNSON

Copies sent to Ms District

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES AND STANDARDS

ACTIVITY REPORT

Date 4.21.92 Report by RICHARD WEINERT

To: Name JOHNSONS OYSTER CO.

Location 17171 SIR FRANCIS DRAKE BLVD, INVERNESS 94937

Owner (If other than above) TOM JOHNSON

Address

AREA OFFICES

☑ Northern Area
1800 Third Street
Sacramento, CA 95814
P.O. Box 1407
Sacramento, CA
95812-1407
Tel. (916) 445-0135

☐ Southern Area
28 Civic Center Plaza
Room 639
Santa Ana, CA
92701-4024
Tel. (714) 558-4161

ASSIGNMENT #

LABOR DATA:
DR ID 71 DATE 4.21.92
PCA/ACT CODE EHPD AREA
CO 21 LOC TR MILES
TIME: INSP/ACT TR

INSPECTION DATA:
☑ TIME REPORT ONLY
☐ INITIAL INSPECTION ☐ REINSPECTION
HOME/UNIT # FLOORS

VIOLATION DATA:
TOTAL 0 MP TENANT
S F E M P G/O NP

MH ALTERATION TYPE:
AC ☐ ACC ☐ ROOF ☐ FP ☐ O ☐

THIRD-PARTY MONITORING:
OAA @ HQ ☐ IP ☐ DL ☐ IS ☐
DAA #PLANS #COMPLY

MP INSPECTION DATA:
BLG/FIX MH LOT RV LOT AS

EH INSPECTION DATA:
☑ ACTIVE ☐ INACTIVE
MAX CAP 22 P CAP 22 OCC 22
SFD 1 DORM MH/RV 7 O

FEE ACCOUNTING:
COL# 1602-5

	USED	DUE	ATTACH
INSPECTION	299.00		
INSIGNIA			
OTHER			

ATTACHED FEE I.D.

PURPOSE OF REPORT: (Checked (✓) as appropriate)

☑ INSPECTION RECORD ONLY

☐ INFORMATION ONLY

☐ NOTICE OF VIOLATION AND RELATED INFORMATION: This report provides notice of violations of the California Health and Safety Code, Division 13 or the California Code of Regulations, Title 25, Part 1, Chapter ____, Sections indicated. Copies of the regulations may be obtained from the State of California, Office of Procurement, Publications Section, P.O. Box 1015, North Highlands, CA 95660-1015.

Violations indicated shall be corrected and a written request for further inspection filed with the Area Office indicated above on or before _____. The request for inspection shall be accompanied by minimum fee of $ _____.

A permit shall be obtained from the Area Office identified above for work to correct item(s) # _____.

If you believe this report has been issued in error or is factually incorrect, please contact the Area Supervisor at the Area Office indicated above.

INSPECTED UNIT IDENTIFICATION:

Type of Unit _____ Box Size _____ Overall Size _____ RT Decal No. _____

Manufacturer, Year and Model _____

HUD LABEL or HCD Insignia No. _____ Serial No. or V. I. N. _____

INSPECTION RESULTS OR INFORMATION:

OCCUPANCY INSPECTION OF EMPLOYEE HOUSING FACILITY WITH TOM JOHNSON, OWNE

THE FACILITY CONSISTS OF (1) SINGLE FAMILY DWELLING & (7) MOBILEHOMES FOR 22 EMPLOYEES. NOTE PREVIOUS REPORTS OF LACK OF USE PERMIT FROM MARIN CO FOR THE MOBILEHOMES USED FOR EMPLOYEE HOUSING. OWNER IS OBTAINING PERMITS F INSTALLATION OF NEW SEPTIC SYSTEM, PENDING MARIN CO. APPROVAL.

THE HOUSING IS IN SUBSTANTIAL COMPLIANCE. CLOSE FILE

RECEIVED BY _____ TITLE President

DEPARTMENTAL USE ONLY: Action: ☑ Close Permit File ☐ Reinspection Required ☐ Progress Inspection Required

☐ Other _____

SEND COPIES TO: ☐ Recipient ☐ Owner ☐ SAA ☐ OL ☐ Other _____

SUPERVISOR REVIEW _____ DATE _____ COPIES SENT BY _____ DATE _____

HCD-61 (Rev. 4/89)

L1425
Tract 02 106

March 8, 1993

Mr. Tom Johnson, President
Johnson Oyster Company
P.O. Box 69
Inverness, CA 94937

Dear Tom:

We appreciate your recent verbal progress report to District Ranger Case. He has informed me that things are looking better and that you are continuing to work on the general appearance of the area. The following is a summary of additional work you have agreed to complete.

1. Finish construction and paint new fences.

2. Remove the debris in front of the new fence at the beginning of your compound.

3. Paint the container boxes used for storage.

4. General clean up of the area where oyster strings are prepared for planting.

5. Replace broken boards on front of "old" office building.

6. Paint buildings and unpainted plywood in the area of customer parking, (single wide trailer with plywood porch, "old" office, etc).

7. Remove travel trailer and motor home.

8. Remove the two vehicles you identified as derelict.

9. Remove debris and generally clean the area near Mark's trailer.

10. Clean up the beach area behind the last trailer down in the corner past Mark's trailer.

We are still concerned about trailers which could be removed to correct the County permit deficiencies relative to the sewage and, of course, about resolving the remodeled building permit

deficiencies. Hopefully you will have this corrected by our April meeting.

We appreciate your efforts up to this point and look forward to a positive written report from you by April 1. We will also plan a meeting around this date.

Sincerely yours,

John L. Sansing
Superintendent

bc: North District Ranger

RCase:at:3/8/93

L3019

April 13, 1993

Tom Johnson, President
Johnsons' Oyster Company
P.O. Box 69
Inverness, CA 94937

Dear Tom:

On April 7, Rangers Case and Martinez met with you concerning the progress of the improvements to your facility. We are pleased with what you have accomplished. At this time we would like to confirm the following projects.

1. Remove the old dump truck and the blue Corolla from Nellie's yard.

2. Finish the fence around the wire storage area, including painting and completion of a gate.

3. Paint the storage sheds (2 containers).

4. Paint the porch and storage shed at Jose's trailer.

5. Remove the travel trailer and the R.V. at the end of the residential area.

6. Clean the beach area behind Nellie's place.

7. Clean up the area and construct fence between Ben and Mark's trailers.

8. Continue working on removal of brown trailer (residence near old office).

9. Build fuel containment basins for above ground storage tanks. This will meet County fire codes. Gus will drop off the standards for this project.

Once again thank you for your cooperation. If you have any questions please contact the North District Rangers. We will schedule a formal meeting after the first of May when hopefully most of these projects will be completed.

Sincerely yours,

John L. Sansing
Superintendent

bc: North District

GMartinez/at:4/13/93

L3019

September 27, 1993

Mr. Tom Johnson, President
Johnson Oyster Company
P.O. Box 69
Inverness, CA 94937

Dear Tom:

This letter is in reference to your meeting with District Ranger Case on September 17. The following is a summary of the items discussed and the dates agreed for completion. Your cooperation will be appreciated in dealing with these items by the dates mentioned below.

1. Removal of the non-operative vehicles by September 29, 1993.

2. Removal of wood, debris and equipment along the new fence by September 24, 1993. Please keep this area clear of additional items in the future.

3. Clean the area along the path and the beach used by kayakers by September 30, 1993.

4. Remove oyster shells and "muck" that has been moved to your leach field site by October 12, 1993. As discussed with Ranger Case, you have agreed to take positive action in regard to your sewage plan by October 12, 1993. Please advise this office of your decision in this matter.

5. We still need your cooperation with the removal of the recreational vehicle and one other trailer. You initially agreed to a September 1, 1993, date and, at this time, we look forward to their removal by the end of October.

We understand that you are looking at a plan for the removal of oyster shells from your facility. We would encourage you in any alternative that would result in removal of the shells from the property.

We appreciate your cooperation and look forward to the completion of all these items.

Sincerely,

John L. Sansing
Superintendent
bc: North District

L1425
02.106

L3019

June 28, 1993

Tom Johnson, President
Johnson Oyster Company
P.O. Box 69
Inverness, CA 94937

Dear Tom:

We appreciate your meeting with us on June 17 to discuss the progress of the improvements you are making to the Johnson Oyster Company facilities. The following is a summary of the meeting and project completion dates for this year.

1. Remove the three non-operative vehicles by July 1.

2. Remove woodpiles and debris at the entrance near the new fence by July 1.

3. Submit the sewage plan for review within 60 days.

4. Complete the new fuel tank containment area by September 1, constructed to county code.

5. Remove the recreational vehicle and one other trailer by September 1.

The work you have done looks very good and we appreciate your effort in making these improvements. We look forward to your continuing effort to improve the overall appearance of the Johnson Oyster Company facilities.

Sincerely,

John L. Sansing
Superintendent

bc: North District
RCase:at:6/28/93

L1425
02-106

March 9, 1994

Ms. Alexis J. McBride
Deputy County Counsel
County Counsel of Marin
Suite 342, Civic Center
San Rafael, CA 94901

Dear Ms. McBride:

We received the FAX of your March 8 letter stating that a number of County officials wish to inspect the Johnson Oyster Company on March 25, on-site at 10:30 AM.

This date is satisfactory. A representative of the National Park Service will be present during your inspection. Mr. Tom Johnson, President of Johnson Oyster Company, has been notified of the meeting date and time.

Please let us know if we can be of further assistance.

Sincerely,

John L. Sansing
Superintendent

bc w/c inc:
Chief Ranger
North District Ranger

JLSansing:an 3/9/94

THOMAS G. HENDERSON
COUNTY COUNSEL

ALLEN A. HAIM
CHIEF DEPUTY

PAULETTE ENGLER
ADMINISTRATIVE ASSISTANT

COUNTY COUNSEL OF MARIN COUNTY
SUITE 342, CIVIC CENTER
SAN RAFAEL, CALIFORNIA 94903
(415) 499-6117
FAX (415) 499-3796

ROBERT H. SAN CHEZ
DOROTHY R. JONES
RUTH W. ROSEN
PATRICK K. FAULKNER
JOHN F. GOVI
ALEXIS J. MCBRIDE
MARI-ANN G. RIVERS
SUE WEAVER
CHARLES J. MCKEE
DEPUTIES

March 8, 1994

Mr. John L. Sansing
U.S. Department of the Interior
National Park Service
Point Reyes National Seashore
Pt. Reyes, Ca. 94956

Re: Johnson Oyster Bed, 17171 Sir Francis Drake Boulevard, Inverness/Assessor's Parcel Number 109-130-17/L1425 Tract 02-106

Dear Mr. Sansing:

The Marin County Building Inspection, Environmental Health, and Planning Departments have received complaints of violations occurring on the above property. As the United States Government is the property owner of record, we are directing our correspondence to your office. Despite extensive correspondence and requests from the above Marin County Departments, the property remains in violation of numerous sections the Marin County Code. Therefore, the Departments have referred this case to our office for purposes of seeking legal remedies to these troublesome and dangerous public health problems.

Specifically the violations on the property include:

Environmental Health Violations:

1. SEWAGE/SEPTIC: Marin County Code Chapter 18.06.040 (B) Prohibited Acts,Construct, rebuild, use, occupy or maintain any residence,place of business or other structure where persons reside, congregate or are employed, which is not provided with a means of disposal of sewage by connection to a public sewer system or an individual sewage disposal system, without first obtaining approval and/or a permit from the health officer.

2. FOOD: Any retail food operation being conducted at the Johnson's Oyster facility in Point Reyes is in violation of the following County and State codes:

A. Marin County Code Section 7.24.030. Permit Required. (a) REQUIRED. It is unlawful for any person to operate any food establishment within the unincorporated area of Marin County without a valid permit issued by the county health officer.

B. California Health and Safety Code, Chapter 4 - California Uniform Retial Food Facilities Law (CURFFL), Section 27551: A food facility shall not be open for business without a valid permit.

C. CURFFL, Section 27550: A person proposing to build or remodel a food facility shall submit complete plans and specifications to the local enforcement agency for review and approval pursuant to the requirements of this chapter.

3. WATER: California Health and Safety Code Section 4010.1 (q) and Health and Safety Code Article 2: If the number of water service connections is 15 ore more or if it serves more than 25 people then Johnson Oyster Company is operating a community water system as defined by California health and Safety Code, Section 1010.1 (q) and without a valid permit, per Health and Safety Code Article 2.

4. WELLS: Marin County Code Section 7.28: Wells on the property have been installed without permits, which is in violation of Marin County Code Section 7.28 domestic Water Supply.

Planning Department Violations

1. Installation and habitation of 9 mobile homes for 22 employees without obtaining the proper permits. (Marin County Code Sections 22.57.132(2), 22.82.020 and 22.56.040)

2. Enlargement of the retail sales area was done without requisite building permits, coastal permit, design review nor use permit approval. (Marin County Code Sections 22.57.132(2), 22.82.020 and 22.76.040)

Building Department Violations:

1. Electrical conductors equipment and panel boxes installed and maintained without in violation of the National Electric Code. (Marin County Code Section 19.04.010).

2. Enlargement of the sales area without a proper building permit. (Marin County Code Section 19.04.010)

The purpose of this letter is to request an inspection of the property by the concerned county officials on March 25, 1994 at 10:30 a.m. We are seeking voluntary compliance with this request. However, if permission to inspect is refused, we will apply to the Superior Court for an inspection warrant, authorized by California Health and Safety Code 17970 and California Code of Civil Procedure 1899.50, et seq.

Please call our office at 499-6117 prior to March 21, 1994 to confirm the inspection.

Very truly yours,

Alexis McBride

ALEXIS J. McBRIDE
Deputy County Counsel

cc: Ed Henry
Dave Mesagno
Debbi Poiani

L1425
02-106

March 18, 1994

Memorandum

To: Regional Director, Western Region

From: Superintendent, Point Reyes National Seashore

Subject: Johnson Oyster Company

Our memorandum of March 10 outlined the difficulties occurring with the Johnson Oyster Company (JOC) relative to Marin County building code and public health violations. As a matter of information, we are enclosing two recent letters from the State of California Department of Health Services which speak to the re-evaluation of Drakes Estero as a commercial shellfish growing area and a notice of the emergency closure of some of JOC beds.

This information again reiterates the desirability of a representative from the Regional or Field Solicitor's Office attend the March 25 on-site meeting with the County and State officials.

John L. Sansing

Enclosures

cc w/c encs:
Field Solicitor

JLSansing;an 3/18/94

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

PETE WILSON, Governor

DEPARTMENT OF HEALTH SERVICES
714/744 P STREET
P.O. BOX 942732
SACRAMENTO, CA 94234-7320
(916) 323-3023

RECEIVED
Point Reyes
National Seashore
MAR 14 '94
SUPT
ADM OFF
INTERPRETATIO
MAINTAINANCE
PROTECTION
HORSE RANCH
RESEARCH
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LIBRARY
READING FILE
CENTRAL FILES

March 11, 1994

(Lea. North, Res. Mgt. Arnaiz 3.14.94)

Tom J. Johnson, President
Johnson Oyster Company
P.O. Box 69
Inverness, CA 94937

Dear Mr. Johnson:

NOTICE OF EMERGENCY CLOSURE OF SCHOONER BAY, DRAKES ESTERO, TO SHELLFISH HARVESTING

This is to confirm the verbal notification delivered by Gregg W. Langlois of this agency to your telephone message recorder on Wednesday, March 9, 1994, which you acknowledged to Mr. Langlois on March 10. That part of your shellfish growing area located in Schooner Bay, an arm of Drakes Estero, Marin County, California, is closed to the harvesting of shellfish for sale for human consumption. This order includes your oyster beds numbered 1 through 5, 8 through 9, and 31 through 35.

This is an emergency action taken pursuant to Section 28502(e) of the California Health and Safety Code. This Department finds that shellfish harvested from Schooner Bay are unsafe or unfit for human consumption. The reason for this finding is that the Department has been informed by the Marin County Department of Health and Human Services that the community septic system at your onshore facility is failing and allowing sewage runoff to enter Schooner Bay.

All interested persons are invited to present their views on this action by submitting data, views, or arguments, orally or in writing, to this Department by April 1, 1994. Please send written responses to Mr. Kenneth H. Hansgen, Supervising Public Health Biologist, Environmental Management Branch, at the address above. If you have any oral comments or questions, or need more information on this matter, please call Mr. Hansgen at (916) 324-2205.

Sincerely,

Jack S. McGurk

Jack S. McGurk, Chief
Environmental Management Branch

cc: Stuart E. Richardson, Chief
Food and Drug Branch
Department of Health Services
601 N. 7th Street, P.O. Box 142732, MS 357
Sacramento, CA 94234-7320

Warren Crawford, Regional Chief
Food and Drug Branch
Department of Health Services
185 Berry St., Lobby 7, Suite 260
San Francisco, CA 94107

F. Robert Studdert
Attorney at Law
39 Professional Center Parkway
San Rafael, CA 94903

Edward J. Stewart, Chief
Environmental Health Services
Marin County Department of Health & Human Services
Marin Civic Center, Room 276
San Rafael, CA 276

Barbara Bania
Department of Fish and Game
Wildlife Protection Division
1416 Ninth Street, Room 1326-2
Sacramento, CA 95814

Robert Hulbrock
Aquaculture Coordinator
Department of Fish and Game
1416 Ninth Street, 12th Flr.
Sacramento, CA 95814

Steven R. Ritchie, Executive Officer
CA Regional Water Quality Control Board--
San Francisco Bay Region (2)
2101 Webster Street, Suite 500
Oakland, CA 94612

John L. Sansing, Superintendent
Point Reyes National Seashore
Point Reyes, CA 94956

Michael G. Goza
Regional Shellfish Specialist
U.S. Food and Drug Administration
50 United Nations Plaza, Room 560
San Francisco, CA 94102

L1425
02-106

March 10, 1994

Mr. Tom Johnson, President
Johnson Oyster Company
P. O. Box 69
Inverness, CA 94937

Dear Tom:

We are enclosing a copy of a letter we received from the County Counsel of Marin County. Please note that County representatives plan to inspect your property at 10:30 AM, on March 25.

We have advised them that we also will send a representative for the inspection and that the March 25 date and time is satisfactory.

Sincerely,

John L. Sansing
Superintendent

Enclosure

bc:
Chief Ranger
North District

JLSansing:an 3/10/94

L1425
02-106

THOMAS G. HENDRICKS
COUNTY COUNSEL

ALLEN A. HAIM
CHIEF DEPUTY

PAULETTE ENGLER
ADMINISTRATIVE ASSISTANT

COUNTY COUNSEL OF MARIN CO
SUITE 342, CIVIC CENTER
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JOHN F. GOVI
ALEXIS J. MCBRIDE
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SUE WEAVER
CHARLES J. MCKEE
DEPUTIES

RECEIVED
Point Reyes
National Seashore
MAR 10 '94
SUPT.
ADM OFF
INTERPRETATION
MAINTAINANCE
PROTECTION
HORSE RANCH
RESEARCH
PPC
LIBRARY
READING FILE
CENTRAL FILES

FAX copy rec'd 3/8/94

March 8, 1994

Mr. John L. Sansing
U.S. Department of the Interior
National Park Service
Point Reyes National Seashore
Pt. Reyes, Ca. 94956

Re: Johnson Oyster Bed, 17171 Sir Francis Drake Boulevard, Inverness/Assessor's Parcel Number 109-130-17/L1425 Tract 02-106

Dear Mr. Sansing:

The Marin County Building Inspection, Environmental Health, and Planning Departments have received complaints of violations occurring on the above property. As the United States Government is the property owner of record, we are directing our correspondence to your office. Despite extensive correspondence and requests from the above Marin County Departments, the property remains in violation of numerous sections the Marin County Code. Therefore, the Departments have referred this case to our office for purposes of seeking legal remedies to these troublesome and dangerous public health problems.

Specifically the violations on the property include:

Environmental Health Violations:

1. SEWAGE/SEPTIC: Marin County Code Chapter 18.06.040 (B) Prohibited Acts,Construct, rebuild, use, occupy or maintain any residence,place of business or other structure where persons reside, congregate or are employed, which is not provided with a means of disposal of sewage by connection to a public sewer system or an individual sewage disposal system, without first obtaining approval and/or a permit from the health officer.

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A. Marin County Code Section 7.24.030. Permit Required. (a) REQUIRED. It is unlawful for any person to operate any food establishment within the unincorporated area of Marin County without a valid permit issued by the county health officer.

B. California Health and Safety Code, Chapter 4 - California Uniform Retial Food Facilities Law (CURFFL), Section 27551: A food facility shall not be open for business without a valid permit.

C. CURFFL, Section 27550: A person proposing to build or remodel a food facility shall submit complete plans and specifications to the local enforcement agency for review and approval pursuant to the requirements of this chapter.

3. WATER: California Health and Safety Code Section 4010.1 (q) and Health and Safety Code Article 2: If the number of water service connections is 15 ore more or if it serves more than 25 people then Johnson Oyster Company is operating a community water system as defined by California health and Safety Code, Section 1010.1 (q) and without a valid permit, per Health and Safety Code Article 2.

4. WELLS: Marin County Code Section 7.28: Wells on the property have been installed without permits, which is in violation of Marin County Code Section 7.28 domestic Water Supply.

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1. Electrical conductors equipment and panel boxes installed and maintained without in violation of the National Electric Code. (Marin County Code Section 19.04.010).

2. Enlargement of the sales area without a proper building permit. (Marin County Code Section 19.04.010)

The purpose of this letter is to request an inspection of the property by the concerned county officials on March 25, 1994 at 10:30 a.m. We are seeking voluntary compliance with this request. However, if permission to inspect is refused, we will apply to the Superior Court for an inspection warrant, authorized by California Health and Safety Code 17970 and California Code of Civil Procedure 1899.50, et seq.

Please call our office at 499-6117 prior to March 21, 1994 to confirm the inspection.

Very truly yours,

Alexis McBride

ALEXIS J. McBRIDE
Deputy County Counsel

cc: Ed Henry
Dave Mesagno
Debbi Poiani

L425 02.1VD

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

PETE WILSON, Governor

DEPARTMENT OF HEALTH SERVICES
714/744 P STREET
P.O. BOX 942732
SACRAMENTO, CA 94234-7320
(916) 323-1167

RECEIVED
Point Reyes
APR 4 - '94

SUPT.
ADM OFF
INTERPRETATION
MAINTAINANCE
PROTECTION
HORSE RANCH
RESEARCH
FED
cc: NORTH DISTRICT 4/4/94
LIBRARY
READING FILE
CENTRAL FILES

March 30, 1994

Mr. Tom J. Johnson, President
Johnson Oyster Company
P. O. Box 69
Inverness, CA 94937

Dear Mr. Johnson:

NOTICE OF REVOCATION OF EMERGENCY CLOSURE OF SCHOONER BAY, DRAKES ESTERO, TO SHELLFISH HARVESTING

This is to confirm the verbal notification delivered by Jack S. McGurk and Gregg Langlois of this agency on March 29, 1994, to Tom Johnson and F. Robert Studdert regarding the rescinding of the emergency closure of Schooner Bay within Drakes Estero, Marin County, California. The emergency closure was established on March 9th to prevent harvesting of shellfish for sale for human consumption after receiving notice by the Marin County Department of Health and Human Services that the county septic system at your onshore facility was failing and allowing sewage runoff to enter Schooner Bay.

Subsequent water testing for the presence of fecal coliform (FC) contamination in the immediate and surrounding area was conducted by our agency on the following dates: March 10th, 15th, and 22nd. The sample collected from the failing leach field on March 15th contained a high concentration of FC (> 160,000 MPN); it should be noted that, at the time of sample collection, you had ceased pumping from your septic tank to the leach field. All other water samples collected from Drakes Estero contained very low to undetectable concentrations of FC. In addition, all oyster meat samples analyzed from Schooner Bay contained low to undetectable concentrations of FC.

Based on the results of our monitoring data, we have determined that the harvesting of shellfish from Schooner Bay, or anywhere else within the classified growing areas of Drakes Estero, does not present a public health risk. The closure established on March 9th is hereby rescinded.

Please be advised that this agency is to be apprised of all repair work to the failing septic system. Prior to reactivating your septic system, you must notify this agency. Upon reactivation of this system, we will consider Schooner Bay to be closed to shellfish harvesting as a precautionary measure until such time as adequate water and shellfish testing is done to ensure that there is no contamination of Drakes Estero and no risk to the public health.

Should you have questions, please call Mr. Ken Hansgen at (916) 324-2205 or Mr. Gregg Langlois at (510) 540-3423.

Sincerely,

Rufus B. Howell

for Jack S. McGurk, Chief
Environmental Management Branch

cc: Stuart E. Richardson, Chief
Food and Drug Branch
Department of Health Services
601 North 7th Street, MS-357
P. O. Box 142732
Sacramento, CA 94234-7320

Warren Crawford
Regional Chief
Food and Drug Branch
Department of Health Services
185 Berry Street, Lobby 7, Suite 260
San Francisco, CA 94107

F. Robert Studdert
Attorney at Law
39 Professional Center Parkway
San Rafael, CA 94903

Edward J. Stewart, Chief
Environmental Health Services
Marin County
Department of Health and Human Services
Marin Civic Center, Room 276
San Rafael, CA 94903

cc: Barbara Bania
Department of Fish and Game
Wildlife Protection Division
1416 Ninth Street, Room 1326-2
Sacramento, CA 95814

Robert Hulbrook
Aquaculture Coordinator
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Steven R. Ritchie
Executive Officer
CA Regional Water Quality Control Board
San Francisco Bay Region 2
2101 Webster Street, Suite 500
Oakland, CA 94612

√ John L. Sansing, Superintendent
Point Reyes National Seashore
Point Reyes, CA 94956

Michael G. Goza
Regional Shellfish Specialist
U. S. Food and Drug Administration
50 United Nations Plaza, Room 560
San Francisco, CA 94102

L1425
02-106

April 14, 1994

Mr. Richard McMillan, P.E.
Chief, North Coastal Section
Division of Drinking Water &
Environmental Management
State of California
Department of Health Services
2151 Berkeley Way, Room 458
Berkeley, CA 94704

Dear Mr. McMillan:

On April 11, the County of Marin provided us with a copy of Water Permit No. 02-04-94P-21504, for System No. 21-504 for Johnson Oyster Company. The permit was issued by your office by the State of California.

For your information, we have no record of any request from the Johnson Oyster Company for drilling a water well on Federal land or on the Federal land under reservation or permit to Johnson Oyster Company. Our preliminary review indicates that the well was drilled on park land without authorization. However, we will ascertain the exact location once we obtain a survey of the property.

In the future it will be helpful if we are advised of such applications in advance. Please let us know if you have any questions or need additional information.

Sincerely,

John L. Sansing
Superintendent

cc:
Alexis McBride,
County Counsel of Marin County

Ralph Mihan,
Field Solicitor, National Park Service

bc:
Brock
Sansing

JLSansing: an
4/14/94

L1425
Tract 02-106

June 1, 1994

Ms. Alexis J. McBride
Deputy Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Dear Ms. McBride:

In response to your May 24 letter and the May 19 letter from Mr. Studdert which you furnished, we offer the following comments relative to Mr. Studdert's letter.

1. With respect to the "two mobile homes" which the Johnson Oyster Company (JOC) removed, one was a travel trailer and the other a recreation vehicle. The physical condition of the travel trailer seemed to indicate that it was not in use before it was removed. Apparently, the recreation vehicle had been in use by only one person, a nephew. Consequently, the removal of the two units would not appear to have had a significant impact on the sewage disposal system.

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Please let us know if you need additional information.

Sincerely,

John L. Sansing
Superintendent

cc:
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36 Professional Center Parkway
San Rafael, CA 94903

Regional Director, WRO

bc w/c inc:
Field Solicitor, WRO
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North District Ranger

JLSansing:an 6/1/94

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CHARLES J. McKEE
DEPUTIES

May 24, 1994

Mr. John Sansig, Superintendent
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

Dear Mr. Sansig:

I have enclosed a copy of a letter from Mr. Studdart regarding the Johnson Oyster property. This letter was in mistaken response to my April 18, 1994 request that a detailed plan be submitted by May 17, 1994.

Mr. Studdart, on page 2 of the letter, suggests that after County approvals are gained then he will approach the Park Service to get land for a new septic system. Such a suggestion places the cart before the horse. It is central to any permit or plan for the property that the septic needs be addressed. It is impossible for the County to consider an application, much less issue permits, based on a hypothetical septic disposal system to be situated on lands neither owned nor controlled by the applicant.

I have also attached a copy of my response to Mr. Studdart.

Yours truly,

Alexis McBride

ALEXIS J. McBRIDE
Deputy County Counsel

g:\ann\letvic\sansig

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May 23, 1994

F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, Ca. 94903

RE: Johnson Oyster

Dear Mr. Studdert:

This letter is is response to your letter of May 19, 1994 and our conversation of today.

As I indicated to you, the letter is totally insufficient to meet the requirements of my May 8, 1994 letter. I requested "a DETAILED PLAN WITH AN EXPEDITED PROCESS FOR RESOLVING THE LAND USE AND SEPTIC VIOLATIONS." The number of mobile homes is determined by various factors, one of the most important being the means of sewage disposal.

The detailed plan requested must at a a bare minimum contain:

1. The area to be utilized for the septic system showing its location and size as this will determine the capacity of the septic system which is determinitive of the number of mobile homes and uses that can be considered for the property.

2. The number and location of mobile homes proposed by the use permit/design review process.

As my letter indicates this plan must be submitted prior to the preapplication interview. After the detailed plan is received a planner will be assigned. This planner will be the staff person assigned for processing this permit. As the information sheet provided to you indicates, the charge for a preapplication interview will be $75 per hour with a $300 retainer requested.

If a detailed plan is not submitted by June 6, 1994 I intend to seek injunctive relief from the Superior Court requesting the removal of all illegal uses.

Very truly yours,

Alexis McBride

ALEXIS J. McBRIDE
Deputy County Counsel

F. ROBERT STUDDERT
ATTORNEY AT LAW

MARIN COUNTY
COUNSEL'S OFFICE

REPLY TO NORTHGATE OFFICE

May 19, 1994

HAND DELIVERED

Alexis J. McBride, Esq.
Deputy County Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Re: Johnson Oyster Company, Inc.
17171 Sir Francis Drake Boulevard
Inverness A.P. #109-130-17

Dear Ms. McBride:

The following constitutes the Johnson Oyster Company, Inc. (hereinafter "Company") plan for resolving certain land use and septic problems on the captioned property, and is in response to your letter of April 18, 1994.

At the outset, two matters should be noted. Two mobile homes have been removed from the property, and an additional ten mobile home resident employees have been put on notice that it may be necessary to vacate depending on the outcome of negotiations with the County and National Park Service (hereinafter "NPS"). A copy of that notice, in both Spanish and English, served on April 10, 1994, is attached hereto. It is submitted that the Company is making a good faith effort in the right direction.

Secondly, the water system permit issued by the California Department of Health Service on April 1, 1994, a copy of which is attached hereto, would appear to address the concerns raised by Item No. 16 at page 2. Since the Department of Health Services otherwise regulates the Company's operations, including its domestic water supply, it seems only appropriate and reasonable that the State issue the well and water distribution permit. Additionally, there is precedent for the Department of Health Services issuing water system permits on other Federal reservations in both the GGNRA and Yosemite. However, should the State permit for any reason be revoked, the Company would gladly apply for a County permit. It would seem that a water system that meets State

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FAX: (415) 479-8416

standards would equally meet County standards.

Cutting across all permit issues raised by your letter, is finding a septic system solution. The present alternative of pumping the system is prohibitively expensive ($4,600.00/month), and not, in any event, a long-term solution as pointed out in your letter. It is my understanding that the existing leach field is beyond use or rehabilitation in any form. Moreover, I further understand from Dave Mesagno that such a leach field only has a life of approximately twenty years in any event. Hence, it is essential that the Company obtain additional land, under a Special Use permit from NPS for a new leach field.

Heretofore, Park Superintendent John Sansing has been very resistant to issuing any further Special Use permit for the Company septic system purposes. However, in a telephone conference with him this date, he agreed that such a permit for NPS land could be issued for a leach field sufficient to accommodate the number of mobile homes and residences permitted by State and Local law. He further authorized me to represent this fact to you in this letter. Previously, we had anticipated that litigation in the form of a declaratory relief action might be necessary to determine rights under the Company's leaseback from the NPS, which would have greatly lengthened the timetable for our compliance with County requirements. The aforementioned change of position should expedite the Company's ability to correct the alleged violations.

In attempting to formulate a plan, and the timetable incidental thereto, we will treat of the mobile homes in one phase, and the business facilities - - - i.e. salesroom, etc., in another. There is a certain amount of inter-relationship between some items. That is, it is necessary to determine the number of mobile homes allowed under Title 25 Housing and Community Development to arrive at the magnitude of the septic system and attendant timetable and expense. Insofar as possible, the time period specified for accomplishment would run from the application date following the initial Pre-application meeting. Further, in this respect, it is anticipated that the Pre-application meeting will provide citation to the applicable ordinances and codes together with any other guidance available.

With respect to Item No. 7 generally, the Company proposes correcting all electrical installations within six months respecting the mobile homes, and within nine months respecting the balance of the property.

With respect to Item No. 14, there will no longer be a sewage injection pump following implementation of this plan.

Any deficiencies respecting Item Nos. 4 and 9, above ground

gas tank and gas flue respectively, will be corrected within 30 days from the Pre-application meeting.

With respect to Item Nos. 8 and 13, the electrical supply at the well and stairs at office respectively, any violations will be corrected within 60 days of the Pre-application meeting.

With respect to Item No. 6, propane gas lines and tanks, McPhail's has agreed to correct any tank matters within its area of responsibility, and the Company will correct any deficiency attributed to it within six months of the Pre-application meeting.

With respect to Item No. 5, sewer and water line connections to mobile homes, the connections will be brought into compliance within six months of the application date.

With respect to Item Nos. 10 and 12, carports, sheds, entrance landings, and exit stairways, will be brought into compliance within six months of the application, or, removed in the case of carports and sheds that do not meet permit standards.

With respect to Item No. 11, the Company is not certain which free standing sheds and wood structures require permits - - - e.g. some structures are merely windbreaks. Any temporary structures that can't be permitted will be removed.

The Company will simultaneously seek design review approval, coastal permit or use permit approval alongside the aforementioned building permit applications and follow the same time frame. To that end, the Company respectfully requests an interview to further discuss the formal use permit/design review submittal.

Obviously, any and all of the foregoing permit processes assume an applied for and adequate septic system. The Company has already retained a sanitary engineer and consulted regarding a new septic system. In that regard, our engineer Rich Lincoln has met with the County's Dave Mesagno. As soon as the appropriate number of mobile homes and residences are arrived at, that information will be plugged into an existing septic system design, and septic permit approval sought.

Respecting the retail commercial use of the property, please be advised that the Company has continuously conducted retail commercial operations on the property since 1957. Its predecessors have similarly conducted retail commercial operations, in the following order: - - - David Dreier in 1934, Drake's Bay Oyster Company in 1935, Larry Jensen in 1946, and Van Camp Seafoods, Inc. dba Coast Oyster Company in 1954. Persons are still available to make affidavits regarding the Coast Oyster Company and Jensen retail use. Materials are available from the California Department

of Fish and Game, California Department of Health Services, and other State agencies respecting the Company's retail usage since 1957.

Both Tom Johnson and I would be available any time after June 6, 1994 for the Pre-application meeting with you and the Planning, Environmental Health and Building departments. It is anticipated that requisite applications could be prepared and submitted within a reasonably short time thereafter.

I look forward to meeting with you on May 23, 1994 at 10:00 a.m. in your office. To that end, this plan is being hand carried and submitted for your review on May 20, 1994.

At this time, I would like to extend my most sincere appreciation for your patience and understanding in resolving this matter. I look forward to seeing you on the 23rd.

Respectfully submitted,

F. Robert Studdert

cc: Johnson Oyster Company, Inc.

FRS/lcv

L1425
Tract 02-106

June 1, 1994

Ms. Alexis J. McBride
Deputy Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Dear Ms. McBride:

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Please let us know if you need additional information.

Sincerely,

John L. Sansing
Superintendent

cc:
F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, CA 94903

Regional Director, WRO

bc w/c inc:
Field Solicitor, WRO
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National Park Service
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F. ROBERT STUDDERT
ATTORNEY AT LAW

MARIN COUNTY
COUNSEL'S OFFICE

REPLY TO NORTHGATE OFFICE

May 19, 1994

HAND DELIVERED

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F. Robert Studdert

cc: Johnson Oyster Company, Inc.

FRS/lcv

L1425
Tract 02-106

June 1, 1994

Ms. Alexis J. McBride
Deputy Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

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Please let us know if you need additional information.

Sincerely,

John L. Sansing
Superintendent

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San Rafael, CA 94903

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May 24, 1994

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National Park Service
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Point Reyes, CA 94956

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I have also attached a copy of my response to Mr. Studdart.

Yours truly,

Alexis McBride

ALEXIS J. McBRIDE
Deputy County Counsel

g:\ancienvir\sansig

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CHARLES J. McKEE
DEPUTIES

May 23, 1994

F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, Ca. 94903

RE: Johnson Oyster

Dear Mr. Studdert:

This letter is is response to your letter of May 19, 1994 and our conversation of today.

As I indicated to you, the letter is totally insufficient to meet the requirements of my May 8, 1994 letter. I requested "a DETAILED PLAN WITH AN EXPEDITED PROCESS FOR RESOLVING THE LAND USE AND SEPTIC VIOLATIONS." The number of mobile homes is determined by various factors, one of the most important being the means of sewage disposal.

The detailed plan requested must at a a bare minimum contain:

1. The area to be utilized for the septic system showing its location and size as this will determine the capacity of the septic system which is determinitive of the number of mobile homes and uses that can be considered for the property.

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If a detailed plan is not submitted by June 6, 1994 I intend to seek injunctive relief from the Superior Court requesting the removal of all illegal uses.

Very truly yours,

ALEXIS J. McBRIDE
Deputy County Counsel

F. ROBERT STUDDERT
ATTORNEY AT LAW

MARIN COUNTY
COUNSEL'S OFFICE

REPLY TO NORTHGATE OFFICE

May 19, 1994

HAND DELIVERED

Alexis J. McBride, Esq.
Deputy County Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Re: Johnson Oyster Company, Inc.
17171 Sir Francis Drake Boulevard
Inverness A.P. #109-130-17

Dear Ms. McBride:

The following constitutes the Johnson Oyster Company, Inc. (hereinafter "Company") plan for resolving certain land use and septic problems on the captioned property, and is in response to your letter of April 18, 1994.

At the outset, two matters should be noted. Two mobile homes have been removed from the property, and an additional ten mobile home resident employees have been put on notice that it may be necessary to vacate depending on the outcome of negotiations with the County and National Park Service (hereinafter "NPS"). A copy of that notice, in both Spanish and English, served on April 10, 1994, is attached hereto. It is submitted that the Company is making a good faith effort in the right direction.

Secondly, the water system permit issued by the California Department of Health Service on April 1, 1994, a copy of which is attached hereto, would appear to address the concerns raised by Item No. 16 at page 2. Since the Department of Health Services otherwise regulates the Company's operations, including its domestic water supply, it seems only appropriate and reasonable that the State issue the well and water distribution permit. Additionally, there is precedent for the Department of Health Services issuing water system permits on other Federal reservations in both the GGNRA and Yosemite. However, should the State permit for any reason be revoked, the Company would gladly apply for a County permit. It would seem that a water system that meets State

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standards would equally meet County standards.

Cutting across all permit issues raised by your letter, is finding a septic system solution. The present alternative of pumping the system is prohibitively expensive ($4,600.00/month), and not, in any event, a long-term solution as pointed out in your letter. It is my understanding that the existing leach field is beyond use or rehabilitation in any form. Moreover, I further understand from Dave Mesagno that such a leach field only has a life of approximately twenty years in any event. Hence, it is essential that the Company obtain additional land, under a Special Use permit from NPS for a new leach field.

Heretofore, Park Superintendent John Sansing has been very resistant to issuing any further Special Use permit for the Company septic system purposes. However, in a telephone conference with him this date, he agreed that such a permit for NPS land could be issued for a leach field sufficient to accommodate the number of mobile homes and residences permitted by State and Local law. He further authorized me to represent this fact to you in this letter. Previously, we had anticipated that litigation in the form of a declaratory relief action might be necessary to determine rights under the Company's leaseback from the NPS, which would have greatly lengthened the timetable for our compliance with County requirements. The aforementioned change of position should expedite the Company's ability to correct the alleged violations.

In attempting to formulate a plan, and the timetable incidental thereto, we will treat of the mobile homes in one phase, and the business facilities - - - i.e. salesroom, etc., in another. There is a certain amount of inter-relationship between some items. That is, it is necessary to determine the number of mobile homes allowed under Title 25 Housing and Community Development to arrive at the magnitude of the septic system and attendant timetable and expense. Insofar as possible, the time period specified for accomplishment would run from the application date following the initial Pre-application meeting. Further, in this respect, it is anticipated that the Pre-application meeting will provide citation to the applicable ordinances and codes together with any other guidance available.

With respect to Item No. 7 generally, the Company proposes correcting all electrical installations within six months respecting the mobile homes, and within nine months respecting the balance of the property.

With respect to Item No. 14, there will no longer be a sewage injection pump following implementation of this plan.

Any deficiencies respecting Item Nos. 4 and 9, above ground

gas tank and gas flue respectively, will be corrected within 30 days from the Pre-application meeting.

With respect to Item Nos. 8 and 13, the electrical supply at the well and stairs at office respectively, any violations will be corrected within 60 days of the Pre-application meeting.

With respect to Item No. 6, propane gas lines and tanks, McPhail's has agreed to correct any tank matters within its area of responsibility, and the Company will correct any deficiency attributed to it within six months of the Pre-application meeting.

With respect to Item No. 5, sewer and water line connections to mobile homes, the connections will be brought into compliance within six months of the application date.

With respect to Item Nos. 10 and 12, carports, sheds, entrance landings, and exit stairways, will be brought into compliance within six months of the application, or, removed in the case of carports and sheds that do not meet permit standards.

With respect to Item No. 11, the Company is not certain which free standing sheds and wood structures require permits - - - e.g. some structures are merely windbreaks. Any temporary structures that can't be permitted will be removed.

The Company will simultaneously seek design review approval, coastal permit or use permit approval alongside the aforementioned building permit applications and follow the same time frame. To that end, the Company respectfully requests an interview to further discuss the formal use permit/design review submittal.

Obviously, any and all of the foregoing permit processes assume an applied for and adequate septic system. The Company has already retained a sanitary engineer and consulted regarding a new septic system. In that regard, our engineer Rich Lincoln has met with the County's Dave Mesagno. As soon as the appropriate number of mobile homes and residences are arrived at, that information will be plugged into an existing septic system design, and septic permit approval sought.

Respecting the retail commercial use of the property, please be advised that the Company has continuously conducted retail commercial operations on the property since 1957. Its predecessors have similarly conducted retail commercial operations, in the following order: - - - David Dreier in 1934, Drake's Bay Oyster Company in 1935, Larry Jensen in 1946, and Van Camp Seafoods, Inc. dba Coast Oyster Company in 1954. Persons are still available to make affidavits regarding the Coast Oyster Company and Jensen retail use. Materials are available from the California Department

of Fish and Game, California Department of Health Services, and other State agencies respecting the Company's retail usage since 1957.

Both Tom Johnson and I would be available any time after June 6, 1994 for the Pre-application meeting with you and the Planning, Environmental Health and Building departments. It is anticipated that requisite applications could be prepared and submitted within a reasonably short time thereafter.

I look forward to meeting with you on May 23, 1994 at 10:00 a.m. in your office. To that end, this plan is being hand carried and submitted for your review on May 20, 1994.

At this time, I would like to extend my most sincere appreciation for your patience and understanding in resolving this matter. I look forward to seeing you on the 23rd.

Respectfully submitted,

F. Robert Studdert

cc: Johnson Oyster Company, Inc.

FRS/lcv

L1425
Tract 02-106

June 1, 1994

Ms. Alexis J. McBride
Deputy Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Dear Ms. McBride:

In response to your May 24 letter and the May 19 letter from Mr. Studdert which you furnished, we offer the following comments relative to Mr. Studdert's letter.

1. With respect to the "two mobile homes" which the Johnson Oyster Company (JOC) removed, one was a travel trailer and the other a recreation vehicle. The physical condition of the travel trailer seemed to indicate that it was not in use before it was removed. Apparently, the recreation vehicle had been in use by only one person, a nephew. Consequently, the removal of the two units would not appear to have had a significant impact on the sewage disposal system.

2. As to the water system permit our preliminary information indicates that the well was drilled by A & K Drilling of Petaluma in February, 1989, on government land without benefit of a permit or any other type of permission documentation. We are exploring the circumstances surrounding the development of the well and verifying whether the location is on government land not included in the Reservation of Use and Occupancy. We are also obtaining an appraisal to determine the charge for water produced, which will be billed to JOC.

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4. Mr. Studdert misunderstood or misinterpreted our telephone conversation about using park land for a sewage disposal system. Recent discussions between this office and our Regional Office indicate there is no probability that we will issue any permit to JOC for additional land. Consequently, JOC should concentrate on meeting the County requirements and regulations.

Please let us know if you need additional information.

Sincerely,

John L. Sansing
Superintendent

cc:
F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, CA 94903

Regional Director, WRO

bc w/c inc:
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JLSansing:an 6/1/94

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DEPUTIES

May 24, 1994

Mr. John Sansig, Superintendent
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

Dear Mr. Sansig:

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Mr. Studdart, on page 2 of the letter, suggests that after County approvals are gained then he will approach the Park Service to get land for a new septic system. Such a suggestion places the cart before the horse. It is central to any permit or plan for the property that the septic needs be addressed. It is impossible for the County to consider an application, much less issue permits, based on a hypothetical septic disposal system to be situated on lands neither owned nor controlled by the applicant.

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ATTORNEY AT LAW

MARIN COUNTY
COUNSEL'S OFFICE

[illegible]

REPLY TO NORTHGATE OFFICE

May 19, 1994

HAND DELIVERED

Alexis J. McBride, Esq.
Deputy County Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Re: Johnson Oyster Company, Inc.
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F. Robert Studdert

cc: Johnson Oyster Company, Inc.

FRS/lcv

L1425
Tract 02-106

June 1, 1994

Ms. Alexis J. McBride
Deputy Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Dear Ms. McBride:

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Please let us know if you need additional information.

Sincerely,

John L. Sansing
Superintendent

cc:
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San Rafael, CA 94903

Regional Director, WRO

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DEPUTIES

May 24, 1994

Mr. John Sansig, Superintendent
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

Dear Mr. Sansig:

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Deputy County Counsel

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May 23, 1994

F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, Ca. 94903

RE: Johnson Oyster

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Alexis McBride

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Deputy County Counsel

F. ROBERT STUDDERT
ATTORNEY AT LAW

MARIN COUNTY
COUNSEL'S OFFICE

REPLY TO NORTHGATE OFFICE

May 19, 1994

HAND DELIVERED

Alexis J. McBride, Esq.
Deputy County Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Re: Johnson Oyster Company, Inc.
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Inverness A.P. #109-130-17

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Heretofore, Park Superintendent John Sansing has been very resistant to issuing any further Special Use permit for the Company septic system purposes. However, in a telephone conference with him this date, he agreed that such a permit for NPS land could be issued for a leach field sufficient to accommodate the number of mobile homes and residences permitted by State and Local law. He further authorized me to represent this fact to you in this letter. Previously, we had anticipated that litigation in the form of a declaratory relief action might be necessary to determine rights under the Company's leaseback from the NPS, which would have greatly lengthened the timetable for our compliance with County requirements. The aforementioned change of position should expedite the Company's ability to correct the alleged violations.

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Any deficiencies respecting Item Nos. 4 and 9, above ground

gas tank and gas flue respectively, will be corrected within 30 days from the Pre-application meeting.

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With respect to Item No. 6, propane gas lines and tanks, McPhail's has agreed to correct any tank matters within its area of responsibility, and the Company will correct any deficiency attributed to it within six months of the Pre-application meeting.

With respect to Item No. 5, sewer and water line connections to mobile homes, the connections will be brought into compliance within six months of the application date.

With respect to Item Nos. 10 and 12, carports, sheds, entrance landings, and exit stairways, will be brought into compliance within six months of the application, or, removed in the case of carports and sheds that do not meet permit standards.

With respect to Item No. 11, the Company is not certain which free standing sheds and wood structures require permits - - - e.g. some structures are merely windbreaks. Any temporary structures that can't be permitted will be removed.

The Company will simultaneously seek design review approval, coastal permit or use permit approval alongside the aforementioned building permit applications and follow the same time frame. To that end, the Company respectfully requests an interview to further discuss the formal use permit/design review submittal.

Obviously, any and all of the foregoing permit processes assume an applied for and adequate septic system. The Company has already retained a sanitary engineer and consulted regarding a new septic system. In that regard, our engineer Rich Lincoln has met with the County's Dave Mesagno. As soon as the appropriate number of mobile homes and residences are arrived at, that information will be plugged into an existing septic system design, and septic permit approval sought.

Respecting the retail commercial use of the property, please be advised that the Company has continuously conducted retail commercial operations on the property since 1957. Its predecessors have similarly conducted retail commercial operations, in the following order: - - - David Dreier in 1934, Drake's Bay Oyster Company in 1935, Larry Jensen in 1946, and Van Camp Seafoods, Inc. dba Coast Oyster Company in 1954. Persons are still available to make affidavits regarding the Coast Oyster Company and Jensen retail use. Materials are available from the California Department

of Fish and Game, California Department of Health Services, and other State agencies respecting the Company's retail usage since 1957.

Both Tom Johnson and I would be available any time after June 6, 1994 for the Pre-application meeting with you and the Planning, Environmental Health and Building departments. It is anticipated that requisite applications could be prepared and submitted within a reasonably short time thereafter.

I look forward to meeting with you on May 23, 1994 at 10:00 a.m. in your office. To that end, this plan is being hand carried and submitted for your review on May 20, 1994.

At this time, I would like to extend my most sincere appreciation for your patience and understanding in resolving this matter. I look forward to seeing you on the 23rd.

Respectfully submitted,

F. Robert Studdert

cc: Johnson Oyster Company, Inc.

FRS/lcv

L1425
Tract 02-106

June 1, 1994

Ms. Alexis J. McBride
Deputy Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Dear Ms. McBride:

In response to your May 24 letter and the May 19 letter from Mr. Studdert which you furnished, we offer the following comments relative to Mr. Studdert's letter.

1. With respect to the "two mobile homes" which the Johnson Oyster Company (JOC) removed, one was a travel trailer and the other a recreation vehicle. The physical condition of the travel trailer seemed to indicate that it was not in use before it was removed. Apparently, the recreation vehicle had been in use by only one person, a nephew. Consequently, the removal of the two units would not appear to have had a significant impact on the sewage disposal system.

2. As to the water system permit our preliminary information indicates that the well was drilled by A & K Drilling of Petaluma in February, 1989, on government land without benefit of a permit or any other type of permission documentation. We are exploring the circumstances surrounding the development of the well and verifying whether the location is on government land not included in the Reservation of Use and Occupancy. We are also obtaining an appraisal to determine the charge for water produced, which will be billed to JOC.

3. After discussions with two different engineers, it is our understanding that the existing leach field could be rehabilitated. In addition there may be some land covered by the existing permit which is not in use which could be used to assist with that rehabilitation. However, we presume that the leach field would only accommodate the number of facilities previously approved by the County. We are uncertain as to the precise number but it is substantially less than the number currently in use.

4. Mr. Studdert misunderstood or misinterpreted our telephone conversation about using park land for a sewage disposal system. Recent discussions between this office and our Regional Office indicate there is no probability that we will issue any permit to JOC for additional land. Consequently, JOC should concentrate on meeting the County requirements and regulations.

Please let us know if you need additional information.

Sincerely,

John L. Sansing
Superintendent

cc:
F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, CA 94903

Regional Director, WRO

bc w/c inc:
Field Solicitor, WRO
Chief Ranger
North District Ranger

JLSansing:an 6/1/94

THOMAS G. HENDRICKS
COUNTY COUNSEL

ALLEN A. HAIM
CHIEF DEPUTY

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ADMINISTRATIVE ASSISTANT

COUNTY COUNSEL OF MARIN COUNTY
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ROBERT H. SAN CHEZ
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RUTH W. ROSEN
PATRICK K. FAULKNER
JOHN F. GOVI
ALEXIS J. McBRIDE
MARI-ANN G. RIVERS
CHARLES J. MCKEE
DEPUTIES

May 24, 1994

Mr. John Sansig, Superintendent
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

Dear Mr. Sansig:

I have enclosed a copy of a letter from Mr. Studdart regarding the Johnson Oyster property. This letter was in mistaken response to my April 18, 1994 request that a detailed plan be submitted by May 17, 1994.

Mr. Studdart, on page 2 of the letter, suggests that after County approvals are gained then he will approach the Park Service to get land for a new septic system. Such a suggestion places the cart before the horse. It is central to any permit or plan for the property that the septic needs be addressed. It is impossible for the County to consider an application, much less issue permits, based on a hypothetical septic disposal system to be situated on lands neither owned nor controlled by the applicant.

I have also attached a copy of my response to Mr. Studdart.

Yours truly,

Alexis McBride

ALEXIS J. McBRIDE
Deputy County Counsel

g:\ancl\envirol\sansig

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CHARLES J. MCKEE
DEPUTIES

May 23, 1994

F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, Ca. 94903

RE: Johnson Oyster

Dear Mr. Studdert:

This letter is is response to your letter of May 19, 1994 and our conversation of today.

As I indicated to you, the letter is totally insufficient to meet the requirements of my May 8, 1994 letter. I requested "a DETAILED PLAN WITH AN EXPEDITED PROCESS FOR RESOLVING THE LAND USE AND SEPTIC VIOLATIONS." The number of mobile homes is determined by various factors, one of the most important being the means of sewage disposal.

The detailed plan requested must at a a bare minimum contain:

1. The area to be utilized for the septic system showing its location and size as this will determine the capacity of the septic system which is determinitive of the number of mobile homes and uses that can be considered for the property.

2. The number and location of mobile homes proposed by the use permit/design review process.

As my letter indicates this plan must be submitted prior to the preapplication interview. After the detailed plan is received a planner will be assigned. This planner will be the staff person assigned for processing this permit. As the information sheet provided to you indicates, the charge for a preapplication interview will be $75 per hour with a $300 retainer requested.

If a detailed plan is not submitted by June 6, 1994 I intend to seek injunctive relief from the Superior Court requesting the removal of all illegal uses.

Very truly yours,

ALEXIS J. McBRIDE
Deputy County Counsel

F. ROBERT STUDDERT
ATTORNEY AT LAW

MARIN COUNTY
COUNSEL'S OFFICE

REPLY TO NORTHGATE OFFICE

May 19, 1994

HAND DELIVERED

Alexis J. McBride, Esq.
Deputy County Counsel
County Counsel of Marin County
Suite 342, Civic Center
San Rafael, CA 94903

Re: Johnson Oyster Company, Inc.
17171 Sir Francis Drake Boulevard
Inverness A.P. #109-130-17

Dear Ms. McBride:

The following constitutes the Johnson Oyster Company, Inc. (hereinafter "Company") plan for resolving certain land use and septic problems on the captioned property, and is in response to your letter of April 18, 1994.

At the outset, two matters should be noted. Two mobile homes have been removed from the property, and an additional ten mobile home resident employees have been put on notice that it may be necessary to vacate depending on the outcome of negotiations with the County and National Park Service (hereinafter "NPS"). A copy of that notice, in both Spanish and English, served on April 10, 1994, is attached hereto. It is submitted that the Company is making a good faith effort in the right direction.

Secondly, the water system permit issued by the California Department of Health Service on April 1, 1994, a copy of which is attached hereto, would appear to address the concerns raised by Item No. 16 at page 2. Since the Department of Health Services otherwise regulates the Company's operations, including its domestic water supply, it seems only appropriate and reasonable that the State issue the well and water distribution permit. Additionally, there is precedent for the Department of Health Services issuing water system permits on other Federal reservations in both the GGNRA and Yosemite. However, should the State permit for any reason be revoked, the Company would gladly apply for a County permit. It would seem that a water system that meets State

NORTHGATE OFFICE: 36 PROFESSIONAL CENTER PARKWAY • SAN RAFAEL, CA 94903 • (415) 499-1155
WEST MARIN OFFICE: P.O. BOX 6 • INVERNESS, CA 94937 • (415) 663-8235
FAX: (415) 479-8416

standards would equally meet County standards.

Cutting across all permit issues raised by your letter, is finding a septic system solution. The present alternative of pumping the system is prohibitively expensive ($4,600.00/month), and not, in any event, a long-term solution as pointed out in your letter. It is my understanding that the existing leach field is beyond use or rehabilitation in any form. Moreover, I further understand from Dave Mesagno that such a leach field only has a life of approximately twenty years in any event. Hence, it is essential that the Company obtain additional land, under a Special Use permit from NPS for a new leach field.

Heretofore, Park Superintendent John Sansing has been very resistant to issuing any further Special Use permit for the Company septic system purposes. However, in a telephone conference with him this date, he agreed that such a permit for NPS land could be issued for a leach field sufficient to accommodate the number of mobile homes and residences permitted by State and Local law. He further authorized me to represent this fact to you in this letter. Previously, we had anticipated that litigation in the form of a declaratory relief action might be necessary to determine rights under the Company's leaseback from the NPS, which would have greatly lengthened the timetable for our compliance with County requirements. The aforementioned change of position should expedite the Company's ability to correct the alleged violations.

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With respect to Item No. 14, there will no longer be a sewage injection pump following implementation of this plan.

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gas tank and gas flue respectively, will be corrected within 30 days from the Pre-application meeting.

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At this time, I would like to extend my most sincere appreciation for your patience and understanding in resolving this matter. I look forward to seeing you on the 23rd.

Respectfully submitted,

F. Robert Studdert

cc: Johnson Oyster Company, Inc.

FRS/lcv

L1425
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~~L3019~~

June 20, 1994

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Deputy Counsel
County Counsel of Marin county
Suite 342, Civic Center
San Rafael, CA 94903

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We reiterated our stand that we would not authorize use of additional land for an expansion of the sewage system beyond the area presently authorized by permit. We did however state that we would check our records to see how many mobile homes we had authorized pending county approval. This information was needed by Mr. Lincoln relative to the rehabilitation of the existing sewage disposal site.

Our records show a copy of an unsigned county sewage disposal permit dated October 2, 1974, which lists the following facilities: house, two mobile homes, and an oyster shucking plant (restrooms) = 7 bedrooms. This number was apparently authorized upon acquisition of the property.

In August, 1980, we approved the addition of a 30-foot mobile home pending county approval. In December, 1984, we withheld approval of an additional mobile home pending county approval.

If the county approves the August, 1980, and December, 1984, requests this will add four bedrooms for a total of 11 bedrooms for the Johnson Oyster Company. Consequently, we are forwarding a copy of this letter to Mr. Lincoln for his use in preparing the sewage system rehabilitation plans. However, he should keep in mind that county approvals are necessary before any action is taken.

Mr. Johnson was also given a bill of collection for the water used from the well drilled on government land without our knowledge in February, 1989. He was also informed that trailers on the Special Use Permit lands must be removed.

We learned that in addition to the house trailers there is also one oyster seeding building and a garage on the permit area. Apparently the oyster seed plant was constructed some years ago and we plan to include it in a revised special use permit if the structure meets county requirements. The garage structure was disapproved when requested but obviously was constructed anyway. Accordingly, this structure must be removed also.

A final note; our surveyor plans to be in the area the week of June 20. Hopefully, this will allow us to more precisely locate the structures, the reservation area, the parking permit area and the sewage disposal permit area.

Please let us know if you have any questions.

Sincerely,

John L. Sansing
Superintendent

cc:
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36 Professional Center Parkway
San Rafael, CA 94903

Rich Lincoln & Sons
P.O. Box 443
Occidental, CA 95465

bc:
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Ralph Mihan, Field Solicitor, WRO
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JSansing:at:6/17/94

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Dear Ms. McBride:

Mr. F. Robert Studdert, Mr. Tom Johnson and Mr. Rich Lincoln met with us and our Regional Office personnel to discuss our denial of their request for additional land for a sewage disposal system for the Johnson Oyster Co. operation.

We reiterated our stand that we would not authorize use of additional land for an expansion of the sewage system beyond the area presently authorized by permit. We did however state that we would check our records to see how many mobile homes we had authorized pending county approval. This information was needed by Mr. Lincoln relative to the rehabilitation of the existing sewage disposal site.

Our records show a copy of an unsigned county sewage disposal permit dated October 2, 1974, which lists the following facilities: house, two mobile homes, and an oyster shucking plant (restrooms) = 7 bedrooms. This number was apparently authorized upon acquisition of the property.

In August, 1980, we approved the addition of a 30-foot mobile home pending county approval. In December, 1984, we withheld approval of an additional mobile home pending county approval.

If the county approves the August, 1980, and December, 1984, requests this will add four bedrooms for a total of 11 bedrooms for the Johnson Oyster Company. Consequently, we are forwarding a copy of this letter to Mr. Lincoln for his use in preparing the sewage system rehabilitation plans. However, he should keep in mind that county approvals are necessary before any action is taken.

Mr. Johnson was also given a bill of collection for the water used from the well drilled on government land without our knowledge in February, 1989. He was also informed that trailers on the Special Use Permit lands must be removed.

We learned that in addition to the house trailers there is also one oyster seeding building and a garage on the permit area. Apparently the oyster seed plant was constructed some years ago and we plan to include it in a revised special use permit if the structure meets county requirements. The garage structure was disapproved when requested but obviously was constructed anyway. Accordingly, this structure must be removed also.

A final note; our surveyor plans to be in the area the week of June 20. Hopefully, this will allow us to more precisely locate the structures, the reservation area, the parking permit area and the sewage disposal permit area.

Please let us know if you have any questions.

Sincerely,

John L. Sansing
Superintendent

cc:
L. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, CA 94903

Rich Lincoln & Sons
P.O. Box 443
Occidental, CA 95465

bc:
Phil Ward, Acting Asst. Regional Dir., WRO
Ralph Mihan, Field Solicitor, WRO
J. Sansing, Superintendent, PORE
L. Brock, Chief Ranger, PORE

JSansing:at:6/17/94

THOMAS G. HENDRICKS
COUNTY COUNSEL

ALLEN A. HAIM
CHIEF DEPUTY

PAULETTE ENGLER
ADMINISTRATIVE ASSISTANT

COUNTY COUNSEL OF MARIN COUNTY
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June 23, 1994

F. Robert Studdert, Esq.
36 Professional Center Parkway
San Rafael, CA 94903

Re: JOHNSON'S OYSTERS COMPANY

Dear Mr. Studdert:

This letter will memorialize our meeting of June 23, 1994 and will confirm in writing the agreement that we reached.

The County granted an extension of the deadlines contained in our May 8, 1994 letter in order to give you and your client an opportunity to negotiate with the Federal Parks system for more land for a septic system to meet the needs of the property. You reported, and this was confirmed by letter from John Sansig that your efforts met with failure resulting in the siting of the septic system within its approximate present configuration.

Due to the limitations of that area it will be necessary to design a septic system repair rather than design a new system. Marin County Codes allow a repair to service only a legal entitlement. As we discussed the only legal entitlement on the property according to county records is two houses and a shucking plant.

Due to the limitations of the system it will be necessary for your client to remove the twelve mobilehomes that are currently on the property. The County agreed to allow six months or until January 1, 1995 to complete this removal on the understanding that two trailers will be removed at each month interval. The schedule will be as follows:

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The County is requesting the right to inspect the property on the first working day after the first of each month in order to ensure compliance. If compliance is not undertaken the County reserves the right to pursue an action in the Superior Court requesting immediate removal of all mobilehomes.

The County is further requesting that pumping continue until a septic system is designed, approved and constructed. Mr. Lincoln will proceed with tests and design as soon as feasible, and should complete the necessary tests and design within a two month period. The design will be a repair but as the code requires will come as close as feasible to meet current standards.

Please write back immediately to confirm this understanding.

Sincerely yours,

Alexis McBride
Deputy County Counsel

cc: Tom Johnson
Debbi Poiani
Ed Stewart
Dave Mesagno
John Sansing
Richard Wirnert
Rich Lincoln

BC P. WARD WRO
R. MIARN FIELD SOLICITOR

THOMAS G. HENDRICKS
COUNTY COUNSEL

ALLEN A. HAIM
CHIEF DEPUTY

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San Rafael, CA 94903

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The County is further requesting that pumping continue until a septic system is designed, approved and constructed. Mr. Lincoln will proceed with tests and design as soon as feasible, and should complete the necessary tests and design within a two month period. The design will be a repair but as the code requires will come as close as feasible to meet current standards.

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Richard Wirnert
Rich Lincoln

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June 23, 1994

cc: Pt. Reyes District (1 ea.)

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Sincerely yours,

Alexis McBride
Deputy County Counsel

cc: Tom Johnson
Debbi Poiani
Ed Stewart
Dave Mesagno
John Sansing
Richard Wirnert
Rich Lincoln

BC P. WARD WRO
R. MIAMI FIELD SOLICITOR

L1425
02-106

October 31, 1994

Ms. Alexis J. McBride
Deputy County Counsel
County Counsel of Marin
Civic Center, Suite 342
San Rafael, CA 94901

Dear Ms. McBride:

During our annual Special Use Permit review we discovered that the Johnson Oyster Company (JOC) has not complied with the conditions outlined in your June 23, 1994 letter to JOC. In that letter the County Counsel required that JOC remove twelve mobile homes from the property by eliminating two trailers each month beginning August 1. As of this date only one trailer has been removed. Earlier this year JOC removed two small units from the property consisting of one motorhome and a small travel-type trailer. It does not appear that any effort has been made to remove any additional units.

Please advise us if you have made any changes to the implementation schedule as outlined in your June 23 letter. We look forward to continuing to work with your agency in the hopes of resolving this matter.

Sincerely,

John L. Sansing
Superintendent

bc:
Chief Ranger
North District Ranger

RCase:an 10/31/94

L1425
02-106 PORE

December 5, 1995 **CERTIFIED MAIL #Z142 415 917**

Mr. Tom Johnson, President
Johnson Oyster Company
P.O. Box 68
Inverness, CA 94937

Dear Tom:

A recent site visit on November 9, 1995, confirmed that you remain in violation of conditions contained in the Reservation of Use and Occupancy (Tract 02-106, Contract No. CX800032073), the Special Use Permit #WRO-PORE-6000-306, and the Special Use Permit #WRO-PORE-6000-501. This letter will serve as the first official notification to Johnson Oyster Company of default of Reservation of Use and Occupancy and Special Use Permit conditions.

Regarding your Reservation of Use and Occupancy of a portion of Tract 05-102 (1.47 acres), you have specifically violated Condition 1 described in Exhibit C. Condition 1 requires Johnson Oyster Company "maintain in a safe, sanitary, and sightly condition, open to reasonable inspection by the Director, and meeting all Federal, State, and County health, sanitation, and safety standards applicable to operation of and residence within areas engaged in the processing and retail sale of oysters." Currently, as stated in a Marin County vs. Johnson Oyster Company suit (No. 16531, October 18, 1995), the septic system, water system, and buildings are in violation of Marin County health and safety codes.

Further, the National Park Service observed on November 9, 1995, that the sites authorized for use by the Johnson Oyster Company (JOC) contain two houses, ten trailers, and a residence in a storage plant. The Special Use Permits and the Reservation of Use and Occupancy (ROP) authorize one residence and one trailer.

Condition 5 authorizes "a permanent residence shall be maintained upon the reserved property, occupied by a responsible employee of Vendor." Currently, the site has numerous buildings and approximately eight trailers, beyond one permanent residence, that have not been authorized by the National Park Service and have not been permitted by Marin County.

Condition 7 states "no permanent or temporary structure, sign or other improvement of any type whatsoever shall be erected by Vendor in or upon the reserved premises or improvement without the prior written approval of the Director." Currently, numerous structures, including trailers, have been erected without the permission of the National Park Service and have not been permitted by Marin County.

Regarding Special Use Permit #WRO-PORE-6000-501 for the continuing use of a water well drilled on non-reserved, Department of Interior property, you are in non-compliance with permit condition #7 that requires permittee to "comply with applicable public health and sanitation standards and codes." Currently, as stated in Marin County vs. Johnson Oyster Company (No. 16531, October 18, 1995), you have not received the proper permits from the Marin County Environmental Health Services Division.

Special Use Permit #WRO-PORE-6000-306 allows "parking space for Seashore and Johnson Oyster Co. visitors, including an area for launching canoes, kayaks or other non-motorized boats." Currently, the site authorized by the special use permit (2.2 acres) contains two unauthorized trailers, non-permitted buildings and other structures which are in violation of the permit conditions. In addition, one of the non-permitted building is being used as a residence.

You are advised to consider this letter as your notice that the two above-mentioned Special Use Permits will be revoked unless Johnson Oyster Company meets permit conditions.

While we regret that Johnson Oyster Company has breached the conditions of the Reservation of Use and Occupancy and the two Special Use Permits, we also want to state that we have every intention of fulfilling our obligations in the original Reservation of Use and Occupancy to allow an oyster operation to continue.

Sincerely,

Don L. Neubacher
Superintendent

Enclosure

cc w/c enc:
Alexis McBride, Deputy, Marin County Counsel
Ralph Mihan, Solicitor, Department of Interior

DLNeubacher:an 12/5/95

L1425
02-106 PORE

December 15, 1995

Mr. Tom Johnson, President
Johnson Oyster Company
P.O. Box 68
Inverness, CA 94937

Dear Tom:

On December 5, 1995, we sent you a certified letter regarding your non-compliance with the Special Use Permit conditions for use of National Park Service lands. In addition to these violations, we have several other outstanding issues that will need to be resolved in the near future. Most of the following items were discussed during your Fall meeting with Rangers Russ Case and Charlie Strickfaden.

1. Remove the dump truck, scrap metal and debris from the side yard by December 31, 1995.

2. Paint the fence adjacent to the side yard and side of the plant storage trailer by December 31, 1995.

3. Clear the debris from the tidewater pond and remove the old boat by December 31, 1995.

4. You may install a fence along the pond adjacent to your trailers for the purpose of preventing debris from entering the pond. The fence should be a dark color (dark green or black) and its appearance should be maintained in good condition; should its appearance deteriorate, the fence may need to be removed.

5. Please continue your efforts to remove the oyster sludge piles from the entrance to the parking lot by March 15, 1996.

6. Discontinue the use of plastic oyster spacers. A biodegradable substitute or alternative system should be used. The plastic spacer issue has been brought to your attention previously and they continue to litter area beaches.

We appreciate your efforts to keep the entrance grounds and parking lot clean. Please do not hesitate to contact a North District Ranger if you have any questions or concerns.

Sincerely,

Don L. Newbacher
Superintendent

bc: North District Ranger

RCase/FDean:at:12/14/95

L1425 CERTIFIED MAIL #Z142 415 916

February 1, 1996

Mr. Tom Johnson, President
Johnson Oyster Company
P.O. Box 68
Inverness, CA 94937

Dear Tom:

This letter will serve as your second written notice of potential revocation of Special Use Permits #WRO-PORE-6000-306 and #WRO-PORE-6000-501 within Point Reyes National Seashore because of failure to comply with permit conditions. Your first written notice was sent December 10, 1995 and no response has been received to date.

Consider this the final notice that the two above mentioned special use permits will be revoked unless Johnson Oyster Company meets permit conditions within 30 days of receipt of this letter. If permit conditions are not met by March 1, 1996 you will have 30 days to vacate the premises and all property and debris must be removed from the site. As stated in your current permit, "the permittee will also be responsible for any damage resulting from this use which would not reasonably be inherent in the use which the permittee is authorized to make of the land described in this permit." Therefore, if damages have occurred to the vacated property, we will be issuing a bill of collection for required corrective actions.

You are also advised that the National Park Service has no intention of issuing any future special use permits until current permit and reservation conditions are met. We concur with the recent correspondence from Marin County Environmental Health (David Mesagno to Tom Johnson, January 24, 1996) which indicates that you must submit a proposal within your current entitlements allowed under your permits and reservation.

We also want to state that we have every intention to fulfill our obligations in the original reservation of use and occupancy to allow an oyster operation to continue. We regret that Johnson Oyster Company has breached the conditions of the two permits and the reservation.

Sincerely,

Don L. Neubacher
Superintendent

cc:
Alexis McBride, Deputy, Marin County Counsel
Ralph Mihan, Solicitor, Department of Interi

DLNeubacher:an 2/1/96

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:
L3019

April 10, 1996

Mr. Tom Johnson
Johnson Oyster Company
P.O. Box 68
Inverness, CA 94937

Dear Mr. Johnson:

While your seed plant is essential to your operation, it is outside your reserved parcel. From the inspection to be conducted within 30 days of the receipt of this letter by the National Park Service, Marin County, and Johnson Oyster Company, we will establish whether the facility should remain at its current location or be removed and relocated to your reserve parcel. We acknowledge that the facility is essential to your operation and will permit the facility if applicable building, health, and safety codes are met. However, if the facility needs to be totally rehabilitated, then we may wish to consider removal and new constrution in another location.

In addition to the health and building code compliance for your facilities, as you have agreed, Johnson Oyster Company must initiate cleanup of the entire complex. The issues that need to be addressed are the general appearance and quality of construction, storage locations, and oyster shell disposal. These issues are discussed in more detail on the attached list. Our intent is to ensure a clean, neat, and, appealing facility when park visitors arrive at Johnson Oyster Company. All of the attached issues will be resolved by August 1, 1996.

Sincerely,

Don L. Neubacher
Superintendent

cc: Robert Studdert, Attorney at Law
Ralph Mihan, Field Solicitor
Alexis McBride, County Counsel

JOHNSON OYSTER COMPANY

FACILITY CLEANUP AND SITE APPREARANCE

The following issues were discussed during a site inspection of Johnson Oyster Company on March 8, 1996. These issues will need to be resolved prior to a new Special Use Permit being issued for National Park Service lands at Johnson's Oyster Company.

1. Remove the two saltwater wells and pump facilities on the shoreline and return the sites to a natural appearance.

2. Remove conveyer belt debris pile from the kayak parking area.

3. Discontinue any storage of materials, shells or debris in the kayak parking area to present an open and clean visitor area and positive first impression upon arriving at the facility.

4. Remove dirt and broken shell piles on the northeast side of the facility at the entrance area.

5. Eliminate the spreading of broken oyster shell "gravel" along the entrance road. Restore natural contour of shoreline.

6. Eliminate any further filling of the bay with oyster shells or other debris.

7. Restrict all storage of equipment and oyster shells to the flat area south of the seed plant which will be out of public view.

8. Clean up the shell punch area and screen from public view.

9. Remove and properly dispose of tires and debris in fenced enclosure.

10. Modify fenced storage area to contain trash dumpsters. A fence/gate should be constructed to provide access to dumpster truck.

11. Provide documentation on permits and/or waivers on the fenced grey water leach sump adjacent to the processing plant.

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L3019

April 10, 1996

Mr. Tom Johnson
Johnson Oyster Company
P.O. Box 68
Inverness, CA 94937

Dear Mr. Johnson:

As a result of our meetings with you on March 6 and 8, we are providing you this written summary of the NPS stated position and what you agreed to regarding the Johnson's Oyster Company facilities.

Consistent with the intent and reasons set forth in our letter of February 1, 1996, the special use permits WRO-PORE-6000-306, WRO-5300-449,and WRO-6000-501 for the National Park Service lands adjacent to your reserved parcel are revoked as of the date of this letter.

During our meeting on March 6, you agreed to remove all but four of the mobile homes by July 1, 1996. Specifically, you also agreed to remove units #1, 2, 6, 8, 9, and 10 by July 1, 1996 (survey map to follow). We understand that you want to retain units #3, 4, 5, and 7 as the four authorized trailers. You also agreed that #4 and #7 would be relocated behind the current residence and screened from view.

The reason for the removal of the six mobile homes is to bring you into compliance with the terms of your reservation of possession as well as the special use permits with the National Park Service. Our mutual review of the 1972 appraisal report for the National Park Service's purchase of Johnson's Oyster Company fee lands reveals that at that time there were one house, one cabin, and three mobile homes present on the portion of property reserved by Johnson Oyster Company at the time NPS acquired the land.

Your reserved property right was for the use of a specific part of the acquired lands for 40 (expires 2012) years with only those buildings thereon at that time and the cash purchase price was adjusted accordingly. The terms of your reservation clearly stated that no additional buildings were allowed upon the reserved lands without written approval of the Park Service. Further, the subsequent special use permits, to complement your operation with parking space, for adjoining lands did not permit buildings thereon. During our March 8 inspection of your facilities, we confirmed that there are now one cabin, one house, and 10 mobile homes (7 additional) currently on site, some on the reserved lands and several on special use permit lands.

Regarding building, health, and safety code violations, all remaining authorized housing units (one house, one cabin, four trailers) must meet State and County codes and will be inspected by State and County representatives to ensure they meet current codes. Violations must be corrected as directed by the applicable agency and be completed by August 1, 1996. All other structures will be inspected within 30 days of the date of this letter by Marin County and the National Park Service. As deemed appropriate, the facilities will be required to undergo design review, and violations of building, health, and safety codes shall be corrected within 60 days of issuance of building permits. The building permits must be obtained within 60 days of septic, water system and well permits.

The existing water system under special use permit must be approved by Marin County Environmental Health Department. Specifically, the existing water well and water system will need to be permitted by Marin County and any modifications the County requires will be completed within 60 days and/or as directed by Marin County officials. When Marin County approval is received, the National Park Service will issue a new special use permit to allow its operation. The National Park Service will inspect the water meter at the well and we plan to convert water consumption charges to a metered rate.

As you agreed, the construction and design documents for the waste water system will be submitted to Marin County within 60 days of the receipt of this letter. The system will be redesigned and rehabilitated by October 1, 1996. You will need to apply to Marin County for a permit to design and construct a new septic and leach field for the two residences, four mobile homes, and processing facilities. All of the waste water system permit applications and construction will require review and approval by applicable State and County agencies after which National Park Service approval must be obtained. Only after such approval in writing will NPS grant approval and issue a special use permit to allow for use of land for waste water treatement.

Finally, we are encouraged by our meeting on March 6 and 8. We urge you to show good faith on your stated agreement to comply with the requirements of your original reservation and the subsequent special use permit terms with the National Park Service, as well as the State of California and County of Marin. If real progress is made, we can envision a cooperative situation in the future. Please call my office if you have any questions regarding this letter or recent discussions.

Sincerely,

Don Neubacher
Superintendent

cc: Robert Studdert, Attorney at Law
Ralph Mihan, Field Solicitor
Alexis McBride, County Counsel

L1425
02:106
PORE

COUNTY OF MARIN
COMMUNITY DEVELOPMENT AGENCY

RECEIVED
Point Reyes
MAY 31 '96

Environmental Health Services
Civic Center, Room 283
San Rafael, CA 94903
(415) 499-6907
FAX (415) 507-4120

May 30, 1996
Don Neubacher, Superintendent
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956

Re: Johnson Oyster Company
17171 Sir Francis Drake Blvd.
Inverness CA
APN 109-130-17

Dear Don:

This letter comprises a list of Environmental Health Services violations noted during a joint inspection of Johnson Oyster Company on May 7, 1996. The violations will be limited to items pertaining to: sewage disposal, potable water system and well, and the retail food sales area.

Sewage Disposal

A. The sewage disposal system serving this facility was found to be failing on March 8, 1994. To mitigate this situation Johnson Oyster Company (JOC) was ordered to discontinue use of the septic system. All sewage was to be hauled from the site by a licensed sewage pumping company until a final septic system remedy was approved by this office. Copies of all pump out receipts were to be sent to Environmental Health Services on a weekly basis. Pump out receipts have not been submitted to Environmental Health Services on a weekly basis, and therefore JOC is not in compliance.
B. Several trailers have been placed on the property without first being approved by this office.
C. The retail sales area was enlarged and/or reconstructed without prior approval of this office.
D. Two chemical toilets have been placed on the property without obtaining a permit from this office.
E. The facility does not have an operable on-site sewage disposal system.
F. The septic system has not been repaired or replaced within the required time frame.
G. A waste discharge pond has been constructed and is currently operating without prior approval of this office. The discharge includes drainage and waste from sinks, floor drains, shucking and a bottling process.
H. The 2 compartment sink in the algae shed discharges directly to Schooner Bay.
I. The algae and seeding vats discharge directly to Schooner Bay.
J. An office was constructed over the retail sales area without first being approved by this office.

PRINTED ON RECYCLED PAPER

WATER SYSTEM AND WELL

A. JOC is operating a community water system (nontransient / noncommunity public water system) without approval of Environmental Health Services.
B. The well serving the water system was drilled and installed without obtaining the necessary permit from Environmental Health Services.

RETAIL FOOD OPERATION

A. JOC is operating a retail food operation without a valid Environmental Health Services permit.
B. JOC has remodeled and enlarged the retail sales area without first submitting complete plans and specifications to Environmental Health Services. A permit to remodel and enlarge the retail food facility has never been issued to JOC.

Please let me know if this office can be of any further assistance. I believe that Ed Henry of the Building Inspection Division will be providing you with additional details concerning structural and related building and plumbing code violations.

Sincerely,

David Mesagno, Supervising R.E.H.S.

cc: Ed Stewart, Chief Environmental Health Services
Chun Chang, Regional Water Quality Control Board
Alexis McBride, County Counsels Office
Don Gomsi, DHS Environmental Management Branch
Mike Hernandez, DHS Food And Drug Branch
Cliff Bowen, DHS Office Of Drinking Water

DEPARTMENT OF HEALTH SERVICES
FOOD AND DRUG BRANCH
185 BERRY STREET, SUITE 260
SAN FRANCISCO, CA 94107-1724
(415) 904-9738
(415) 904-9752 FAX

L1425
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PORE

RECEIVED
Point Reyes
National Seashore
JUN - 5 '96
SUPT. (CC:)
ASST. SUPT. (CC:)
CC: NAT. RES. (CC:)
INTERP.
MAINT.
PERSONNEL
BUDGET
PURCHASING
SUPT. SAFETY
RES. MGT.
RANGE ITEMS
SCIENCE
CENTRAL FILES
LAW ENFOR.

June 3, 1996

Don Neubacher, Superintendent
Chief Park Ranger's Office
Point Reyes National Seashore
Point Reyes, CA 94956

Dear Mr. Neubacher:

I would personally like to thank you for coordinating the site visit at the shellfish processing facility operated by the Johnson Oyster Company (JOC) on May 7, 1996, in which representatives of your agency, Marin County and the California Department of Health were in attendance. I have long felt that a coordinated effort between the regulatory agencies would be required to address most of the health concerns associated with the harvesting, processing and distribution of shellfish at JOC. Site inspections conducted at JOC by the California Health and Safety Code (HSC) and the California Code of Regulations (CCR) and the Code of Federal Regulations (CFR). These issues have been summarized per your request.

Harvesting:

Of major concern is the lack of adequate controls for the protection of shellfish prior to transfer onto the loading dock at the facility. The barges have been observed numerous times with an accumulation of sea gulls roosting on shellfish and they have been exposed to potentially adverse environment effects (e.g. heat from the sun, etc.) for prolonged periods of time (CFR 110.80). In addition, shellstock has been observed, stored in or in contact with prohibited water located near the loading dock (CFR 110.80).

Water Quality:

The water used by the firm for processing and sanitation operations is also an area of concern. The water has been analyzed and been shown to have excessive iron content. Although it is acceptable for drinking water, the iron does not appear to have major public health impact, but, it does constitute a contaminant in the shucked oysters and the production of ice on-site (CFR 110.37 and 110.80).

Processing Controls:

There are a number of areas in which there is an observed need for processing controls over the processing of shellfish. Many of these items overlap with areas mentioned in this summary (e.g. sanitation, facilities construction, harvesting issues, etc.). Two areas of major concern relate to the lack of temperature controls on shellstock and shucked product. The firm has inadequate refrigeration space for the storage of shellstock. Most shellstock remains on the loading dock at ambient temperature for extended periods of time which exposes the product to potential decomposition (CFR 110.80). Moreover, there is a lack of training and supervision within the shucking room to prevent shellfish from potential sources of contamination due to sanitation, handling and temperature considerations (CFR 110.10 and 110.80).

Record Keeping:

The firm has been observed on several occasions to have inadequate and not current harvest and sales records for the purpose of traceability (CCR 7725).

Labeling:

The firm's labeling of shellfish is an area which has been called into question. There have been several instances in which the harvest date and area have been omitted and/or misrepresented (CCR 7741).

Pest Control:

The firm has failed to control potential contamination from pests. Dogs and cats have been observed freely roaming throughout the general grounds, loading dock, and retail area. Additionally, the lack of maintenance of the grounds provides extensive areas of harborage for rodents and flies. Within the processing plant, there is inadequate sealing of openings to the outside including; door frames, the conveyor entrance and floor drains (CFR 110.20).

Sanitation:

The overall sanitation of the firm is inadequate to protect food products from potential contamination. The employees have been observed to lack adequate training in proper sanitation principles and techniques for equipment sanitation and personal hygiene. A major aspect of the lack of control is the use of sanitizer (bleach) at unknown concentrations. This poses the potential for ineffective sanitization of work surfaces and the potential for the introduction of indirect food additives to the shellfish (CFR 110.35). The lack of handwash facilities within the shucking and packing room exacerbate the lack of proper sanitation controls (CFR 110.37).

Building and Grounds:

The current processing facility has existed in excess of 30 years without major renovation. FDB has significant concerns regarding the condition of the loading dock, shellfish conveyor system, shucking room and packing room. Most of the facility and equipment are not constructed to be maintained in a sanitary condition (ie smooth, durable, non-corrosive surfaces) [CFR 110.20, 110.35, 110.37, and 110.40]. Further, the infrastructure consisting of plumbing, sewage disposal, and electrical components does not appear to be installed to applicable codes (CFR 110.37).

Enforcement Actions:

Currently, our legal office has requested that FDB hold an administrative hearing prior to requesting either an injunction or revocation of firm license. We are beginning this process now.

FDB has discussed the violations noted subsequent to each inspection and made an effort to work with the firm for the resolution of concerns. On occasion the firm has responded with written action plans for addressing the problems noted, however, little improvement has been observed in the areas noted. It is hoped that the efforts of the Park Service in conjunction with state and local agencies will provide a forum in which JOC and the regulatory agencies can address the issues and come to some resolution of our public health concerns.

Should you have any questions please call me at (415) 904-9738.

Sincerely,

Warren D. Crawford
Regional Administrator
Food & Drug Branch

MFH:eg

COPY

FILED

MAR 21 1997

JOHN P. MONTGOMERY,
Court Executive Officer
MARIN COUNTY COURTS
By: C. Baker, Deputy

THOMAS G. HENDRICKS, County Counsel (State Bar #35025)
ALEXIS J. McBRIDE, Deputy (State Bar #97367)
Suite 342, Civic Center
San Rafael, California 94903
Telephone: 1 (415) 499-7890
Fax: 1 (415) 499-3796

Attorneys for Plaintiffs

SUPERIOR COURT OF CALIFORNIA
FOR MARIN COUNTY

PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the COUNTY OF MARIN, Plaintiffs, vs. JOHNSON OYSTER COMPANY, INCORPORATED, TOM JOHNSON AND DOES 1-20 INCLUSIVE Defendants. ALICIA FLORES, et al. Intervenors.	NO. 165361 STIPULATED AGREEMENT BETWEEN THE PARTIES AND ORDER

This stipulation is entered into this 9th day of January, 1997 by and between the parties. For the purposes of this Agreement, all time frames shall run from the date that the Judge of the Superior Court signs this Agreement, unless otherwise specified.

1. The parties hereto agree that a design review application with a site plan showing the proposed improvements locate don the subject property at 17171 Sir Francis Drake Boulevard, Inverness, AP # 109-130-17), will be prepared by JOHNSON OYSTER COMPANY, INC. (hereinafter JOC) and submitted to Community Development Agency,Planning Division, within 45 days from the date of this agreement.

2. The parties and the U.S. Park Service have agreed that no more than four

mobile homes and two residences may remain on the subject property after September 30, 1996. To accommodate this agreement, five intervenors, namely Juan-Jose Pelayo, Alicia Flores, Aida Pelayo, Manuel R. Pelayo and Marin Pelayo ("the Relocated Intervenors") and their families reached a seperate agreement with JOC under the terms of which those families timely relocated. JOC and the Relocated Intervenors agree to work in good faith to formalize that seperate agreement within 15 days.

3. A septic system that meets current standards shall be designed and all necessary permits and approvals from Environmental Health Services Division of the Community Development Agency shall be obtained within 30 days of the date submitted. This system shall be constructed within six weeks of approval of septic system permit and coastal permit. This system shall have adequate capacity to process the waste that is produced form the uses and operations specifically allowed under this agreement. Unit such time as this septic system is approved, built and fully functioning, defendants shall pump the failed septic system tank and provide to Environment heal Services receipts for such pumping on a weekly basis. For good cause,including but not limited to, inclement weather, an extension of time to construct the approved system may be granted in writing by Environmental Health Services after written request for such extension by JOC.

4. A permit to drill a well shall be obtained from the Environmental Health Services Division of the Community Development Agency within 90 days of the date of this agreement.

5. A retail food establishment permit shall be obtained from the Environmental Health Services Division of the Community Development Agency within 90 days of the date of this agreement.

6. A Coastal Permit shall be obtained from the California Coastal Commission within 120 days of the date of this agreement.

7. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for all work completed without building permits and building permits shall be obtained for any work requiring such permits prior to

commencement of work.

8. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the structures adjacent and appurtenant to the remaining trailers.

9. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the addition to the house.

10. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the wiring, plumbing, propane tanks, the well house, and any new improvements. JOC will either obtain a permit for the retail sales office expansion, the second story addition, the three sided structure used for stringing of the oyster shells and the containers used for storage and refrigeration OR submit a permit application for replacement structures to serve the same use as that of commercial oyster production.

11. JOC may continue operation of the processing plant, algae shed, the growing shed, the retail sales office, the second story addition and the three-sided stringing shed and the containers used for storage and refrigeration if the design review and required permits are submitted in a timely basis as required by paragraph 10. JOC may continue the above operations in their present locations until construction is completed on the replacement structures. Construction under the permits will commence upon issuance and continue in a timely fashion to be completed within 24 (twenty four) months. If any of the operations and structures above have not obtained required building or replacement permits, or if the permit applications are denied, withdrawn or if construction is not completed within 24 months of obtaining the permit then operations shall cease and the structures shall be removed.

12. Any use, operation or structure for which all required permits have not been obtained within the time deadlines of this agreement shall be immediately terminated and removed from the property. This includes all uses, operations and structures whether they be residential, commercial or agricultural.

13. All permits required by this agreement shall be obtained within 90 days of this agreement unless otherwise specified. Extensions of time to obtain permits or complete

construction may only be granted by the issuing agency in writing after written request for such extension by JOC.

14. Staff members of all divisions of the Marin County Community Development Agency shall upon 48 hours notice, be granted entry onto the property to ensure compliance with this agreement.

15. The Court shall retain jurisdiction for the purposes of enforcement of this Stipulated Agreement and of the agreement between JOC and the Relocated Intervenors.

16. The County shall dismiss their action for injunctive relief within 30 days of the date of this agreement.

17. Plaintiff reserves the right to obtain a judgment pursuant to CCP 664.6

FOR THE PLAINTIFFS:

COUNTY OF MARIN

By _____ Date 3/5/97
HAROLD C. BROWN JR.
CHAIRMAN, BOARD OF SUPERVISORS

By _____ Date 1/10/97
ALEXIS J. McBRIDE
Attorney for Plaintiffs

FOR THE DEFENDANTS:

JOHNSON OYSTER COMPANY, INC. and
TOM JOHNSON

By _____ Date 1/10/97
TOM JOHNSON

By _____ Date 1/10/97
F. ROBERT STUDDERT
Attorney for Defendants
Tom Johnson and Johnson Oyster Company, Inc.

FOR THE INTERVENORS:

LEGAL AID OF MARIN

By _____ Date 1/10/97

RICHARD MARCANTONIO
Attorney for Intervenors

ORDER

This Agreement signed by the parties is hereby made an order of this Court. It is the order of this court that all parties shall bear their own attorney's fees and costs.

Date: 18 March, 1997

_____
LYNN O'MALLEY TAYLOR
Judge of the Superior Court

g:\mvs\johnson\joo-stip

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L1425
02-106
27617

May 12, 1998

Subject: Replacement and Rehabilitation of Johnson Oyster Company Facilities

Dear Reviewer:

Pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), the National Park Service, and Marin County Community Development Agency have prepared the enclosed Environmental Assessment (EA) and CEQA Initial Study Checklist for the replacement and rehabilitation of the facilities at Johnson Oyster Company (JOC). JOC operates under a reservation of use and occupancy agreement with the National Park Service. The JOC reservation of use and occupancy expires in 2012.

Based on the EA, the National Park Service proposes to approve a Finding of No Significant Impact (FONSI) for the proposed action, Alternative B: Replacement and Rehabilitation of JOC Facilities. Based on the Initial Study, Marin County has determined there will not be a significant environmental impact; therefore, a Negative Declaration will be prepared.

Marin County is considering the Initial Study for the purposes of adopting a Negative Declaration and taking action on a Design Review application, individual sewage disposal system and subsequent building permit. The Marin County Planning Commission will hold a public hearing on the JOC application for a Design Review sometime shortly after the National Park Service's public hearing. Please contact Tod Carr of the Marin County Community Development Agency, Planning Division at (415)499-6275 if you have any questions.

If you challenge the decision on the merits of the project or the adoption of a Negative Declaration of Environmental Impact in court, you will be limited to only raising those issue you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the Community Development Agency at, or prior to, the Marin County Planning Commission public hearing.

The National Park Service and Marin County Community Development Agency invite you to express your comments on the EA to the point of contact listed below by June 19, 1998.

Superintendent
Point Reyes National Seashore
Point Reyes, CA 94956

Email: Ann_Nelson@nps.gov

FAX: (415)663-8132

A final decision will be determined on the proposed action will be made after the EA and Initial Study Checklist have been reviewed.

For additional information you may contact John Dell'Osso at Point Reyes National Seashore at (415)663-8522, ext. 226

Thank you for your participation in the environmental assessment process.

Sincerely,

Don L. Neubacher
Superintendent

L7617

August 6, 1998

Memorandum

To: Regional Director, Pacific West
ATTN: Alan Schmierer, Environmental Compliance Coordinator

From: Superintendent, Point Reyes National Seashore

Subject: Environmental Assessment and FONSI

The enclosed Environmental Assessment (EA) and FONSI address the replacement and rehabilitation of facilities at Johnson's Oyster Company (JOC). The National Park Service and Marin County Community Development Agency conducted public review of the EA for thirty days and closed to public comment on June 19,1998. Eleven letters were received from the public. Two letters endorsed Alternative B, the preferred alternative. Three letters expressed concerns regarding the new facilities would create additional growth in the overall oyster operation in Drakes Estero.

At the July 18, 1998 Point Reyes National Seashore/Golden Gate National Recreation Area Citizens Advisory Commission meeting, the project was unanimously approved.

We will appreciate your favorable review and approval.

Don L. Neubacher

Enclosures

U.S. Department of the interior
National Park Service
Point Reyes National Seashore

Finding of No Significant Impact (FONSI)

Johnson Oyster Company Replacement and Rehabilitation of Facilities
Point Reyes National Seashore

The National Park Service (NPS) has completed the Environmental Assessment (EA) for construction and replacement of facilities at Johnson's Oyster Company (JOC) on Drakes Estero. The EA was prepared to assist the NPS planning and decision making process to determine if an Environmental Impact Statement (EIS) was required for the proposed replacement facilities and the construction of a new processing facility at JOC. The EA describes the NPS proposal and the affected environment, and evaluates the effects of the proposed action and alternatives on the environment.

The EA evaluates and describes the following alternatives: A) a no action alternative; B) rehabilitation of two facilities and construction of a new processing facility; and C) rehabilitation of existing structures at same location.

The preferred Alternative B was selected for implementation to bring the JOC into compliance with federal, state, and Marin County health and safety regulations. In addition, this alternative provides improvements to area's visual quality. The no action was rejected because it would not meet the goals of the park's General Management Plan and would result in failure to perform the necessary improvements which wouuld result in Marin County and the NPS issuing cease and desist orders for the operation of the facility. Alternative C did not provide environmental benefits which would occur under the proposed action.

The NPS/Marin County conducted public review of the EA for 30 days with the comment period ending on June 19, 1998. The park received 11 letters ~~(attached)~~ regarding the project. Letters were received from the Marin Conservation League, California Department of Fish and Game (CDFG), Marin Audubon Society, Sierra Club Marin Group, Tomales Bay Association, the Environmental Forum of Marin, Gulf of the Farallones National Marine Sanctuary and two individuals.

Two of the letters endorsed Alternative B: The Proposed Action. Both specifically discussed the positive aspects of moving the main facility away from Drakes Estero.

Three of the letters expressed concern that the new facilities would create additional growth in the overall oyster operation in the Bay. The letters indicated that additional growth may create potential negative impacts. The project is not sized to create additional growth in oyster production in Drakes Bay. The building has been only sized to meet public health and safety codes. In addition, JOC has agreed, as a condition of the NPS permit, to not exceed an annual processing/production limit of 700,000 lbs (oyster weight). This limit is the past peak production level over the last 10 years. This 700,000 lbs limit will ensure that the new facilities will not create additional growth (and any new negative impacts) in overall oyster production in the estuary.

General stewardship of the estuary by JOC was discussed in a number of letters. Several of the letters discussed oyster production related debris--particularly black plastic tubes and deteriorated plastic oyster bag--around the JOC facility and on the shores of the estuary and adjacent beaches. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the shoreline. The NPS and CDFG have agreed to monitor JOC and inspect the shoreline on a regular basis. JOC has also agreed to immediately remove any unused or abandoned oyster racks. In addition, JOC has agreed to pay the Gulf of the Farallones National Marine Sanctuary for quarterly monitoring of the shoreline.

Long-term impacts of oyster production to resources in the estuary was a concern of a number of organizations. The NPS agrees that long-term impacts to estuary resources are not fully known. As stated above, the NPS has concluded that there will not be any new impacts in the estuary as a result of the alternative chosen. However, as a condition of the permit, NPS, JOC, Gulf of the Farallones National Marine Sanctuary, and CDFG agree to begin a three year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern of several of the organizations. To mitigate any impacts related to this issue, both JOC, and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment, and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster stock shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed in Drakes Estero.

At the July 18, 1998 Point Reyes National Seashore/Golden Gate National Recreation Area Citizens Advisory Commission meeting, the project was unanimously approved.

The required migiation measures necessary to eliminate and minimize environmental impacts are addressed in the mitigation matrix that follow.

Impacts	Prescribed Mitigation	Responsible Party
Vegetation	To mitigate the invasion of non-native vegetation, the main disturbed site will be monitored and non-native plants removed after construction from disturbed areas. Areas will be replanted with natives where needed. At the leach field area, the site will be monitored to ensure rapid regrowth by surrounding native vegetation. All weed species will be removed. If necessary, planting with natives will occur.	Point Reyes National Seashore Resource Management Staff
Water Resources	The site will be monitored during construction and appropriate measures taken to ensure Drakes Estero and adjacent pond are not contaminated with sediments and construction debris. Soil and straw bale berms and plastic fencing will be established, as necessary, to protect the estuary from sediments and construction debris.	Johnson Oyster Company
Air	Some dust will be generated from construction activities. Dust will be mitigated by watering of area and covering truck leaving area with debris.	Johnson Oyster Company
Wildlife	Park staff will monitor species before, during, and after the project to insure disturbance is minimal. Resident bird nesting season will be avoided.	Point Reyes National Seashore Resource Management Staff
Threatened and Endangered Species	NA	
Soils	Some short-term impacts due to heavy equipment on-site will occur. These impacts can be mitigated by JOC by regrading and restoring the site quickly to allow regrowth of vegetation. To minimize any soil loss during construction, the area will be sprayed with water regularly to reduce dust and soil erosion. In addition, ground disturbance will be kept to a minimum (less than three acres on the main construction area and 2.25 acres on the leach field site) to ensure soil erosion is minimal. Any materials stockpiled will be on previously disturbed sites away from the estuary.	Johnson Oyster Company
Topography	To mitigate any potential impact to new structures, a	Johnson Oyster

	qualified soil engineer will investigate soil conditions to ensure long-term stability of proposed structures.	Company
Cultural Resources	Archeological site will be fenced to protect from any potential impacts and monitored throughout the construction period. If any archeological material is located during construction, the project will be stopped and the area evaluated.	NPS Regional Archeologist
Visual Quality	NA	
Health & Safety	NA	
Noise	Short-term impacts only during normal business hours on weekdays as demolition crews remove the structures and debris. Residents will be notified of construction activity and hours of all construction activity will be regulated. No construction can occur before 7:00 am and after 7:00 pm.	Johnson Oyster Company
Public Services	NA	
Economic	NA	

Additional Mitigation Efforts Required Related to Public Comments

Three letters received during the public comment period expressed concerns that new facilities would create additional growth in the production of oysters. The building is not sized to create added space but to meet public health and safety codes of Marin County. In addition, Johnson Oyster Company (JOC) has agreed as a conditional use of the permit not to exceed an annual processing/production limit of 700,000 lbs (oyster weight) which is the past peak production over the last 10 years.

General stewardship of Drakes Estero by JOC was mentioned in a number of letters. Specifically, the letters concerned the production related debris - particularly black plastic tubing and deteriorated oyster bags. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the adjacent shoreline. The National Park Service and California Department of Fish & Game have agreed to monitor JOC and inspect the shoreline regularly. JOC has also agreed to immediately remove any unused or abandoned oyster racks and pay the Gulf of the Farallones National Marine Sanctuary to monitor the shoreline quarterly.

Long-term impacts of oyster production to resources in the estuary was a concern from a number of organizations. ~~The NPS agrees that these impacts are not fully known.~~ As another condition of the permit, the NPS, JOC, CDFG, and the Gulf of the Farallones NMS will begin

a three-year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern by several organizations. To mitigate any impacts related to this issue, both JOC and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed into Drakes Estero.

Based on the analysis of the environmental assessment and the alternatives, required mitigation measures (detailed on attached matrix), and with consideration of the public commentthe National Park Service will be authorized to undertake the replacement of two facilities and construction of a new processing facility at JOC. The National Park Service has determined that this action will not have a significant impact upon the environment. There are no cumulative ipmact nor is precedent established by these actions. Therefore, the project will be implemented and an environmental impact statement (EIS) will not be prepared.

Recommended: _____ 8/6/98
Superintendent, Point Reyes National Seashore — Date

Approved: _____ _____
Regional Director, Pacific West — Date

Staff Report
Johnson Oyster Company Replacement and Rehabilitation of Facilities
Point Reyes National Seashore

Background

Pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), the National Park Service and Marin County Community Development Agency have prepared an Environmental Assessment (EA) and CEQA Initial Study Checklist for the replacement and rehabilitation of the facilities at Johnson Oyster Company (JOC). JOC operates under a reservation of use and occupancy agreement with the National Park Service (NPS). The agreement with JOC expires in 2012.

Based on the EA, the National Park Service proposes to approve a Finding of No Significant Impact (FONSI) for the proposed action, Alternative B: Replacement and Rehabilitation of JOC Facilities. Based on the Initial Study, Marin County has determined there will not be a significant environmental impact; therefore, a negative declaration will be prepared.

Summary of Comment from Public Review

The NPS/Marin County conducted public review of the EA for 30 days with the comment period ending on June 19, 1998. The park received 11 letters (attached) regarding the project. Letters were received from the Marin Conservation League, California Department of Fish and Game (CDFG), Marin Audubon Society, Sierra Club Marin Group, Tomales Bay Association, the Environmental Forum of Marin, Gulf of the Farallones National Marine Sanctuary and two individuals.

Two of the letters endorsed Alternative B: The Proposed Action. Both specifically discussed the positive aspects of moving the main facility away from Drakes Estero.

Three of the letters expressed concern that the new facilities would create additional growth in the overall oyster operation in the Bay. The letters indicated that additional growth may create potential negative impacts. The project is not sized to create additional growth in oyster production in Drakes Bay. The building has been only sized to meet public health and safety codes. In addition, JOC has agreed, as a condition of the NPS permit, to not exceed an annual processing/production limit of 700,000 lbs (oyster weight). This limit is the past peak production level over the last 10 years. This 700,000 lbs limit will ensure that the new facilities will not create additional growth (and any new negative impacts) in overall oyster production in the estuary.

General stewardship of the estuary by JOC was discussed in a number of letters. Several of the letters discussed oyster production related debris--particularly black plastic tubes and deteriorated plastic oyster bag--around the JOC facility and on the shores of the estuary and adjacent beaches. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the shoreline. The NPS and CDFG have agreed to monitor JOC and inspect the shoreline on a regular basis. JOC has also agreed to immediately remove any unused or

abandoned oyster racks. In addition, JOC has agreed to pay the Gulf of the Farallones National Marine Sanctuary for quarterly monitoring of the shoreline.

Long-term impacts of oyster production to resources in the estuary was a concern of a number of organizations. The NPS agrees that long-term impacts to estuary resources are not fully known. As stated above, the NPS has concluded that there will not be any new impacts in the estuary as a result of the alternative chosen. However, as a condition of the permit, NPS, JOC, Gulf of the Farallones National Marine Sanctuary, and CDFG agree to begin a three year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern by several of the organizations. To mitigate any impacts related to this issue, both JOC, and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment, and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster stock shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed in Drakes Estero.

Staff Recommendation to Commission

Based on the above conditions, the staff recommends the Citizen's Advisory Commission endorse the Environmental Assessment for the Replacement and Rehabilitation of Johnson Oyster Company facilities.

7/8/98

United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Region
600 Harrison Street, Suite 600
San Francisco, California 94107-1372

IN REPLY REFER TO:

L7617 (PGSO-PP)

AUG 11 1998

RECEIVED
Point Reyes
National Seashore
AUG 13 '98
SUPT.
ASST. SUPT.
SPEC. PK. USES
LAW ENFORC.
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RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

Memorandum

To: Superintendent, Point Reyes National Seashore

From: ACTING Regional Director, Pacific West Region

Subject: Environmental Compliance for Replacement and Rehabilitation of Johnson Oyster Company Facilities

The revised *Finding of No Significant Impact* (FONSI) for this facility management project is approved. To finish this particular impact analysis-conservation planning process, the park should send notice of the decision (along with copy of the FONSI document) to all individuals and organizations who received or commented on the *Environmental Assessment*.

for John J. Reynolds
Attachment

U.S. Department of the interior
National Park Service
Point Reyes National Seashore

Finding of No Significant Impact (FONSI)

Johnson Oyster Company Replacement and Rehabilitation of Facilities
Point Reyes National Seashore

The National Park Service (NPS) has completed the Environmental Assessment (EA) for construction and replacement of facilities at Johnson's Oyster Company (JOC) on Drakes Estero. The EA was prepared to assist the NPS planning and decision making process to determine if an Environmental Impact Statement (EIS) was required for the proposed replacement facilities and the construction of a new processing facility at JOC. The EA describes the NPS proposal and the affected environment, and evaluates the effects of the proposed action and alternatives on the environment. The EA was prepared in consultation with the Marin County Community Development Agency to aid their use of the analysis in fulfilling California Environmental Quality Act requirements.

The EA evaluates and describes the following alternatives: A) a no action alternative; B) rehabilitation of two facilities and construction of a new processing facility; and C) rehabilitation of existing structures at same location.

The preferred Alternative B was selected for implementation to bring the JOC into compliance with federal, state, and Marin County health and safety regulations. In addition, this alternative provides improvements to area's visual quality. The no action was rejected because it would not meet the goals of the park's General Management Plan and would result in failure to perform the necessary improvements which would result in Marin County and the NPS issuing cease and desist orders for the operation of the facility. Alternative C did not provide environmental benefits which would occur under the proposed action.

The NPS/Marin County conducted public review of the EA for 30 days with the comment period ending on June 19, 1998. The park received 11 letters regarding the project. Letters were received from the Marin Conservation League, California Department of Fish and Game (CDFG), Marin Audubon Society, Sierra Club Marin Group, Tomales Bay Association, the Environmental Forum of Marin, Gulf of the Farallones National Marine Sanctuary and two individuals.

Two of the letters endorsed Alternative B: The Proposed Action. Both specifically discussed the positive aspects of moving the main facility away from Drakes Estero.

Three of the letters expressed concern that the new facilities would create additional growth in the overall oyster operation in the Bay. The letters indicated that additional growth may create potential negative impacts. The project is not sized to create additional growth in oyster production in Drakes Bay. The building has been only sized to meet public health and safety codes. In addition, JOC has agreed, as a condition of the NPS permit, to not exceed an annual processing/production limit of 700,000 lbs (oyster weight). This limit is the past peak production level over the last 10 years. This 700,000 lbs limit will ensure that the new facilities will not create additional growth (and any new negative impacts) in overall oyster production in the estuary.

General stewardship of the estuary by JOC was discussed in a number of letters. Several of the letters discussed oyster production related debris--particularly black plastic tubes and deteriorated plastic oyster bag--around the JOC facility and on the shores of the estuary and adjacent beaches. To address this concern, JOC has agreed as a condition of their permit to monthly remove any debris from the shoreline. The NPS and CDFG have agreed to monitor JOC and inspect the shoreline on a regular basis. JOC has also agreed to immediately remove any unused or abandoned oyster racks. In addition, JOC has agreed to pay the Gulf of the Farallones National Marine Sanctuary for quarterly monitoring of the shoreline.

Long-term impacts of oyster production to resources in the estuary was a concern of a number of organizations. As stated above, the NPS has concluded that there will not be any new impacts in the estuary as a result of the alternative chosen. However, as a condition of the permit, NPS, JOC, Gulf of the Farallones National Marine Sanctuary, and CDFG agree to begin a three year research program on long-term impacts of the oyster operations on estuarine species. This information will provide information for future modification of the permit and limits on the oyster operation.

The importation of foreign oyster stock into Drakes Estero and the potential contamination of Drakes Bay with "hitch-hiking" alien species was a concern of several of the organizations. To mitigate any impacts related to this issue, both JOC, and the CDFG have agreed to establish a policy of zero tolerance, develop a risk assessment, and protocols for importing Mexican oysters into Drakes Estero. All foreign oyster stock shipments will be inspected by CDFG and NPS prior to placement in the estuary. If contaminated, the stock will not be placed in Drakes Estero.

At the July 18, 1998 Point Reyes National Seashore/Golden Gate National Recreation Area Citizens Advisory Commission meeting, the project was unanimously approved.

The required mitigation measures necessary to eliminate and minimize environmental impacts are addressed in the mitigation matrix that follow.

Impacts	Proposed Mitigation	Responsible Party
Vegetation	To mitigate the invasion of non-native vegetation, the main disturbed site will be monitored and non-native plants removed after construction from disturbed areas. Areas will be replanted with natives where needed. At the leach field area, the site will be monitored to ensure rapid regrowth by surrounding native vegetation. All weed species will be removed. If necessary, planting with natives will occur.	Point Reyes National Seashore Resource Management Staff
Water Resources	The site will be monitored during construction and appropriate measures taken to ensure Drakes Estero and adjacent pond are not contaminated with sediments and construction debris. Soil and straw bale berms and plastic fencing will be established, as necessary, to protect the estuary from sediments and construction debris.	Johnson Oyster Company
Air	Some dust will be generated from construction activities. Dust will be mitigated by watering of area and covering truck leaving area with debris.	Johnson Oyster Company
Wildlife	Park staff will monitor species before, during, and after the project to insure disturbance is minimal. Resident bird nesting season will be avoided.	Point Reyes National Seashore Resource Management Staff
Threatened and Endangered Species	NA	
Soils	Some short-term impacts due to heavy equipment on-site will occur. These impacts can be mitigated by JOC by regrading and restoring the site quickly to allow regrowth of vegetation. To minimize any soil loss during construction, the area will be sprayed with water regularly to reduce dust and soil erosion. In addition, ground disturbance will be kept to a minimum (less than three acres on the main construction area and 2.25 acres on the leach field site) to ensure soil erosion is minimal. Any materials stockpiled will be on previously disturbed sites away from the estuary.	Johnson Oyster Company
Topography	To mitigate any potential impact to new structures, a qualified soil engineer will investigate soil conditions	Johnson Oyster Company

	to ensure long-term stability of proposed structures.	
Cultural Resources	Archeological site will be fenced to protect from any potential impacts and monitored throughout the construction period. If any archeological material is located during construction, the project will be stopped and the area evaluated.	NPS Regional Archeologist
Visual Quality	NA	
Health & Safety	NA	
Noise	Short-term impacts only during normal business hours on weekdays as demolition crews remove the structures and debris. Residents will be notified of construction activity and hours of all construction activity will be regulated. No construction can occur before 7:00 am and after 7:00 pm.	Johnson Oyster Company
Public Services	NA	
Economic	NA	

Based on the analysis of the environmental assessment and the alternatives, required mitigation measures, and with consideration of the public comment, the National Park Service will be authorized to undertake the replacement of two facilities and construction of a new processing facility at JOC. The National Park Service has determined that this action will not have a significant impact upon the environment. There are no cumulative impact nor is precedent established by these actions. Therefore, the project will be implemented and an environmental impact statement (EIS) will not be prepared.

Recommended: Frank Dean
Acting Superintendent, Point Reyes National Seashore

August 11, 1998
Date

Approved: Cynthia J.
for Acting Regional Director, Pacific West

8-11-98
Date

MARIN COUNTY PLANNING COMMISSION MINUTES
SEPTEMBER 14, 1998
Marin County Civic Center, Room #319 - San Rafael, California

Commissioners Present: Jan Alff Wiegel
Ray Buddie
Ross Herbertson
Patty Garbarino
Jo Julin
Paul Lusczynski
Deborah Rowland

Commissioners Absent:

Staff Present: Scott R. Davidson, Planning Services Coordinator
Dean R. Powell, Principal Planner
Tom Lai, Senior Planner
Johanna Patri, Planner
Tod Carr, Planner
Neal Osborne, Planner
Alexandra Morales, Planning Commission Secretary

Minutes Approved on: *September 28, 1998*

RECEIVED
Point Reyes
National Seashore
OCT 1 - '98
SUPT.
ASST. SUPT.
SPEC. PK USES
LAW ENFORC.
RES./SCIENCE
RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

Convened at 1:00 p.m.
Adjourned at 6:10 p.m.

10A. NEGATIVE DECLARATION OF ENVIRONMENTAL IMPACT: JOHNSON'S OYSTER COMPANY DESIGN REVIEW

10B. DESIGN REVIEW: JOHNSON'S OYSTER COMPANY

Application proposing construction of mariculture facilities including: 1) a 19-foot high, 900 square foot detached garage; 2) a 20-foot high, 2,625 square foot seed plant; 3) a 16-foot high, 500 square foot string plant; and 4) a 36-foot high, 7,600 square foot, two-story processing plant. The processing plant would be relocated from directly adjacent to the shoreline to 100 feet east of Drake's Estero. New septic and water systems would be installed as part of the project. The project would bring the oyster facilities into compliance with Federal, State, and County health and safety standards. The subject property is located at **17171 Sir Francis Drake Boulevard, Point Reyes National Seashore**, and is further identified as **Assessor's Parcel 109-130-17**.

Prior to taking any action, the Planning Commission will consider granting a Negative Declaration of Environmental Impact.

Tod Carr, project planner, presented the merits of the proposed project as set forth in the staff report. Additionally, he noted the supplemental memorandums dated September 8, September 10, and September 14, 1998 recommending modifications to the proposed resolution.

The hearing was opened to public testimony.

Bob Studder, applicant's attorney, endorsed staff's recommendation.

Cela O'Connor, Sierra Club Marin, suggested that the Johnson's Oyster Company agree to the following: 1) production should not exceed 700,000 pounds (oyster weight) per year; 2) remove debris from the shoreline on a regular basis; 3) remove abandoned oyster racks and pay for monitoring of the shoreline; 4) begin a three-year research program on long term impacts of the oyster operation on the estuarine species; and 5) establish a policy of zero tolerance of hitch-hiking alien species on imported foreign oyster stock and develop a risk assessment and protocols for importing Mexican oysters. She concluded by recommending that the Negative Declaration be approved conditioned upon the recommendations made and that the same conditions be imposed on the Design Review.

Frank Dean, Assistant Superintendent of the Point Reyes National Seashore, clarified that the oyster production is limited to 700,000 pounds (oyster weight) per year and that the three-year research program is expected to be extended.

The hearing was closed to public testimony.

After taking into consideration the information presented, the Commission found the proposed project to be environmentally sensitive and commended the applicants for their cooperation. The Commission supported the proposed project with the following modifications: 1) Rewrite language in Section III of the Design Review Resolution to maintain consistency with the requirements of the Settlement Agreement; 2) add a new condition requiring the applicant to submit an executed copy of the agreement between the National Park Service, the Gulf of Farallones national Marine Sanctuary, the California Department of Fish and Game, and Johnson's Oyster Company regarding implementation of conditions of approval for the rehabilitation and construction of facilities; 3) add a new condition requiring that roof materials be of a matte finish; and 4) include a stipulation that only pacific islander oysters (crassosereagigas) will be harvested.

MARIN COUNTY PLANNING COMMISSION

RESOLUTION NO. PC 98-122

A RESOLUTION ADOPTING A NEGATIVE DECLARATION OF ENVIRONMENTAL IMPACT FOR THE U.S. GOVERNMENT/JOHNSON'S OYSTER COMPANY DESIGN REVIEW ASSESSOR'S PARCEL 109-130-17

* *

SECTION I: FINDINGS

I. WHEREAS the applicant, Johnson's Oyster Company, is requesting approval of a Design Review for the rehabilitation of the Johnson's Oyster Company oyster processing facilities located near Drake's Estero within the Point Reyes National Seashore. The facilities include the following: 1) 19-foot high, 900 square foot detached garage; 2) 20-foot high, 2,625 square foot seed plant; 3) 16-foot high, 500 square foot stringing plant; and 4) 36-foot high, 7,600 square foot, two-story processing plant. The processing plant would be relocated from directly adjacent to shoreline to 100 feet east of Drake's Estero. New septic are water systems would be installed as part of the project. The project would bring the oyster facilities into compliance with Federal, State, and County health and safety standards. The subject property is located at 17171 Sir Francis Drake Boulevard., Point Reyes National Seashore, and is further identified as Assessor's Parcel 109-130-17.

II. WHEREAS the National Park Service as Lead Agency under the National Environmental Policy Act (NEPA) prepared an Environmental Assessment/Initial Study for the project which determined that potential impacts relating to Vegetation, Water Resources, Air, Wildlife, Soils, Cultural Resources and Noise are avoided or mitigated to a point where no significant effects would occur because revisions in the project plans have been made by or agreed to by the applicant and there is no evidence that the project as revised may have a significant effect on the environment and, therefore, have adopted a Finding of No Significant Impact (FONSI). Marin County, acting as Lead Agency under the California Environmental Quality Act (CEQA), has reviewed the project description relative to the adopted mitigation measures contained in the FONSI and conditions of approval attached to the Federal Lead Agency permit for the project, and have determined that there is no evidence that the project may have a significant effect on the environment.

III. WHEREAS the Marin County Environmental Coordinator determined that based on the Environmental Assessment/Initial Study, a Negative Declaration of Environmental Impact was required for the project pursuant to CEQA.

IV. WHEREAS on May 12, 1998, an Environmental Assessment/Initial Study was completed and distributed by the National Park Service as Lead Agency to agencies and interested parties to commence a 30-day public review period for review and comment on the Environmental Assessment/Initial Study, and a Notice of the public review period and hearing date to consider approval of the Finding of No Significant Impact (FONSI)/Negative Declaration was published in a general circulation newspaper pursuant to CEQA.

V. WHEREAS after the close of the public review period on June 19, 1998, the National Park Service conducted a public hearing on July 18, 1998 to receive public testimony on the adequacy of the FONSI/Negative Declaration for approval.

MARIN COUNTY PLANNING COMMISSION

RESOLUTION NO. PC98-123

A RESOLUTION APPROVING THE U.S. GOVERNMENT/JOHNSON'S OYSTER COMPANY
DESIGN REVIEW
ASSESSOR'S PARCEL 109-130-17

* *

SECTION I: FINDINGS

I. WHEREAS the applicant, Johnson's Oyster Company, is requesting approval of a Design Review for the rehabilitation of the Johnson's Oyster Company oyster processing facilities located near Drake's Estero within the Point Reyes National Seashore. The facilities include the following: 1) 19-foot high, 900 square foot detached garage; 2) 20-foot high, 2,625 square foot seed plant; 3) 16-foot high, 500 square foot stringing plant; and 4) 36-foot high, 7,600 square foot, two-story processing plant. The processing plant would be relocated from directly adjacent to shoreline to 100 feet east of Drake's Estero. New septic are water systems would be installed as part of the project. The project would bring the oyster facilities into compliance with Federal, State, and County health and safety standards. The subject property is located at 17171 Sir Francis Drake Boulevard., Inverness, and is further identified as Assessor's Parcel 109-130-17.

II. WHEREAS the Marin County Planning Commission held a duly noticed public hearing on September 14, 1998, to consider the merits of the project, and hear testimony in favor of, and in opposition to, the project.

III. WHEREAS the Marin County Planning Commission finds that an Negative Declaration of Environmental Impact has been prepared stipulating that the proposed project would have no potentially significant impacts on the environment.

IV. WHEREAS the Marin County Planning Commission finds that the proposed project is consistent with the Marin Countywide Plan because it would:

A. Support continued mariculture operations in the coastal zone while protecting coastal wildlife, water and visual resources;

B. Conform with the governing land use designation relative to continued agricultural operations;

C. Comply with Marin County standards for flood control, geotechnical engineering, and seismic safety, and include improvements to protect lives and property from hazards;

D. Conform to the governing standards related to building height, size and location;

E. Comply with governing development standards related to parking, grading, drainage and utility improvements as verified by the Department of Public Works;

F. Not cause significant adverse impacts on water supply, fire protection, waste disposal, schools, traffic and circulation, or other services;

G. Minimize soil disturbance and maximize protection of natural vegetation;

and southwest from JOC. These facilities are subject to Point Reyes National Seashore General Management Plan also and would not be impacted by the proposed project. The proposed improvements to the oyster facilities would occur within the designated lease area and, therefore, would not impact public trails associated with the Point Reyes National Seashore.

4. **It will be properly and adequately landscaped with maximum retention of trees and other natural material.**

No major changes in the topography are anticipated for rehabilitation, replacement and construction of the new facilities. The project site is flat and, therefore, grading would be limited to construction of new slab foundations, septic and water system infrastructure, and drainage improvements. Foundations would be slab on grade with drainage sloped away from buildings for use with the natural drainage pattern as verified by the Department of Public Works, Land Use and Water Resources Division. There is no landscaping proposed as part of the project because of the threat of invasive species possibly being introduced into the surrounding natural coastal grass and scrub environment. Approximately three acres of ground disturbance would occur on an area dominated by non-native vegetation. In accordance with National Park Service management policies and guidelines, disturbed areas would be revegetated with native plant materials (e.g., seeds, cuttings, transplants) that originated from the genetic stock onsite or from other adjacent sources. Revegetation efforts would be concentrated in and around the pond and shoreline to establish native salt grass, grindelia and coyote brush.

5. **It will minimize or eliminate adverse physical or visual effects which might otherwise result from unplanned or inappropriate development, design, or juxtaposition.**

The main oyster processing plant and its accessory building would be uniform in appearance because all the proposed structures would utilize redwood board and batten siding with painted metal window trim and roofs. The proposed building heights are appropriate in scale and are compatible with the surrounding natural environment. The oyster processing plant would appear as the primary commercial element of the facilities with the remaining accessory structures appearing subordinate to it. Lastly, the oyster processing plant would be relocated from the shoreline to a new location 100 feet back from Drake's Estero. This would allow the structure to better blend with the sloping coastal hillsides surrounding the facilities while also creating improved views of Drake's Estero for the public.

The facilities are located within a narrow coastal plain between moderately steep coastal foothills. As such the facilities are predominately visible from within the lease area only. The site is not visible from Sir Francis Drake Boulevard or other public roads. Persons hiking Bull Point may have views of the facilities to the northeast but at that distance, the proposed buildings would appear fairly small. Persons kayaking on Drake's Estero would have views of the facilities depending upon their location within the Estero. However, as discussed above, staff finds that the proposed rehabilitation of the oyster facilities would result in a visual improvement to the immediate area along the shoreline of Drake's Estero.

6. **It may contain roof overhang, roofing material, and siding material that are compatible both with the principles of energy-conserving design and with the prevailing architectural style in the neighborhood.**

The proposed rehabilitated oyster processing facilities would utilize board and batten siding with metal window trim and roofing which would be compatible with the surrounding natural environment. Submittal of building permits for the project would require compliance with Uniform Building Code standards including Title 24 requirements for energy calculations to ensure an energy-conserving design.

7. All soils disturbed by development of the project shall be reseeded with native grasses or wildflowers to control erosion.

8. It shall be the responsibility of the applicant to store all construction materials and equipment at the site (or secured and approved off-site location) in such a manner as to permit safe passage for vehicular traffic at all times. No vehicles may be parked at the site overnight. No vehicles shall be parked along the access road to JOC or in a manner which interrupts the passage of vehicles. Every effort shall be made by the holder of the building permit to strictly limit the number of vehicles used to transport workers and materials to the site to the minimum necessary.

9. Any changes or additions to the project shall be submitted to the Community Development Agency (CDA) for review and approval before the contemplated modifications may be initiated. The CDA Director may approve minor modifications.

Marin County Department of Public Works, Land Use and Water Resources Division

10. BEFORE ISSUANCE OF A BUILDING PERMIT, comply with the following requirements:

    a. The site/driveway retaining wall, drainage, and grading plans must be designed by a Registered Civil Engineer. Plans shall have his/her signature and wet stamp.

    b. A separate Building Permit is required for site retaining walls with a height more than three feet (four feet when backfill area is not sloped).

    c. Submit engineer's calculations for site/driveway retaining walls signed and stamped by the engineer.

    d. The site plan shall show site drainage. Sheet flow drainage is encouraged. Avoid ponding and concentrated flows.

    e. If grading is to be done between October 15 and April 15, an Erosion and Siltation Control Plan shall be submitted.

    f. Address surface runoff/erosion control measures for and after construction. Show the measures on the plans.

    g. Note on the plans that retaining wall excavation and construction and grading and drainage shall be certified in writing by the architect or engineer. Parking spaces and dimensions shall be inspected by DPW Engineer.

Marin County Fire Department

11. BEFORE FRAMING INSPECTION, the applicant shall comply with the following requirements:

    a. A minimum dedicated 20,000 gallon fire protection water supply must be maintained. This is to supply the fire sprinkler system, hose boxes, and fire hydrant. Fire department notification is required if the supply drops below 20,000 gallons.

    b. A fire hydrant capable of flowing not less than 500 gallons per minute is required. MCFD standard 1-2.5-inch and 1-4.5-inch outlets. Location to be determined by MCFD.

NOW, THEREFORE BE IT FURTHER RESOLVED that this decision approving the U.S. Government/Johnson's Oyster Company Design Review is final unless appealed to the Board of Supervisors. A Petition for Appeal and a $650.00 filing fee must be submitted in the Community Development Agency - Planning Division, Room 308, Civic Center, San Rafael, no later than 4:00 p.m. on September 21, 1998.

SECTION IV: VOTE

PASSED AND ADOPTED at a regular meeting of the Planning Commission of the County of Marin, State of California, on the 14th day of September, 1998, by the following vote to wit:

AYES: Alff Wiegel, Buddie, Garbarino, Herbertson, Julin, Lusczynski, Rowland

NOES:

ABSENT:

Patricia Garbarino

PATRICIA GARBARINO, CHAIRPERSON
MARIN COUNTY PLANNING COMMISSION

Attest:

Alexandra Morales
Recording Secretary

United States Department of the Interior

NATIONAL PARK SERVICE
Point Reyes National Seashore
Point Reyes, California 94956

IN REPLY REFER TO:

L7617

June 11, 1999

Johnson Oyster Company
P.O. Box 69
Point Reyes, CA 94537

Dear Tom,

Environmental planning for the proposed construction of a new oyster processing plant and the replacement and rehabilitation of several existing accessory structures including upgrading and construction of a new wastewater disposal system at the Johnson Oyster Company is complete. You may proceed with final project design in coordination with park staff and the County of Marin. As you know, the Advisory Commission, at its July 18, 1998 public meeting, concurred with park staff in its Finding of No Significant Impact based on the Environmental Assessment (EA) prepared earlier this year. This approval completes the design review portion for this project.

Your park contact during design and construction will be Larry Harris, 415-663-8522 ext. 237, Chief of Maintenance for Point Reyes National Seashore. Although your wastewater permit and building permits will be issued by Marin County authorities, park staff will need to review and approve your design to ensure that the environmental, historic preservation, and life safety requirements described in the EA are reflected in the final construction documents.

Park review of the construction specifications for the new sewage disposal system as referenced in County of Marin permit #97-18 have been reviewed by park staff. The following comments and requirements are provided for your information.

1. As requested by Sky Construction a temporary electrified cattle fence will be allowed to keep cattle out of the construction site of the new leachfield and to help with the revegetation of the site to current conditions. The fence will be removed after complete revegetation of the site has occurred. This is anticipated to take at least 12 months.
2. Park staff have agreed that re-vegetation of the leachfield may be accomplished by removing and reusing the top three (3) inches of top soil. The contractor must be careful not to mix or otherwise contaminate the stored topsoil with other materials from the site. Staff recommends that dirt or material piles on site be marked or labeled to insure differing soils are not mixed.

3. During the revegetation cycle, the leachfield site must be monitored for non-native/exotic plant species and as needed removed. Park staff is available to provide assistance in plant identification during this time. Johnson Oyster Company will be responsible for actual removal of non-native/exotic plants or weeds.
4. Preparing the route for the 3000' pipeline will be done without undue disturbance of soils. Specifically, it is advised that the removing of brush and plants to allow site access for the trenching equipment and installation of the pipeline be done by either cutting at ground level or by rolling over (crushing) the brush. Any undue or extensive soil disturbance will require a higher level of restoration and re-vegetation at the end of the project.
5. A construction/material storage trailer will be allowed if located at main facility site. This unit cannot be used for sleeping quarters at any time.

Thank you for your continuing efforts to improve and enhance the facilities and utility systems at the Johnson Oyster Company.

Sincerely,

Don L. Neubacher
Superintendent

FILE

MARIN COUNTY
COMMUNITY DEVELOPMENT AGENCY
ALEX HINDS, DIRECTOR

MEMORANDUM

TO: Alexis McBride, Deputy County Counsel

FROM: Debbi Poiani, Sr. Code Enforcement Specialist

RE: Johnson's Oysters

DATE: May 30, 2003

Planning:

During our joint inspection of Johnson's Oysters on May 21, 2003 I found the property to be in violation of Marin County Code, Section 22.57.132 (C-OA permitted uses) for the following reasons:

1. A junkyard as defined by MCC, Section 22.02.420 is being operated on the property;
2. Residences and Trailers that are accessory to the primary agricultural use of the property require a Use Permit and Coastal Permit. The previous Use Permits have expired. The trailers are no longer under the jurisdiction of the State, as there are fewer than five.

Building Inspection: (these are my notes-Ed can clarify)

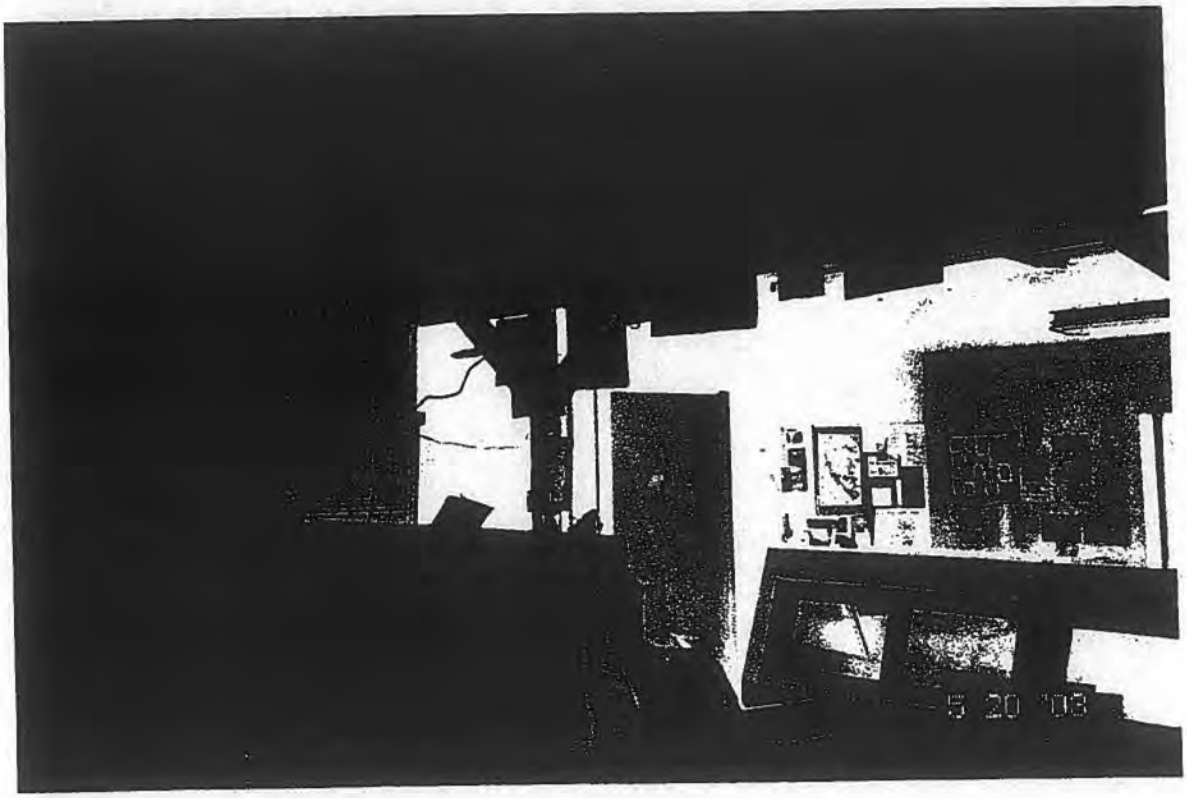
1. Retail Building – Second story constructed w/o permits – stairs do not comply with UBC.
2. Washroom and kitchen – Exposed wiring, plastic piping in the interior, uneven walking surfaces, floor level changes. Appears that this structure discharges directly into Bay.
3. Shucking Sheds – No Permits. New office in middle shed. Barrels of oil in shed have discharged onto the ground.
4. Outside between the shucking sheds and the kitchen, wiring is exposed and spliced.
5. Fuel Tank- Wiring is improperly installed, exposed electrical wires, no grounds to the equipment. Tim Underwood in DPW should inspect this above-ground tank.
6. Garage behind the green house – No permit,
7. Porch to Mobile home- No permits.
8. Location of propane tanks to residence – Fire Dept. needs to inspect.
9. Green house –vent to Water heater terminated improperly under eave of structure.

Cc: Ed Henry, Assistant Chief Building Inspector

3501 CIVIC CENTER DRIVE, ROOM 308 – SAN RAFAEL, CA 94903-4157 – 415-499-6269 – FAX 415-499-7880

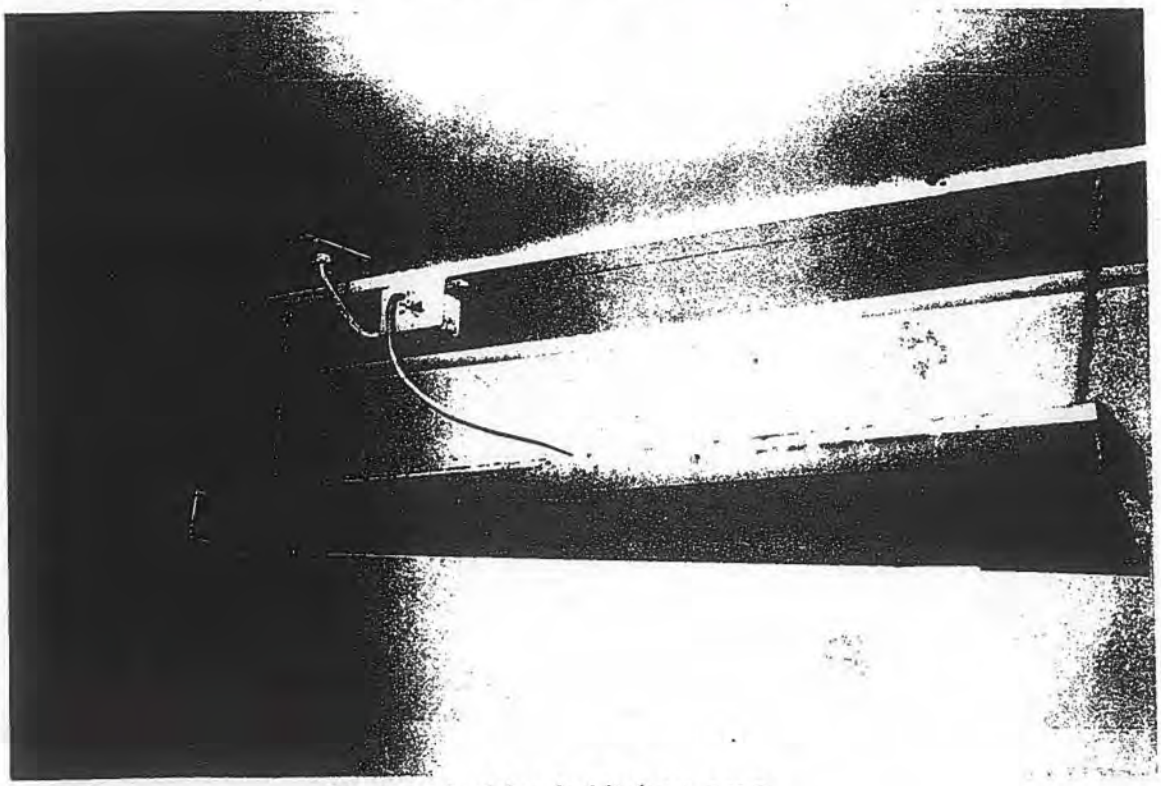
Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

2nd story office addition – no permits

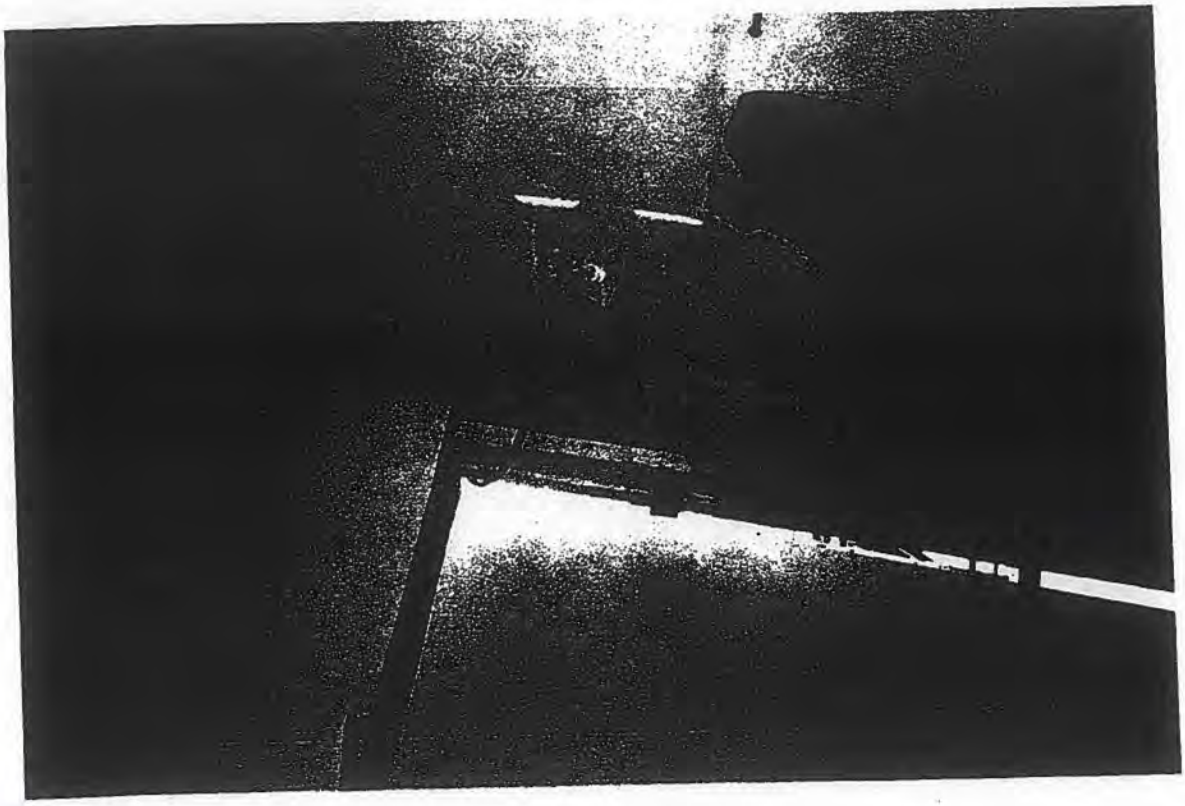


Interior of retail sales
- exposed wiring

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

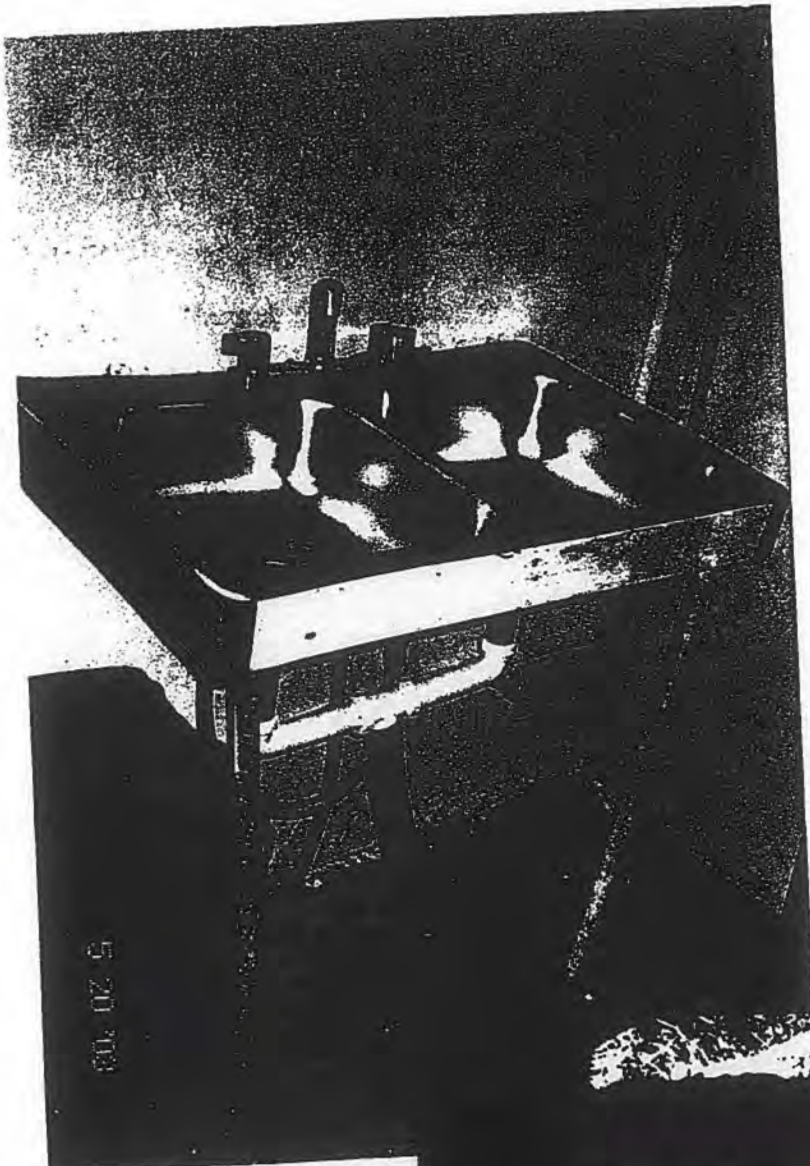


Exposed wiring in kitchen area

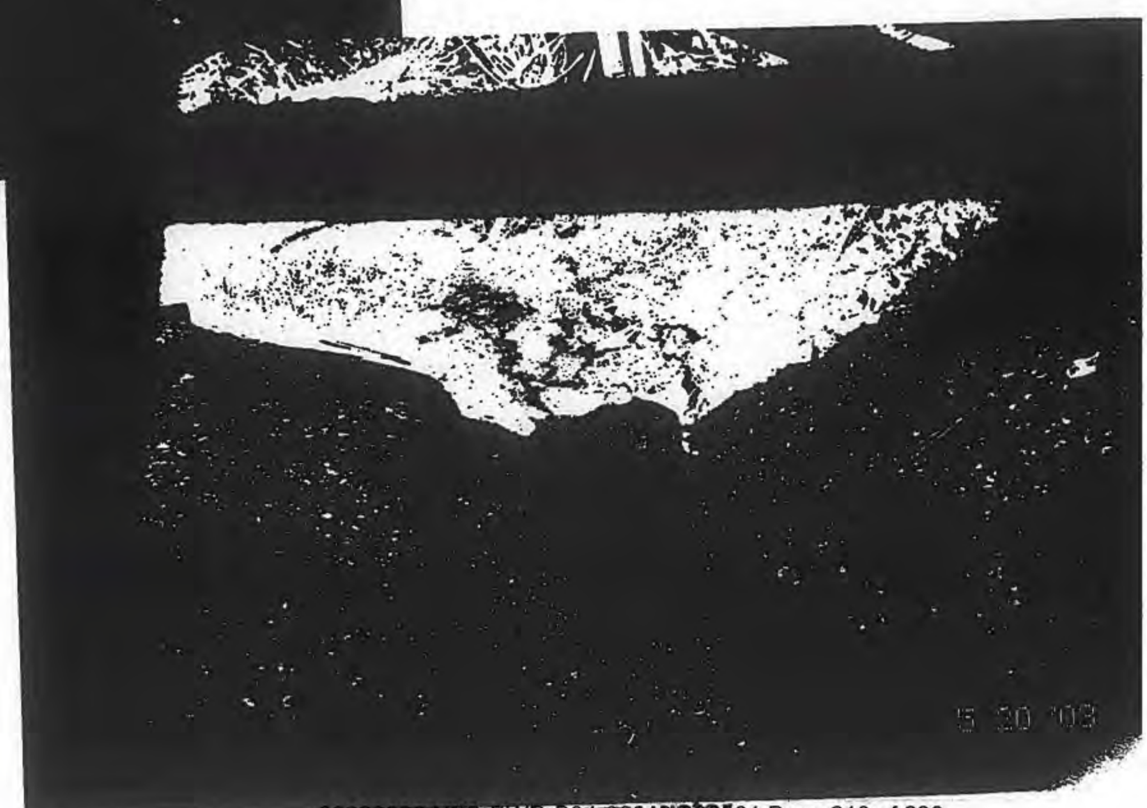


Extension cord in kitchen area
for permanent lighting

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

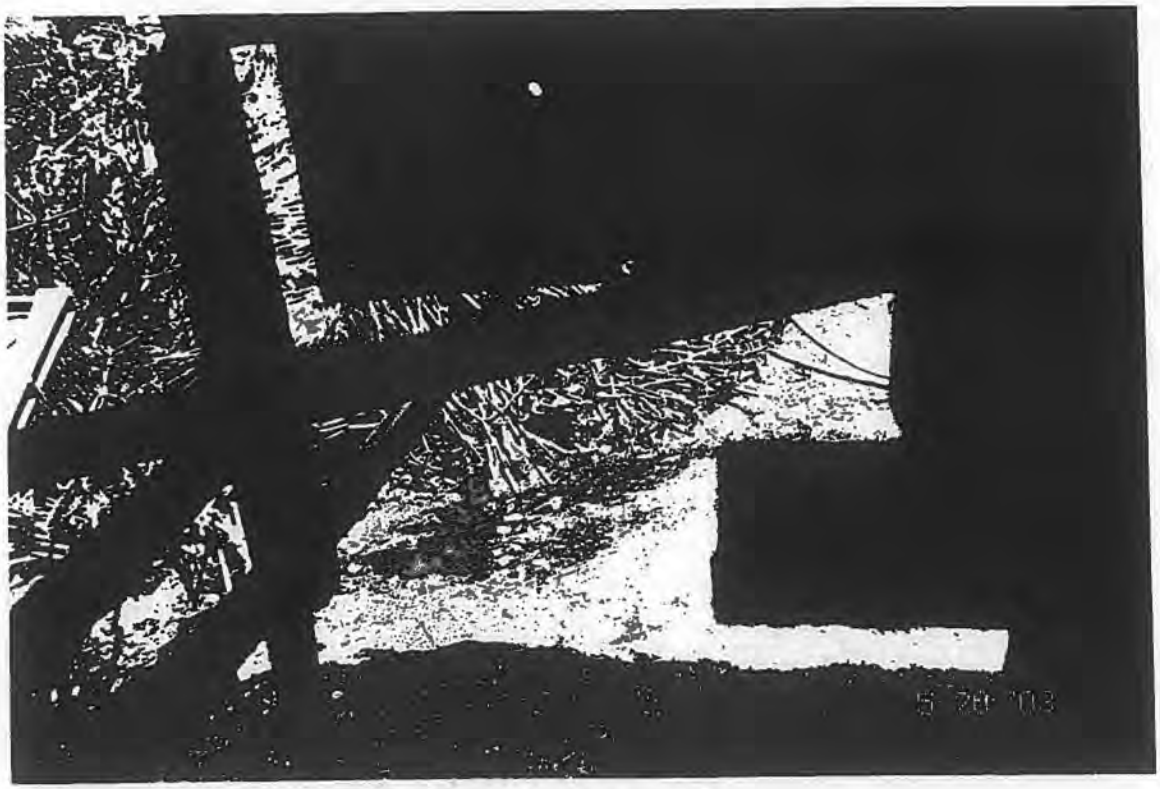


Kitchen sink-plastic piping -
Does not appear to be
connected to septic

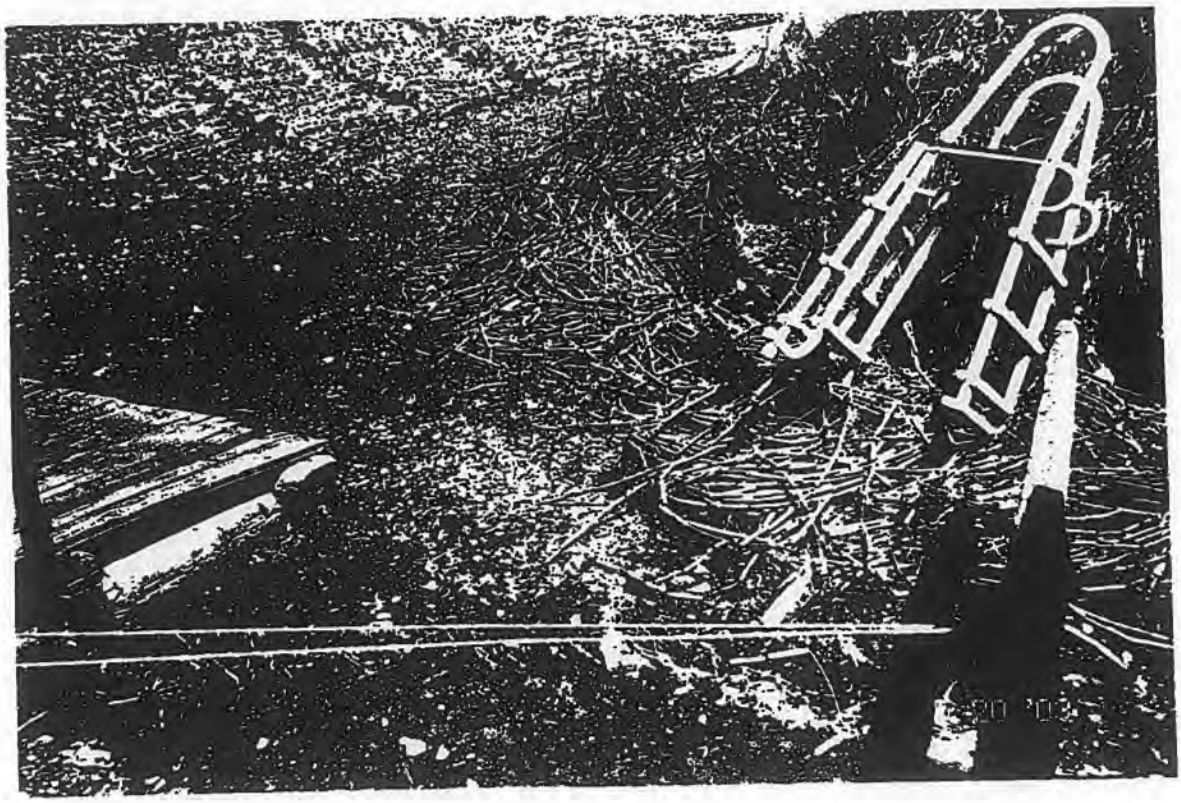


Appears to be gray water
discharge from kitchen

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



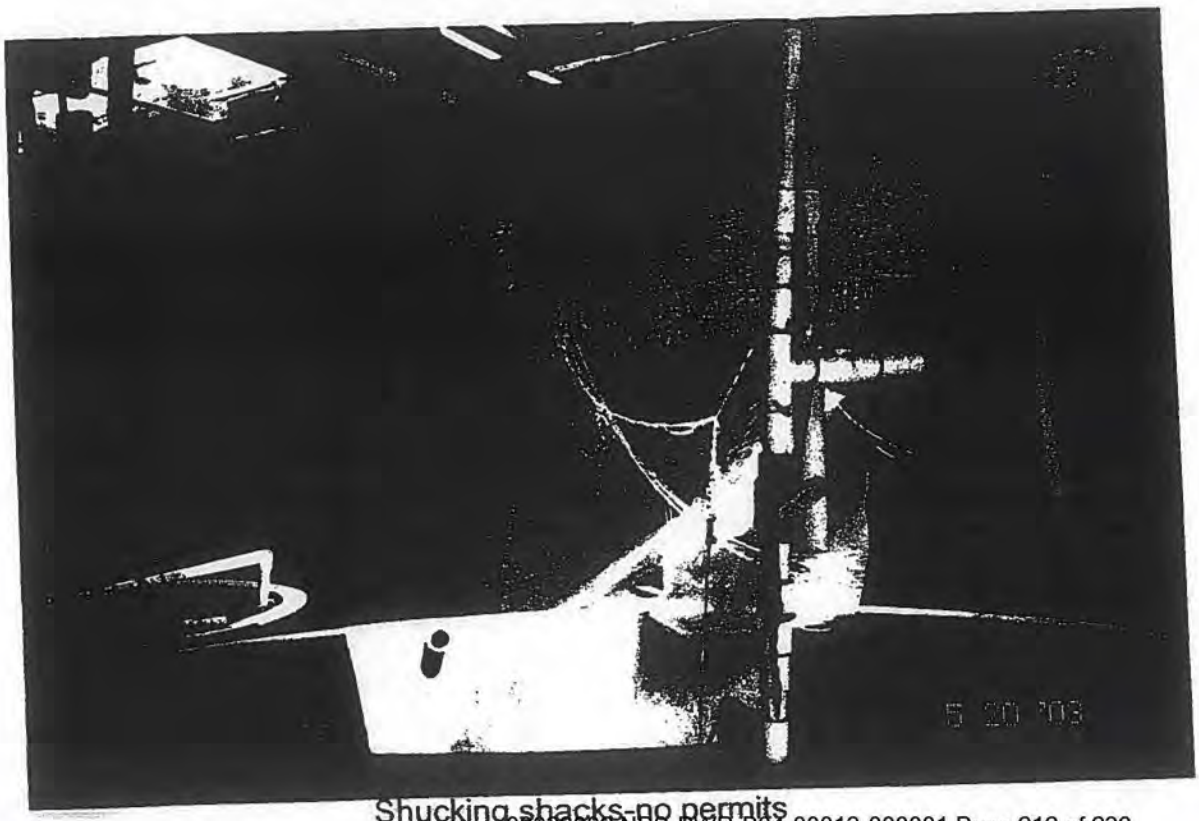
Gray water discharge under building



Junk Pile

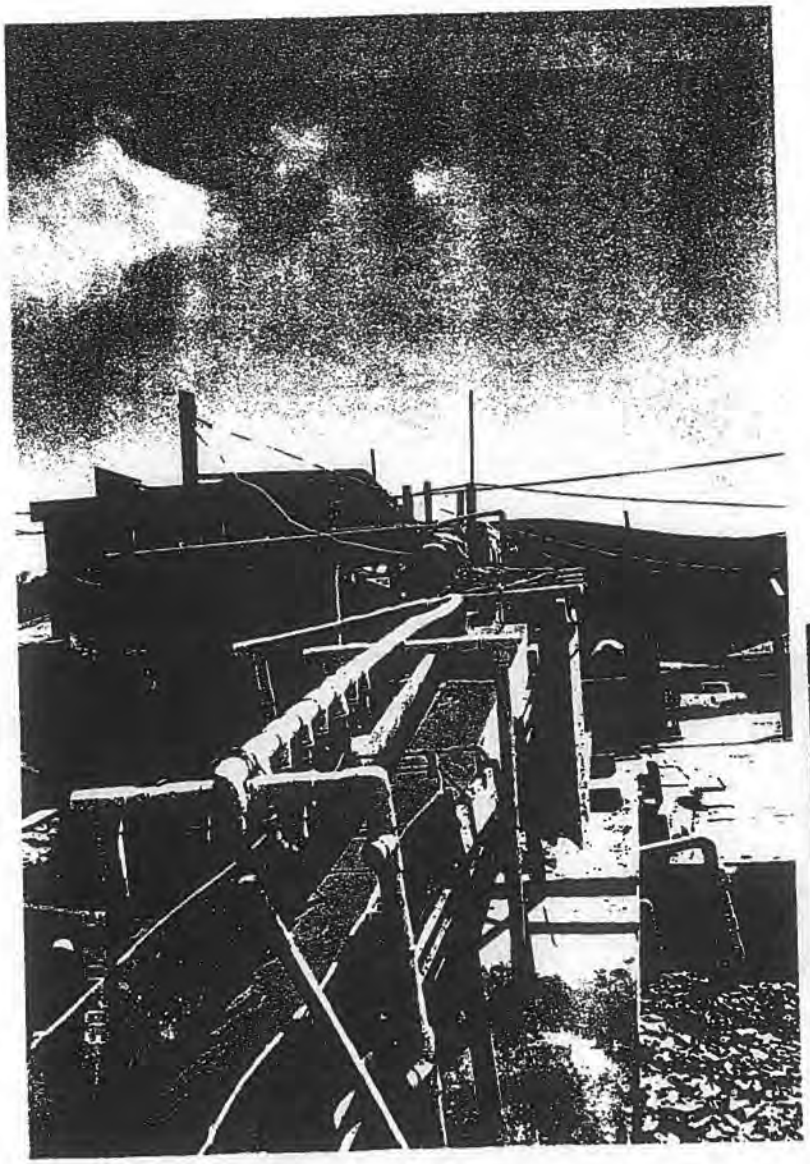
Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

Plastic piping



Shucking shacks-no permits
Plastic piping

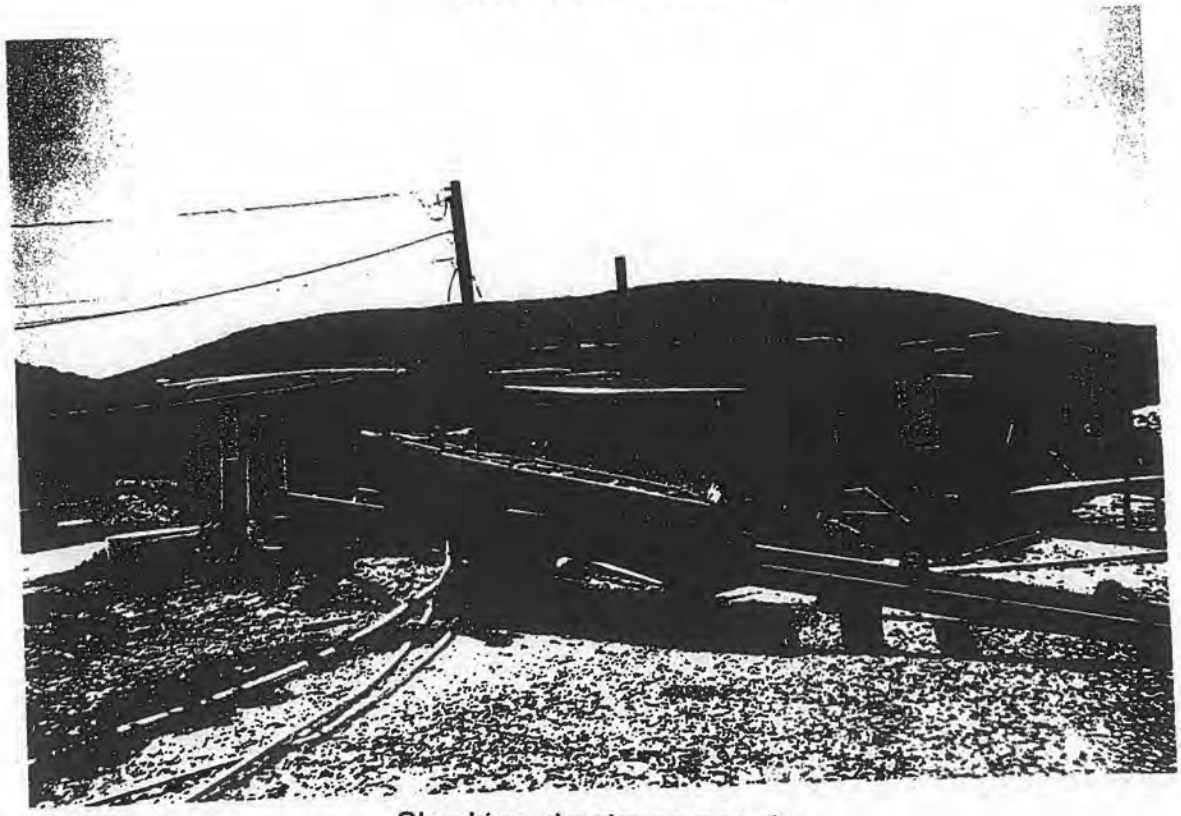
Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



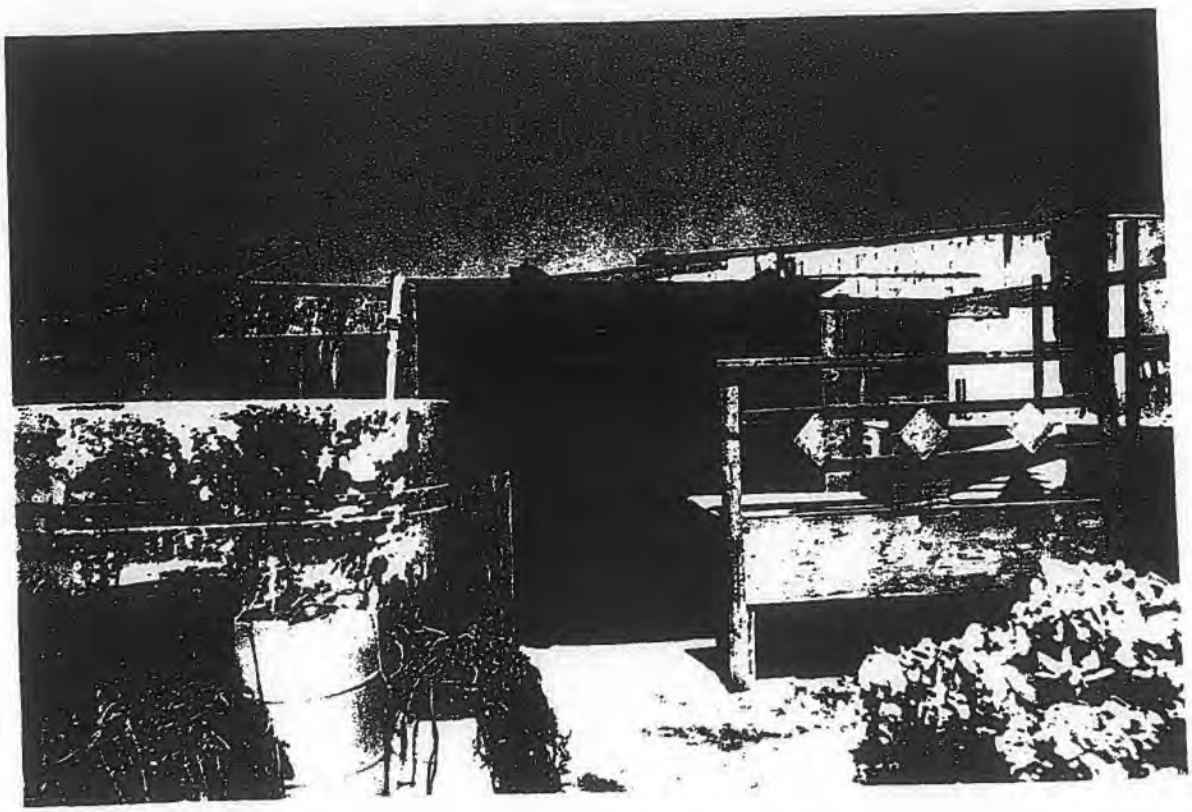
Plastic piping

Improper walkway surfaces

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

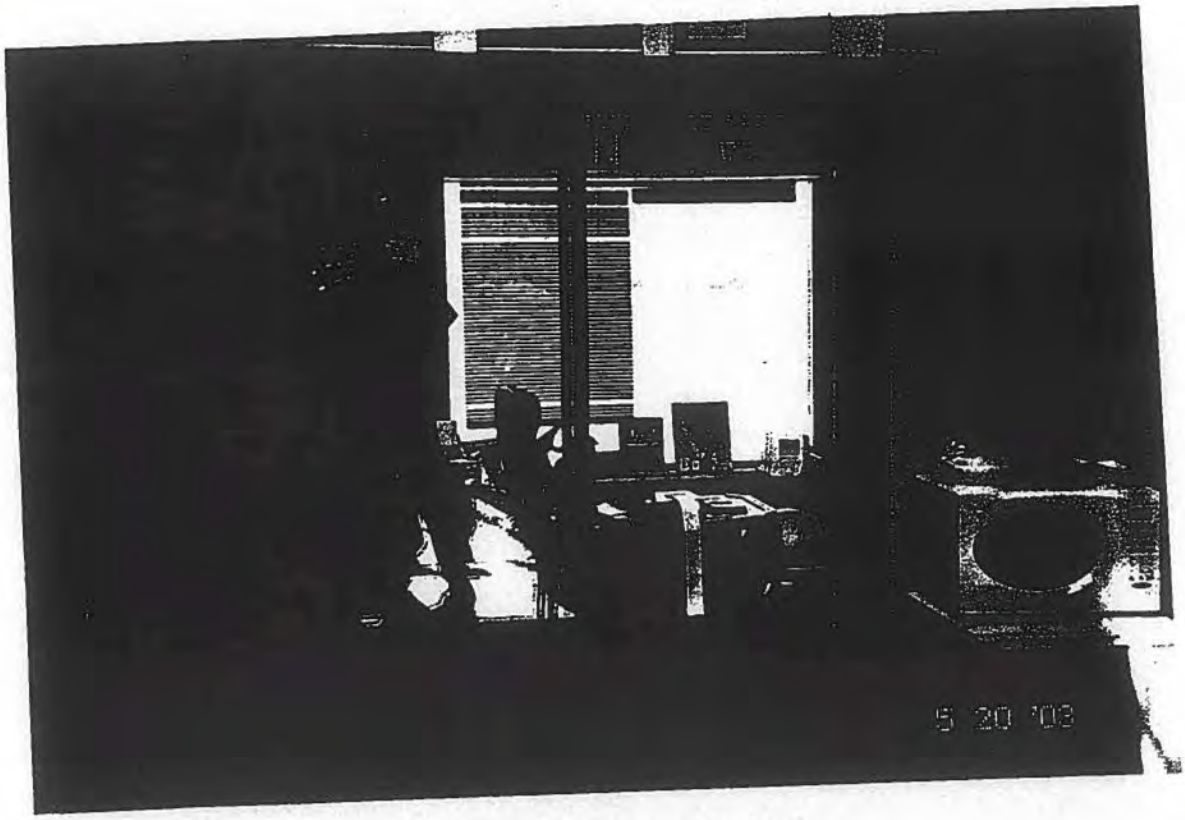


Shucking shacks-no permits
Misc debris



Shucking shacks-no permits
Misc debris

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



Conversion of shucking shack to office – no permits

This is recent construction

Johnson's Oysters
17171 Sir Francis Drake, Inverness
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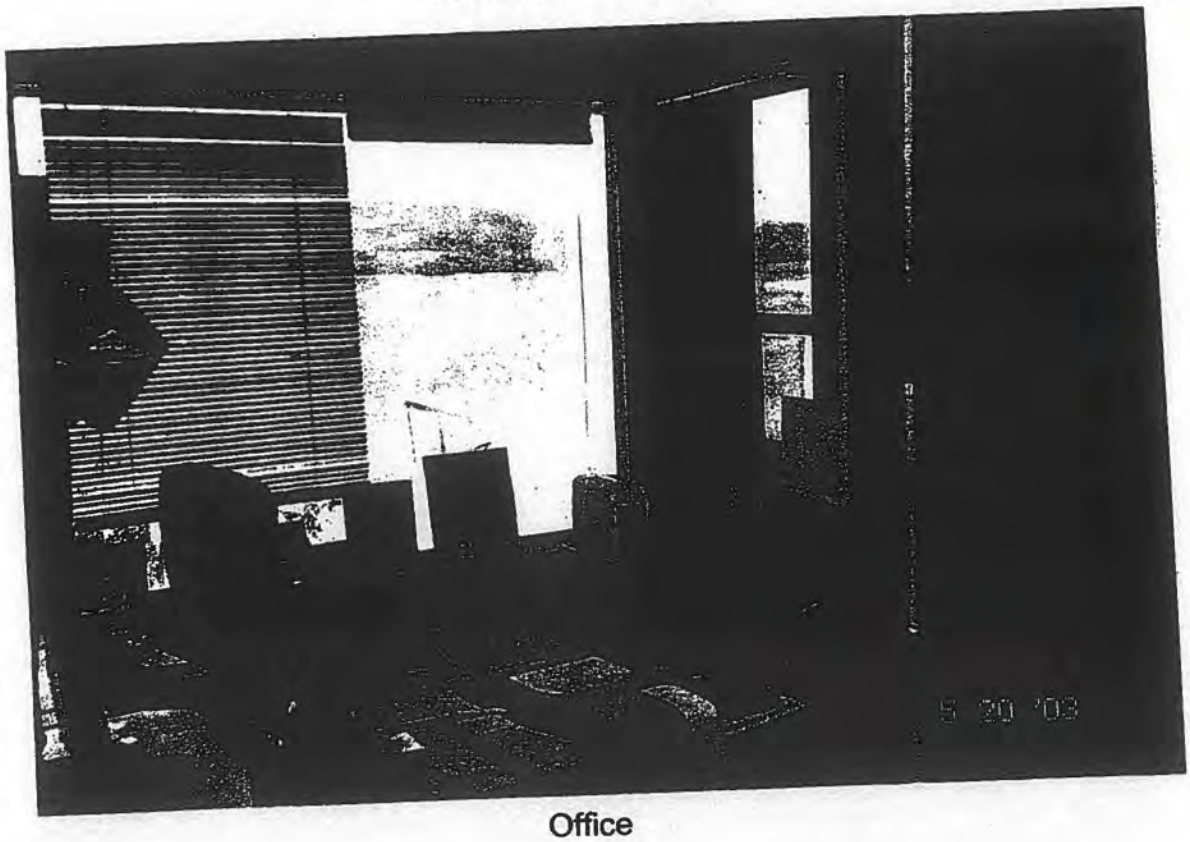
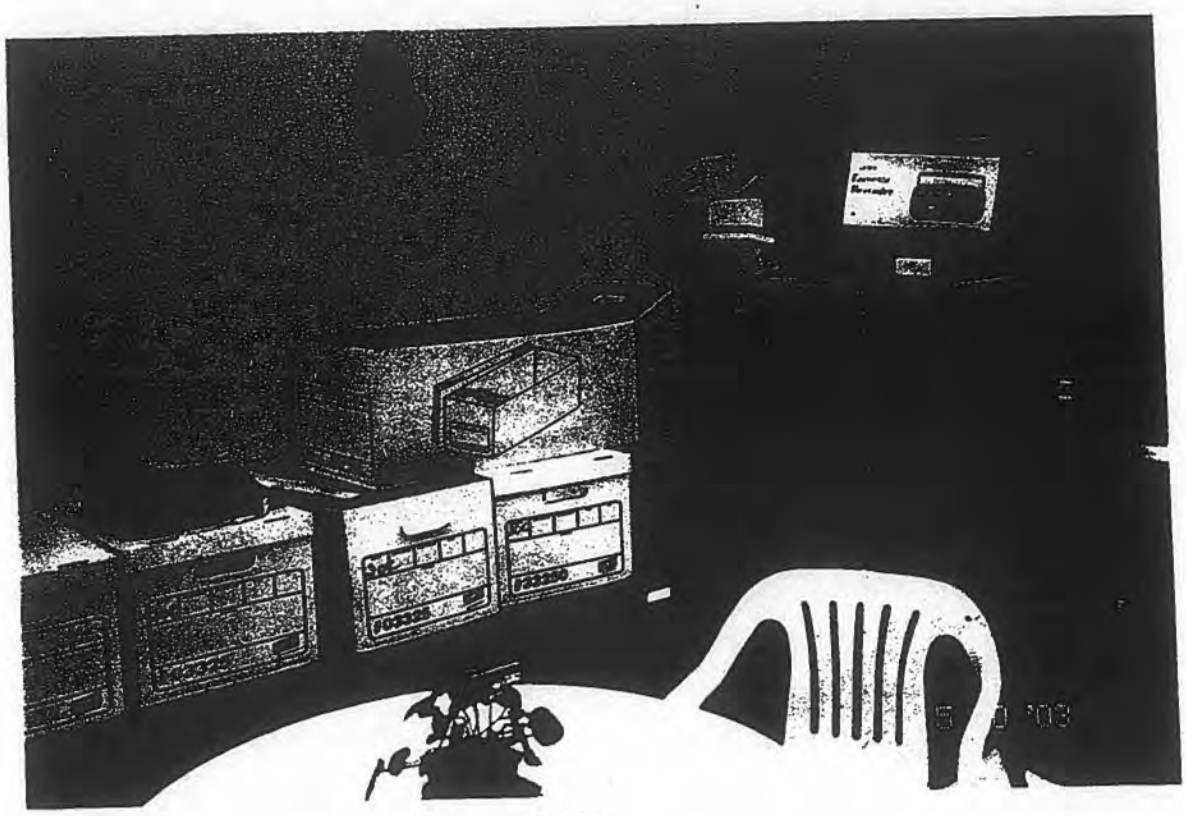
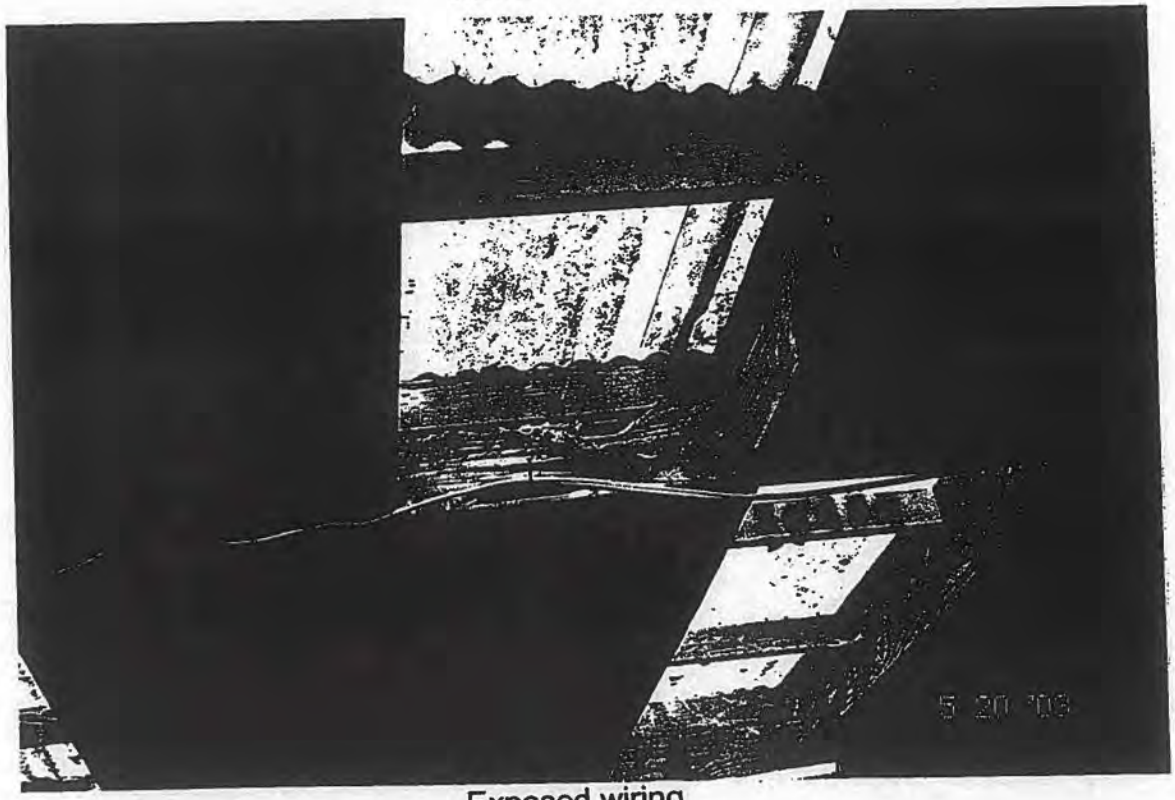


Office

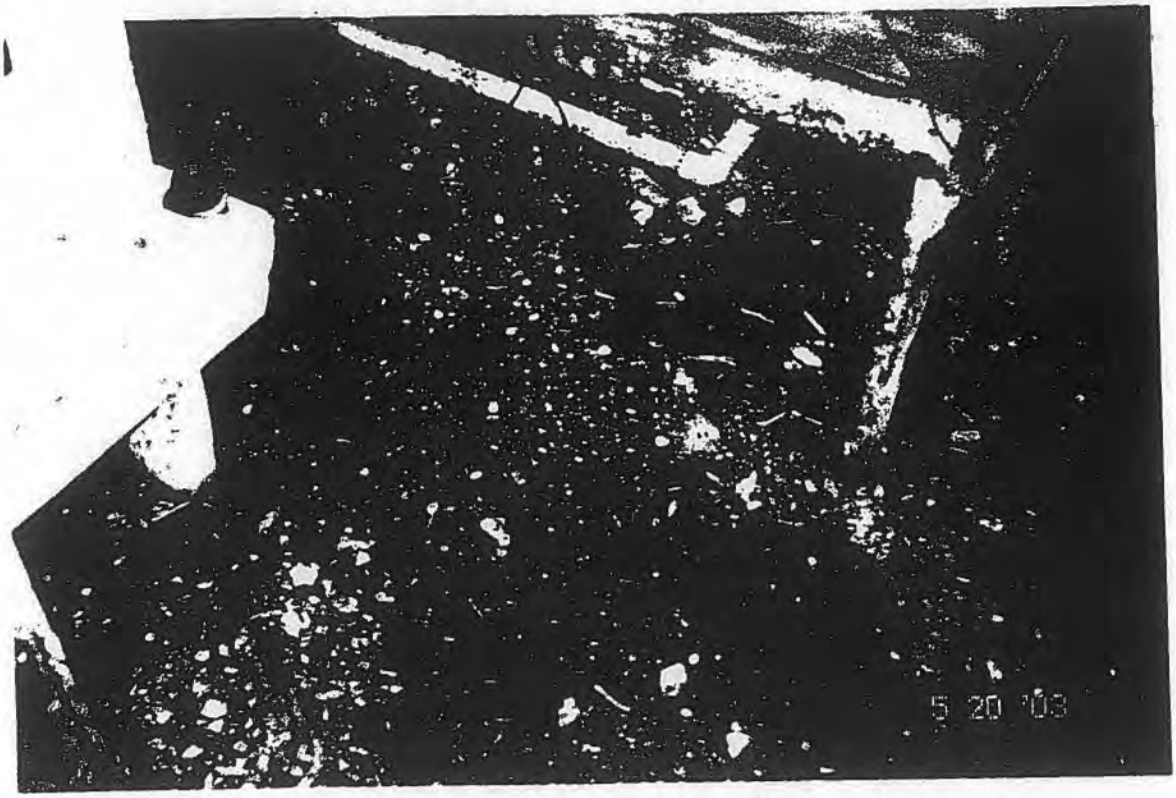


Office

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

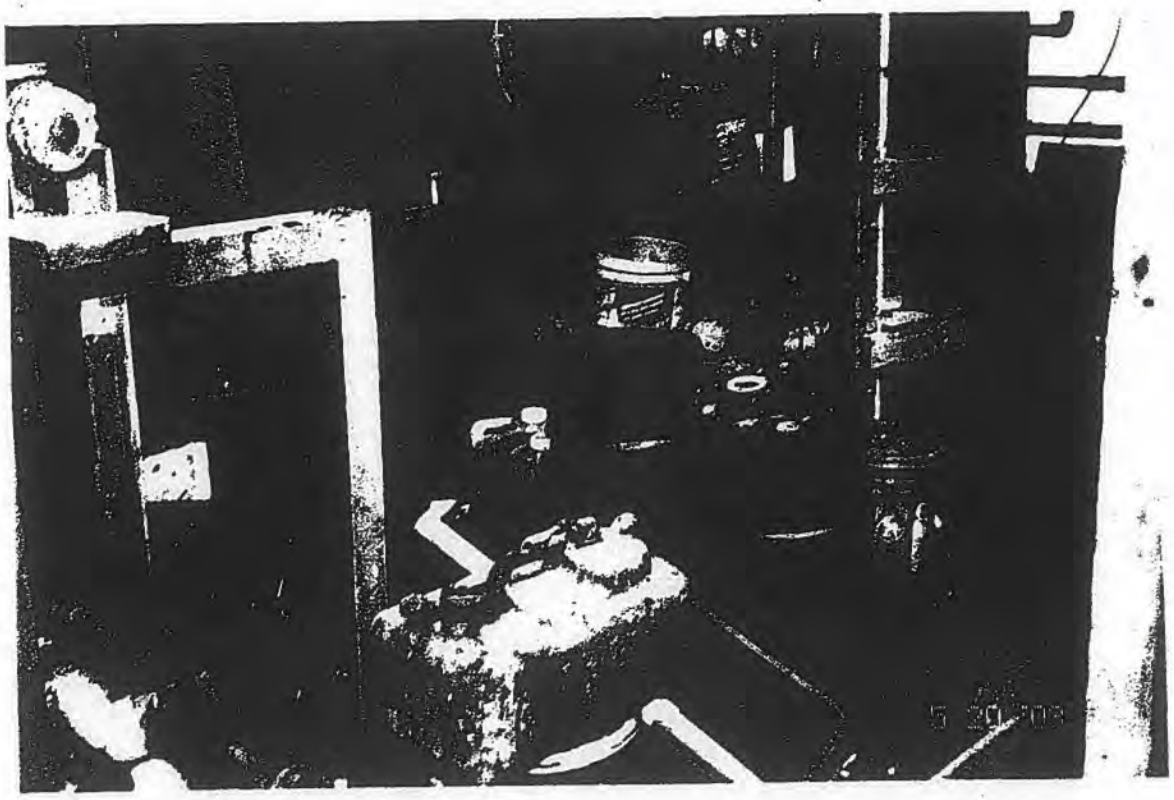


Exposed wiring

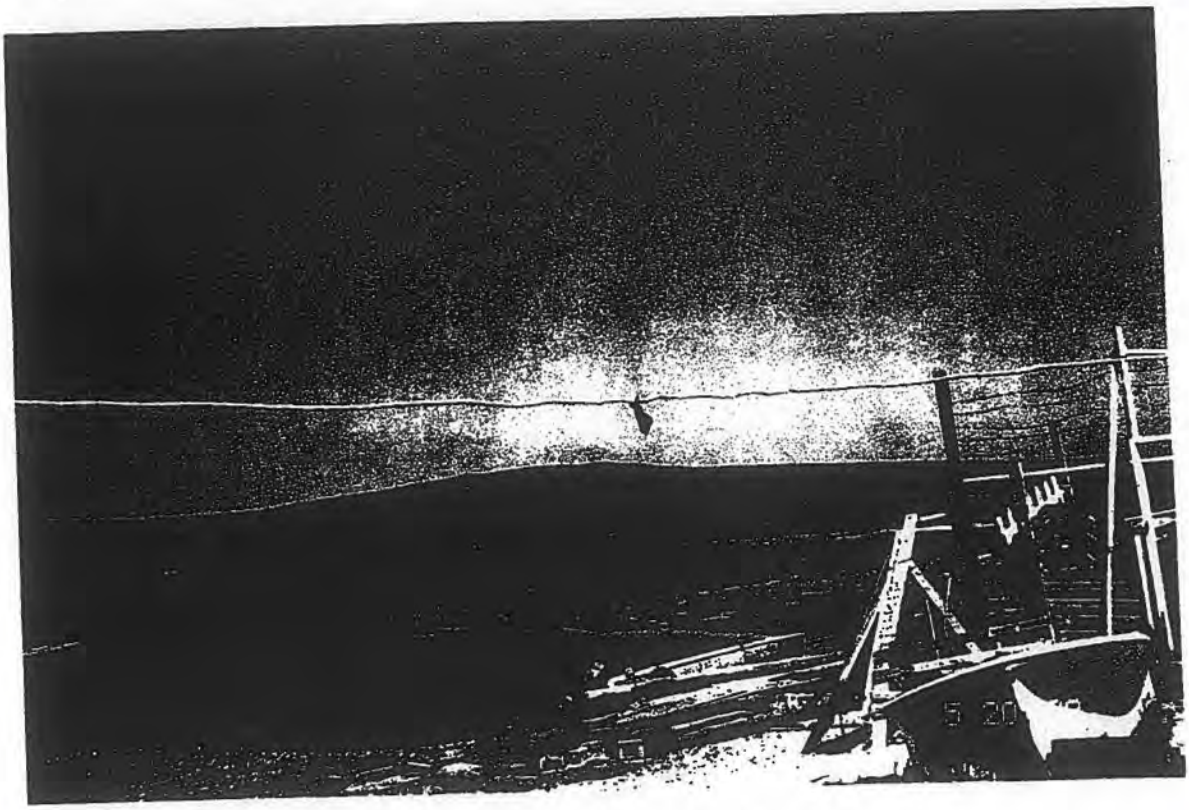


Ground inside shucking shack-
shows oil saturation and plastic
piping

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



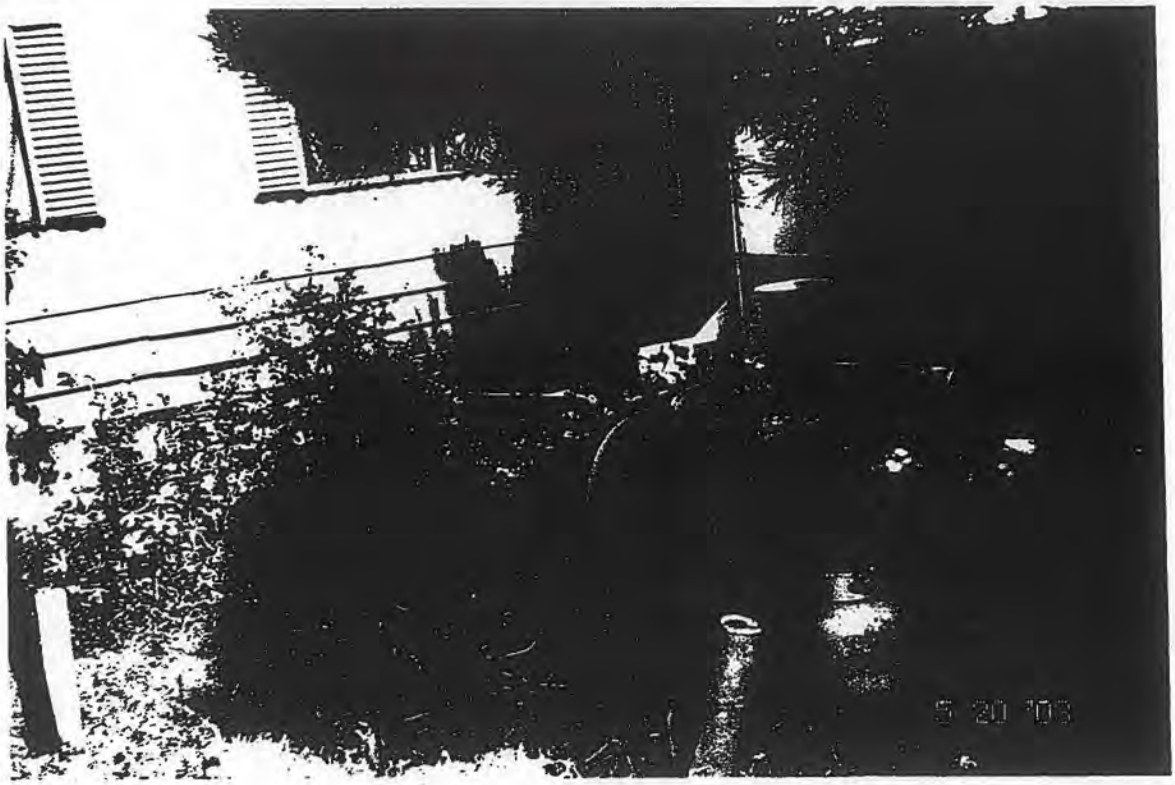
Oil Barrels



Exposed wiring, splice in violation NEC

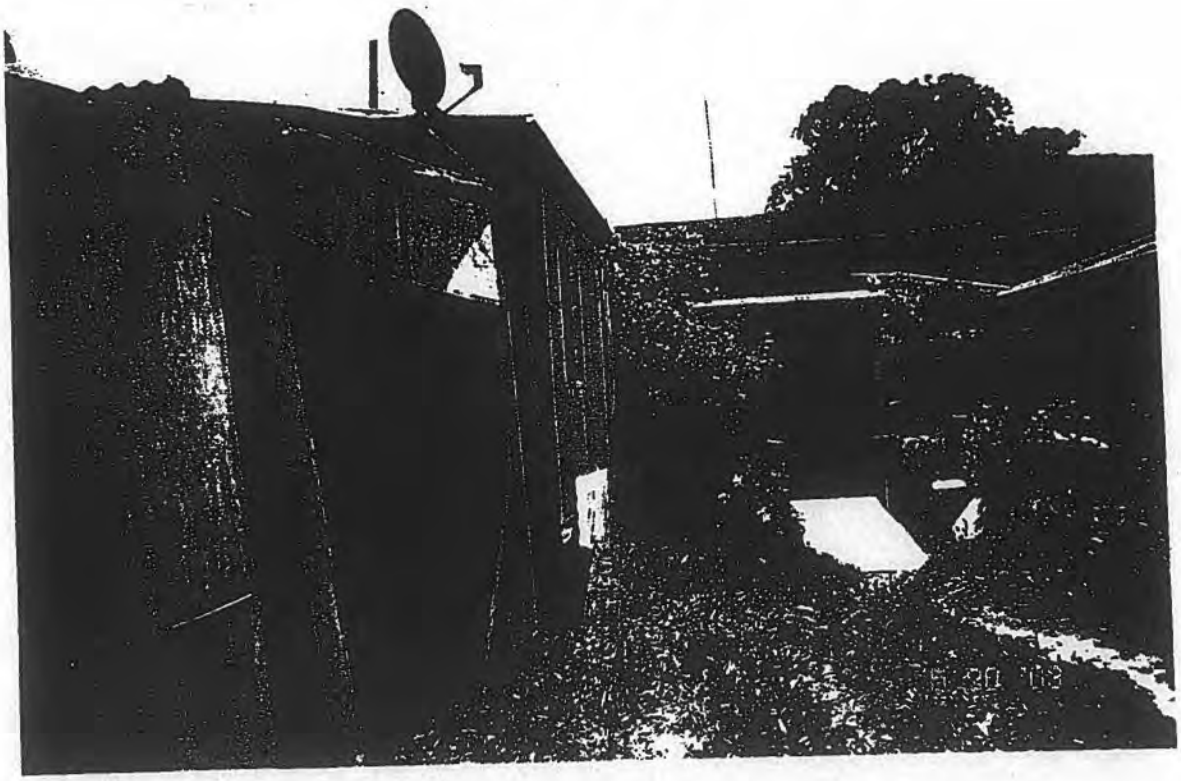
Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

Uneven, unsafe walking surface

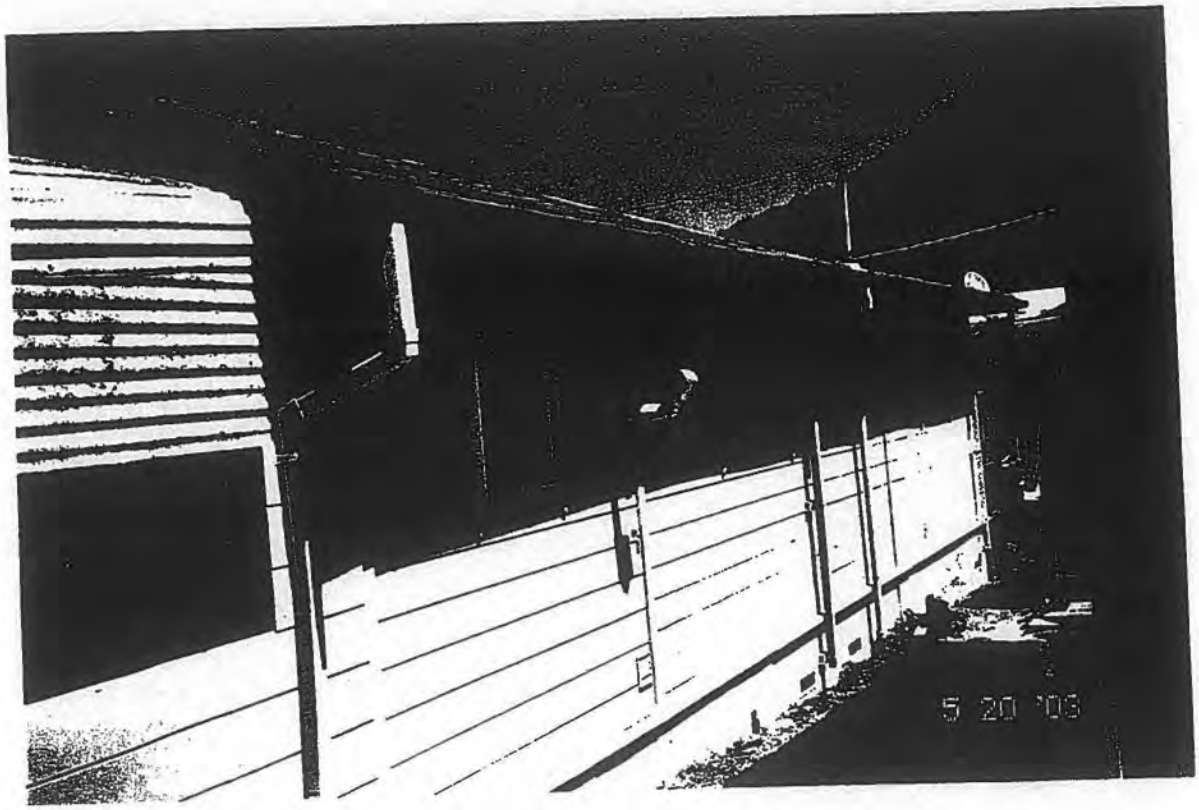


Propane tank located too close
to mobile homes-less than 10 ft

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

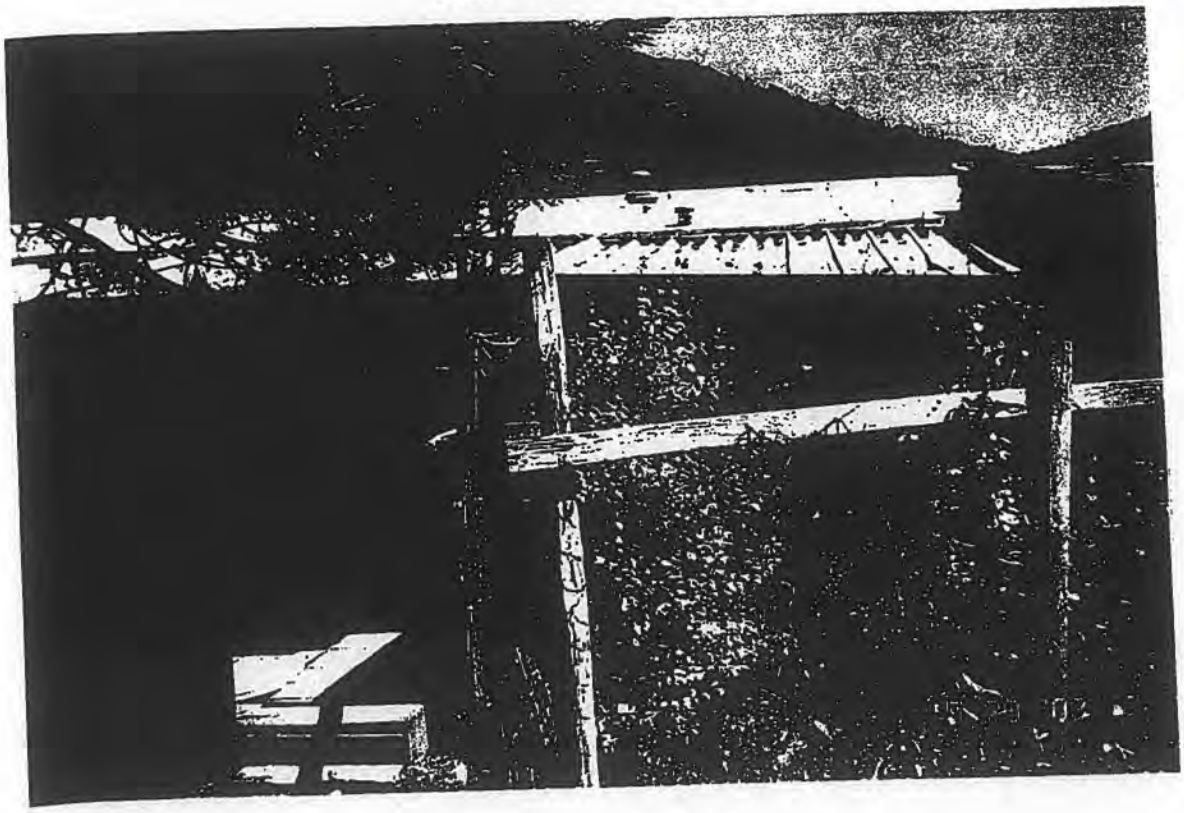


Lean to on mobile home – no permit

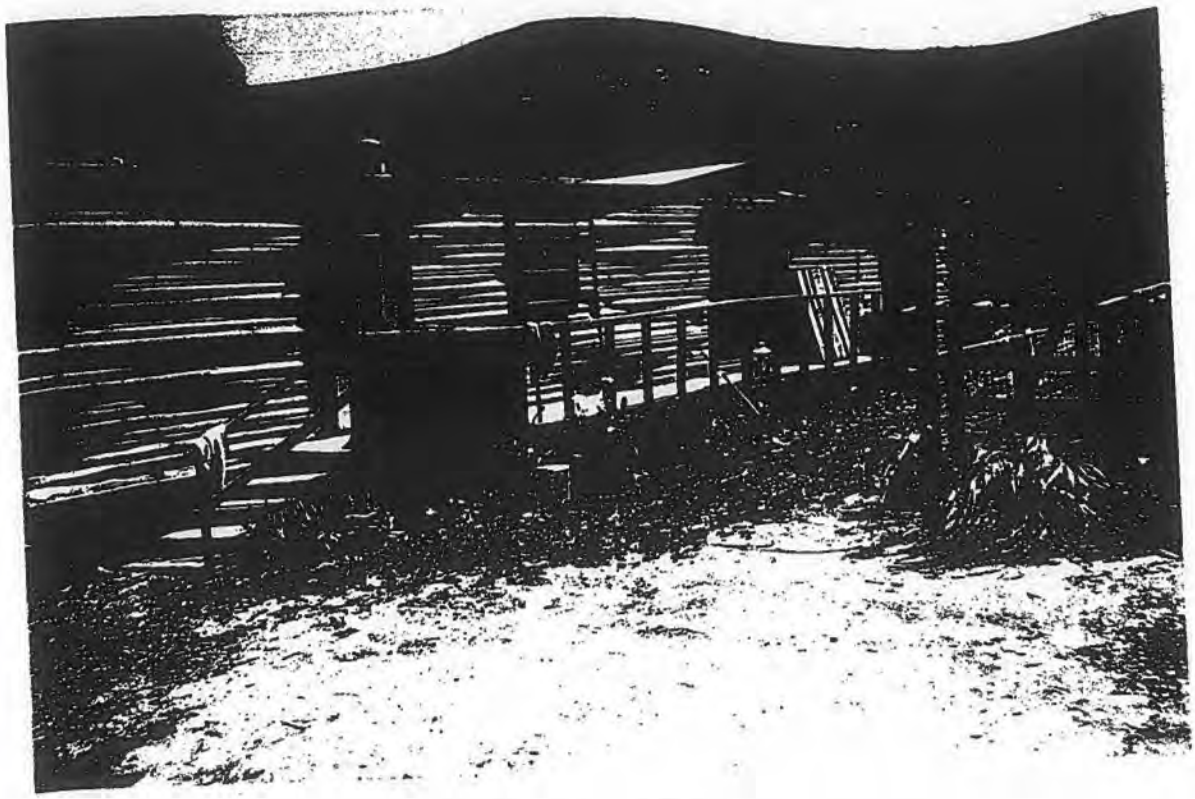


Vent pipe improperly installed.

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

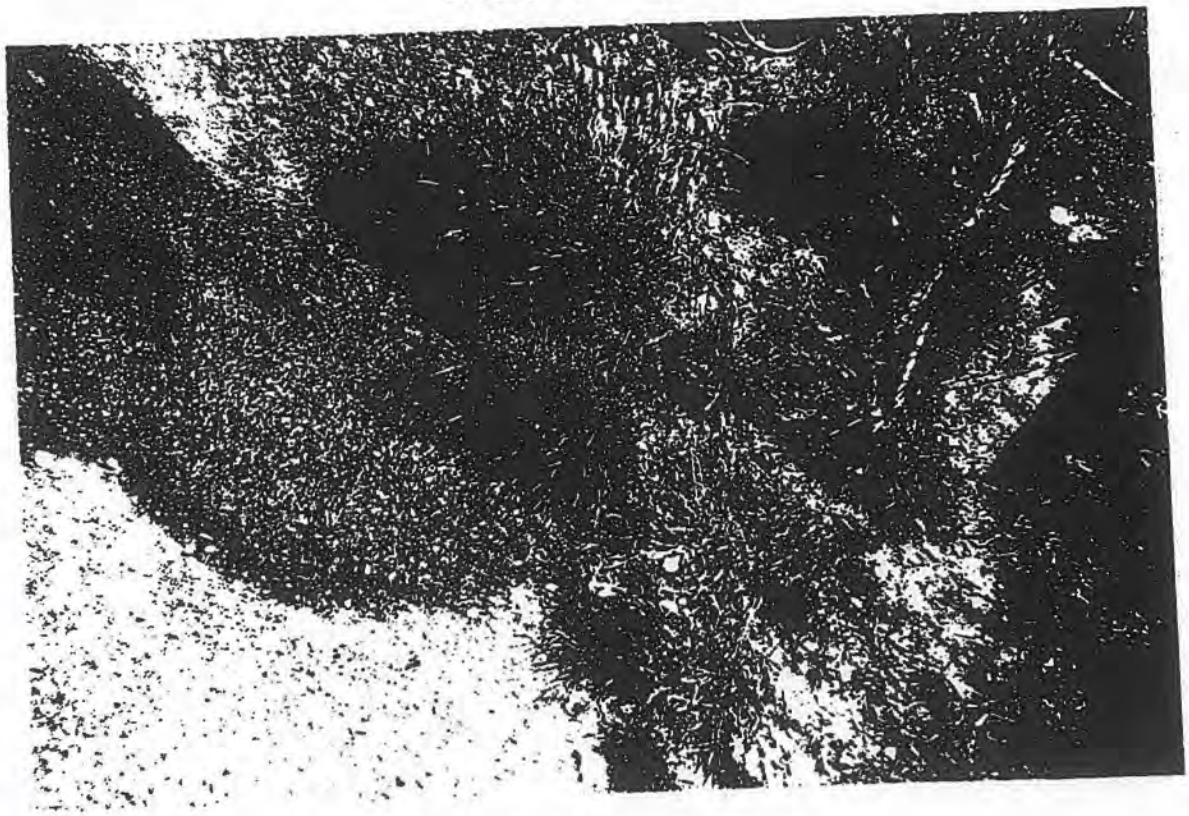


Apparent structures – no permit



Porch-no permit

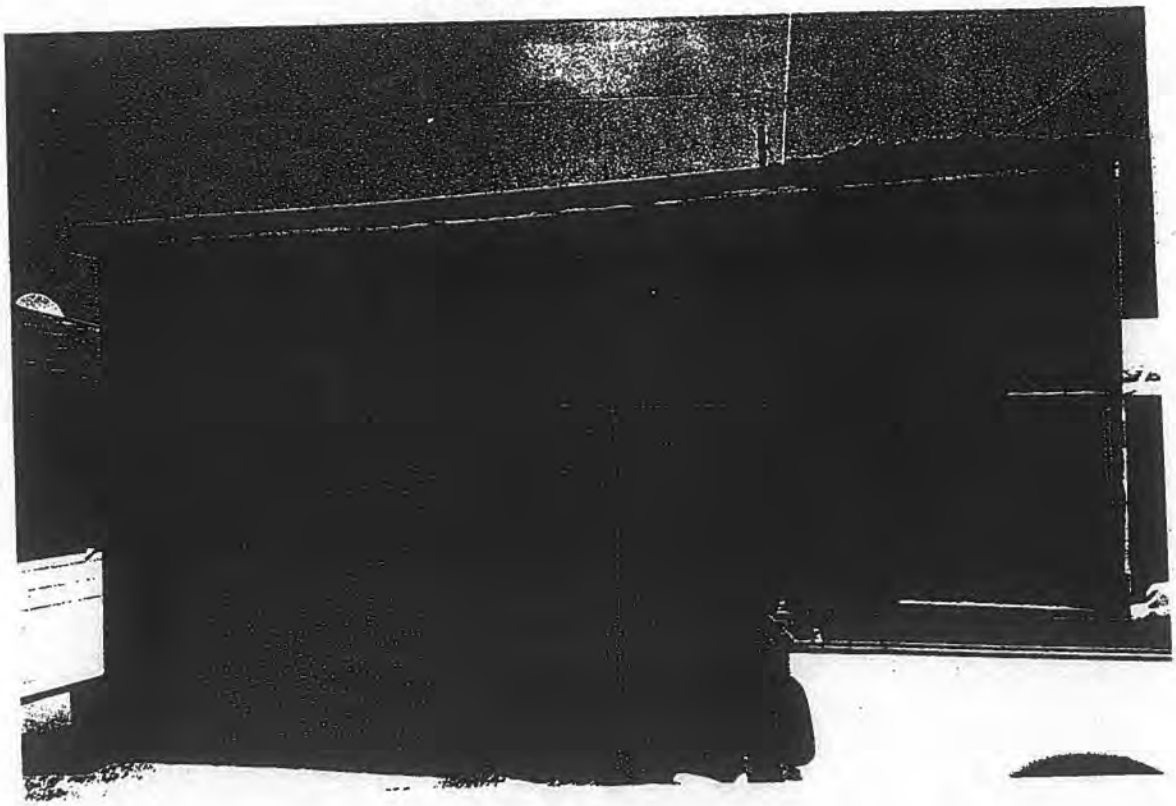
Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



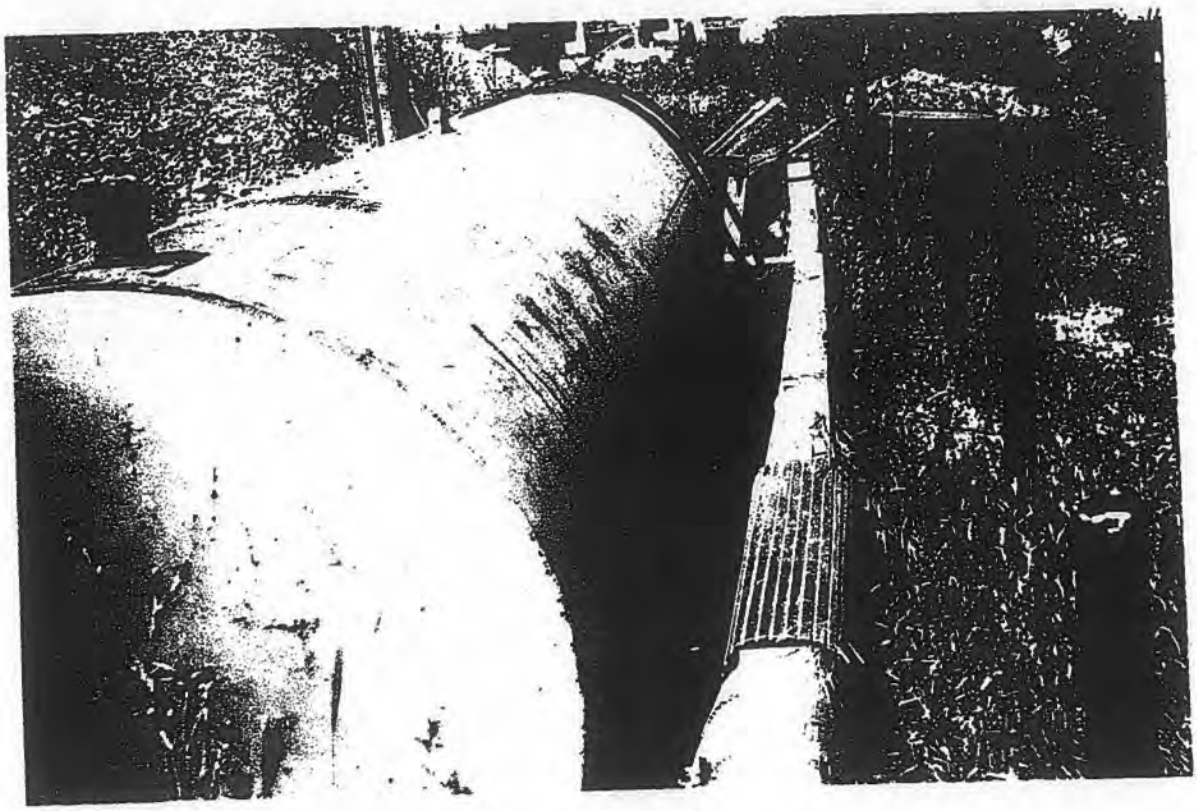
Area between mobile home and
back house-wet area

Addition to mobile home-no
permit

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



Garage-no permit

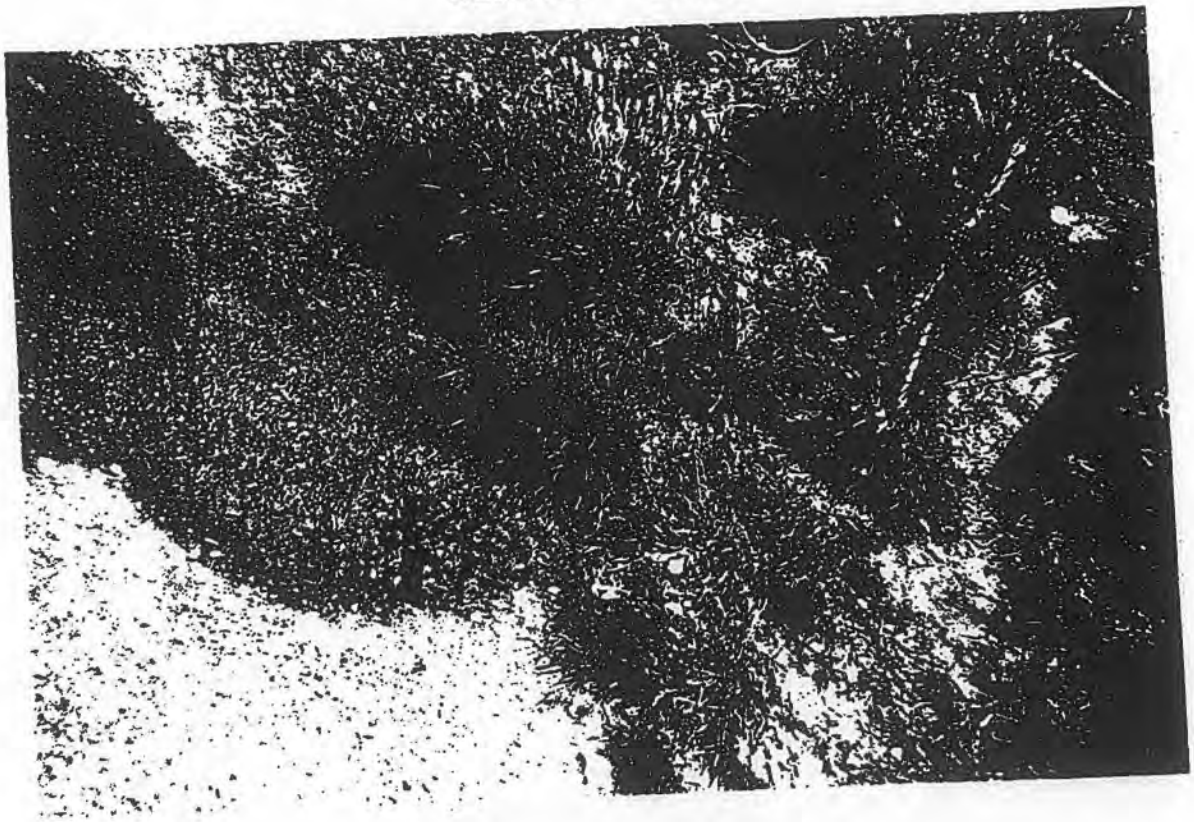


Above ground
gas tank. No permit; wiring illegal

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

Porch on mobile home – no permits and proximity of propane tank

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS



Area between mobile home and back house-wet area

Addition to mobile home-no permit

Johnson's Oysters
17171 Sir Francis Drake, Inverness
5/20/2003 DP/MS

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Johnson's Oysters
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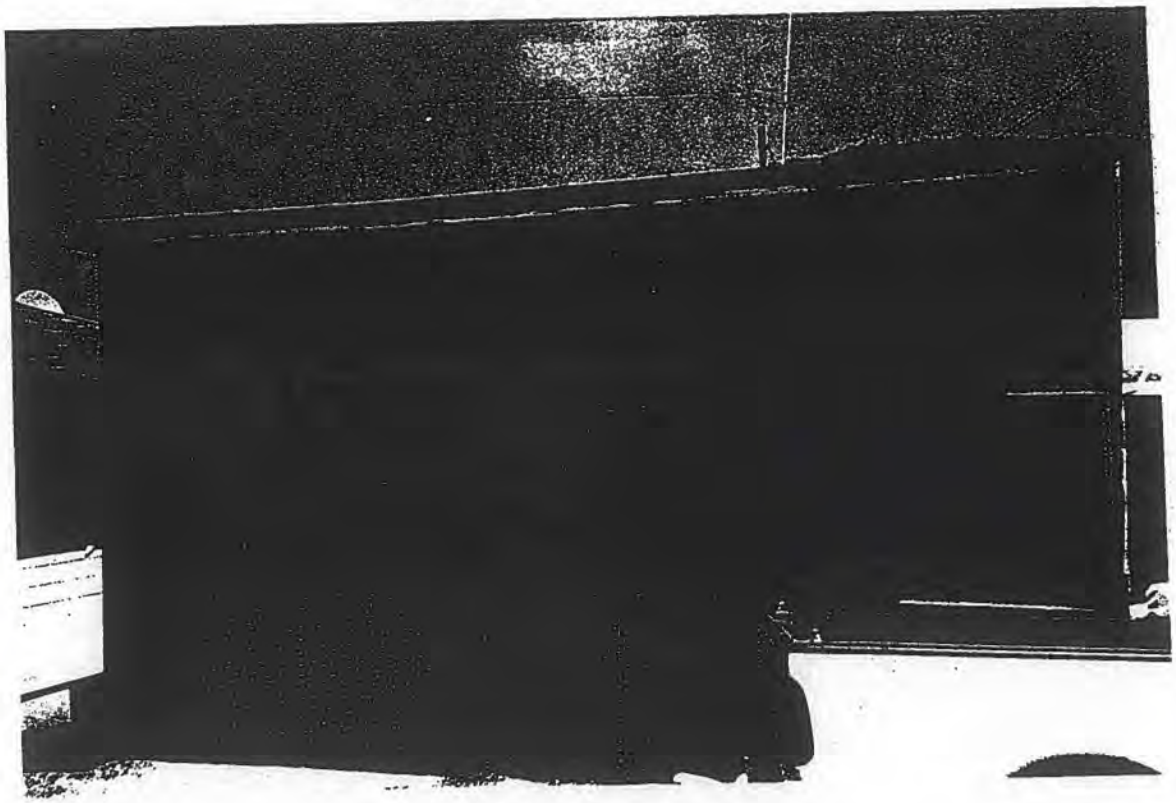
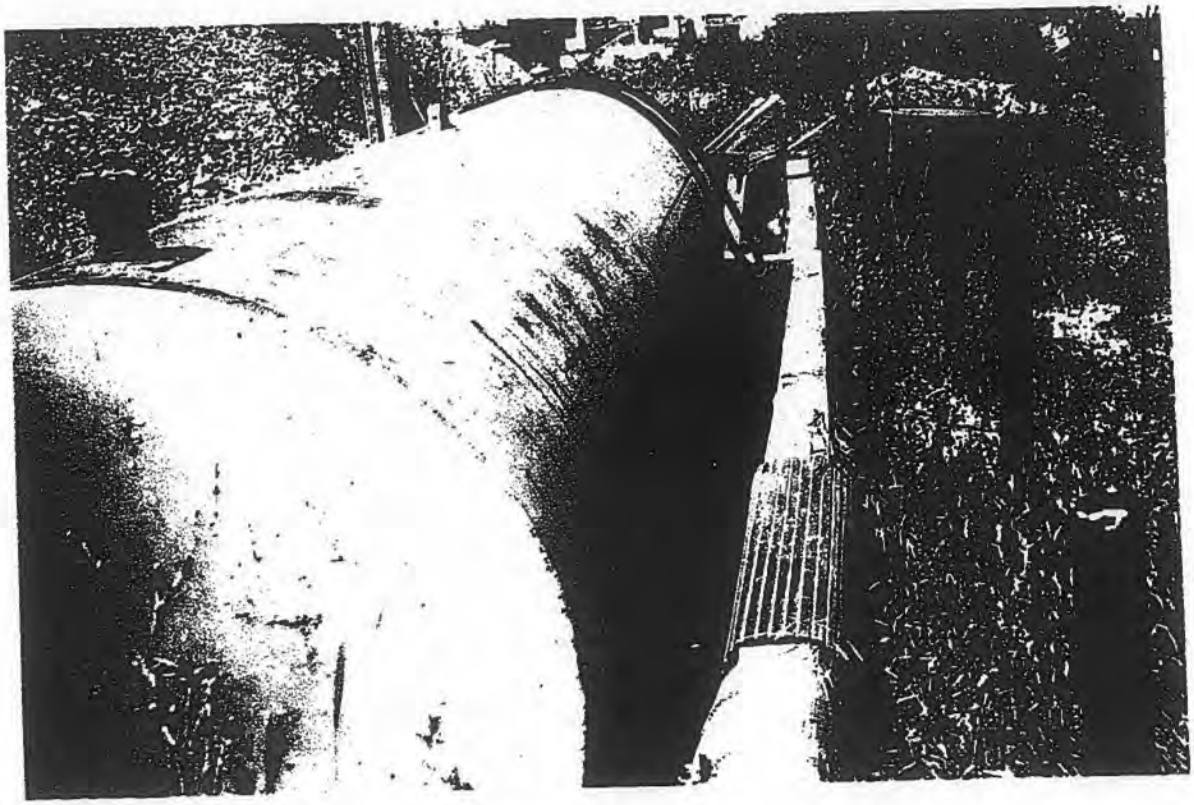


Garage-no permit



Above ground
gas tank. No permit; wiring illegal

PATRICK K. FAULKNER
COUNTY COUNSEL

JACK F. GOVI
ASSISTANT COUNTY COUNSEL

DOROTHY R. JONES
JAMES G. FLAGEOLLET
CHIEF DEPUTIES

COUNTY COUNSEL OF MARIN COUNTY

3501 Civic Center Drive, Suite 303
San Rafael, California 94903-5222

(415) 499-6117

FAX (415) 499-3796
TDD (415) 499-6172

ALEXIS J. MCBRIDE
MARI-ANN G. RIVERS
RENEE GIACOMINI BREWER
DAVID L. ZALTSMAN
MICHELE KENO
NANCY STUART GRISHAM
JENNIFER M. W. VUILLERMET
THOMAS F. LYONS
BYRON K. TOMA
DEPUTIES

PAULETTE ENGLER
ASST. SUPT. ADMINISTRATIVE ASSISTANT

RECEIVED
Point Reyes
National Seashore
SEP 12 '03
SUPT
ASST. SUPT.
SPEC. PR. USES
LAW ENFORC.
RES./SCIENCE
RANGE CONS.
FIRE MGT.
INTERP.
CULT. RES.
MAINT.
CONTRACTING
PERSONNEL
BUDGET
CENTRAL FILES

September 10, 2003

Mr. Tom Johnson
Johnson's Oyster Company
P.O. Box 68
Inverness, CA 94937

RE: Stipulated Agreement between Johnson's Oysters and County of Marin - 17171 Sir Francis Drake Blvd., Inverness
A.P. #109-130-17

Dear Mr. Johnson:

Thank you for permitting an inspection of your property as provided in paragraph 14 of the Stipulated Judgment executed on January 9, 1997. I have attached a copy of the Stipulated Judgment.

The records of the County, coupled with the inspection of the property, reveal that the following items contained in the Judgment remain ignored and uncompleted

Item 3: The septic system for the commercial uses on the property has been neither approved nor constructed.

Item 4: A well permit has not been submitted or approved.

Item 5: A retail food establishment permit has not been submitted or approved.

Item 6A: Coastal Permit was submitted and approved, but has expired.

Items 7, 8, 9, 10:
No building permits have been submitted or approved. However, there has been subsequent construction of an office without the benefit of permits.

Item 11: JOC has continued operations despite the fact that none of the required permits were submitted as required by paragraph 10. No legal construction has taken place. Therefore, the following provision of item 11 is operative "If any of the operations and structures above have not obtained required building or replacement permits, or if the permit applications are denied, withdrawn or if construction is not completed within 24 months of obtaining the permit then operations shall cease and the structures shall be removed."

Item 12: Similarly provisions of this paragraph are operative. "Any use, operation or structure for which all required permits have not been obtained with the time deadlines of this agreement shall be immediately terminated and removed from the property. This includes all uses, operations, and structures whether they are residential, commercial or agricultural."

Item 13: No record of any requests for time extensions are on file with the Marin County Community Development Agency, Planning Division.

I would draw your attention to the provisions of paragraph 12. The Stipulated Agreement, which was signed and made a Judgment of the Marin County Superior Court, mandates that "any use, operation or structure for which all required permits have not been obtained within the time deadlines of this agreement shall be immediately terminated and removed from the property. This includes all uses, operations and structures whether they are residential, commercial or agriculture."

The time lines for the required permits and any entitlements under the Designed Review 98-01 have long since expired leaving you no choice but

to terminate the uses and operations at the site. Please inform this office in writing by September 30, 2003 of your closure plans.

Sincerely,

Alexis McBride

cc: Tom Johnson (Proof of Service)
Don Neubacher, U.S. Dept. of Interior
Alex Hinds, CDA Director
Michael Hernandez, Dept. of Health Services, Food & Drug
Deborah Poiani, CDA

COPY

THOMAS G. HENDRICKS, County Counsel (State Bar #35025)
ALEXIS J. McBRIDE, Deputy (State Bar #97367)
Suite 342, Civic Center
San Rafael, California 94903
Telephone: 1 (415) 499-7890
Fax: 1 (415) 499-3796

Attorneys for Plaintiffs

FILED

MAR 2 1 1997

JOHN P. MONTGOMERY,
Court Executive Officer
MARIN COUNTY COURTS
By: C. *Baker*, *Deputy*

SUPERIOR COURT OF CALIFORNIA
FOR MARIN COUNTY

PEOPLE OF THE STATE OF CALIFORNIA, acting by and through the COUNTY OF MARIN, Plaintiffs, vs. JOHNSON OYSTER COMPANY, INCORPORATED, TOM JOHNSON AND DOES 1-20 INCLUSIVE Defendants. ALICIA FLORES, et al. Intervenors.	NO. 165361 STIPULATED AGREEMENT BETWEEN THE PARTIES AND ORDER

This stipulation is entered into this 9th day of January 1997 by and between the parties. For the purposes of this Agreement, all time frames shall run from the date that the Judge of the Superior Court signs this Agreement, unless otherwise specified.

1. The parties hereto agree that a design review application with a site plan showing the proposed improvements locate don the subject property at 17171 Sir Francis Drake Boulevard, Inverness, AP # 109-130-17), will be prepared by JOHNSON OYSTER COMPANY, INC. (hereinafter JOC) and submitted to Community Development Agency,Planning Division, within 45 days from the date of this agreement.

2. The parties and the U.S. Park Service have agreed that no more than four

00033002 NPS-PWR-B04-00013-000001 Page 231 of 239

mobile homes and two residences may remain on the subject property after September 30, 1996. To accommodate this agreement, five intervenors, namely Juan-Jose Pelayo, Alicia Flores, Aida Pelayo, Manuel R. Pelayo and Marin Pelayo ("the Relocated Intervenors") and their families reached a seperate agreement with JOC under the terms of which those families timely relocated. JOC and the Relocated Intervenors agree to work in good faith to formalize that seperate agreement within 15 days.

3. A septic system that meets current standards shall be designed and all necessary permits and approvals from Environmental Health Services Division of the Community Development Agency shall be obtained within 30 days of the date submitted. This system shall be constructed within six weeks of approval of septic system permit and coastal permit. This system shall have adequate capacity to process the waste that is produced form the uses and operations specifically allowed under this agreement. Unit such time as this septic system is approved, built and fully functioning, defendants shall pump the failed septic system tank and provide to Environment heal Services receipts for such pumping on a weekly basis. For good cause,including but not limited to, inclement weather, an extension of time to construct the approved system may be granted in writing by Environmental Health Services after written request for such extension by JOC.

4. A permit to drill a well shall be obtained from the Environmental Health Services Division of the Community Development Agency within 90 days of the date of this agreement.

5. A retail food establishment permit shall be obtained from the Environmental Health Services Division of the Community Development Agency within 90 days of the date of this agreement.

6. A Coastal Permit shall be obtained from the California Coastal Commission within 120 days of the date of this agreement.

7. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for all work completed without building permits and building permits shall be obtained for any work requiring such permits prior to

commencement of work.

8. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the structures adjacent and appurtenant to the remaining trailers.

9. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the addition to the house.

10. Building permits shall be obtained from the Marin County Community Development Agency, Building Inspection Division for the wiring, plumbing, propane tanks, the well house, and any new improvements. JOC will either obtain a permit for the retail sales office expansion, the second story addition, the three sided structure used for stringing of the oyster shells and the containers used for storage and refrigeration OR submit a permit application for replacement structures to serve the same use as that of commercial oyster production.

11. JOC may continue operation of the processing plant, algae shed, the growing shed, the retail sales office, the second story addition and the three-sided stringing shed and the containers used for storage and refrigeration if the design review and required permits are submitted in a timely basis as required by paragraph 10. JOC may continue the above operations in their present locations until construction is completed on the replacement structures. Construction under the permits will commence upon issuance and continue in a timely fashion to be completed within 24 (twenty four) months. If any of the operations and structures above have not obtained required building or replacement permits, or if the permit applications are denied, withdrawn or if construction is not completed within 24 months of obtaining the permit then operations shall cease and the structures shall be removed.

12. Any use, operation or structure for which all required permits have not been obtained within the time deadlines of this agreement shall be immediately terminated and removed from the property. This includes all uses, operations and structures whether they be residential, commercial or agricultural.

13. All permits required by this agreement shall be obtained within 90 days of this agreement unless otherwise specified. Extensions of time to obtain permits or complete

construction may only be granted by the issuing agency in writing after written request for such extension by JOC.

14. Staff members of all divisions of the Marin County Community Development Agency shall upon 48 hours notice, be granted entry onto the property to ensure compliance with this agreement.

15. The Court shall retain jurisdiction for the purposes of enforcement of this Stipulated Agreement and of the agreement between JOC and the Relocated Intervenors.

16. The County shall dismiss their action for injunctive relief within 30 days of the date of this agreement.

17. Plaintiff reserves the right to obtain a judgment pursuant to CCP 664.6

FOR THE PLAINTIFFS:

COUNTY OF MARIN

By _____ Date 3/5/97
HAROLD C. BROWN JR.
CHAIRMAN, BOARD OF SUPERVISORS

By _____ Date 1/10/97
ALEXIS J. McBRIDE
Attorney for Plaintiffs

FOR THE DEFENDANTS:

JOHNSON OYSTER COMPANY, INC. and
TOM JOHNSON

By _____ Date 1/10/97
TOM JOHNSON

By _____ Date 1/10/97
F. ROBERT STUDDERT
Attorney for Defendants
Tom Johnson and Johnson Oyster Company, Inc.

FOR THE INTERVENORS:

LEGAL AID OF MARIN

By _____ Date 1/10/97

RICHARD MARCANTONIO
Attorney for Intervenors

ORDER

This Agreement signed by the parties is hereby made an order of this Court. It is the order of this court that all parties shall bear their own attorney's fees and costs.

Date: 18 Mardi, 1997

_____
LYNN O'MALLEY TAYLOR
Judge of the Superior Court

g:\anvs\johnson\joc-stip

L1425
02-106

September 17, 2003

Mr. Tom Johnson
Johnson Oyster Company
17171 Sir Francis Drake Hwy
Inverness, CA 94937

Dear Tom:

As you know, the National Park Service and Marin County officials inspected your lease and permit area on Drakes Estero on May 21, 2003. As a condition of the stipulated agreement (Marin County Superior Court No. 165361), you were to complete several items.

At this time and based on the inspection, we believe you have not completed the following:

1. A permit to drill the well has not been obtained from Environmental Health Services Division, Marin County.
2. A retail food establishment permit has not been obtained from Environmental Health Services Division, Marin County.
3. A Coastal Permit from the California Coastal Commission has not been obtained for various structures.
4. A sewage system has not been fully installed for the oyster processing facilities and residential structures. The domestic, on-site, wastewater treatment system, installed in1999, was not installed as indicated on the Marin County approved plans. Field examination of the system layout could not reconcile what was observed with what the approved plans indicated should have been installed. The contractor, City Sewer, needs to be contacted and a site visit arranged to account for this discrepancy. The oyster facilities are directly discharging into a leach pit that is potentially discharging into the Estero.
5. Building permits for various buildings—office, outbuildings, structures adjacent to trailers, retails sales area, etc.—have not been obtained from Marin County Community Development Agency.
6. Design review for new facilities was submitted to Marin County Community Planning Agency. However, the design and environmental compliance review are now expired because building permits were not acquired.

During the inspection, we found additional violations including:

1. Water from shucking room drains directly into Estero. Clear and obvious drainage shows water spilling over edge of concrete foundation into small rivulet that runs approximately 50 feet into the Estero.
2. In one of the outbuildings, located within 60 feet of the Estero, there were two 35-gallon drums, three 5-gallon buckets, several 5-gallon jugs, and miscellaneous other containers filled with what appears to be used oil and/or gasoline. The drums were overflowing onto the earthen floor with no containment. The buckets were without lids. The apparently used oil has been spilled over the outside of these containers, on the wooden flooring, and onto the ground in that portion of the building without flooring. There are also several used oil filters lying among these containers. There are several used auto or marine batteries left in this building.
3. The above-ground fuel storage tank is in an inadequate/marginal containment structure. The storage tank is located in a 2-compartment, single-wall concrete containment structure. The home-made structure is situated against a cut into a rocky hillside. The rocky material is weathering and collecting against and into the containment structure. This is reducing storage volume of the structure. The non-monolithic nature of this concrete structure presents potential for leaking at the cold joints formed between pours. In the second compartment there are two 55-gallon drums filled to overflowing with what appears to be used auto oil. A wooden power pole is installed in the floor of the compartment. This pole penetrates the floor and compromises the structural integrity of the structure.
4. There are many 5-gallon fuel containers located throughout the property. Several old outboard engines are lying on the ground outside. Several old refrigerators are lying around the buildings. In general, the entire property shows a distinct lack of up-keep and no effort at keeping the area clean or cleaning up of material, tools, or items not longer used or useful.
5. A junkyard as defined by MCC, Section 22.02.420 is being operated on the property.
6. Various other health and safety violations were found during the inspection including exposed wiring, improper vents, etc.
7. Buildings have been improved and added (shucking area converted to office) without permission and Marin County and NPS building permits.

Based on the above, the Marin County Superior Court Order requires you to do the following:

Item 12, page 3, Marin County Superior Court No. 165361

> "If any of the operations and structures above have not obtained required building or replacement permits, or if the permit applications are denied, withdrawn or if construction is not completed within 24 months of obtaining the permit then operations shall cease and the structures shall be removed."

Item 12, page 3, Marin County Superior Court No. 165361

> "Any use, operation, or structure for which all required permits have not been obtained within the time deadlines of this agreement shall be immediately terminated and removed from the property. This includes all uses, operations and structures whether they be residential or agricultural."

In addition, according to your reservation of use agreement with the National Park Service, you must comply with the following:

> "The premises reserved by vendor hereunder shall at all times be maintained in a safe, sanitary, and sightly condition, open to reasonable inspection by the Director, and meeting all Federal, State, and County health, sanitation and safety standards applicable to operation of and residence with areas engaged in the process and retail sale of oysters."

For leach field permit #MSC 8530-6000-2011 and water line permit #MSC 8530-6000-2010, your are required to follow the following clauses.

> "Construction of Improvements or Alterations by Permittee shall be performed in accordance with all Applicable Laws and approved design plans and shall be undertaken and completed at Permittee's sole cost and expense."

> "Permittee's use of the Premises shall be in accordance with all of the Provisions contained in this Permit and all Applicable Laws."

In addition, the National Park Service has not received rental and use payments for various permit activities. Therefore, you are in violation of the permit rental payment agreement clause.

Based on the above information, the National Park Service has no choice but to provide you 30 days notice of intent to revoke all special use permits for the Johnson Oyster Facility site and provide notice to you that you are in violation of your use and occupancy agreement.

Finally, we must ensure you realize that you do not have authority or permission to construct any new facilities on the reservation lands or other lands authorized under permits. Regarding any new facilities that were authorized by the completion of the Johnson Oyster Replacement and Rehabilitation Environmental Assessment in 1998, the NPS revokes any authority for construction and replacement activities.

We regret that the situation has come to this conclusion; however, we do have the legal obligation to provide safe facilities for the public and your employees and residents. We strongly believe that we have given you ample time to meet your obligations and have provided you the necessary land for the septic system that was required. As you know, we also spent countless hours preparing the environmental analysis and attended many meeting on these issues.

Sincerely,

Don L. Neubacher
Superintendent

DLNeubacher:9/17/03

L1425
02-106

December 4, 2003

Chris Darnell
California Coastal Commission
45 Fremont, Suite 2000
San Francisco, CA 94105

Re: Cease and Desist Order CCC-03-CD-12 (Johnson Oyster Company)

Dear Mr. Darnell:

We want to express our support of the Cease and Desist Order CCC-03-CD12 at Johnson Oyster Company (JOC) within Point Reyes National Seashore. The JOC is under a Use and Occupancy Agreement with the National Park Service (NPS) that essentially allows use of 1.47 acres for aquaculture facilities until 2012. The Agreement requires JOC to meet all local, state and federal regulations and laws.

Over the course of more than ten years, the National Park Service and the County of Marin have worked with JOC to bring them into compliance with appropriate laws and regulations. Most of this effort has resulted in limited progress. The final result was a Stipulated Order (165361; 1997) from the Superior Court of California for Marin County requiring the JOC to obtain proper permits, build proper septic systems, meet appropriate health and safety codes, and remove illegal structures. Under the Order, permitting by the Coastal Commission was required. If JOC did not meet the conditions of the Order within 24 months, they were required to removal all structures and cease operation. To date, they have not fully completed any of the requirements of the Order.

Therefore, the NPS has written JOC to notify them of the park's intent to cancel all use permits for the premises. We appreciate being able to comment on this issue.

Sincerely,

Don L. Neubacher
Superintendent

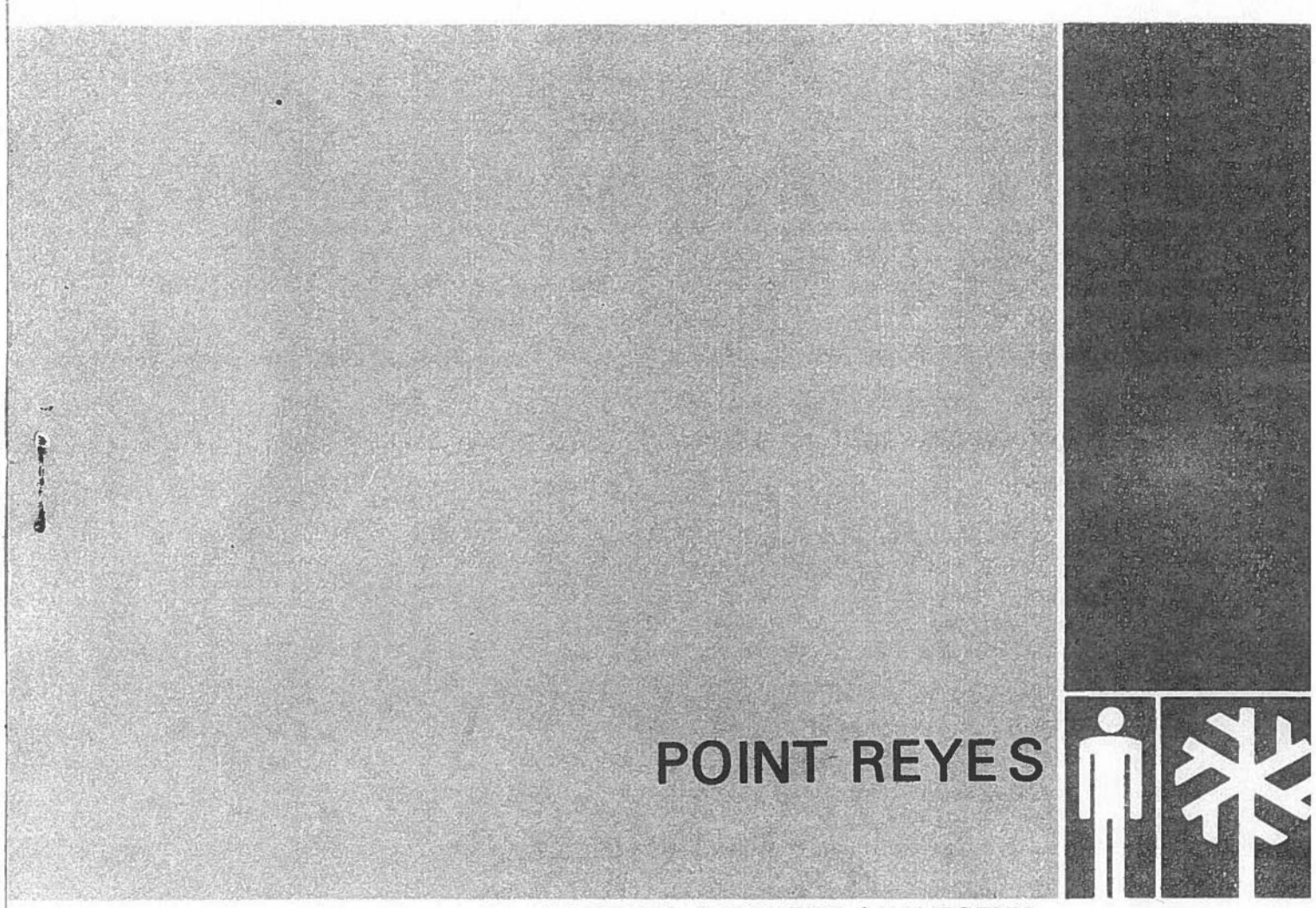
cc:
County Counsel, Marin County

DLNeubacher:an 12/04/03

2007-00607
#1

general management plan

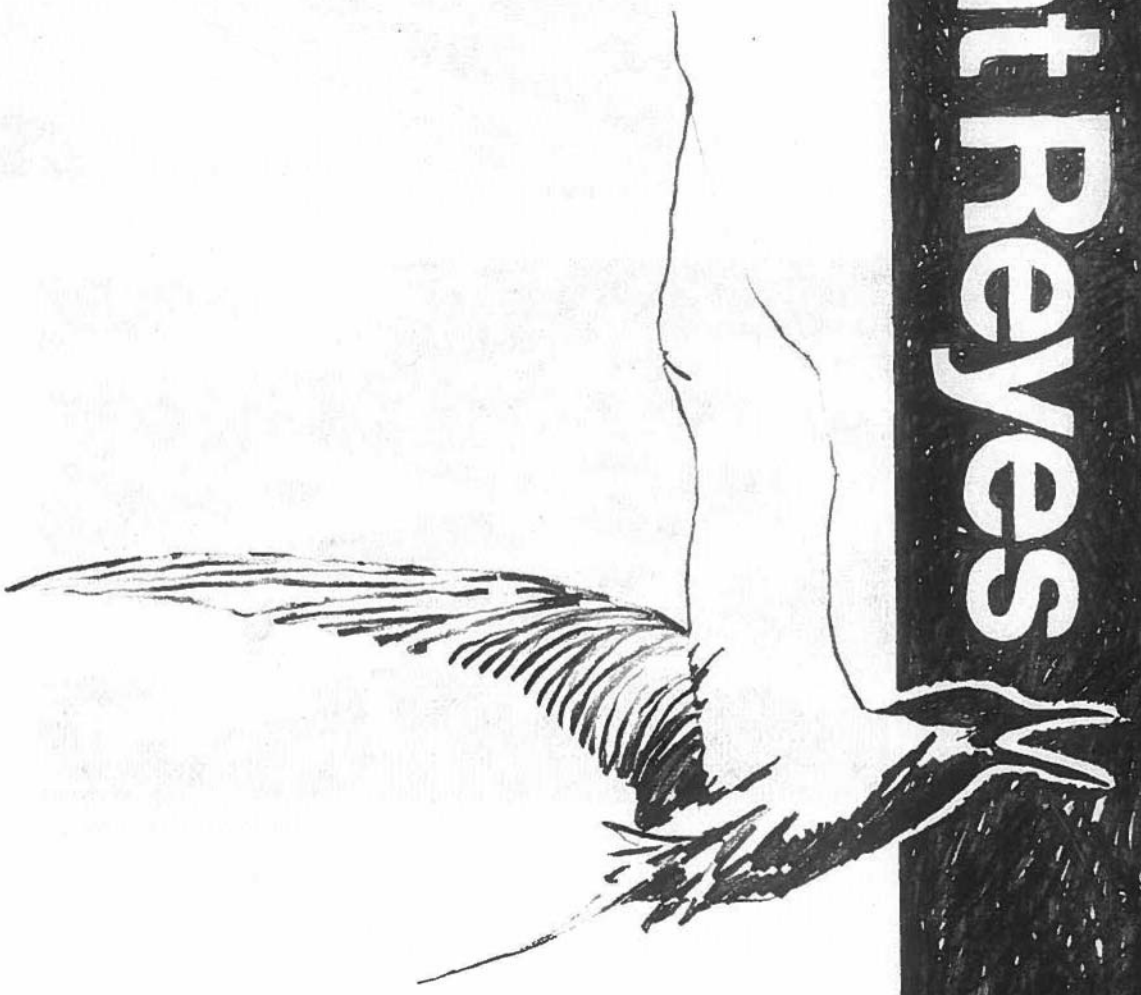
september 1980



POINT REYES

NATIONAL SEASHORE / CALIFORNIA

Point Reyes



POINT REYES NATIONAL SEASHORE / CALIFORNIA

GENERAL MANAGEMENT PLAN

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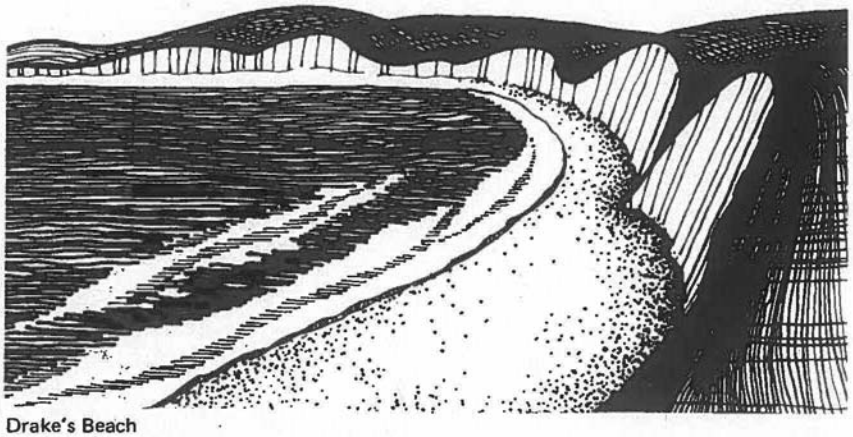

Drake's Beach

Salt Marsh - Drake's Estero

PREFACE

Confronted by the accelerating deterioration of life on earth, perceptive people reach out for benchmarks of natural integrity--places in which to recharge the mind and body, and learn of the things that are vital to the quality of our existence. To such people, the Point Reyes peninsula speaks eloquently of the past, and offers priceless hope for the future. There is no better place for man to contemplate his origins, the factors that sustain him, and the threats that may destroy him, than at the edge of the sea. Its magnetism is expressed in the words of Rachel Carson: "Like the sea itself, the shore fascinates us who return to it, the place of our dim ancestral beginnings. In the recurrent rhythms of tides and surf and in the varied life of the tide lines there is obvious attraction of movement and change and beauty. There is also, I am convinced, a deeper fascination born of inner meaning and significance."

This sense of attraction--whether consciously felt or not--modifies the objectives and responses of all who come to the shore seeking recreation. The resulting activities, though often dissimilar, derive their meaning from the inherent qualities of the land. As early as 1970, annual visitation at Point Reyes exceeded a million, with less than half of its acreage available for public use. Since this is one of the windiest and foggiest spots on the coast, such a visitation figure suggests that this is apparently something more than simply a place to play.

Even without its unusual variety of resources, Point Reyes would loom large in importance when viewed in proper context. In the 1959 survey of the recreation potential of the Pacific Coast, the National Park Service made this recommendation concerning the entire western shoreline: "As much of the seashore as possible should be preserved in its present undeveloped state and there should be no further invasion of coastal wilderness by highways except for incidental access and appropriate minimum development." The coast of California offers spectacular impressions to the automobile-borne traveler. However, nearly 90 percent of the state's shoreline is rimmed with a ribbon of asphalt--California Highway 1. This thoroughfare for many constitutes a permanent dilution of the seashore experience, constantly interrupting the continuity between the mountains and the sea.

Unfortunately, most state parks that include coastal frontage are either hemmed in as tiny enclaves between the highway and the ocean, or are bisected by the pavement. Less than half of the California coastline lies in public ownership, and even this is primarily preserved in isolated patches and strips of land which are

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frequently vulnerable, both aesthetically and ecologically, to surrounding development. In only a few places is there a piece of coastal land large enough and undisturbed enough to convey the full impact and range of seashore experiences that this stimulating environment deserves. Point Reyes is one of a tiny number of such places that are permanently dedicated to the American public.

These attributes are basic to what this coastal remnant means to the people, and are expressed in the opening statement of the enabling legislation, in which Congress proclaimed that the national seashore was being established "in order to save and preserve . . . a portion of the diminishing seashore of the United States that remains undeveloped."

Point Reyes can perhaps be described best as a relict of the aboriginal California coast, serving as a vital and convenient outlet for a people becoming more and more pressured by technology. To many, it represents a last frontier--so near to the urban core, yet remaining unviolated by the symbols of contemporary life. Pristine it is not, for it bears the scars of miles of unsurfaced ranch roads. But these in themselves are anachronistic. The entire peninsula contains few reminders of the urgency of today, and in this condition it serves the present as usefully as any piece of land could. As a sharply contrasting complement to other public places in the San Francisco Bay Area, Point Reyes provides a major contribution to an effectively balanced system of recreational opportunities.

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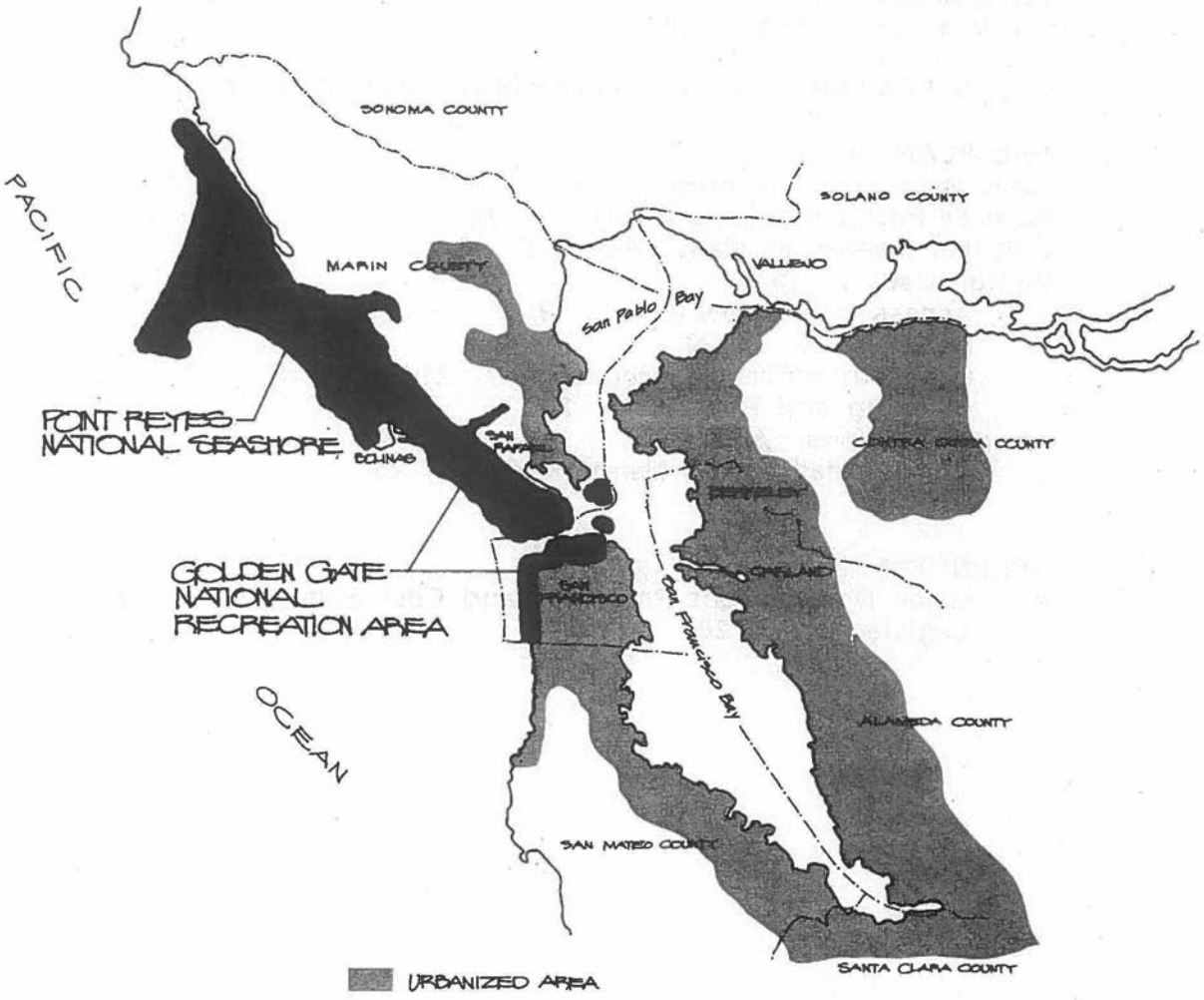

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NOT TO SCALE

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

REGION

POINT REYES NATIONAL SEASHORE

PLANNING CONSIDERATIONS

OVERVIEW

Discovery of Point Reyes by more and more people is both inevitable and desirable. With Golden Gate National Recreation Area now adjoining the national seashore on the south and east, Point Reyes has become the hinterland of an unbroken chain of parks that reaches to the San Francisco waterfront and has tremendous potential to attract Bay Area residents and tourists across the Golden Gate. As the extensive wilderness segment of these parklands, Point Reyes displays the greatest diversity of wildlife and vegetation. Native land mammals there number about 37 species, including the elusive mountain lion and an endemic race of mountain beaver. Marine mammals augment this number by perhaps another dozen species. With 338 recorded species of birds, the seashore ranks as one of the best bird-watching and ornithological research areas in the United States. About 750 plant species are found on the peninsula, a few of which are found nowhere else. Coastline habitats harbor some of the richest and most diverse collections of marine organisms on the Pacific Coast.

This rare juxtaposition of an outstanding natural area with a major metropolitan population presents a special opportunity and responsibility--to convey an environmental message to millions of people by facilitating and interpreting a unique outdoor experience. With perceptive management and sensitive development, the national seashore will continue to sustain a relatively high volume of use. However, the primary objectives for the park must continue to relate to the natural integrity of the seashore, upon which the quality of a Point Reyes experience totally depends.

MANAGEMENT OBJECTIVES

Natural Resource Management

To identify, protect, and perpetuate the diversity of existing ecosystems which are found at Point Reyes National Seashore and are representative of the California seacoast.

To protect marine mammals, threatened and endangered species, and other sensitive natural resources found within the seashore.

To enhance knowledge and expertise of ecosystem management through research and experimental programs relating to wildlife, prescribed burning techniques, exotic plant and animal reduction, regulation and control of resource use, and pollution control.

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To preserve and manage as wilderness those lands so designated under Public Law 94-567 and to also manage as wilderness to the extent possible those tidelands and lands legislatively designated as potential wilderness.

To retain research natural area status for the Estero de Limantour and the Point Reyes Headlands reserves and propose other suitable sites if found highly desirable for research and necessary for resource protection.

To manage seashore activities in the pastoral and estuarine areas in a manner compatible with resource carrying capacity.

To monitor grazing and improve range management practices in the pastoral zone in cooperation with the ranchers and the Soil Conservation Service.

To monitor and improve maricultural operations, in particular the oyster farm operation in Drakes Estero, in cooperation with the California Department of Fish and Game.

To monitor activities occurring on nonfederal properties within the national seashore owned by the Radio Corporation of America, the American Telephone and Telegraph Company, and the Vedanta Society, to ensure that land uses are in agreement with the legislative acquisition exemption.

Cultural Resource Preservation

To identify, protect, and preserve the significant historic and cultural resources of Point Reyes.

To identify features and events that have played a vital part in the recorded history of Point Reyes, such as earthquakes, shipwrecks, land and water uses, the voyage of Sir Francis Drake, and the former U.S. Coast Guard lighthouse and lifeboat station.

To enhance knowledge of the Miwok Indian culture through research and investigation of the numerous archeological sites located at Point Reyes.

To preserve and protect all structures in or nominated to the National Register of Historic Places, and to stabilize and protect other structures and sites pending their historical evaluation.

To monitor and support productive land uses and activities which are consistent with historical patterns.

To ensure that agricultural and maricultural activities are consistent with the historical evolution of land and water use at Point Reyes.

Interpretation

To offer interpretive programs and services which further an awareness and appreciation of the wide diversity of seashore ecosystems and cultural resources, their variety and similarity, their interdependence, and their fragile nature.

To develop programs for interpretation which foster an environmental awareness of the conditions imposed by preservation.

To offer visitor orientation and information programs which furnish a general knowledge of the wide diversity of the seashore and enhance visitor appreciation and knowledge.

To provide opportunities for emphasizing environmental education and programs related to the resource, including the coastal environment.

To continue to interpret the replica Miwok Indian village to further visitor understanding and appreciation of the Miwok Indian heritage.

Visitor Activities

To provide for and permit only those cultural, educational, and recreational activities which are compatible with the preservation of an undeveloped coastline.

Development

To ensure that park development is the minimum necessary for efficient and essential management and that visitor services are consistent with the seashore purposes and compatible with natural resource limitations and the special requirements imposed by the coastal environment.

Access and Circulation

To provide access to and circulation within the seashore which is compatible with other park objectives and considers a full range of alternative means of transportation.

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PUBLIC EXPECTATIONS

Use of Point Reyes is mainly regional and almost entirely concentrated on weekends. Weather is an important factor affecting visitation because many people come to use the beaches. But the scenic drive to Point Reyes is also a part of the area's appeal, and the park has an extensive trail system that is ideal for regional hikers and horsemen. Point Reyes is thought to be an excellent training ground for novice backpackers. Four hike-in campgrounds are available by reservation. Sunbathing, wading, picnicking, fishing, bird watching, canoeing, and bicycling round out the range of activities enjoyed at the park. Interpretive programs are presently somewhat limited by the lack of facilities; and the small information center at park headquarters is often filled.

The coastal wilderness qualities of Point Reyes are well respected, as evidenced by the broad public support responsible for its inclusion in the National Wilderness Preservation System. Visitor responses indicate that people are generally enthusiastic about the kind of experience being offered, but some have expressed the feeling that present provisions for backpack or hike-in camping are inadequate. On summer weekends there are sometimes three times as many requests for camping permits as there are sites. Much illegal camping is due in part to this disparity. In addition to increasing the number of campsites available, some people would like to see a different camping system developed (like primitive camping zones). Other people feel that the natural and historic values of the park are not being adequately explained to provide for maximum enjoyment and appreciation. They have expressed a desire for additional exhibits, programs, and personal services. Another request often heard is for more shuttle service within the park to reduce automobile use. There is also public demand for transit service to the area. When new groups of users (like senior citizens) begin to arrive at the area in greater numbers because of improved transit access, provision of some minor conveniences such as food service facilities near the terminus of bus routes will be necessary.

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MAJOR FEATURES OF THE NATIONAL SEASHORE

Point Reyes is a remnant of California coastal wilderness. Its 67,684 acres provide one of the few pieces of coastal land large enough and undisturbed enough to offer people a seashore experience seemingly untouched by the modern world. About half of Point Reyes has been included in the National Wilderness Preservation System.

The southern area of the park is rugged and densely vegetated and has historically received little human use. Today these qualities contribute to making this area one of the most prized primitive areas on the Pacific Coast. The most notable aspect of the south coast of Point Reyes is the luxuriant forest of Douglas-fir that covers the Inverness Ridge. Inverness Ridge rises to an elevation of more than 1,400 feet at the summit of Mount Wittenburg, a popular hikers' destination. On the lower hills and coastal terraces, the trees give way to chaparral and grasslands which provide a setting for an exquisite collection of small lakes in close proximity to the ocean. Miles of primitive beaches and pocket coves are fringed by steep cliffs and broken by rocky headlands. Bear Valley is the only major break in Inverness Ridge. It provides a gently sloping corridor from the head of Olema Valley to the ocean and is lined with a dense canopy of streamside vegetation predominated by California bay and buckeye. Wildlife is abundant and includes an important and sensitive harbor seal rookery at Double Point Cove, numerous species of birds (more than 300 in the entire seashore), several species of deer (two are exotic), reintroduced native tule elk, and rich concentrations of marine invertebrates.

In contrast with the enclosing canopy of the Douglas-fir forest that dominates the south end of the seashore, the north portion offers a unique panorama of wild, open grasslands. Here the crest of Inverness Ridge is topped with a rare and picturesque forest of Bishop pines, while shrub communities cover much of the seaward lower slopes. The center of the gently sloping expanses of grass is marked by a welcome break in land--the outstretched arms of Drakes and Limantour esteros. These large interconnecting estuaries are among the finest on the Pacific Coast and may represent the most important single natural resource in the entire park. In addition to their scenic value, their mud flats, salt marshes, sandy bottoms, and shallow waters provide habitat for an amazing variety of plants and animals.

Broad sandy beaches of contrasting qualities also characterize Point Reyes. Drakes Beach and the long sandspit protecting Limantour Estero, both facing on Drakes Bay, are graced with a gentle surf

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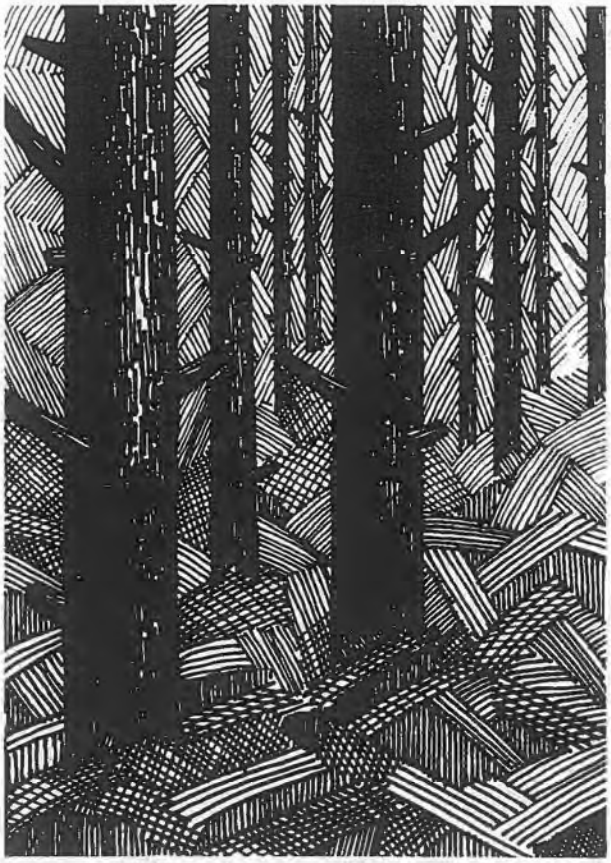

Inverness Ridge - West Slope

which is used for swimming and water play (although water temperatures averaging 50-55 degrees are discouraging). In contrast, the 10-mile-long Point Reyes Beach faces directly into prevailing winds and the full force of the Pacific. Nowhere on the coast is there a more spectacularly violent surf--nor a more dangerous one. The Point Reyes lighthouse and lifeboat station are effective reminders of the part the seashore has played in West Coast maritime activities.

Like a finger indicating the northward extension of the San Andreas Fault, Tomales Point juts seaward, protecting the quiet waters of Tomales Bay. Along its shoreline are more natural treasures--tide pools not yet ravaged by the collector and the curious visitor. In few places can one find such easy access to such abundant marine life. An equally rich concentration of marine organisms can be found at Point Reyes itself, but its high, steep, and rugged cliffs render them inaccessible. Both locations accommodate populations of the Stellar sea lion.

Throughout the last half of the 19th century and the first half of the 20th century Point Reyes was well known for its productive dairy ranches. Although the establishment of the seashore and changes within the dairy industry have resulted in a reduction of agricultural activity at Point Reyes, Congress clearly intended that the ranches continue to operate. A pastoral zone of approximately 15,000 acres has been established within the park in which dairy and beef cattle are allowed to graze under permit or lease from the National Park Service.

A commercial oyster farm operates out of a small facility, located a short distance off Drake Highway, where the shellfish are also offered for sale.

Recreational use of the northern portions of the seashore focuses primarily on the beaches, and includes such activities as beachcombing, hiking, picnicking, fishing, informal sports, wildlife viewing, "surf-watching," and a limited amount of swimming. Paved access roads, parking lots, and rest room facilities can be found at two points on the Point Reyes beach and at Drakes and McClures beaches. Change rooms, a small interpretive facility, and a snack bar are also provided at Drakes Beach.

Recreational use of the southern portions has not been exceptionally diverse, but it has been relatively intensive. Hiking, backpack camping, picnicking, horseback riding, fishing, and beach use at Limantour are the most popular activities that it accommodates. Many miles of unsurfaced ranch roads provide the trail system. Bear Valley contains one of the most popular trails in the Bay Area, attracting a wide variety of users. Three 12-site backcountry campgrounds and a group camp, offering a total capacity of 408 people, exist within the park. The Clem Miller

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Environmental Education Center is located at the north end near the Limantour Road and is used by local school districts for the implementation of their own programs. A small American Youth Hostel facility developed in some existing ranch buildings is located in the same area. Major entry points to the area are represented by Limantour Road and three trailheads--Bear Valley, Five Brooks, and Palomarin. Bear Valley is the major hikers' entrance and contains a visitor contact facility, the park headquarters and maintenance facilities, the Morgan horse ranch, and a replica of a Coast Miwok Indian village. Most of the development is contained in old ranch structures. The Limantour Road furnishes access to the youth hostel and the Clem Miller Environmental Education Center as well as Limantour Beach. The Five Brooks trailhead provides the most popular entrance to Point Reyes for horseback riders. Increasing numbers of hikers are also entering from this trailhead. The Palomarin trailhead at the extreme southern end of the park provides the shortest and most direct access to the Lake Ranch area and is accessible over Mesa Road through Bolinas. All three trailheads offer unsurfaced parking areas.

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THE PLAN

LAND MANAGEMENT ZONING

The following zone designations represent a composite picture of how the park will be managed and developed in the future based on its resource values, management objectives, and public expectations.

Natural Zone--41,867.95 Acres

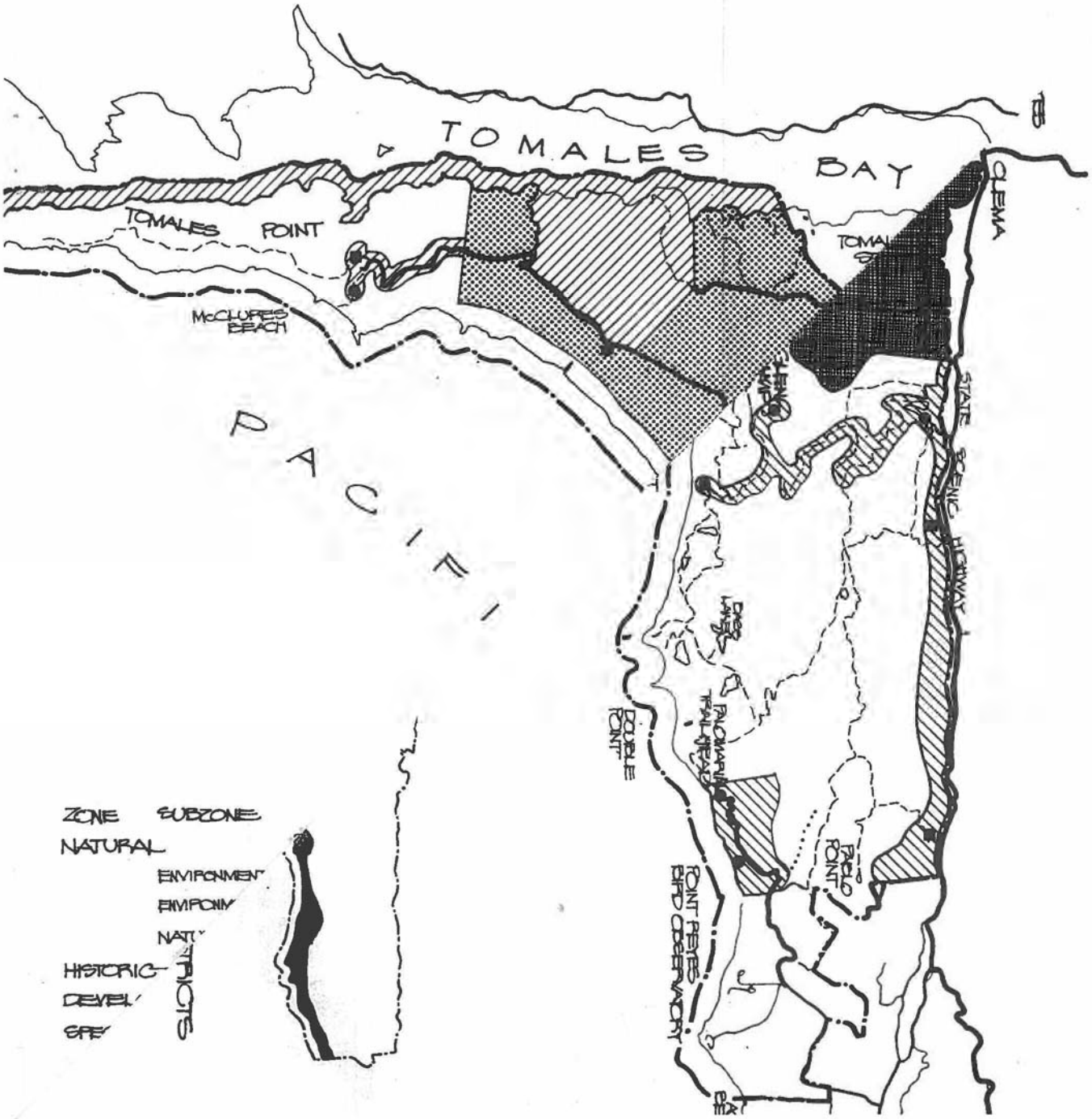
Environmental Protection Subzone--Reserves (1,300 acres). This subzone consists of two marine life reserves, the Point Reyes Headlands Reserve and the Estero de Limantour Reserve, established in January 1972 by the California Department of Fish and Game Commission to "preserve these land and water areas in a natural condition, and to protect the aquatic organisms and wildlife found thereon for public observation and scientific study." Management of the headlands reserve allows no human intrusion except that associated with approved research projects, and the estero reserve protects all lifeforms from removal or disturbance without state and federal collecting permits.

Environmental Protection Subzone--Wilderness (32,730 acres). Over one-half of the seashore has been legislatively designated as wilderness (24,200 acres) or potential wilderness (8,530 acres) by Public Law 94-567, signed on October 20, 1976. These lands are managed in accordance with the mandates of the Wilderness Act (78 Stat. 890). The designated potential wilderness consists of most of the quarter-mile offshore strip and other wetlands over which the state of California has retained some rights, and a strip still being used as a ranch access road. The two reserves described above are also designated wilderness, but are not included in the total acreage for this subzone.

Natural Environment Subzone (7,837.95 acres). These lands are managed to maintain their natural appearance while allowing compatible visitor use and providing a transition between man-made intrusions, such as roads and other developments, and the designated wilderness. Also included in this subzone are 3,413 acres of wetlands not designated as potential wilderness.

Historic Zone--157 acres

The following buildings or groups of buildings appear on the list of classified structures: Point Reyes lighthouse complex, Olema lime kilns, Point Reyes lifeboat station, Texeira Ranch complex, Home


TOMALES BAY
TOMALES POINT
McCLURES BEACH
PACIFIC
DOUBLE POINT
POINT REYES BIRD OBSERVATORY
PALOMARIN TRAILHEAD
STATE SCENIC HIGHWAY
ZONE
SUBZONE
NATURAL
ENVIRONMENT
HISTORIC
DEVELOPED

Ranch complex, Pierce Point Ranch complex, and the Drake Monument. These resources are managed to preserve the historic remains and to allow visitor access where such access is not adversely affecting those remains.

A total of 95 archeological sites have been recorded within the national seashore. Five archeological districts have been designated. These districts encompass 74 individual sites of which 15 possess more than local significance. The 2,950 acres contained within these districts are all included within the totals shown for other zones, as management of the districts is generally in accord with the zone in which they are found unless proximity to visitor use areas requires specific preservation measures.

The historic properties shown have been included on the list of classified structures and have been or are in process of being nominated for inclusion on the National Register of Historic Places. The archeological districts are already nominated to the National Register and are currently undergoing review. These areas will be managed as National Register properties until final determination has been made.

Development Zone--85 acres

This classification includes all areas of development ranging in size and complexity from that at Bear Valley headquarters to trailhead parking for 10 cars. This zone is managed to provide essential visitor service and administrative facilities. Areas of heavy visitor concentration are shown with a larger circle on the map. In addition to Bear Valley these include the four areas where parking is available adjacent to beaches at North Beach, South Beach, Drakes Beach, and Limantour. Relatively minor developments include ten trailhead parking areas of from 10 to 100 cars, the American Youth Hostel, the Clem Miller Environmental Education Center, the Point Reyes Bird Observatory, backcountry campgrounds, the lighthouse, and the lifeboat station.

Special Use Zone--23,271.2 acres

These lands include those over which the National Park Service does not have complete jurisdiction, or upon which activities are permitted other than preservation and visitor use. Four subzones have been shown in this category.

Pastoral Lands (19,854.23 acres). This subzone was established to permit the continued use of existing ranchlands for ranching and dairying purposes, although owned by the United States. The permits, which run until 1990, and in two cases until 2000, restrict

the use of the lands to traditional ranching only. Trails for public use may be established over these lands provided they do not materially interfere with ranching activities. The concept of these pastoral lands has the support of the public and many organizations and groups, and it is probable that this use will continue indefinitely.

Radio Range Station (4 acres). This small area on Point Reyes Hill is leased to the Federal Aviation Adminstration and houses a directional signal station which guides planes to the San Francisco Airport. It was in existence at the time the national seashore was established.

Oyster Farm (5 acres). This property on the upper end of Drakes Estero is under a reservation of possession. The company has a lease which runs until the year 2015 from the California Department of Fish and Game for oyster culture in the estero.

Lands Not to Be Acquired (3,407.97 acres). This classification includes four ownerships excluded from acquisition although they are within the boundary. These are the American Telephone and Telegraph, the Radio Corporation of America, and the United States Coast Guard communication facilities located near North Beach, totaling 804.22 acres, and the Vedanta Society property near Bear Valley, totaling 2,144.98 acres. The exclusions are subject to removal if other than the present use is made of the properties. Other minor exclusions are as follows: U.S. Coast Guard automated lighthouse and U.S. Coast Guard communications stations, totaling 334.87 acres; Pacific Telephone, 2.83 acres; North Marin Water District, 1.06 acres; Inverness Water Company, 6.71 acres; County of Marin, 17.22 acres; and the Bolinas Community Public Utilities District, 96.08 acres.

Lands to Be Acquired--2,303.06 acres.

These lands were added by the National Parks and Recreation Act of 1978. When acquired, the lands will be added to the special use zone and the natural zone. The total acreage for the national seashore is now 67,684.21 acres.

NATURAL RESOURCES MANAGEMENT

Management strategies for perpetuating the biotic diversity and scenic quality of the park are contained in a separate natural resource management plan, which was approved in 1976.

As reflected in the land management zones, most of the national seashore is either legally designated as wilderness or is under lease

or permit for grazing purposes in accordance with its enabling legislation. Within the legal and administrative constraints imposed by these two designations, the unusual variety of scenic qualities and biotic communities that make the seashore attractive to scientists as well as recreationists will be aggressively maintained. Although the majority of the seashore is generally viewed as a wild area where natural processes are allowed to predominate, manipulation of those processes through methods such as selective thinning, burning, and mowing will be cautiously pursued when necessary to protect its scenic, ecological, and recreational values. Restoration of historic natural conditions (such as reestablishment of Tule elk) will continue to be implemented when such actions will not seriously diminish scenic and recreational values.

CULTURAL RESOURCES MANAGEMENT

Description of Resources

At Point Reyes, the complete story of northern California Indians is represented--from prehistory through European contact to recent times. For many centuries, the Coast Miwok Indians occupied this land; archeological evidence indicates that by A.D. 1500 the peninsula supported a greater population of people than today. Locked in the archeological sites of the Point Reyes peninsula lies the story of 350 years of European contact with native Californians--a contact that eventually displaced the Indian way of life. Five archeological districts containing a total of approximately 65 significant sites have been nominated to the National Register of Historic Places. These districts are Tomales Point, Headlands, Double Point Coast, Drakes Estero, and Bear Valley.

The attraction of Point Reyes to European explorers is also an important part of the area's history. Francis Drake, the English seaman, may have repaired his vessel the Golden Hinde here in 1579 at what is now known as Drakes Estero. Although Drake claimed the peninsula for England, the Spanish made the same proclamation 17 years later and gave it the name Punta de los Reyes. Pacific coast explorers continued to visit Point Reyes, and during the 19th century the area was familiar to traders, whalers, and fur hunters of the United States, Great Britain, and Russia.

The shipping trade along the coast resulted in frequent shipwrecks--56 of them from 1841 to 1934, perhaps fewer in number due to the Point Reyes lighthouse and the Point Reyes lifeboat station. The Point Reyes lighthouse (1870-1975, 9 structures), which includes the site of a weather bureau station, and the lifeboat station (1927-1969, 6 structures) have been nominated to the National Register as facilities that represent the rugged navigational history of this coastline, particularly treacherous due to harsh climate and currents.

Throughout the last half of the 19th century and first half of the 20th century, Point Reyes was well known for its productive dairy ranches. Butter and cheese products were loaded on schooners from wharves in Tomales Bay and the estero for shipment to San Francisco. Home Ranch (16 structures) and Upper Pierce Point Ranch (20 structures), begun in the 1860s, represent the peninsula's initial growth into a dairying center and appear to be eligible for inclusion in the National Register.

Another food industry servicing San Francisco from Point Reyes was commercial fishing. Since about 1919 Drakes Bay served as a base where fish were received and cleaned from as many as 40 to 60 boats daily.

Proposed Management Strategies

All sites, objects, and structures of historic or architectural significance will be maintained and preserved. No removal of historic structures is envisioned. Specific management strategies are listed in the following table.

Adaptive restoration for park use is proposed for many of the historic ranch structures and several structures at the lighthouse. This will involve modifications to meet basic life safety codes, structural standards, and handicapped access. Every attempt will be made to design changes to avoid effects on the quality and character that qualifies the property for the National Register and to design changes to be reversible in nature.

PROPOSED MANAGEMENT OF HISTORIC STRUCTURES

Area	Structure No.	Name	P	AR	R	National Register
Point Reyes						
	PR-12	Lighthouse stairway & cable track	X			2
	PR-14	Lighthouse lower water shed and cistern	X			2
	PR-16	Lighthouse powerhouse	X			2
	PR-17	Lighthouse multipurpose garage bldg.	X			2
	PR-19	Lighthouse water shed & cistern	X			2
	PR-21	Lighthouse original pumphouse	X			2
	PR-22	Lighthouse pumphouse	X			2
	PR-25	Lighthouse			X	2
	PR-110	Olema lime kilns	X			1
	PR-116	Lifeboat station water tank	X			2
	PR-117	Lifeboat station water tank	X			2
	PR-118	Lifeboat station garage		X		3
	PR-119	Lifeboat station pumphouse	X			2
	PR-120	Lifeboat station stone-faced wall	X			2
	PR-121	Lifeboat station water tank	X			2
	PR-122	Lifeboat station water tank	X			2
	PR-123	Lifeboat station fire pumphouse	X			2
	PR-124	Lifeboat station rock wall	X			2
	PR-125	Lifeboat station & dock		X		2
	PR-126	Three-stall garage		X		2
	PR-159	Lifeboat station qtrs.		X		2

P-preservation
AR-adaptive restoration
R-restoration
1-on register
2-nominated to register
3- being nominated

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Area	Structure No.	Name	P	AR	R	National Register
	PR-180	Pierce Ranch house		X		3
	PR-181	Pierce Ranch washroom		X		3
	PR-182	Pierce Ranch north bunkhouse		X		3
	PR-183	Pierce Ranch schoolhouse		X		3
	PR-184	Pierce Ranch outhouse	X			3
	PR-185	Pierce Ranch open-front shed	X			3
	PR-186	Pierce Ranch west bunkhouse		X		3
	PR-187	Pierce Ranch west garage		X		3
	PR-188	Pierce Ranch calf shed		X		3
	PR-189	Pierce Ranch hay barn		X		3
	PR-190	Pierce Ranch new dairy house		X		3
	PR-191	Pierce Ranch old horse barn		X		
	PR-192	Pierce Ranch old garage		X		3
	PR-193	Pierce Ranch old wagon shed		X		3
	PR-194	Pierce Ranch chicken house A	X			3
	PR-195	Pierce Ranch chicken house B	X			3
	PR-196	Pierce Ranch old creamery	X			3
	PR-197	Pierce Ranch garage		X		3
	PR-198	Pierce Ranch corral fences	X			3
	PR-199	Pierce Ranch tank house	X			3
	PR-200	Pierce Ranch lath house	X			3
	PR-201	Pierce Ranch road to Tomales Bay	X			3
	PR-202	Pierce Ranch road to Lower Ranch	X			3
	PR-203	Pierce Ranch entrance road	X			3
	PR-204	Pierce Ranch cattle guard	X			3
	PR-226	Texeira Ranch house		X		2
	PR-227	Texeira Ranch loafing barn		X		2
	PR-228	Texeira Ranch barn		X		2
	PR-240	Lifesaving station (Great Beach) compass station	X			3
	PR-241	Lifesaving station lookout station	X			3

Area	Structure No.	Name	P	AR	R	National Register
	PR-242	Lifesaving station storage bldg.	X			3
	PR-243	Lifesaving station old pumphouse	X			3
	PR-244	Lifesaving station small shed	X			3
	PR-251	Home Ranch house		X		3
	PR-252	Home Ranch barn & silo		X		3
	PR-253	Home Ranch storage shed		X		3
	PR-254	Home Ranch pig shed	X			3
	PR-255	Home Ranch freezer shed	X			3
	PR-256	Home Ranch residence		X		3
	PR-257	Home Ranch shop		X		3
	PR-258	Home Ranch hopital barn		X		3
	PR-259	Home Ranch heifer barn		X		3
	PR-260	Home Ranch old hog shed & storage shed	X			3
	PR-261	Home Ranch water tank	X			3
	PR-262	Home Ranch storage shed		X		3
	PR-263	Home Ranch garage		X		3
	PR-264	Home Ranch pumphouse	X			3
	PR-265	Home Ranch granary	X			3
	PR-266	Home Ranch horse barn		X		3
	PR-267	Home Ranch road	X			3

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Hikers on the Bear Valley Trail

VISITOR USE

Visitor use of the park will be facilitated by improving access, expanding services at the Bear Valley center, providing new interpretive programs, and adding three new campgrounds. Visitor use levels are projected to increase by about 50 percent--from a high of approximately 17,000 to a high of approximately 25,000 people a day on pleasant summer weekends.

Access Improvements

People traveling to Point Reyes can often enjoy a pleasant and scenic trip. But at times when the weather is good, a trip from San Francisco to Point Reyes can double in time and involve traveling through four areas of traffic congestion. Transportation issues are critical, for their resolution will affect how successfully the park provides an enjoyable recreational experience for a diverse group of people. Unless action is taken, expected visitation increases will result in too many people coming to the park by car. More auto traffic will contribute to more congestion, more impacts on adjacent communities, and more frustration for people traveling to the park. Unfortunately, time will not make transportation problems disappear; it will only make them more apparent. Meanwhile, for those without automobiles, a sizable population in the Bay Area, the park will remain largely inaccessible.

This section outlines the transportation proposals that the National Park Service feels merit the most consideration--by itself and by other agencies. The aim of these proposals is to alleviate existing problems and minimize potential ones in the interest of making park access as pleasant, safe, and convenient as possible.

The National Park Service and other agencies with influence over park-related transportation will work cooperatively to improve transit service to the park. A key link may be a bus route connection between Bear Valley and the Larkspur ferry terminal. This will tie the park into a public transportation network that includes bus and ferry service to San Francisco. If demand warrants, it may also be possible to initiate "recreation specials" (expanded service by public carriers or charter companies to allow point-to-point travel between specific neighborhoods and the park).

From Bear Valley, in-park shuttle buses will provide access to the Point Reyes lighthouse, Drakes Beach, Limantour, Five Brooks, and Palomarin. Limited shuttle service is now provided between Bear Valley and Limantour on weekends during the summer and between Drakes Beach and the lighthouse during the December-March whale-watching season.

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With these improvements, visitors using transit are expected to increase from 3 percent to 10 percent of all park visitors.

Up to 500 additional formal parking spaces will be provided in the park if it is demonstrated that they are needed. They will be grassy or graveled areas rather than asphalt to allow for relocation or removal as appropriate and to create a more aesthetic appearance when they are not being fully utilized. With 500 additional spaces, the parking capacity of the park would total 2,595 vehicles.

Bear Valley

To the many wilderness travelers and beach-goers who frequent Point Reyes National Seashore, Bear Valley may only be a functional spot--a place to park for a hike in the forests of Inverness Ridge, a place to catch the shuttle bus to Limantour Beach, a restroom stop on the way to Drakes Beach, or a place to buy a needed map or book. But to those who may not have the time or the ability to fully explore the seashore's expanses (like the out-of-towner passing by), Bear Valley may be the highlight of his or her visit.

The rich blend of rural and natural scenery in this area is already supplemented by fine interpretive facilities such as the Morgan horse ranch, the Miwok Indian village, the Woodpecker Trail, and the Earthquake Trail. Nevertheless, some expansion of interpretive programs is in order, particularly to help first-time visitors.

The public's expressed desire is that onsite interpretive facilities should be kept to a minimum throughout the park. Therefore, instead of providing major informational services onsite, programs and exhibits will be expanded at the Bear Valley information center.

A new information center will be developed to offer improved personal information services, an audiovisual introduction to the seashore, an easily grasped geographic orientation to activities and scenery, and additional publications such as maps, books, and pamphlets. The new structure will be modest in size and appropriate to the rurual setting in appearance. Its location should provide a degree of isolation from administrative and maintenance areas, which are now a very visible aspect of Bear Valley.

Other minor actions that will significantly increase visitor convenience in this location include the conversion of pit toilets to flush toilets at the heavily used trailhead, expansion of the small picnic area near the trailhead parking lot, and provision of enough food service to satisfy the minimal needs of transit dependent visitors who may reach this distant point by bus without having thought to bring their lunch.

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Other Interpretive Programs

In addition to expanded interpretive programs at Bear Valley, exhibits will be expanded at the Drakes Beach center, and special tours and programs may be conducted at both the Pierce Point Ranch and the lifeboat station. Most new exterior signing and wayside exhibits at the seashore will be for necessary resource and visitor protection purposes.

Hostels and Campgrounds

A second hostel is proposed as an adaptive use of one or several of the historic structures along Highway 1. Because all of the structures that might be adapted as a hostel are still leased and occupied by their former owners, only a general hostel location is indicated on the General Development map. Both the proposed hostel and the existing hostel at Laguna Ranch are intended to provide low-cost overnight accommodations for hikers and cyclists of all ages, but car-driving visitors will not be turned away.

Despite the sizable unmet demand for all types of camping facilities in the region, environmental and aesthetic constraints seriously limit the ability of the National Park Service to significantly alleviate the shortage. Campgrounds are proposed, not as a convenience for people passing through the park, but because the activity of camping is considered an important aspect of a park experience here. Thus, the location, size, and number of campgrounds proposed in this plan reflect a concern for the quality of the camping experience rather than an attempt to satisfy the demand for camping facilities--which probably could never be satisfied at any rate.

New 15-site hike-in campgrounds at Home Ranch and Muddy Hollow Ranch are intended for use by backpack campers and will be accessible only by trail. Both camps will be equipped with sanitary facilities and trash receptacles. The proposed boat-in camp at Marshall Beach will have similar facilities to the hike-in camps. A walk-in campground is also proposed in the vicinity of Five Brooks. Because many people and organizations have expressed a serious concern for increased use in the Olema Valley, facilities in this area should be developed with great caution only after the complete development of similar facilities in other areas of the park. Conservation organizations, county planners, and local people should be directly involved in the specific siting and design of this facility. The most important aspect of the proposal is its character and location. All camps will be used on a permit/reservation basis. No open fires will be permitted except on the beaches.

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The idea of establishing primitive camping zones at Point Reyes, where backpackers would be permitted to camp in generally specified areas with no provision of sanitary facilities, was strongly advocated by most workshop and public meeting participants. However, park management and some organizations are concerned about the potential for fire hazard and water pollution. After the proposals for conventional campgrounds have been implemented, a special study will fully analyze the feasibility of zone camping. The study will focus primarily on the success or failure of zone camping in other park and wilderness settings, with comparative interpretations developed for Point Reyes's unique combination of conditions (climate, accessibility, terrain, resource sensitivities, etc.). If the study results are positive, an experimental zone camping program, including regular monitoring and evaluation, will be instituted based on study recommendations. The success of such an experiment and subsequent establishment of primitive zones could require the elimination of some conventional campgrounds.

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GENERAL DEVELOPMENT

POINT REYES NATIONAL SEASHORE

SUMMARY OF VISITOR USE FACILITIES

Existing	Proposed
Hiking-riding trails (146 miles) Hiking trails (146 miles) Riding trails (119 miles)	Hiking trails (100 miles) Riding trails (46 miles)
Parking (2,095 spaces)	Parking (2,595 spaces)
Bear Valley visitor center--interpretation, information, comfort station, picnic area, Morgan horse ranch, trailhead, Miwok Village, self-guiding trails	Bear Valley visitor center--expanded interpretive activities, improved comfort stations, food service, picnic area, Morgan horse ranch, trailhead, Miwok Village, self-guiding trails
Drakes Beach information center	Drakes Beach information center--exhibits expanded
Tours and exhibits at lighthouse	Tours and exhibits at lighthouse
	Tours and programs at Pierce Point Ranch
	Tours and programs at lifesaving station
Beach access at North Beach, South Beach, Drakes Beach, Limantour	Beach access at North Beach, South Beach, Drakes Beach, Limantour
Environmental education center along Limantour Road	Environmental education center along Limantour Road
Hostel at Laguna Ranch	Hostel at Laguna Ranch
	Hostel along Highway 1
Mount Vision overlook	Mount Vision overlook
Johnson's Oyster Farm	Johnson's Oyster Farm
Sky hike-in camp	Sky hike-in camp

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Existing	Proposed
Glen hike-in camp	Glen hike-in camp
Coast hike-in camp	Coast hike-in camp
Wildcat group camp	Wildcat group camp
	Home Ranch hike-in camp
	Muddy Hollw Ranch hike-in camp
	Marshall Beach boat-in camp
Palomarin trailhead	Palomarin trailhead
Five Brooks trailhead--public stables, picnic area	Five Brooks trailhead--public stables, picnic area walk-in campground

PARK OPERATIONS

Administration and Maintenance

Under the terms of a current administrative agreement, the superintendent of Point Reyes, who has management authority over the national seashore, also has operational authority over the Olema Valley portion of GGNRA north of the Bolinas-Fairfax Road. As long as this agreement is in effect, the headquarters in Bear Valley will continue to be the center of operations for Olema Valley as well as the seashore. The superintendent of GGNRA, based at headquarters facilities at Fort Mason, has administrative supervision over all National Park Service lands south of the Bolinas-Fairfax Road.

As supplements to the Bear Valley center, the following existing ranger stations and maintenance substations will continue in operation:

Hagmaier Ranch
Tomales
Drakes Beach
Point Reyes lighthouse

Fire-fighting and search-and-rescue equipment will be maintained at all these locations.

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Utilities

The National Park Service will adhere to all applicable provisions of Executive Order 11752 for the prevention, control, and abatement of environmental pollution for all facilities under its jurisdiction. This includes adequate sewage collection and disposal, solid waste collection and disposal, and protection of the quality of waters within, or flowing through, the area.

With expansion of the Bear Valley center, the existing sewer system in that area will also be expanded. The existing water system is adequate to meet projected demands.

The feasibility of developing groundwater or surface-water sources of domestic water for proposed campgrounds will be explored; if water is not available, the camps will be operated as dry camps.

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APPENDIX A: MAJOR DEVELOPMENT PRIORITIES AND COST SUMMARY

The following list represents the major development priorities for the park. The numerical ranking of the projects is based on a number of considerations including legislative mandates to preserve cultural and natural resources as well as the responsibility to deliver safe recreation opportunities to the public.

1.	BEAR VALLEY new visitor information center	$1,500,000
2.	LIMANTOUR repair/rehabilitation of utilities, roads, parking area, and visitor facilities	$2,700,000
3.	LIGHTHOUSE historic preservation and rehabilitation of visitor facilities	$ 401,000
4.	PARK ROAD SYSTEMS repair and rehabilitation of roadways and improved trailhead facilities	$6,580,000
5.	MISC. INTERPRETIVE IMPROVEMENTS	$ 270,000
6.	LIFEBOAT STATION historic preservation and adaptation for public use	$1,137,000
7.	PIERCE POINT RANCH historic preservation and adaptation for public use	$1,460,000
8.	BACKCOUNTRY CAMPGROUNDS construct three new camps and rehabilitate existing facilities	$ 505,000
9.	TOMALES BAY boat dock and ranger station	$ 235,000
10.	BEAR VALLEY administrative and maintenance facilities	$3,270,000

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Public Law 87-657
87th Congress, S. 476
September 13, 1962

An Act

76 STAT. 538.

To establish the Point Reyes National Seashore in the State of California, and for other purposes.

California. Point Reyes National Seashore. Establishment.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to save and preserve, for purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped, the Secretary of the Interior (hereinafter referred to as the "Secretary") is hereby authorized to take appropriate action in the public interest toward the establishment of the national seashore set forth in section 2 of this Act.

SEC. 2. (a) The area comprising that portion of the land and waters located on Point Reyes Peninsula, Marin County, California, which shall be known as the Point Reyes National Seashore, is described as follows by reference to that certain boundary map, designated NS–PR–7001, dated June 1, 1960, on file with the Director, National Park Service, Washington, District of Columbia.

Beginning at a point, not monumented, where the boundary line common to Rancho Punta de los Reyes (Sobrante) and Rancho Las Baulines meets the average high tide line of the Pacific Ocean as shown on said boundary map;

Thence southwesterly from said point 1,320 feet offshore on a prolongation of said boundary line common to Rancho Punta de los Reyes (Sobrante) and Rancho Las Baulines;

Thence in a northerly and westerly direction paralleling the average high tide line of the shore of the Pacific Ocean; along Drakes Bay, and around Point Reyes;

Thence generally northerly and around Tomales Point, offshore a distance of 1,320 feet from average high tide line;

Thence southeasterly along a line 1,320 feet offshore and parallel to the average high tide line along the west shore of Bodega Bay and Tomales Bay to the intersection of this line with a prolongation of the most northerly tangent of the boundary of Tomales Bay State Park;

Thence south 54 degrees 32 minutes west 1,320 feet along the prolongation of said tangent of Tomales Bay State Park boundary to the average high tide line on the shore of Tomales Bay;

Thence following the boundary of Tomales Bay State Park in a southerly direction to a point lying 105.4 feet north 41 degrees east of an unimproved road heading westerly and northerly from Pierce Point Road;

Thence south 41 degrees west 105.4 feet to a point on the north right-of-way of said unimproved road;

Thence southeasterly along the north right-of-way of said unimproved road and Pierce Point Road to a point at the southwest corner of Tomales Bay State Park at the junction of the Pierce Point Road and Sir Francis Drake Boulevard;

Thence due south to a point on the south right-of-way of said Sir Francis Drake Boulevard;

Thence southeasterly along said south right-of-way approximately 3,100 feet to a point;

Thence approximately south 19 degrees west approximately 300 feet;

Thence south approximately 400 feet;

Thence southwest to the most northerly corner of the Inverness watershed area;

Thence southerly and easterly along the west property line of the Inverness watershed area approximately 9,040 feet to a point near the

intersection of this property line with an unimproved road as shown on said boundary map;

Thence southerly along existing property lines that roughly follow said unimproved road to its intersection with Drakes Summit Road and to a point on the north right-of-way of Drakes Summit Road;

Thence easterly approximately 1,000 feet along the north right-of-way of said Drakes Summit Road to a point which is a property line corner at the intersection with an unimproved road to the south;

Thence southerly and easterly and then northerly, as shown approximately on said boundary map, along existing property lines to a point on the south right-of-way of the Bear Valley Road, approximately 1,500 feet southeast of its intersection with Sir Francis Drake Boulevard;

Thence easterly and southerly along said south right-of-way of Bear Valley Road to a point on a property line approximately 1,000 feet west of the intersection of Bear Valley Road and Sir Francis Drake Boulevard in the village of Olema;

Thence south approximately 1,700 feet to the northwest corner of property now owned by Helen U. and Mary S. Shafter;

Thence southwest and southeast along the west boundary of said Shafter property to the southwest corner of said Shafter property:

Thence approximately south 30 degrees east on a course approximately 1,700 feet to a point;

Thence approximately south 10 degrees east on a course to the centerline of Olema Creek;

Thence generally southeasterly up the centerline of Olema Creek to a point on the west right-of-way line of State Route Numbered 1;

Thence southeasterly along westerly right-of-way line to State Highway Numbered 1 to a point where a prolongation of the boundary line common to Rancho Punta de los Reyes (Sobrante) and Rancho Las Baulines would intersect right-of-way line of State Highway Numbered 1;

Thence southwesterly to and along said south boundary line of Rancho Punta de los Reyes (Sobrante) approximately 2,900 feet to a property corner;

Thence approximately south 38 degrees east approximately 1,500 feet to the centerline of Pine Gulch Creek;

Thence down the centerline of Pine Gulch Creek approximately 400 feet to the intersection with a side creek flowing from the west;

Thence up said side creek to its intersection with said south boundary line of Rancho Punta de los Reyes (Sobrante);

Thence southwest along said south boundary line of Rancho Punta de los Reyes to the point of beginning, containing approximately 53,000 acres. Notwithstanding the foregoing description, the Secretary is authorized to include within the Point Reyes National Seashore the entire tract of land owned by the Vedanta Society of Northern California west of the centerline of Olema Creek, in order to avoid a severance of said tract.

(b) The area referred to in subsection (a) shall include also a right-of-way, to be selected by the Secretary, of not more than 400 feet in width to the aforesaid tract from the intersection of Sir Francis Drake Boulevard and Haggerty Gulch.

SEC. 3. (a) Except as provided in section 4, the Secretary is authorized to acquire, and it is the intent of Congress that he shall acquire as rapidly as appropriated funds become available for this purpose or as such acquisition can be accomplished by donation or with donated funds or by transfer, exchange, or otherwise the lands, waters, and other property, and improvements thereon and any interest therein, within the areas described in section 2 of this Act or which lie within

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the boundaries of the seashore as established under section 5 of this Act (hereinafter referred to as "such area"). Any property, or interest therein, owned by a State or political subdivision thereof may be acquired only with the concurrence of such owner. Notwithstanding any other provision of law, any Federal property located within such area may, with the concurrence of the agency having custody thereof, be transferred without consideration to the administrative jurisdiction of the Secretary for use by him in carrying out the provisions of this Act. In exercising his authority to acquire property in accordance with the provisions of this subsection, the Secretary may enter into contracts requiring the expenditure, when appropriated, of funds authorized by section 8 of this Act, but the liability of the United States under any such contract shall be contingent on the appropriation of funds sufficient to fulfill the obligations thereby incurred.

(b) The Secretary is authorized to pay for any acquisitions which he makes by purchase under this Act their fair market value, as determined by the Secretary, who may in his discretion base his determination on an independent appraisal obtained by him.

(c) In exercising his authority to acquire property by exchange, the Secretary may accept title to any non-Federal property located within such area and convey to the grantor of such property any federally owned property under the jurisdiction of the Secretary within California and adjacent States, notwithstanding any other provision of law. The properties so exchanged shall be approximately equal in fair market value, provided that the Secretary may accept cash from or pay cash to the grantor in such an exchange in order to equalize the values of the properties exchanged.

SEC. 4. No parcel of more than five hundred acres within the zone of approximately twenty-six thousand acres depicted on map numbered NS–PR–7002, dated August 15, 1961, on file with the director, National Park Service, Washington, District of Columbia, exclusive of that land required to provide access for purposes of the national seashore, shall be acquired without the consent of the owner so long as it remains in its natural state, or is used exclusively for ranching and dairying purposes including housing directly incident thereto. The term "ranching and dairying purposes", as used herein, means such ranching and dairying, primarily for the production of food, as is presently practiced in the area.

"Ranching and dairying purposes."

In acquiring access roads within the pastoral zone, the Secretary shall give due consideration to existing ranching and dairying uses and shall not unnecessarily interfere with or damage such use.

SEC. 5. (a) As soon as practicable after the date of enactment of this Act and following the acquisition by the Secretary of an acreage in the area described in section 2 of this Act, that is in the opinion of the Secretary efficiently administrable to carry out the purposes of this Act, the Secretary shall establish Point Reyes National Seashore by the publication of notice thereof in the Federal Register.

Publication in F. R.

(b) Such notice referred to in subsection (a) of this section shall contain a detailed description of the boundaries of the seashore which shall encompass an area as nearly as practicable identical to the area described in section 2 of this Act. The Secretary shall forthwith after the date of publication of such notice in the Federal Register (1) send a copy of such notice, together with a map showing such boundaries, by registered or certified mail to the Governor of the State and to the governing body of each of the political subdivisions involved; (2) cause a copy of such notice and map to be published in one or more newspapers which circulate in each of the localities; and (3) cause a certified copy of such notice, a copy of such map, and a copy of this Act to be recorded at the registry of deeds for the county involved.

Notification of Governor, etc.

76 STAT. 541.

SEC. 6. (a) Any owner or owners (hereinafter in this subsection referred to as "owner") of improved property on the date of its acquisition by the Secretary may, as a condition to such acquisition, retain the right of use and occupancy of the improved property for noncommercial residential purposes for a term of fifty years. The Secretary shall pay to the owner the fair market value of the property on the date of such acquisition less the fair market value on such date of the right retained by the owner.

"Improved property."

(b) As used in this Act, the term "improved property" shall mean a private noncommercial dwelling, including the land on which it is situated, whose construction was begun before September 1, 1959, and structures accessory thereto (hereinafter in this subsection referred to as "dwelling"), together with such amount and locus of the property adjoining and in the same ownership as such dwelling as the Secretary designates to be reasonably necessary for the enjoyment of such dwelling for the sole purpose of noncommercial residential use and occupancy. In making such designation the Secretary shall take into account the manner of noncommercial residential use and occupancy in which the dwelling and such adjoining property has usually been enjoyed by its owner or occupant.

SEC. 7. (a) Except as otherwise provided in this Act, the property acquired by the Secretary under this Act shall be administered by the Secretary, subject to the provisions of the Act entitled "An Act to establish a National Park Service, and for other purposes", approved August 25, 1916 (39 Stat. 535), as amended and supplemented, and in accordance with other laws of general application relating to the national park system as defined by the Act of August 8, 1953 (67 Stat. 496), except that authority otherwise available to the Secretary for the conservation and management of natural resources may be utilized to the extent he finds such authority will further the purposes of this Act.

16 USC 1.

16 USC 1c.

(b) The Secretary may permit hunting and fishing on lands and waters under his jurisdiction within the seashore in such areas and under such regulations as he may prescribe during open seasons prescribed by applicable local, State, and Federal law. The Secretary shall consult with officials of the State of California and any political subdivision thereof who have jurisdiction of hunting and fishing prior to the issuance of any such regulations, and the Secretary is authorized to enter into cooperative agreements with such officials regarding such hunting and fishing as he may deem desirable.

Appropriation.

SEC. 8. There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act, except that no more than $14,000,000 shall be appropriated for the acquisition of land and waters and improvements thereon, and interests therein, and incidental costs relating thereto, in accordance with the provisions of this Act.

Approved September 13, 1962.

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Public Law 89-666
89th Congress, S. 1607
October 15, 1966

An Act

To amend the Act of September 13, 1962, authorizing the establishment of the Point Reyes National Seashore in the State of California, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Act of September 13, 1962 (76 Stat. 538) is hereby amended as follows:

(a) Strike subsection (b) of section 2 and substitute therefor: "The area referred to in subsection (a) shall also include a right-of-way to the aforesaid tract in the general vicinity of the northwesterly portion of the property known as 'Bear Valley Ranch', to be selected by the Secretary, of not more than four hundred feet in width, together with such adjoining lands as would be deprived of access by reason of the acquisition of such right-of-way." 16 USC 459c-1.

(b) In section 8 strike out "$14,000,000" and substitute "$19,135,000". 16 USC 459c-7.

Approved October 15, 1966.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 2057 (Comm. on Interior & Insular Affairs).
SENATE REPORT No. 1526 (Comm. on Interior & Insular Affairs).
CONGRESSIONAL RECORD, Vol. 112 (1966):
Aug. 29: Considered and passed Senate.
Oct. 3: Considered and passed House, amended.
Oct. 7: Senate concurred in House amendment.

Public Law 91-223
91st Congress, H. R. 3786
April 3, 1970

An Act

84 STAT. 90

To authorize the appropriation of additional funds necessary for acquisition of land at the Point Reyes National Seashore in California.

Point Reyes National Seashore, Calif. Appropriation. 80 Stat. 919.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 8 of the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c–7), is amended (a) by deleting "$19,135,000" and inserting "$57,500,000", and (b) by changing the period at the end of the section to a colon and adding: "*Provided*, That no freehold, leasehold, or lesser interest in any lands hereafter acquired within the boundaries of the Point Reyes National Seashore shall be conveyed for residential or commercial purposes except for public accommodations, facilities, and services provided pursuant to the Act of October 9, 1965 (Public Law 89–249; 79 Stat. 969).".

16 USC 20.

Sec. 2. (a) Section 3(a) of the Act of September 13, 1962 (76 Stat. 538), is amended by striking out the words "Except as provided in section 4, the," in the first sentence and inserting the word "The" in lieu thereof.

16 USC 459c-2.

(b) Section 4 is hereby repealed.

Repeal. 16 USC 459c-3.

(c) The remaining sections of the Act of September 13, 1962 (76 Stat. 538), are renumbered accordingly.

Approved April 3, 1970.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 91-755 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 91-738 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 116 (1970):
Feb. 10, considered and passed House.
Mar. 17, considered and passed Senate, amended.
Mar. 19, House concurred in Senate amendment.

GPO 37-139

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Public Law 93-550
93rd Congress, H. R. 11013
December 26, 1974

An Act

88 STAT. 1744

To designate certain lands in the Farallon National Wildlife Refuge, California, as wilderness; to add certain lands to the Point Reyes National Seashore; and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Farallon Wilderness, Calif., designation; Point Reyes National Seashore, Calif., additional lands.

TITLE I

SEC. 101. In accordance with section 3(c) of the Wilderness Act of September 3, 1964 (78 Stat. 890, 892; 16 U.S.C. 1132(c)), certain lands in the Farallon National Wildlife Refuge, California, which comprise about one hundred and forty-one acres and which are depicted on a map entitled "Farallon Wilderness—Proposed" and dated October 1969, and revised March 1970, are hereby designated as wilderness. The map shall be on file and available for public inspection in the offices of the Bureau of Sport Fisheries and Wildlife, Department of the Interior.

Administration.

SEC. 102. The area designated by this Act as wilderness shall be known as the Farallon Wilderness and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act.

16 USC 1131 note.

TITLE II

16 USC 459c-1.

SEC. 201. Subsection (a) of section 2 of the Act of September 13, 1962 (76 Stat. 538), describing the boundaries of the Point Reyes National Seashore, California, is amended to read as follows:

"SEC. 2. (a) The area comprising that portion of the land and waters located on Point Reyes Peninsula, Marin County, California, which shall be known as the Point Reyes National Seashore, is described as the area within the boundaries generally depicted on the map entitled 'Boundary Map, Point Reyes National Seashore, Marin County, California', numbered 612–80,008–B, and dated August 1974, which shall be on file and available for public inspection in the office of the National Park Service, Department of the Interior.".

Publication in Federal Register.

SEC. 202. The Secretary of the Interior shall, as soon as practicable after the date of enactment of this title, publish an amended description of the boundaries of the Point Reyes National Seashore in the Federal Register, and thereafter he shall take such action with regard to such amended description and the map referred to in section 201 of this title as is required in the second sentence of subsection (b) of section 4 of the Act of September 13, 1962, as amended.

16 USC 459c-4.

Approved December 26, 1974.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 93-968 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 93-1221 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol 120 (1974):
May 7, considered and passed House.
Oct. 4, considered and passed Senate, amended.
Dec. 11, House concurred in Senate amendment.

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PUBLIC LAW 94–389 [H.J.Res. 738]; Aug. 14, 1976

PRESERVATION OF TULE ELK POPULATION—CALIFORNIA

For Legislative History of Act, see p. 3252

Joint Resolution providing for Federal participation in preserving the Tule elk population in California.

Whereas, although Tule elk once roamed the central valleys of California in vast numbers, the species became nearly extinct during the latter part of the last century as a result of its native habitat being developed for agricultural purposes and urban growth; and

Whereas, although around 1870 the Tule elk population reached a low of approximately thirty animals, through the dedicated efforts of various citizen groups and individual cattlemen, the population has slowly recovered to a total of approximately six hundred animals, the majority of which may be found in free-roaming herds in the Owens Valley, at Cache Creek in Colusa County, California, a small number which are captive in the Tupman Refuge in Vern County, California; and

Whereas in 1971 the California Legislature, recognizing the threat to the Tule elk as a species, amended section 332 and enacted section 3951 of the Fish and Game Code which provide for the encouragement of a statewide population of Tule elk of not less than two thousand, if suitable areas can be found in California to accommodate such population in a healthy environment, and further fixed the population of the Tule elk in the Owens Valley at four hundred and ninety animals, or such greater number as might thereafter be determined by the California Department of Fish and Game, in accordance with game management principles, to be the Owens Valley holding capacity; and

Whereas the Tule elk is considered by the Department of the Interior to be a rare, though not endangered, species by reason of the steps taken by the State of California; and

Whereas the protection and maintenance of California's Tule elk in a free and wild state is of educational, scientific, and esthetic value to the people of the United States; and

Whereas there are Federal lands in the State of California (including, but not limited to, the San Luis National Wildlife Refuge, the Point Reyes National Seashore, various national forests and national parks, and Bureau of Land Management lands located in central California, as well as lands under the jurisdiction of the Secretary of Defense such as Camp Pendleton, Camp Roberts, and Camp Hunter Liggett) which, together with adjacent lands in public and private ownership, offer a potential for increasing the Tule elk population in California to the two thousand level envisioned by the California Legislature: Now, therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the sense of Congress that the restoration and conservation of a Tule elk population in California of at least two thousand, except that the number of Tule elk in the Owens River Watershed area shall at no time exceed four hundred and ninety or such greater number which is determined by the State of California to be the maximum holding capacity of such area, is an appropriate national goal.

California. Tule elk population, preservation. 16 USC 673d.

Cooperation.
16 USC 673e.

SEC. 2. The Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Defense shall cooperate with the State of California in making the lands under their respective jurisdictions reasonably available for the preservation and grazing of Tule elk in such manner and to such extent as may be consistent with Federal law.

Report to Congress.
16 USC 673f.

SEC. 3. The Secretary of the Interior shall submit, on or before the first of March of each year, a report to the Congress as to the estimated size and condition of the various Tule elk herds in California and the nature and condition of their respective habitats. The Secretary shall include in such report his determination as to whether or not the preservation of the Tule elk herd at its then-existing level is, or may be, endangered or threatened by actual or proposed changes in land use or land management practices on lands owned by any Federal, State, or local agency, together with his recommendations as to what Federal actions, if any, should be taken in order to preserve the Tule elk herds at the then-existing level or such other level as may be determined from time to time by the State of California.

Tule elk restoration and conservation plan.
16 USC 673g.

SEC. 4. The Secretary of the Interior, in coordination with all Federal, State, and other officers having jurisdiction over lands on which Tule elk herds are located or lands which would provide suitable Tule elk habitat, shall develop a plan for Tule elk restoration and conservation, including habitat management, which shall be integrated with the comparable plans of State and local authorities in California. The Secretary's annual report to Congress shall describe the development and implementation of such plan.

Approved August 14, 1976.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 94-895 (Comm. on Merchant Marine and Fisheries).
SENATE REPORT No. 94-1120 (Comm. on Commerce).
CONGRESSIONAL RECORD, Vol. 122 (1976):
Mar. 15, considered and passed House.
Aug. 6, considered and passed Senate.

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Public Law 94-544
94th Congress

An Act

To designate certain lands in the Point Reyes National Seashore, California, as wilderness, amending the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), and for other purposes.

Oct. 18, 1976
[H.R. 8002]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, in furtherance of the purposes of the Point Reyes National Seashore Act (76 Stat. 538; 16 U.S.C. 459c), and of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1131-36), and in accordance with section 3(c) of the Wilderness Act, the following lands within the Point Reyes National Seashore are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act: those lands comprising twenty-five thousand three hundred and seventy acres, and potential wilderness additions comprising eight thousand and three acres, depicted on a map entitled "Wilderness Plan, Point Reyes National Seashore", numbered 612-90,000-B and dated September 1976, to be known as the Point Reyes Wilderness.

Point Reyes National Seashore, Calif. Certain lands designated as wilderness areas. 16 USC 1132 note. 16 USC 1132. 16 USC 1131 note.

SEC. 2. As soon as practicable after this Act takes effect, the Secretary of the Interior shall file a map of the wilderness area and a description of its boundaries with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such map and descriptions shall have the same force and effect as if included in this Act: *Provided, however*, That correction of clerical and typographical errors in such map and descriptions may be made.

Map and description, filing with congressional committees.

SEC. 3. The area designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture, shall be deemed to be a reference to the Secretary of the Interior.

Administration.

SEC. 4. (a) Amend the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a), as follows:

16 USC 459c-6.

In section 6(a) insert immediately after the words "shall be administered by the Secretary," the words "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration, and preservation of the natural environment within the area,".

(b) Add the following new section 7 and redesignate the existing section 7 as section 8:

16 USC 459c-7.

"SEC. 7. The Secretary shall designate the principal environmental education center within the seashore as 'The Clem Miller Environ-

The Clem Miller Environmental Education Center, designation. 16 USC 459c-6a.

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mental Education Center', in commemoration of the vision and leadership which the late Representative Clem Miller gave to the creation and protection of Point Reyes National Seashore."

Approved October 18, 1976.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 94-1680 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 122 (1976):
Sept. 29, considered and passed House.
Oct. 1, considered and passed Senate.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 12, No. 43:
Oct. 19, Presidential statement.

Note.—A change has been made in the slip law format to provide for one-time preparation of copy to be used for publication of both slip laws and the United States Statutes at Large volumes. Comments from users are invited by the Office of the Federal Register, National Archives and Records Service, Washington, D.C. 20408.

Public Law 94-567
94th Congress

An Act

Oct. 20, 1976
[H.R. 13160]

To designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in accordance with section 3(c) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132(c)), the following lands are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act:

Wilderness areas. Designation. 16 USC 1132 note.

Bandelier National Monument, N. Mex.

(a) Bandelier National Monument, New Mexico, wilderness comprising twenty-three thousand two hundred and sixty-seven acres, depicted on a map entitled "Wilderness Plan, Bandelier National Monument, New Mexico", numbered 315-20,014-B and dated May 1976, to be know as the Bandelier Wilderness.

Gunnison National Monument, Colo.

(b) Black Canyon of the Gunnison National Monument, Colorado, wilderness comprising eleven thousand one hundred and eighty acres, depicted on a map entitled "Wilderness Plan, Black Canyon of the Gunnison National Monument, Colorado", numbered 144-20,017 and dated May 1973, to be known as the Black Canyon of the Gunnison Wilderness.

Chiricahua National Monument, Ariz.

(c) Chiricahua National Monument, Arizona, wilderness comprising nine thousand four hundred and forty acres, and potential wilderness additions comprising two acres, depicted on a map entitled "Wilderness Plan, Chiricahua National Monument, Arizona", numbered 145-20,007-A and dated September 1973, to be known as the Chiricahua National Monument Wilderness.

Great Sand Dunes National Monument, Colo.

(d) Great Sand Dunes National Monument, Colorado, wilderness comprising thirty-three thousand four hundred and fifty acres, and potential wilderness additions comprising six hundred and seventy acres, depicted on a map entitled "Wilderness Plan, Great Sand Dunes National Monument, Colorado", numbered 140-20,006-C and dated February 1976, to be known as the Great Sand Dunes Wilderness.

Haleakala National Park, Hawaii.

(e) Haleakala National Park, Hawaii, wilderness comprising nineteen thousand two hundred and seventy acres, and potential wilderness additions comprising five thousand five hundred acres, depicted on a map entitled "Wilderness Plan, Haleakala National Park, Hawaii", numbered 162-20,006-A and dated July 1972, to be known as the Haleakala Wilderness.

Isle Royale National Park, Mich.

(f) Isle Royale National Park, Michigan, wilderness comprising one hundred and thirty-one thousand eight hundred and eighty acres, and potential wilderness additions comprising two hundred and thirty-one acres, depicted on a map entitled "Wilderness Plan, Isle Royale National Park, Michigan", numbered 139-20,004 and dated December 1974, to be known as the Isle Royale Wilderness.

Joshua Tree National Monument, Calif.

(g) Joshua Tree National Monument, California, wilderness comprising four hundred and twenty-nine thousand six hundred and ninety acres, and potential wilderness additions comprising thirty-seven thousand five hundred and fifty acres, depicted on a map entitled

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"Wilderness Plan, Joshua Tree National Monument, California", numbered 156–20,003–D and dated May 1976, to be known as the Joshua Tree Wilderness.

(h) Mesa Verde National Park, Colorado, wilderness comprising eight thousand one hundred acres, depicted on a map entitled "Wilderness Plan, Mesa Verde National Park, Colorado", numbered 307–20,007–A and dated September 1972, to be known as the Mesa Verde Wilderness. Mesa Verde National Park, Colo.

(i) Pinnacles National Monument, California, wilderness comprising twelve thousand nine hundred and fifty-two acres, and potential wilderness additions comprising nine hundred and ninety acres, depicted on a map entitled "Wilderness Plan, Pinnacles National Monument, California", numbered 114–20,010–D and dated September 1975, to be known as the Pinnacles Wilderness. Pinnacles National Monument, Calif.

(j) Saguaro National Monument, Arizona, wilderness comprising seventy-one thousand four hundred acres, depicted on a map entitled "Wilderness Plan, Saguaro National Mounment, Arizona", numbered 151–20,003–D and dated May 1976, to be known as the Saguaro Wilderness. Saguaro National Monument, Ariz.

(k) Point Reyes National Seashore, California, wilderness comprising twenty-five thousand three hundred and seventy acres, and potential wilderness additions comprising eight thousand and three acres, depicted on a map entitled "Wilderness Plan, Point Reyes National Seashore", numbered 612–90,000–B and dated September 1976, to be known as the Point Reyes Wilderness. Point Reyes National Seashore, Calif.

(l) Badlands National Monument, South Dakota, wilderness comprising sixty-four thousand two hundred and fifty acres, depicted on a map entitled "Wilderness Plan, Badlands National Monument, South Dakota", numbered 137–29,010–B and dated May 1976, to be known as the Badlands Wilderness. Badlands National Monument, S. Dak.

(m) Shenandoah National Park, Virginia, wilderness comprising seventy-nine thousand and nineteen acres, and potential wilderness additions comprising five hundred and sixty acres, depicted on a map entitled "Wilderness Plan, Shenandoah National Park, Virginia", numbered 134–90,001 and dated June 1975, to be known as the Shenandoah Wilderness. Shenandoah National Park, Va.

SEC. 2. A map and description of the boundaries of the areas designated in this Act shall be on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior, and in the office of the Superintendent of each area designated in the Act. As soon as practicable after this Act takes effect, maps of the wilderness areas and descriptions of their boundaries shall be filed with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such maps and descriptions shall have the same force and effect as if included in this Act: *Provided*, That correction of clerical and typographical errors in such maps and descriptions may be made. Map and description, public inspection.

SEC. 3. All lands which represent potential wilderness additions, upon publication in the Federal Register of a notice by the Secretary of the Interior that all uses thereon prohibited by the Wilderness Act have ceased, shall thereby be designated wilderness. Publication in Federal Register. 16 USC 1131 note.

SEC. 4. The boundaries of the following areas are hereby revised, and those lands depicted on the respective maps as wilderness or as potential wilderness addition are hereby so designated at such time and in such manner as provided for by this Act: Boundary revision.

Isle Royale National Park, Mich.

(a) Isle Royale National Park, Michigan:

The Act of March 6, 1942 (56 Stat. 138; 16 U.S.C. 408e–408h), as amended, is further amended as follows:

(1) Insert the letter "(a)" before the second paragraph of the first section, redesignate subparagraphs (a), (b), and (c) of that paragraph as "(1)", "(2)", "(3)", respectively, and add to that section the following new paragraph:

"(b) Gull Islands, containing approximately six acres, located in section 19, township 68 north, range 31 west, in Keweenaw County, Michigan.".

16 USC 408g.

(2) Amend section 3 to read as follows:

"SEC. 3. The boundaries of the Isle Royale National Park are hereby extended to include any submerged lands within the territorial jurisdiction of the United States within four and one-half miles of the shoreline of Isle Royale and the surrounding islands, including Passage Island and the Gull Islands, and the Secretary of the Interior is hereby authorized, in his discretion, to acquire title by donation to any such lands not now owned by the United States, the title to be satisfactory to him.".

Pinnacles National Monument, Calif.

(b) Pinnacles National Monument, California:

(1) The boundary is hereby revised by adding the following described lands, totaling approximately one thousand seven hundred and seventeen and nine-tenths acres:

(a) Mount Diablo meridian, township 17 south, range 7 east: Section 1, east half east half, southwest quarter northeast quarter, and northwest quarter southeast quarter; section 12, east half northeast quarter, and northeast quarter southeast quarter; section 13, east half northeast quarter and northeast quarter southeast quarter.

(b) Township 16 south, range 7 east: Section 32, east half.

(c) Township 17 south, range 7 east: Section 4, west half; section 5, east half.

(d) Township 17 south, range 7 east: Section 6, southwest quarter southwest quarter; section 7, northwest quarter north half southwest quarter.

Publication in Federal Register.

(2) The Secretary of the Interior may make minor revisions in the monument boundary from time to time by publication in the Federal Register of a map or other boundary description, but the total area within the monument may not exceed sixteen thousand five hundred acres: *Provided, however*, That lands designated as wilderness pursuant to this Act may not be excluded from the monument. The monument shall hereafter be administered in accordance with the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1 et seq.), as amended and supplemented.

(3) In order to effectuate the purposes of this subsection, the Secretary of the Interior is authorized to acquire by donation, purchase, transfer from any other Federal agency or exchange, lands and interests therein within the area hereafter encompassed by the monument boundary, except that property owned by the State of California or any political subdivision thereof may be acquired only by donation.

Appropriation authorization.

(4) There are authorized to be appropriated, in addition to such sums as may heretofore have been appropriated, not to exceed $955,000 for the acquisition of lands or interests in lands authorized by this subsection. No funds authorized to be appropriated pursuant to this Act shall be available prior to October 1, 1977.

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Rincon Wilderness Study Area, suitability review.
16 USC 1132 note.

SEC. 5. (a) The Secretary of Agriculture shall, within two years after the date of enactment of this Act, review, as to its suitability or nonsuitability for preservation as wilderness, the area comprising approximately sixty-two thousand nine hundred and thirty acres located in the Coronado National Forest adjacent to Saguaro National Monument, Arizona, and identified on the map referred to in section 1(j) of this Act as the "Rincon Wilderness Study Area," and shall report his findings to the President. The Secretary of Agriculture shall conduct his review in accordance with the provisions of subsections 3(b) and 3(d) of the Wilderness Act, except that any reference in such subsections to areas in the national forests classified as "primitive" on the effective date of that Act shall be deemed to be a reference to the wilderness study area designated by this Act and except that the President shall advise the Congress of his recommendations with respect to this area within two years after the date of enactment of this Act.

Report to President.
16 USC 1132.

Hearings, notice.

(b) The Secretary of Agriculture shall give at least sixty days' advance public notice of any hearing or other public meeting relating to the review provided for by this section.

Administration.

SEC. 6. The areas designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture shall be deemed to be a reference to the Secretary of the Interior.

16 USC 459c–6.

SEC. 7. (a) Section 6(a) of the Act of September 13, 1962 (76 Stat. 538), as amended (16 U.S.C. 459c-6a) is amended by inserting "without impairment of its natural values, in a manner which provides for such recreational, educational, historic preservation, interpretation, and scientific research opportunities as are consistent with, based upon, and supportive of the maximum protection, restoration and preservation of the natural environment with the area" immediately after "shall be administered by the Secretary".

16 USC 459c–7.

(b) Add the following new section 7 and redesignate the existing section 7 as section 8:

The Clem Miller Environmental Education Center, designation.

"SEC. 7. The Secretary shall designate the principal environmental education center within the Seashore as 'The Clem Miller Environmental Education Center,' in commemoration of the vision and leadership which the late Representative Clem Miller gave to the creation and protection of Point Reyes National Seashore.".

16 USC 459c–8a. Whiskey Mountain Area, classification as a primitive area.

SEC. 8. Notwithstanding any other provision of law, any designation of the lands in the Shoshone National Forest, Wyoming, known as the Whiskey Mountain Area, comprising approximately six thousand four hundred and ninety-seven acres and depicted as the "Whiskey Mountain Area—Glacier Primitive Area" on a map entitled "Proposed Glacier Wilderness and Glacier Primitive Area", dated September 23, 1976, on file in the Office of the Chief, Forest Service, Department of Agriculture, shall be classified as a primitive area until the Secretary of Agriculture or his designee determines otherwise pursuant to classification procedures for national forest primitive areas. Provisions of any other Act designating the Fitspatrick Wil-

derness in said Forest shall continue to be effective only for the approximately one hundred and ninety-one thousand one hundred and three acres depicted as the "Proposed Glacier Wilderness" on said map.

Approved October 20, 1976.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 94-1427 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 94-1357 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 122 (1976):
Sept. 22, considered and passed House.
Oct. 1, considered and passed Senate, amended; House agreed to Senate amendments.

Note.—A change has been made in the slip law format to provide for one-time preparation of copy to be used for publication of both slip laws and the United States Statutes at Large volumes. Comments from users are invited by the Office of the Federal Register, National Archives and Records Service, Washington, D.C. 20408.

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CHAPTER 983

An act to convey certain tide and submerged lands to the United States in furtherance of the Point Reyes National Seashore.

[Approved by Governor July 9, 1965. Filed with Secretary of State July 9, 1965.]

The people of the State of California do enact as follows:

SECTION 1. There is hereby granted to the United States, subject to the limitations which are described in Section 2 of this act, all of the right, title, and interest of the State of California, held by the state by virtue of its sovereignty in and to all of the tide and submerged lands or other lands beneath navigable waters situated within the boundaries of the Point Reyes National Seashore which the Secretary of the Interior is authorized to establish by authority of Public Law 87-657, 76 Stat. 538, and as such boundaries exist on the effective date of this act.

SEC. 2. There is hereby excepted and reserved to the State all deposits of minerals, including oil and gas, in the lands, and to the state, or persons authorized by the state, the right to prospect for, mine, and remove such deposits from the lands; provided, that no well or drilling operations of any kind shall be conducted upon the surface of such lands.

SEC. 3. There is hereby reserved to the people of the state the right to fish in the waters underlying the lands described in Section 1.

SEC. 4. If the United States ceases to use the lands for public purposes, all right, title and interest of the United States in and to such lands shall cease and the lands shall revert and rest in the state.

SEC. 5. The United States shall survey and monument the granted lands and record a description and plat thereof in the office of the County Recorder of Marin County.

APPROVAL:

The foregoing Plat and Description, when recorded with the County Recorder, Marin County, California, fulfills the requirements of Section 5, Chapter 983, Statutes of 1965 of the California Legislature.

Meeting of August 29, 1974

State Lands Commission

By: E. N. Gladish

Executive Officer

THIS SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUEST OF THE U.S. NATIONAL PARK SERVICE CONTRACT NO. 14-10-8530-9 DATED JUNE 29, 1972.

Howard W. Waite

RCE 19016

REGISTERED PROFESSIONAL ENGINEER
HOWARD W. WAITE
No 19016
CIVIL
STATE OF CALIFORNIA

PLAT
OF
CALIFORNIA STATE TIDE AND SUBMERGED LANDS
WITHIN THE
POINT REYES NATIONAL SEASHORE
MARIN COUNTY, CALIFORNIA
GRANTED
TO THE
UNITED STATES
BY THE
CALIFORNIA LEGISLATURE
STATUTES OF 1965 - CHAPTER 983

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PLANNING TEAM

Rolf Diamant, Landscape Architect, GGNRA
Nancy Fries, Ecologist, Denver Service Center
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Greg Moore, Park Planner, GGNRA
Doug Nadeau, Planning Coordinator GGNRA
John Sansing, Superintendent, Point Reyes National Seashore
Ron Treabess, Project Manager, Denver Service Center

As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

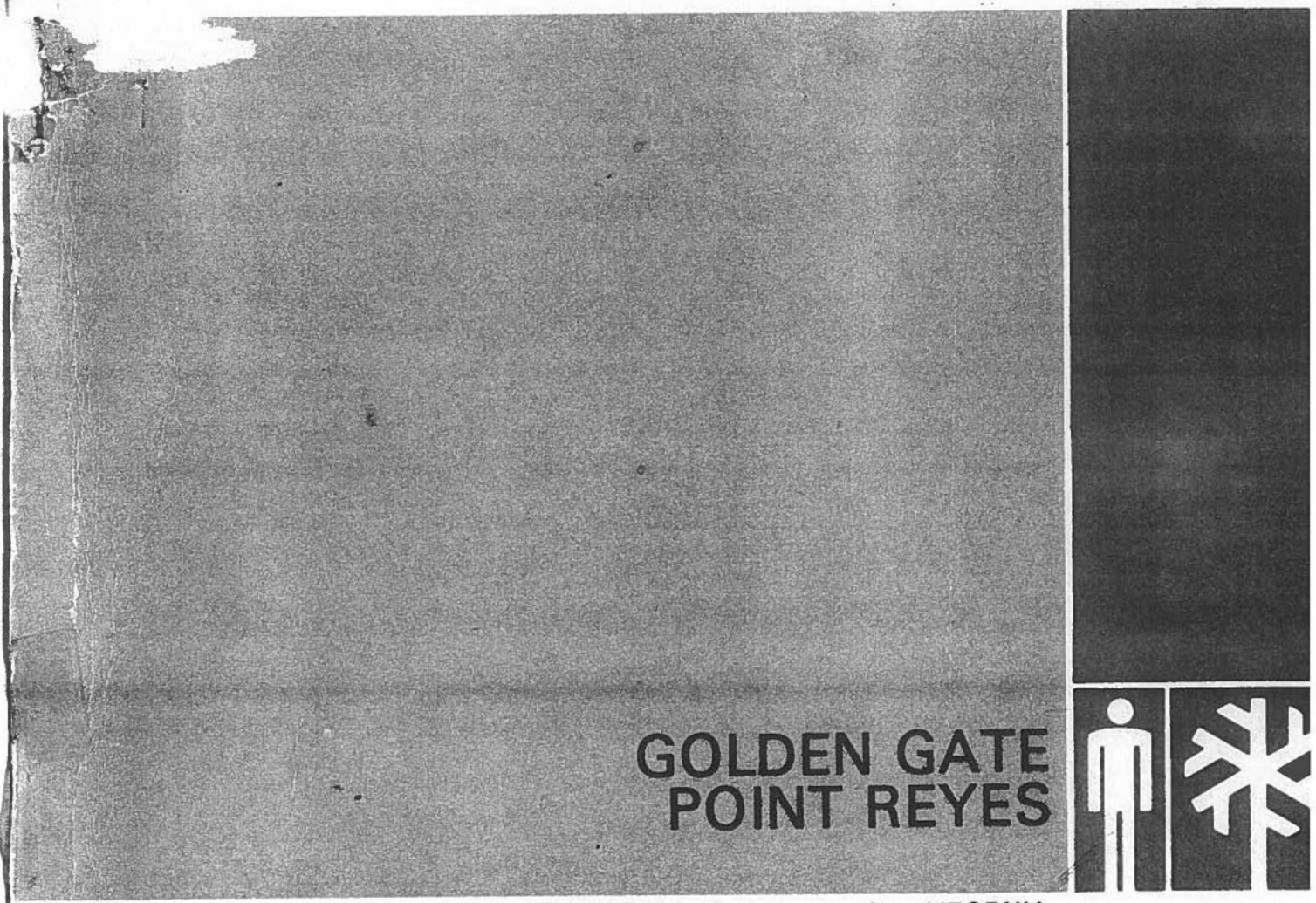
Publication services were provided by the graphics and editorial staffs of the Denver Service Center. NPS 1669

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980—677-120/50

general management plan
environmental analysis

SUPT. OFFICE

september 1980



GOLDEN GATE
POINT REYES

NATIONAL RECREATION AREA / NATIONAL SEASHORE / CALIFORNIA

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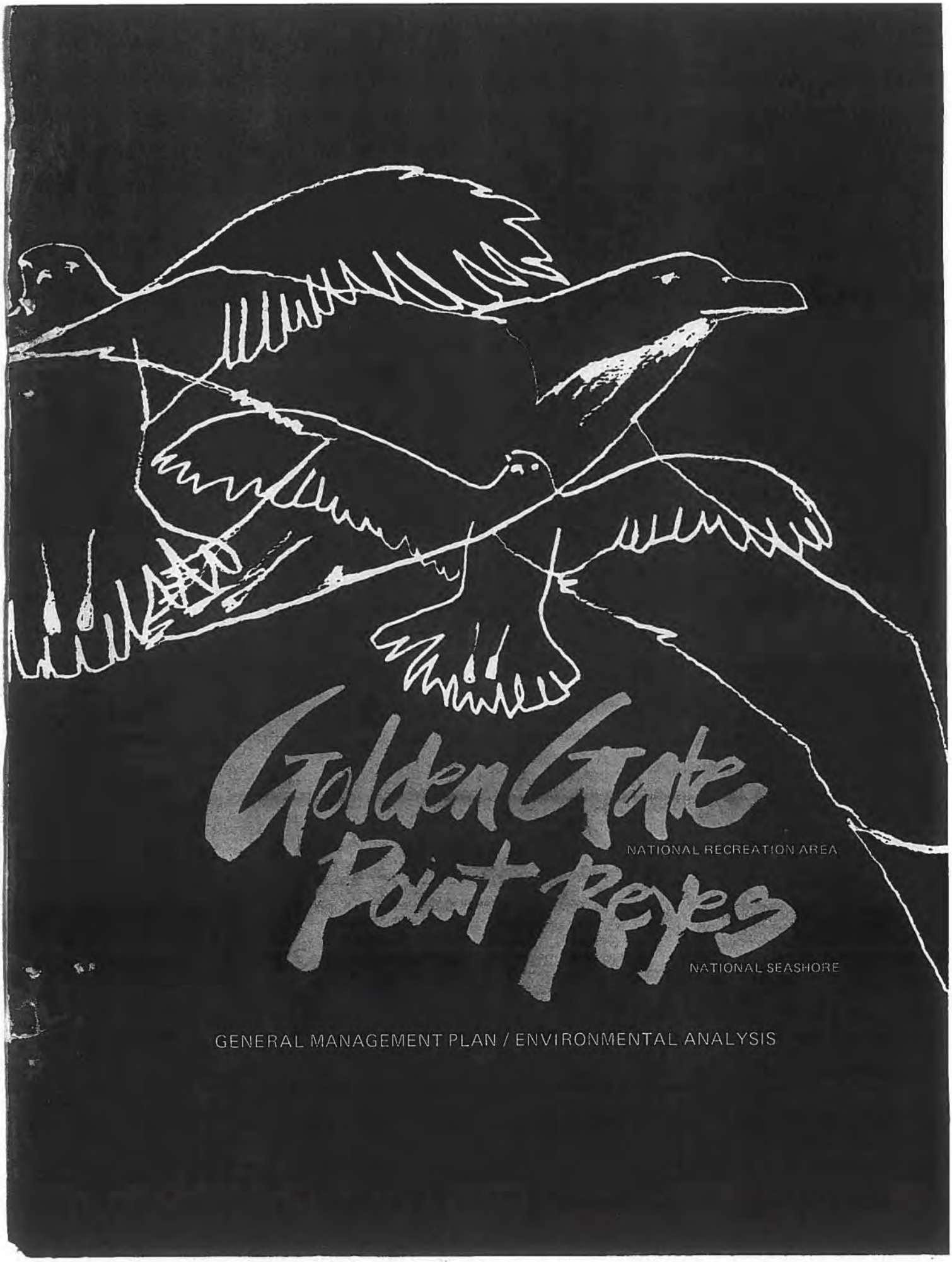

Golden Gate
NATIONAL RECREATION AREA

Point Reyes
NATIONAL SEASHORE

GENERAL MANAGEMENT PLAN / ENVIRONMENTAL ANALYSIS

RECOMMENDED:

Date

Kenneth Faith

9/18/80

Assistant Manager, Western Team
Denver Service Center

9/18/80

Superintendent
Golden Gate National Recreation Area

John L. Dansing

9/18/80

Superintendent
Point Reyes National Seashore

APPROVED:

Howard H. Chapman

9/19/80

Regional Director
Western Region

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Part One: The Plan

INTRODUCTION

The legislative process that led to the establishment of Point Reyes National Seashore and Golden Gate National Recreation Area was truly a grassroots movement, motivated by social concern as well as a conservation ethic. People throughout the Bay Area worked to see these parks established and have helped plan their future. Residents of crowded city neighborhoods, people in rural towns, young people, old people--thousands contributed their thinking to create a vision of the national parks next door.

The new parklands offer possibilities for nearly every conceivable leisure-time pursuit. Not only are they beautiful, they are also replete with usable buildings from past inhabitants, blessed with a variety of landscapes from urban park to wilderness, and rich in historical associations. This plan was begun with the understanding that its mission was to carefully retain the parks' inherent values, correct their problems, and allow people of all ages, income levels, and lifestyles to enjoy them, now and in the future.

Even though GGNRA/Point Reyes attract many vacationers, most park visitors will continue to be local people, many of whom depend on the parks for a variety of daily leisure experiences. Many urban residents are eager to use the parks, but they have encountered obstacles when contemplating a visit, including indirect or nonexistent transportation, lack of knowledge about where to go and what to do, feeling out of place, and limited outdoor recreation skills.

The plan speaks to these urban needs of today and to predicted needs of tomorrow. It is a guide for the responsible management of some of the nation's most outstanding natural and cultural resources so that they may be enjoyed by the people. And it is a commitment by the National Park Service to share in the responsibility for improving the quality of urban living in the Bay Area.

PURPOSE AND SIGNIFICANCE OF THE PARKS

Residents and tourists alike have long appreciated the scenic and historic qualities of the Marin and San Francisco shorelines. As highlights of this appealing territory the Cliff House, Mount Tamalpais, and Muir Woods have been popular picture post card subjects for many decades.

Luckily those who have most appreciated northern California treasures have also realized how easily they can be lost. While large military and agricultural holdings have effectively protected

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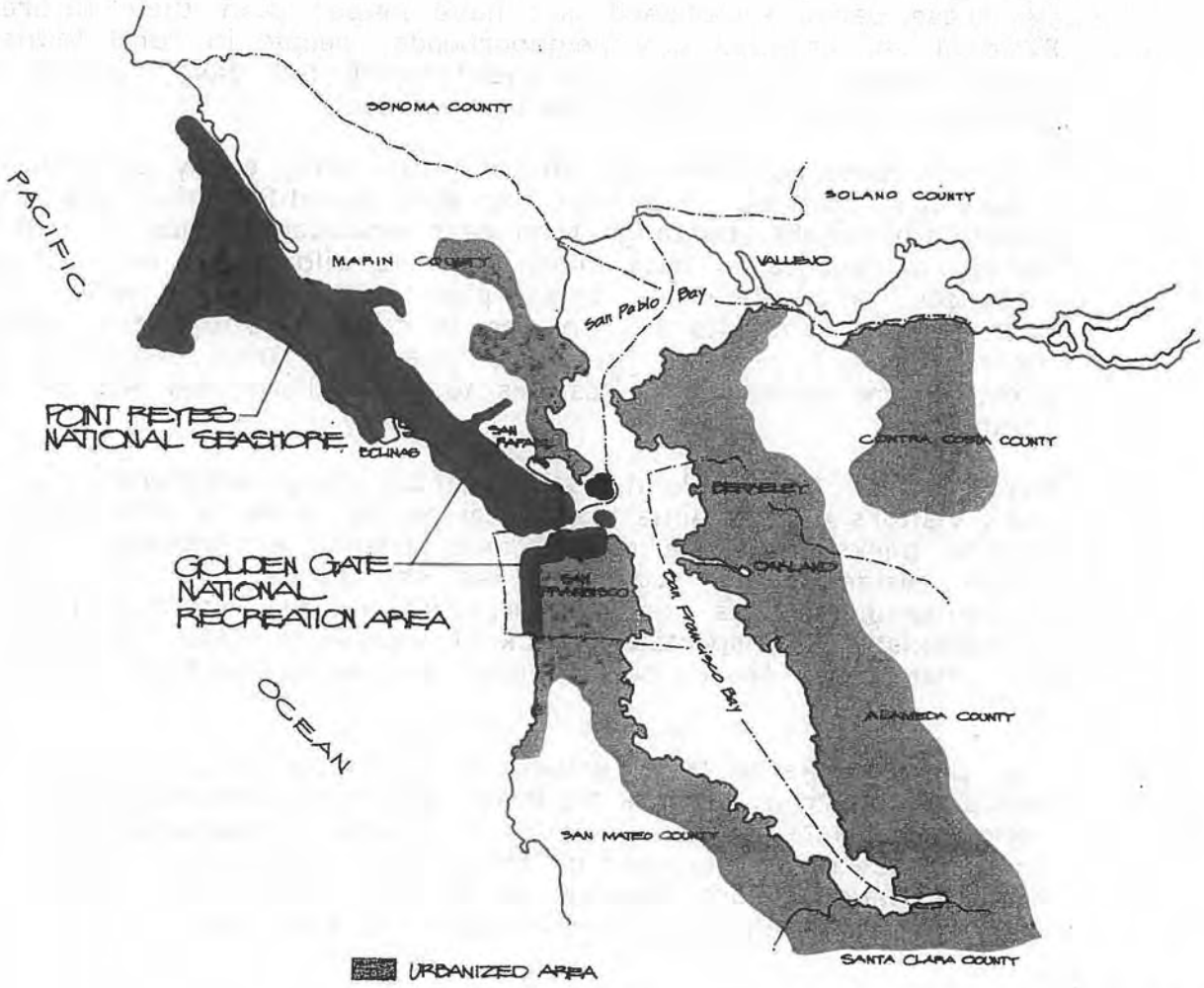

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

REGION

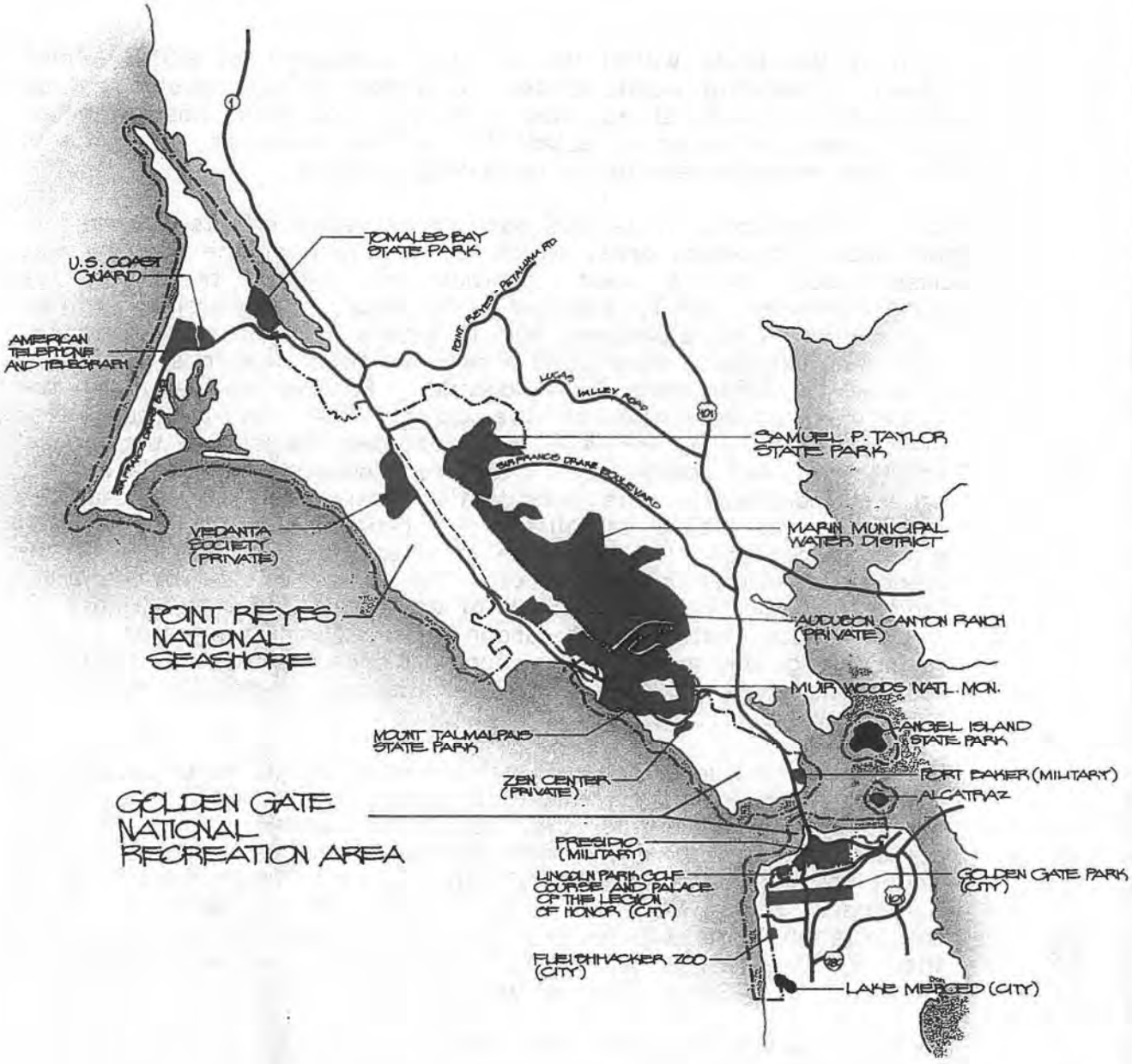
GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

much of the lands within the present boundaries of GGNRA/Point Reyes, resounding public protest to threats of overdevelopment or destruction of natural qualities since the late 1800s has protected other areas, helping to establish the Bay Area as the nation's unofficial headquarters for conservation activists.

The real beginning of serious park preservation efforts occurred in the Mount Tamalpais area, which by the turn of the century was crisscrossed by a vast network of hiking trails and a world-renowned scenic railroad. In 1905, Congressman William Kent, spurred by a personal goal to secure national park status for the entire mountain, purchased a redwood-filled canyon at its flanks to save its lofty trees from logging. Further motivated by the threatened condemnation of the canyon floor by a local water company to build a reservoir, Kent donated the land to the federal government and persuaded Theodore Roosevelt to declare it a national monument. The president's proclamation stated that the monument was being established to protect the grove of coast redwoods because "the trees are of scientific value because of the primeval character of the forest, the age and size of the trees (and) their location near centers of population and instruction." It is clear today that although larger, more extensive redwood forests occur along the more remote northern reaches of the California coast, the trees of Muir Woods are the only redwoods millions of tourists will ever see.

Kent's lofty dream of national park status for his mountain did not come any nearer to realization until 1925, when developers threatened to subdivide the mountain's coastal side. A local conservation group with Kent's assistance helped to raise enough money to purchase the initial piece of land that became Mount Tamalpais State Park in 1930. Additional efforts by many conservation organizations and individuals have since added more than 5,000 acres to the park, which is now included within the boundary of GGNRA and is operated by the state of California.

Miraculously saved from urbanization by rugged terrain and poor access roads, the Point Reyes peninsula has presented itself as an attractive coastal wilderness to a procession of interested park planners and preservationists since the 1930s. But not until serious threats of subdivision, logging, and freeway building in the late 1950s did something substantial happen. In 1958 the National Park Service published a coastline study which recommended the inclusion of the peninsula in the National Park System. Pressed by real incidents of logging and subdivision, local activists and a wise and sympathetic Congress finally forged a bill that was signed by President Kennedy in 1962, establishing Point Reyes National Seashore. For a national seashore at that time, Point Reyes' legislation was unusually clear in its intent that natural values should be scrupulously preserved. Its preamble states that the



UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

STUDY AREA

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

park was established "to save and preserve for the purpose of public recreation, benefit and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped." The emphasis on preservation was even further strengthened in 1976 when Congress declared about 50 percent of the park a unit of the National Wilderness Preservation System.

Fort Point National Historic Site is the historic counterpart for Muir Woods National Monument, in that it also enjoys independent recognition as a separate unit of the National Park System even though it is now part of GGNRA. Strong local regard for its historical value and architectural and engineering merits was forcefully demonstrated in the 1930s when Golden Gate Bridge designers incorporated a special arch in the bridge structure to avoid destroying the old abandoned brick fortification. As a part of the army's Presidio of San Francisco, the fort was never again threatened, but a handful of dedicated military history enthusiasts worked hard for many years to earn special recognition for the fort and the maintenance, restoration work, and public visitation that would come with it. In 1970, two years before the establishment of GGNRA, they achieved success: An act of Congress established a new national historic site "to preserve and interpret for future generations the historical significance of Fort Point."

The greenbelt that many believe is now one of the world's most remarkable pieces of parkland was completed in 1972 with the establishment of Golden Gate National Recreation Area. Hot controversies over the question of what to do with Alcatraz Island and a proposal to build a federal record center on a small piece of federal land in San Francisco precipitated a chain of events that rapidly swept into an unprecedented grassroots park movement.

The language of the Golden Gate legislation states the parks purpose as follows: "In order to preserve for public use and enjoyment certain areas of Marin and San Francisco Counties, California, possessing outstanding natural, historic, scenic, and recreational values and in order to provide for the maintenance of needed recreational open space necessary to urban environment and planning, the Golden Gate National Recreation Area is hereby established." The mandate to preserve the varied resources of the park is obvious in this statement, but the reference to public use and enjoyment deserves additional emphasis. The hearing records pertinent to the enabling legislation reveal that the future use of the park was the subject of considerable discussion. The nearby presence of over five million people provided an unprecedented opportunity to make national park resources and programs available to a wide variety of visitors, many of whom had not been reached by the more remote national parks. Based on the record, this "parks to the people" idea was clearly intended by Congress and the administration to be a major purpose of GGNRA. Although the

idea of establishing more national parks in or near America's larger cities was an innovation of the 1970s, appreciation of the good fortune to have such fine recreational opportunities so close to home has been deeply felt by Bay Area residents since before William Kent started to work toward a national park in 1903. Certainly it was that appreciation which motivated the actions that established all of the parks comprising GGNRA/Point Reyes.

Most observers agree that the lands contained within the boundaries of GGNRA/Point Reyes would be of outstanding significance even if they didn't exist at the fringes of a great city. Together they represent one of the nation's largest coastal preserves--more than 100,000 acres of superlative North Pacific Coast landscape, including sandy beaches, rugged headlands, grasslands, forests, lakes, streams, estuaries, and marshes. Important scientific resources range from small rare plants in the San Francisco and Marin headlands, through towering redwood trees, to the diverse organisms of the mud flats and salt marshes of Point Reyes.

As the extensive wilderness segment of these parklands, Point Reyes displays the greatest diversity of wildlife and vegetation. Native land mammals there number about 37 species, including the elusive mountain lion and an endemic race of mountain beaver. Marine mammals augment this number by perhaps another dozen species. With 338 recorded species of birds, the seashore ranks as one of the best bird-watching and ornithological research areas in the United States. About 750 plant species are found on the peninsula, a few of which are found nowhere else. Coastline habitats harbor some of the richest and most diverse collections of marine organisms on the Pacific Coast.

What Point Reyes contributes in biotic diversity is easily matched by GGNRA's historic wealth. Park Service historians have noted that up to nine distinct areas of Golden Gate would independently qualify as historic units of the National Park System. Cultural resources of GGNRA/Point Reyes present a rich chronicle of two hundred years of history of one of the world's most important and spectacular seaports. Historic themes presented here include Indian culture, the Spanish Empire frontier, the evolution of American coastal fortifications, maritime history, and a multifaceted social history. Prehistoric village sites, lighthouses, a collection of historic ships, military forts, gun emplacements, ranch buildings, and a prison of worldwide infamy are but a few of the highlights of the parks' historic wealth.

But what may be the most significant aspect of the history of the parks remains a mystery. Point Reyes may contain the site of the first known English contact with what is now the United States. According to some experts, Sir Francis Drake probably landed on the peninsula in June of 1579 to refit his ship before sailing across the Pacific on his circumnavigation of the globe.

In spite of the outstanding quality of the scenic, natural, and historic resources of the parks, perhaps their most dramatic aspect is the sharp contrast between extensive undeveloped open spaces and the adjacent intensively developed urban environment of the San Francisco metropolitan area. In the city, the lively color of the GGNRA waterfront and the adjacent tourist bustle of Fisherman's Wharf and Ghirardelli Square are but a short distance from the isolated windswept cliffs and cypress groves of Lands End. Directly across the Golden Gate, facing the soaring towers of the bridge and the high-rise canyons of the city, the Marin Headlands appear much as they did when the gold-seekers poured through this symbolic portal more than a hundred years ago. A short hike from this vantage point can place the viewer in a valley totally remote from the sights and sounds of man. North of the headlands, wilderness quality scenery is common--from mountaintop panoramas to deep forest scenes. This wide variety of resources and outdoor settings provides opportunities for a correspondingly diverse array of recreational and educational activities of a quality and character found nowhere else.

MANAGEMENT OBJECTIVES: GOLDEN GATE NATIONAL RECREATION AREA

Achievement of the following key management objectives will ensure that the purpose for which the parks were established is fulfilled.

Preservation and Restoration of Natural Resources

To maintain the primitive and pastoral character of the parklands in northern Marin County by providing only minimum, dispersed development. Necessary concentrated developments will be confined to the southern Marin County and San Francisco portions of the recreation area.

To locate development in areas previously disturbed by human activity whenever possible.

To maintain grazing in certain suitable areas and at appropriate levels for the purpose of helping to control fire fuels and as an educational and aesthetic element for visitor enjoyment.

To maintain and restore the character of natural environment lands by maintaining the diversity of native park plant and animal life, identifying and protecting threatened and endangered plant and animal species, marine mammals, and other sensitive natural resources, controlling exotic plants, and checking erosion whenever feasible.

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Preservation and Restoration of Cultural Resources

To reuse existing buildings for visitor and management needs in order to help preserve historic structures and reduce building costs.

To retain the current character of cultural resources pending completion of detailed resource management plans.

To recognize the importance of the cultural resources within the recreation area through a positive program of their identification, evaluation, preservation, management, and interpretation.

Making the Recreation Area Readily Available to the Broadest Variety of Park Users

To pursue the extension of transit service between the park and transit dependent neighborhoods.

To offer recreational opportunities to a diversity of park users and to impart knowledge necessary for full enjoyment of park resources through a particular emphasis on interpretation, education, and information programs.

To develop facilities and programs that respond to the special needs of senior citizens, the handicapped, and cultural and ethnic minorities.

To encourage community organizations to utilize park areas and facilities as a setting for their own recreation and education programs.

Provision of a Broad Variety of Park Experiences

To plan facilities to offer a wide variety of uses.

To retain opportunities for recreational activities pursued in the park today.

To develop a trail system for the use of hikers, bicyclists, and equestrians.

To offer visitors a more extensive exposure to the park's resources through the provision of a variety of overnight experiences.

To enhance the visitors' enjoyment of park resources by providing food and rental services where the need is demonstrated.

Consideration of Park Neighbors

To alleviate traffic impacts on adjacent communities and on park resources by the use of transit systems.

To balance the responsibility of meeting the needs of park visitors with the need to protect the interests of residents of adjacent communities.

MANAGEMENT OBJECTIVES: POINT REYES NATIONAL SEASHORE

Natural Resource Management

To identify, protect, and perpetuate the diversity of existing ecosystems which are found at Point Reyes National Seashore and are representative of the California seacoast.

To protect marine mammals, threatened and endangered species, and other sensitive natural resources found within the seashore.

To enhance knowledge and expertise of ecosystem management through research and experimental programs relating to wildlife, prescribed burning techniques, exotic plant and animal reduction, regulation and control of resource use, and pollution control.

To preserve and manage as wilderness those lands so designated under Public Law 94-567 and to also manage as wilderness to the extent possible those tidelands and lands legislatively designated as potential wilderness.

To retain research natural area status for the Estero de Limantour and the Point Reyes Headlands reserves and propose other suitable sites if found highly desirable for research and necessary for resource protection.

To manage seashore activities in the pastoral and estuarine areas in a manner compatible with resource carrying capacity.

To monitor grazing and improve range management practices in the pastoral zone in cooperation with the ranchers and the Soil Conservation Service.

To monitor and improve maricultural operations, in particular the oyster farm operation in Drakes Estero, in cooperation with the California Department of Fish and Game.

To monitor activities occurring on nonfederal properties within the national seashore owned by the Radio Corporation of America, the

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American Telephone and Telegraph Company, and the Vedanta Society, to ensure that land uses are in agreement with the legislative acquisition exemption.

Cultural Resource Preservation

To identify, protect, and preserve the significant historic and cultural resources of Point Reyes.

To identify features and events that have played a vital part in the recorded history of Point Reyes, such as earthquakes, shipwrecks, land and water uses, the voyage of Sir Francis Drake, and the former U.S. Coast Guard lighthouse and lifeboat station.

To enhance knowledge of the Miwok Indian culture through research and investigation of the numerous archeological sites located at Point Reyes.

To preserve and protect all structures in or nominated to the National Register of Historic Places, and to stabilize and protect other structures and sites pending their historical evaluation.

To monitor and support productive land uses and activities which are consistent with historical patterns.

To ensure that agricultural and maricultural activities are consistent with the historical evolution of land and water use at Point Reyes.

Interpretation

To offer interpretive programs and services which further an awareness and appreciation of the wide diversity of seashore ecosystems and cultural resources, their variety and similarity, their interdependence, and their fragile nature.

To develop programs for interpretation which foster an environmental awareness of the conditions imposed by preservation.

To offer visitor orientation and information programs which furnish a general knowledge of the wide diversity of the seashore and enhance visitor appreciation and knowledge.

To provide opportunities for emphasizing environmental education and programs related to the resource, including the coastal environment.

To continue to interpret the replica Miwok Indian village to further visitor understanding and appreciation of the Miwok Indian heritage.

Visitor Activities

To provide for and permit only those cultural, educational, and recreational activities which are compatible with the preservation of an undeveloped coastline.

Development

To ensure that park development is the minimum necessary for efficient and essential management and that visitor services are consistent with the seashore purposes and compatible with natural resource limitations and the special requirements imposed by the coastal environment.

Access and Circulation

To provide access to and circulation within the seashore which is compatible with other park objectives and considers a full range of alternative means of transportation.

BASIS FOR THE PLAN

The basic tenets upon which this plan has been written are found in the enabling legislation for the parks and in the collection of knowledge gained about their natural and cultural resources. But the most noteworthy aspect of this document is that it represents an intensive effort to ensure that the future management and development of the parks is based on the desires of the people who will use them. Planning has involved extensive discussions with public agencies and conservation organizations and also more than one hundred workshops in Bay Area communities. About 10,000 people of all ages, incomes, and lifestyles have directly participated in this process through these public workshops, letters, and meetings with the planning staff.

In conjunction with this extensive public dialogue, the planning team has carefully compiled and analyzed information about the wildlife, vegetation, soils, history, socioeconomic setting, and other subjects that are key factors in making decisions about the parks' future (Preliminary Information Base, four volumes, October 1975). Public preferences and feelings were carefully filtered through this collection of knowledge. An important intermediate product of this process was the Assessment of Alternatives for the General

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Management Plan (May 1977), supplemented by a popular summary, A People's Guide to the Future of the National Parks Next Door. These publications presented up to four alternative scenarios for the future of fourteen geographic units of the park. Each alternative related to one of the four basic park philosophies expressed by the public: (1) minimum visible change--things are O.K. the way they are today; (2) maximum natural appearance--wherever possible restore natural qualities and hold development to a minimum; (3) education/history--the park is an ideal learning environment and visitors need a lot of help to get maximum enjoyment and benefit from it; (4) recreation--the park is a place that offers many opportunities for leisure activities. All of the alternatives protected ecologically sensitive natural areas, retained significant historic structures, and proposed facilities only in areas suitable for development. Each alternative was accompanied by a thorough environmental analysis describing the potential results of each proposal.

During the public review of the Assessment of Alternatives, people were encouraged to interchange the individual proposals to design the park system they preferred. Public responses to the alternatives were gathered in five hearings held by the GGNRA Citizens' Advisory Commission (CAC) and through individual's and group's letters and worksheets. These responses were analyzed to determine areas where people were in general agreement and areas where issues were still to be resolved. These determinations and the recommendations of the planning staff were submitted in a series of position papers to the public and CAC, which voted approval of the recommendations and resolved the few remaining conflicts through additional meetings and committee work.

The analysis of the public responses to the planning alternatives revealed that a surprising number of proposals received nearly unanimous support from reviewers. These were generally recommended, and proposals that received little or no endorsement were rejected. There was one critical exception to this decision-by-vote process. Many key participants, such as the elderly, who were contacted early in the planning process through aggressive efforts to reach into the community, did not return to comment on the alternatives. Nevertheless, to fulfill their commitment to serve a variety of constituents, the planning team carefully considered the needs of these groups in the formulation of the plan.

When public preference for the future of a particular area was split, some basic valuations seemed to prevail in the decision-making process. On the one hand, emphasis was placed on urban recreational development in areas where the natural landscape has already been significantly disturbed. On the other hand, the proposals lean toward low-intensity use and minimal facilities in areas that retain substantial natural integrity.

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Decisions were also tempered by a preference for stabilization and adaptive use of historic structures rather than alternatives for extensive demolition or authentic restoration of buildings and settings. At the same time, the plan favors tearing down nonhistoric buildings to increase outdoor recreational opportunities and enhance the natural scene.

As much as possible, the plan attempts to sustain park uses that are occurring now. However, some activities will be shifted to new locations where they will be more compatible with park resources and other uses.

The cumulative effects of all of the proposals in this plan for GGNRA/Point Reyes have been analyzed to determine if there will be any significant impacts on the environment resulting from plan implementation. The text of this environmental analysis is included as part two of this document.

The Draft General Management Plan (both full text and summary) was distributed to the public in June of 1979. Five public hearings were then conducted by the CAC to receive comments from the public. Generally, comments and suggestions offered by agencies, organizations, the CAC, and the public were supportive and primarily oriented toward clarifying the intent of plan proposals. There were no controversies or recommendations for substantial plan revisions apparent in any of the hearings or in any of the letters and position papers submitted in response to the plan.

Specific suggestions for numerous minor modifications were offered in ten CAC committee reports. These reports, which were approved by the full commission on November 15, 1979, resulted from an exhaustive page-by-page review and analysis of the draft plan by the committees prior to the public hearings. Subsequent to the hearings, two staff reports were submitted to the full commission responding to relevant issues and questions raised by the public in both written and verbal testimony.

At their December 8, 1979, meeting the CAC unanimously voted final approval of the General Management Plan subject to recommended modifications contained in the ten committee reports and the two staff reports. This document contains all of these modifications as well as numerous other specific changes requested by the public during the public hearings and review period.

Because the park has a fulltime planning staff and a citizens' advisory commission which meets regularly, the process of making needed revisions in the plan in the future should be relatively simple and expeditious. Proposals for change may be submitted to the commission or the superintendent either verbally or in writing. An annual review of these proposals by the commission and Park

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Service staff will determine which proposals, if any, are worthy of further consideration. Those that are will be subject to full staff analysis, public hearings, and the basic decision-making process prescribed by the by-laws and rules of the commission. Subsequent to necessary committee work and full commission and staff deliberations, recommendations on the proposed revision will be submitted to the NPS regional director for his review and approval. It is anticipated that most approved revisions could be incorporated into the plan simply by the preparation of addendum sheets.

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LAND MANAGEMENT ZONING

The following zone designations represent a composite picture of how the park will be managed and developed in the future based on legislative and administrative requirements, resource studies, and public preferences. Because the different values that characterize each zone often overlap, it is nearly impossible to produce an understandable graphic representation of them that is also precise. Therefore the accompanying zoning map located in the pocket on the inside back cover should be used only as a general reference.

NATURAL RESOURCE ZONES

Intensive Landscape Management Zone

Lands within this zone occur entirely within southern reaches of the park and basically include all areas where exotic vegetation predominates. Although all of these areas have been substantially modified through human activities, many of them still contain isolated populations of natural wildlife and vegetation which will be carefully preserved. When choices are available in these zones they should favor native species wherever possible. Within this category the following two subzones have been recognized.

Natural Appearance Subzone: (Ocean Beach, Fort Funston, Lands End, Baker Beach, and Rodeo Lagoon picnic area)

To many park users lands in this subzone may appear to be as natural as wilderness areas at Point Reyes, but they are in fact man-created landscapes which in many cases will require the same degree of maintenance as an urban park setting. The primary management goal in these areas will be to continue to accommodate relatively high use levels with a commitment to intensive maintenance in order to retain the appearance of a natural landscape. Examples of intensive measures that will be required in this subzone include reforestation of Monterey cypress and stabilization and maintenance of planted sand dunes.

Urban Landscape Subzone: (Crissy Field, West Fort Mason, Fort Baker waterfront, Fort Barry parade ground, Stinson Beach developed area)

This subzone is characterized by familiar elements found in traditional city parks--well tended trees, shrubs and flowers, irrigated and mowed lawns, and hard-surfaced areas for walking and congregating. These areas are designed for intensive use and should look complete only when filled with people. Primary resource management activities will include

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mowing, irrigation, weeding, fertilization, replanting, and trash pickup.

Pastoral Landscape Management Zone

(northern Olema Valley and northern Point Reyes peninsula)

This zone includes lands within which it has been determined that dairying and cattle ranching are desirable aspects of the scene from both an educational and aesthetic point of view. At a minimum, agricultural buildings and open grasslands will be retained in these areas, and where feasible, livestock grazing will continue within the limits of carefully monitored range capacities. Additional resource management studies may significantly alter the configuration of this zone as it now appears in GGNRA. Also included in this zone is the heather and flower farming operation near Muir Beach, which is considered to be a desirable aspect of the local agricultural scene.

Natural Landscape Management Zone

(Marin Headlands, Stinson Beach area, southern Olema Valley, and a few areas in Point Reyes)

In this zone natural resources and processes will remain as undisturbed as possible given a relatively high level of natural park uses (hiking, primitive camping, etc.). Management activities will be directed primarily at protecting wildlife and vegetation from misuse and overuse and at maintaining a variety of landscape settings conducive to recreation (open grasslands as well as forests).

Special Protection Zone

This zone includes lands that have received legislative or special administrative recognition of exceptional natural qualities requiring strict protection measures. Further analysis of park resources in the future could result in additional lands being placed in this category.

Wilderness Subzone: (Point Reyes)

Public Law 94-567 designated more than half of Point Reyes National Seashore as a part of the National Wilderness Preservation System, prohibiting nearly all development and mechanical conveyances.

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National Monument Subzone: (Muir Woods)

Although contained within the boundary of GGNRA, Muir Woods retains its special status as a national monument, the sole purpose of which is to protect a stand of virgin coast redwoods for public enjoyment of their scientific, scenic, and educational values.

Marine Reserves Subzone: (Point Reyes Headlands, Limantour Estero)

At the recommendation of the National Park Service, marine reserves (research natural areas) were established at the Point Reyes Headlands and Limantour Estero in 1972 by the California Department of Fish and Game to preserve them "in a natural condition, and to protect the aquatic organisms and wildlife found thereon for public observation and scientific study." Management of the headlands reserve prohibits all human intrusion except that associated with approved research projects. The estero reserve protects all lifeforms from removal or disturbance without state and federal collecting permits. The National Park Service maintains a standing proposal to the state to also obtain research natural area status for the Double Point and Bird Rock areas of Point Reyes.

Biotic Sensitivity Subzone: (shoreline and stream courses)

This subzone, derived from high sensitivity ratings in the information base, generally identifies those natural resources in the park that are particularly sensitive to human use or are especially valuable from an ecological or scientific point of view. Use and development in these areas should be either discouraged or mitigated sufficiently to avoid significant levels of deterioration.

Most of the areas covered by this subzone are water courses or bodies of water recognized for their importance in sustaining wildlife and vegetation. Because the lands near these resources have been and will continue to be the most attractive locations for use and minor development, mitigation measures will be particularly important. Siting of minor facilities will be crucial. For example, locating a campground directly upon the bank of a stream could cause unacceptable impacts that could be avoided by shifting the facility only several hundred feet.

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HISTORIC RESOURCE ZONES

Preservation Zone

(Fort Point, ships, lighthouses, fortifications, historic buildings at Alcatraz)

Spaces and objects placed in this category are managed and used primarily for the purpose of facilitating public enjoyment, understanding, and appreciation of their historic values. Management activities will include the protection of structures from influences and uses that could cause deterioration and the presentation of tours, exhibits, or other appropriate interpretive efforts.

Because of the unusually large number of historic structures in the parks, many that are suitable for adaptive use have been placed in this category simply because a use has not yet been specifically identified for them. Undoubtedly some of these will be adapted for management or visitor uses in the future, but in the meantime they will be simply protected from damage and deterioration.

Enhancement Zone

(Sutro Baths, Sutro Heights, Cliff House, Aquatic Park)

All of the areas within this subzone were developed originally as recreation spaces and still derive their primary value from recreation use. Management practices will be directed at preserving the basic integrity of their settings and specific structures within them. Enhancement of the usability and attractiveness of these partially rundown and deteriorated areas will be accomplished through the addition of elements and the practice of maintenance activities similar to those described for the urban landscape subzone.

Adaptive Use Zone

(Alcatraz grounds, north and east Fort Mason, Haslett Warehouse, East Fort Miley, areas of Marin Headlands)

This subzone defines structures or spaces of historic value that have been or will be adapted for recreation, park management, and related activities. Although as much historic integrity as possible will be retained throughout all areas of the park, the interior spaces of structures included in this zone may be modified considerably to accommodate recreation, education, and other park-related uses. Exterior settings may also be modified to include site improvements such as landscaping in cases where such

modification is deemed necessary to properly accommodate public use.

SPECIAL USE ZONE

(Vedanta Society, Audubon Canyon Ranch, Zen Center, Mount Tamalpais and Angel Island state parks, Lincoln Park and Marina Green city parks, Presidio of San Francisco)

Lands within this zone are located within the authorized boundaries of GGNRA or Point Reyes National Seashore but are not currently or expected in the foreseeable future to come under the jurisdiction of the National Park Service. Management policies and practices of the agencies and organizations administering these lands appear to adequately provide for the continued preservation of the natural, scenic, recreational, and historic values which motivated their inclusion within the boundaries.

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CHARACTER AND INTENSITY OF USE

The opportunities for park activities provided by thousands of acres of open land and hundreds of vacant buildings are practically limitless. Clearly, GGNRA/Point Reyes can be many things to many people. Because most visitors will continue to be local people, there will be a basic orientation to residents of the Bay Area and their needs for cultural expression, socializing, physical exercise, and the whole variety of daily leisure experiences. But many vacationers will be attracted as well, and there will be a great deal for them to enjoy, also.

GGNRA/Point Reyes is many parks. Some have an urban character, some are wilderness. There are opportunities for gathering together, for solitude, for adventure, for relaxation, for education, and for entertainment. Furthermore, there is enough room that people can pursue all these different activities without getting in each other's way.

So many activities are possible and appropriate that a comprehensive listing of them would be excessively long. Inappropriate activities would be those that would create a hazard, a disturbance, or a severe inconvenience for other visitors, cause adverse impacts on adjacent communities, or cause significant deterioration of park resources. Based on public comments over the past several years, of all the common outdoor leisure activities, shooting, hunting, and off-road vehicle driving are considered by park users to be inappropriate because they would conflict with other uses. Significant environmental deterioration will generally be avoided by ensuring that activities are pursued in suitable settings by a reasonable number of people.

The recreational opportunities of GGNRA/Point Reyes should be enjoyed by the widest variety of people, and this makes access extremely important. There are different kinds of barriers to access. Lack of transportation to the park is the most obvious. The lack of necessary facilities, such as restrooms and picnic areas for day use and campgrounds for overnight use, is another. The deteriorated condition of park resources, particularly of buildings and ruins at Alcatraz and Fort Mason, creates another serious obstacle to use. Barriers may selectively restrict specific groups or individuals. For example, fees can discourage people with low incomes, physical barriers can exclude the disabled, and lack of group facilities can discourage organizations. Despite the closeness of the park to the city, in the minds of many people it will continue to be distant and inaccessible if these barriers are not overcome.

Many of these barriers can be eliminated. The National Park Service and other agencies capable of influencing park-related

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transportation will work cooperatively to improve transit service so that people without cars and people preferring not to drive their cars can get to the park. A trail system with overnight camps will let hikers and backpackers enjoy longer excursions. Different kinds of campgrounds and hostels will provide overnight opportunities for people with a range of abilities, experience, and equipment. Recreational equipment, including fishing tackle and sports gear, will be available for loan or rent to visitors who cannot afford to bring their own. The park staff will continue to do all it can to ensure that use of facilities is as convenient as possible for visitors with physical disabilities. These and other efforts will help create a park that is accessible to all who wish to visit, promoting a park population with a diversity of lifestyles, cultures, and interests as rich as the variety of park settings.

GGNRA/Point Reyes is an especially important place for people living in communities with limited recreational resources. To help meet the recreational needs of these people, community gardens at Fort Mason will be expanded, there will be a new senior center at Fort Mason, community meeting rooms will be made available at several locations, and multipurpose indoor recreation space will be provided. Community groups will also be able to reserve other special facilities, including campgrounds, picnic areas, and overnight retreats.

As a result of park development, the theoretical visitor capacity of most park areas will increase. An exception is the heavily used Mount Tamalpais area, where it is hoped that excessive use will decline as recreational opportunities are improved in other areas.

Large increases in the number of visitors are anticipated at Fort Mason, Crissy Field, and Marin Headlands, as a wide range of new activities, services, programs, and transportation options is created in these currently undeveloped and underused areas. New focal points will attract additional visitors to already popular recreation areas like the Cliff House and Aquatic Park. Dispersed use throughout large open areas of the Marin Headlands, Olema Valley, and Point Reyes will also increase.

Maximum visitation levels have been estimated for the different park units, primarily so that impacts on the environment could be quantitatively analyzed. These levels are projections of the number of people that can visit any park area before overcrowding occurs. Thus, they are limits based mainly on people's tolerance of other park visitors, rather than being based on the sensitivity of the physical environment. Environmental factors were carefully considered, but it was determined that in most cases people's enjoyment of the park would be impaired by overcrowding before the environment was significantly disturbed. As the plan is implemented, the projected levels, which are listed in table 1, may

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be revised if onsite monitoring indicates that they are too high or too low.

TABLE 1. MAXIMUM VISITATION LEVELS

Unit	Maximum Visitation at Any One Time[a] Existing	Projected
Alcatraz	300	600
Aquatic Park	2,000	4,340
Fort Mason	1,900	7,615
Marina Green	3,400	3,400
Crissy Field	100	4,300
Fort Point	650	1,200
San Francisco Headlands	1,500	2,500
Cliff House	700	1,850
Ocean Beach	2,350	4,020
Marin Headlands[b]	1,167	5,466
Mount Tamalpais[b]	9,334	8,800
Olema Valley	250	1,615[c]
Point Reyes	6,720	10,080

[a]Maximum visitation levels for San Francisco units are based on the estimated capacities of the existing and proposed facilities. Maximum visitation levels for Marin County units are based on known daily visitation rates at Mount Tamalpais State Park and Point Reyes National Seashore, converted to people per acre, and divided by the known turnover rate for each unit.

[b]Figures for the Mount Tamalpais unit include drive-through visitors and assume that a light reduction in visitation can be accomplished by improving recreational opportunities in other areas.

[c]This figure represents a major reduction in the original projection for the Olema Valley contained in the Draft General Management Plan and in the Assessment of Alternatives (3,250). Due to substantial adverse public comment the projection was recalculated based on more detailed and conservative estimated capacities of the land and facilities.

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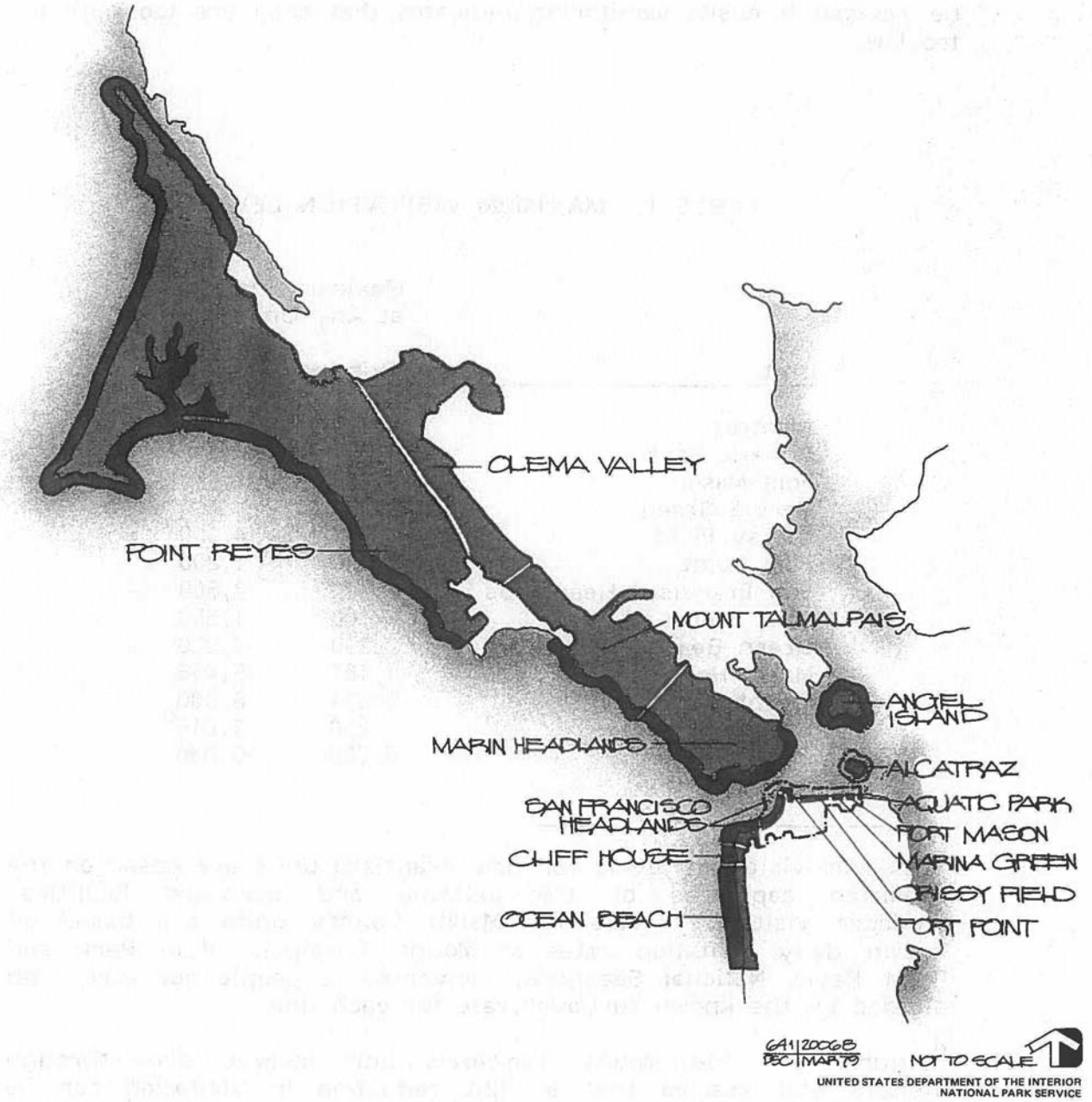

PLANNING UNITS

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

The maximum visitation levels will not be absolute limits. During special events and good weather weekends they could periodically be exceeded without significant long-term effects. They should not be considered as goals, either. Some of them may never be reached. Transportation constraints and weather conditions, in particular, may keep visitation consistently lower. Based on present visitation patterns, however, it is likely that these maximum visitation levels will occur on about 25 to 50 good weather weekend days per year. Visitation will be generally maintained within these maximum limits by controlling auto access wherever possible, informing visitors of opportunities in less heavily used areas, and other practical management strategies.

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INTERPRETATION AND OTHER PROGRAMS

During the 1960s and 70s, many Bay Area residents recognized something that needed changing. Their traditional relationship with the landscape was becoming obsolete--a zealous commitment to urban development was giving way to a contemporary need for protection of open space. The land and water surrounding the Golden Gate had served the city well: The harbor had fostered early immigration and trade; the rich soil and towering trees had supplied food and construction materials for a growing city; the coastal cliffs had provided a strategic location for military fortifications protecting nearby residents. But all the while, another attribute of this landscape had been surfacing and growing more recognizable as the city enlarged. San Francisco residents had always flocked to the coast to enjoy their leisure time. They were attracted to this shoreline environment for play and exploration and for their inspiration and education. Over the years, however, urban sprawl had been greatly reducing the availability of this recreational space, with a corresponding increase in people's appreciation of its value.

The establishment of Point Reyes National Seashore and Golden Gate National Recreation Area represented a change in land use to respond to people's changing needs. The parks' programs will reflect this modern perspective and the recent commitment to make the city more livable by preserving quality recreational environments for all its residents and for visitors from throughout the country.

Programs will serve a variety of functions. The first, aimed at people who still are unfamiliar with the parks' availability, will be to encourage discovery and to prepare first-time visitors by informing them about the weather, facilities, access, and hazards. Second, programs will promote a feeling of ownership and a sense of responsibility for the parks' condition and preservation. They will also seek to impart an understanding of the area's social and natural history and increase people's awareness of their interactions with their environment. Most importantly, however, programs will be intended for enjoyment. A great variety of programs, from Sunday afternoon concerts to bike races to community picnics, will help people have fun with the hope that relaxation and creative use of their leisure time will make them better able to face the frustrations and enjoy the advantages of urban living.

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Discovering the Parks

Informational programs are essential to visitors' enjoyment of GGNRA/Point Reyes. The parks' facilities and programs will continue to change, so repeat visitors as well as first timers will need to know what to expect at each area. The following basic programs are proposed.

General Information. Information centers, information stations, and park publications are proposed to help visitors arriving from nearby or out-of-town to easily understand what the parks offer. Major information centers are proposed for Aquatic Park, Cliff House, Fort Baker, and Bear Valley. Secondary information stations are proposed for Alcatraz, Fort Mason, Fort Cronkhite, and Muir Woods. National Park Service personnel at these locations will extend their informational abilities beyond the parks' boundaries--particularly to understanding transit connections and other public recreational opportunities in the Bay Area. Multilingual staff will be on duty at least at the Aquatic Park and Cliff House information centers. The information program will be coordinated with other public agencies, such as the Visitor and Convention Bureau, involved in the same activities.

Outreach Efforts. A special effort must be made to reach many urban dwellers. People with little money or no mobility often have great recreational needs but few opportunities to learn about and enjoy these parklands. A continual program will be designed to help these potential visitors. Special staff members will be assigned to community outreach, and they will spend more time in the neighborhood than in the park. By making special publications available, attending neighborhood meetings, and presenting out-of-park programs they will help people overcome obstacles to park use such as lack of transportation, timidity, and lack of recreational equipment. A continual effort will be made to supply community service groups with the information and assistance they need to make the park a vital part of their programming. The park staff will be knowledgeable about Bay Area recreational programs, public transit services, new program ideas, and funding sources, and will maintain an up-to-date resource library for use by all interested organizations.

Understanding the Parks

These parklands contain a wealth of natural and cultural resources. They are rich in a variety of terrestrial and marine forms and weather patterns. They are strewn with landmarks, fortifications, monuments, and gun emplacements that bear silent witness to the Spaniards, Russians, Mexicans, Chinese, Japanese, and others who sailed through the Golden Gate, settled by the bay, and added

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their own pages to Bay Area history. The historic ships, the Golden Gate Bridge traffic, the pastoral scene at Olema Valley, the military presence, the wilderness of Point Reyes, and the city's old recreational settings begin to illustrate the abundance of contemporary and historic lifestyles that are the essence of the Bay Area. Interpretation will provide an opportunity for visitors to understand the significance of these resources.

Interpretive facilities, which are described in the "Development" section of this plan, will accommodate the variety of needs and interest levels of visitors. Such facilities, however, will be kept to a minimum, and most interpretation will be accomplished using publications, films, park libraries, information centers, and structured activities.

Environmental Awareness

Programs are not provided only for enjoyment, but as opportunities to learn as well. An urban conservation ethic will be stressed, using the parks as a laboratory for learning how to enrich and perpetuate urban living--on an individual and collective scale. Interpretive programs will help translate environmental problems occurring within the park and the community to visitors. This will create an awareness of these problems and encourage a self-commitment to help in their alleviation both at the park and through day-to-day activities in the community.

These programs will also encourage discovery of recreational skills that involve interaction with the natural environment and foster activities that participants can enjoy independently and inexpensively throughout their lives.

The National Park Service will initiate these programs but strive to give community organizations and individuals the capabilities to proceed with them independently. Examples of potential subjects for programs include transit, cultural and natural resource management, environmental education, and energy conservation. Camping programs, visits to the proposed children's farm, community gardening, water safety classes, living history programs, alternative energy demonstrations, bicycle adventures, and sailing are typical of programs that will foster environmental awareness.

A Sense of Ownership and Responsibility

Interpretation and other visitor programs will strive to build a feeling of cooperation between the parks and their neighbors. Park visitors who recognize their public ownership will feel more welcome and responsible for the parks' well-being. Park managers will be

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able to more effectively communicate with visitors and seek their assistance in program development, resource management, and safety. The following program concepts will help foster this relationship.

Public Involvement. Since inception, GGNRA and Point Reyes have been planned and managed with the public's involvement. The public's advice has helped resolve various controversial issues and improved the quality of decisions. Public workshops held during the preparation of the general management plan have also been one of the parks' strongest interpretive programs--giving the public an idea of the resource variety and of difficult management choices. Public involvement will continue to be an important program, enabling visitors to influence management decisions and assist in their implementation.

Cooperative Activities. Local groups such as environmental education associations, community service agencies, and cultural institutions have special expertise and programs to offer. The National Park Service will support and utilize these local talents for environmental education, cultural programs, and special events.

Many ways of "sharing the load" in program development, planning, and facilities are possible. One way is by the Park Service providing the space--an open lawn for a special event or a building for a continuing indoor program--and cooperating groups helping with program direction and staffing. Successful examples of this have been the Fort Mason Foundation, the Point Reyes Seminars, and the Frontier Arts Institute, all continuing programs, and the Western Regional Folk Festival, a special event.

Special events are organized activities that occur on an irregular basis, like a string quartet performance in Sutro Heights Park or a regional craft fair at Fort Mason. Audiences range in size from a few dozen people to tens of thousands, and programs can last from a few hours to a few days. The large events are best accommodated at Fort Mason, Aquatic Park, the Fort Baker parade ground, and the Fort Barry rifle range. However, other areas may be used, considering the event's compatibility with the environment and feelings of other park visitors. Specific criteria will be developed to help determine what purposes, sizes, visitor costs, frequency, timing, transit needs, and disruptions to existing users are appropriate for special events.

Work Programs. Perhaps one of the strongest ways of encouraging public stewardship of the park is to have people participate in its maintenance, development, and staffing. There are three existing programs that rely heavily on local communities for their operation: Volunteers-In-Parks, Youth Conservation Corps, and the Young Adult Conservation Corps. Programs of this nature will be

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encouraged, giving nearby residents a chance to get involved with the parks' growth. A Senior Conservation Corps is proposed, to utilize the talents of the elderly. A work program for the disabled is also proposed. The Bay Area has a large population of disabled persons due to the progressive measures taken by many of its cities and institutions to ensure that facilities are accessible to everyone. The program will provide opportunities for disabled persons to develop interpretive programs for this audience, help the park recognize and solve access problems, and provide informational services for visitors.

Cultural Heritage Programs. The San Francisco Bay Area is well-known for the strength and diversity of its minority populations, and no other location in the Bay Area is so clearly related to its cultural evolution as the lands near the Golden Gate. The National Park Service will thoroughly investigate the cultural history of these parklands and promote broad-based community interest in the parks by relating their historical relationships with urban dwellers of all backgrounds. An important aspect of these cultural heritage programs will be to welcome all people to the parks and provide a stimulus for cross-cultural communication.

Program Implementation

From discovery to responsibility--that is the goal. Proposed programs should embark the National Park Service on a course of serving a hierarchy of urban needs.

The implications of these programs are many. Managerially, they will depend on a number of changes. New people will be needed--employees with more specialized skills capable of serving a diverse urban population, local people with language skills, knowledge of urban recreational problems, and dedication to solving them. The programs will demand better training for Park Service rangers in social service skills as well as in natural history and protection.

A broader and more detailed definition of interpretation and other visitor programs will be provided in an interpretive plan which will deal exclusively with this subject. This plan will give the needed direction for program and facility development, publications, and items and artifacts that should be included in the park curatorial collection and library. Point Reyes now has an approved Interpretive Prospectus stating the interpretive needs for that park.

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D E V E L O P M E N T

GENERAL

Most areas of GGNRA/Point Reyes are easily accessible by road or trail, and nearly every location currently offers something exciting to see or do. But due to changing functions, deterioration of land and buildings, a desire to serve new users, and the simple existence of opportunities to make some good things better, there is a need for changes in these parks.

GGNRA/Point Reyes displays a fairly typical national park structure, being a large expanse of natural landscape with scattered concentrations of development. The natural landscape, representing most of the park, does not need much more than careful preservation. Proposed improvements there can be termed as modest enhancement measures intended to add depth to a park experience that is already outstanding. They include such facilities as small campgrounds, improved trails, picnic areas, and hostels.

Unlike the typical national park where developed areas are usually clusters of functional support facilities (food service, lodging, etc.), each of these parks' developed areas is a special setting comprised of a unique mix of scenic, cultural, and recreational values. Any one of them has the potential to provide enough experiences to easily occupy an entire day's visit.

All but three of the park's eleven "major" developed areas are located in or near the city--clustered at the edges of the Golden Gate. Primarily because of public preferences, and the need to use and preserve historic resources, these same spots are proposed to remain as developed areas and will continue to represent the focus of park use. Most of them need substantial adaptive measures to fulfill their total potential for public use.

Six of these areas were formerly occupied by the military and derive much of their present appeal from that association. But a large part of these potentially attractive places is marred by deteriorating and unsafe conditions, and their transition to usable parkland is far from complete. Extensive restoration and adaptation measures at Alcatraz, Fort Mason, Crissy Field, Fort Baker, and Rodeo Valley will restore a sense of dignity to these historic settings as well as make them as effective as possible in serving leisure activites. Even though the basic identity of the Aquatic Park and Cliff House areas will not be altered, similar actions will produce a metamorphosis in their appearance. Fort Point, Muir Woods, Stinson Beach, and Bear Valley will all receive improvements, but none will compare with the kind of transformation that is envisioned for their counterparts mentioned above.

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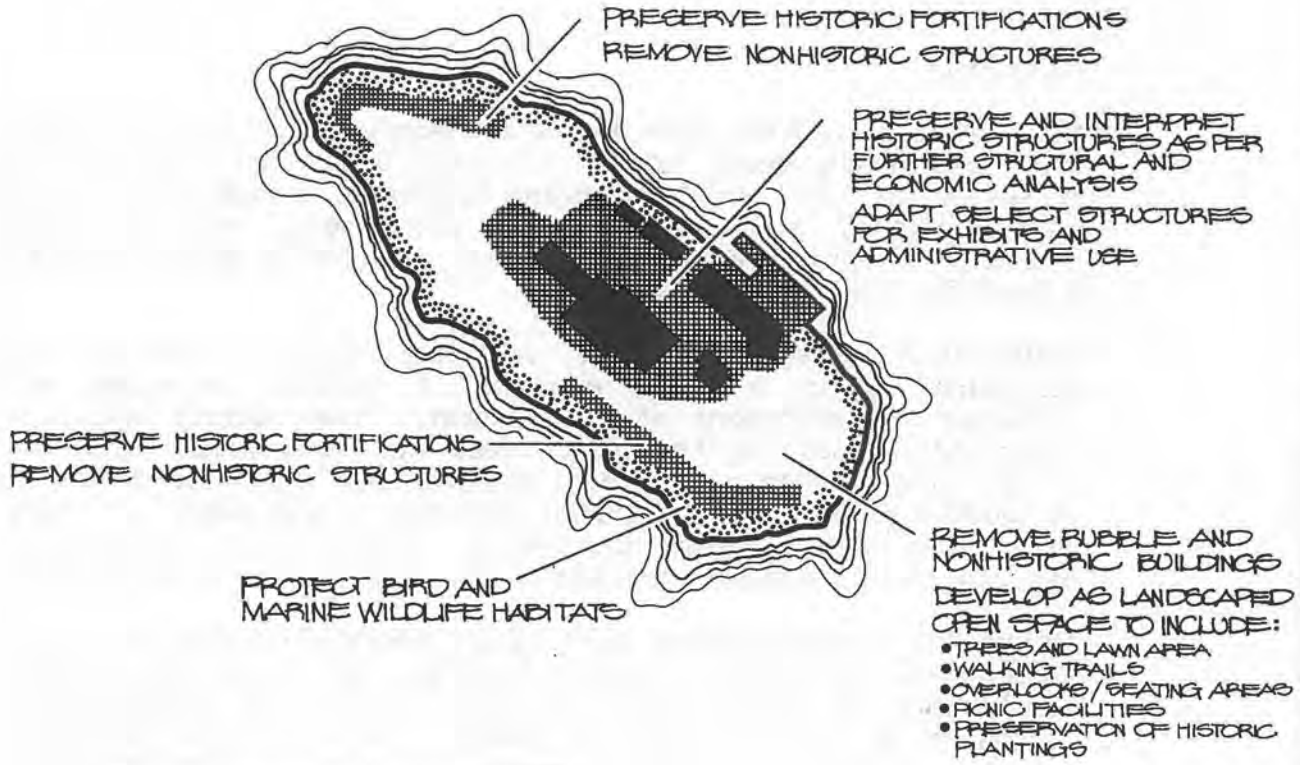

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

ALCATRAZ

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

THE DEVELOPED AREAS

Alcatraz

From a strict resource management viewpoint, historic preservation will be the primary concern at this location. Perhaps the majority of future visitors to the island will continue to be attracted by the intrigue of the prison. But this plan also emphasizes the restoration of the island's parklike qualities and a recognition of its key position in the bay as a spectacular viewpoint.

The piles of building rubble and debris and crumbling nonhistoric structures will be removed. The resulting open space will be refilled with topsoil, trees, shrubs, grass, walkways, overlooks, and picnic facilities. Within this pleasant landscaped setting, the stark prison and military structures will stand in honest contrast. To most people this will seem to be a brand new look for the island. But since Civil War times, carefully tended plantings have been an important element there. While literal restoration of historic gardens is not feasible, in a general sense proposed landscape development will return the island to a more accurate historic setting.

Buildings to be stabilized and made safe will be selected on the basis of historic value and economic and structural feasibility. The main cell house, all military fortifications, the barracks, the wharf and the lighthouse have all been identified as historically significant structures that should be preserved if feasible. Suitable space in these structures will be adapted for exhibits relating to the prison era, military era, natural history, and Indian occupation of the island.

The rocky cliffs and shoreline of the island will remain untouched as important habitat for birds and marine organisms.

Aquatic Park

This aptly named feature of San Francisco's colorful waterfront will continue to be a focal point for interpreting man's historical and contemporary dependence on the water. Elements relating to maritime history dominate the scene and will be made even more prominent with a new maritime museum and an expanded collection of historic ships. Historical interpretation will focus on the subject of San Francisco maritime history, with reference to other regional events, such as the gold rush, only as they help to present the main theme. Although not as prominent visually, water recreation will also remain as a primary activity in this area.

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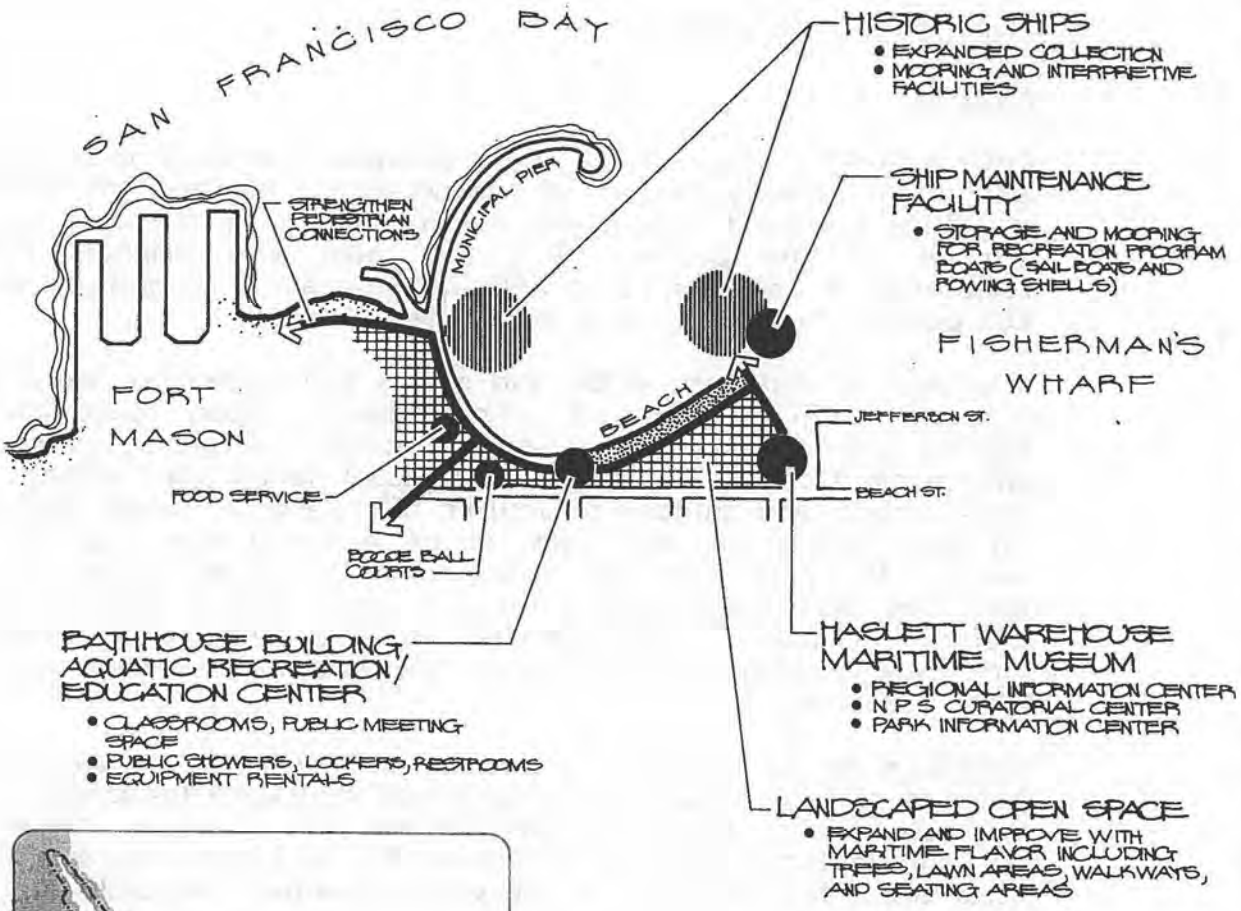

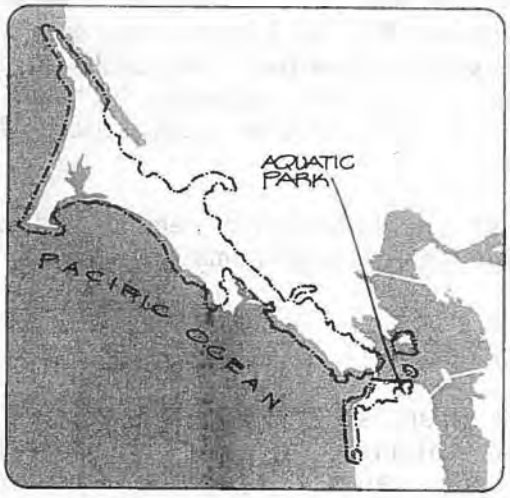

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

AQUATIC PARK

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

The old brick Haslett Warehouse will be adapted for a museum and information center with its exterior architectural and historical integrity retained. Artifacts from the existing museum will be displayed there along with appropriate additional pieces exemplifying San Francisco maritime history--perhaps even full-sized boats or ships' hulls not suited for exterior display. Most park curatorial museum storage and library space will be incorporated into this new structure. Although extensive interior modifications will be required, an effort will be made to retain a significant portion of the original post and beam construction for interpretive purposes.

A major park information center within the new museum building will describe what GGNRA and Point Reyes have to offer and provide related transportation advice. Because Aquatic Park is already part of one of this country's busiest tourist scenes, a portion of the warehouse will also be used as a regional recreational information center, informing visitors of state, federal, local, and private recreational resources--a place to find out about winery tours, San Francisco historic houses, or Forest Service campgrounds.

If the availability of vessels and funds permit, the current collection of 5 historic ships will be expanded (tentatively up to 12 including the Balclutha, which is owned by the National Park Service but is now berthed outside the park). Additional ships must be small to medium sized and compatible with the 19th and early 20th century steam and sail maritime flavor now evident in the area. The lagoon defined by the municipal and Hyde Street piers will be the setting for the display of these vessels. Until more detailed studies (including a continuing U.S. Army Corps of Engineers study of a proposed Fisherman's Wharf breakwater) address the practical problems of wind, surge, and wave protection, it will be assumed that most of the ships will be docked at pier structures on both the east and west sides of the lagoon. For visual and practical purposes, several could be moored in the center with special care to avoid conflict with swimmers and rowers.

If further study confirms the desirability of continued ship mooring in the Hyde Street pier area, the National Park Service will propose to abandon that substandard structure and construct a pier in a new configuration in the same general area. As many ship maintenance functions as possible will be incorporated into the design of this structure, with maximum exposure to visitor viewing. The fate of the existing structure, which is owned by the Port of San Francisco, must be determined through discussions with that agency.

To further strengthen the relationship between the new maritime museum and the Hyde Street pier, a common entry plaza will be developed at the intersection of Hyde and Jefferson streets. The swimming and rowing clubs along Jefferson Street are major visual and physical barriers to the bay, and they will be relocated if they

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are placed under the jurisdiction of the National Park Service. New facilities for swimmers and rowers will be provided in the old museum building, and the historic club buildings and associated boats will either be incorporated into the new Hyde Street pier structure or moved to the west side of the lagoon at the foot of Van Ness Avenue. The portion of Hyde Street within the park boundary (between Jefferson and Beach) will be obliterated.

To visually emphasize pedestrian access between all of the ships, the existing waterfront promenade will be made more prominent with new seating areas, street furniture, and paving materials that contribute to the maritime setting.

The existing maritime museum building (originally built and known as the Aquatic Park bathhouse) will be adapted as the Aquatic Recreation and Education Center, carefully preserving valuable interior as well as exterior architectural details. The renovated lower level will have supervised showers and lockers and a concession for rental of equipment such as small boats, fishing gear, bikes, and bocce balls. The remainder of the building will serve as multipurpose space suitable for use as classrooms, laboratories, and meeting rooms for various-sized groups. National Park Service and community programs accommodated there will carry out the broad Aquatic Park theme; specific program subjects might include lifesaving, sailing, canoeing, maritime history, and wooden ship restoration. The senior center will gradually be phased out of this building as a new center in Fort Mason develops.

All of Van Ness Avenue inside the park boundary will be removed and replaced with landscaping. In recognition of parking deficits in the northern waterfront, the National Park Service in coordination with appropriate departments and officials of the city and county of San Francisco will explore the possibility of constructing a multilevel parking structure at the terminus of Van Ness.

The Sea Scout clubhouse and maintenance docks will also be removed. The Sea Scouts' boats will be moved to the east side of the lagoon, and their programs and meetings will be held in the aquatic center. (The implementation of these proposals will require full breakwater protection. All detailed planning for them will involve consultation with the Sea Scout organization.) The food concession at the foot of Van Ness will receive a good sprucing-up. The municipal pier will also get a substantial cleanup and minor improvements such as fish-cleaning stations and restrooms. (It may also require major structural renovation.) Night lighting throughout the area will be upgraded.

Few facilities will remain unchanged in Aquatic Park--only the bocce ball courts and most of Victorian Park. A park and transportation information kiosk will be developed near the cable car turnaround to

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serve those in the crowd who might not make it into the Haslett Warehouse.

When detailed design work is done for this unit, it will explore ways of making the bleachers adjacent to the aquatic center more attractive and useful as a casual seating and sunning area while retaining their usefulness as seating space for special events. To enhance this function, the original plans for a floating stage should be reassessed and implemented if feasible.

Fort Mason

Acres of vacant or asphalt-paved land adjoining the red-roofed buildings of Fort Mason will be dramatically exchanged for a generous dose of traditional park landscaping, including trees, shrubs, great expanses of lawn, and meandering walkways. The buildings themselves, varying from massive pier structures to match-box 19th century houses will be adapted for a variety of cultural, recreational, and educational programs.

Because of the obvious appeal of the bayshore, the imposing stature of the buildings, and the attractive programs they will contain, the pier and warehouse area will remain the center of attention at Fort Mason. Here the cultural color and diversity of the people of the San Francisco Bay Area will be revealed in theaters, studios, workshops, galleries, and classrooms imaginatively created within one pier building and two or more warehouses. To the Bay Area resident this center will represent one more important source of entertainment and enrichment. To the out-of-towner spilling in from Fisherman's Wharf it could become a convenient place to learn more about one of the Bay Area's prime attractions--its people.

Another pier structure and warehouse will be adapted to accommodate programs concerning San Francisco Bay marine ecology. Specific programs and exhibits offered in these facilities should appeal to drop-in visitors as well as to local school groups and could cover such subjects as marine wildlife, tidal dynamics, bay pollution, and shipping. Although some static museum presentations may be included, emphasis should be placed on visitor participation in learning experiences. Space for docking appropriate research vessels relating to the above programs will be provided adjacent to the pier structure.

The remaining pier structure will be developed as a multipurpose facility to be used for large special events or by community organizations for indoor recreational activities. Space should be reservable to encourage groups to utilize it when participating in other Fort Mason programs.

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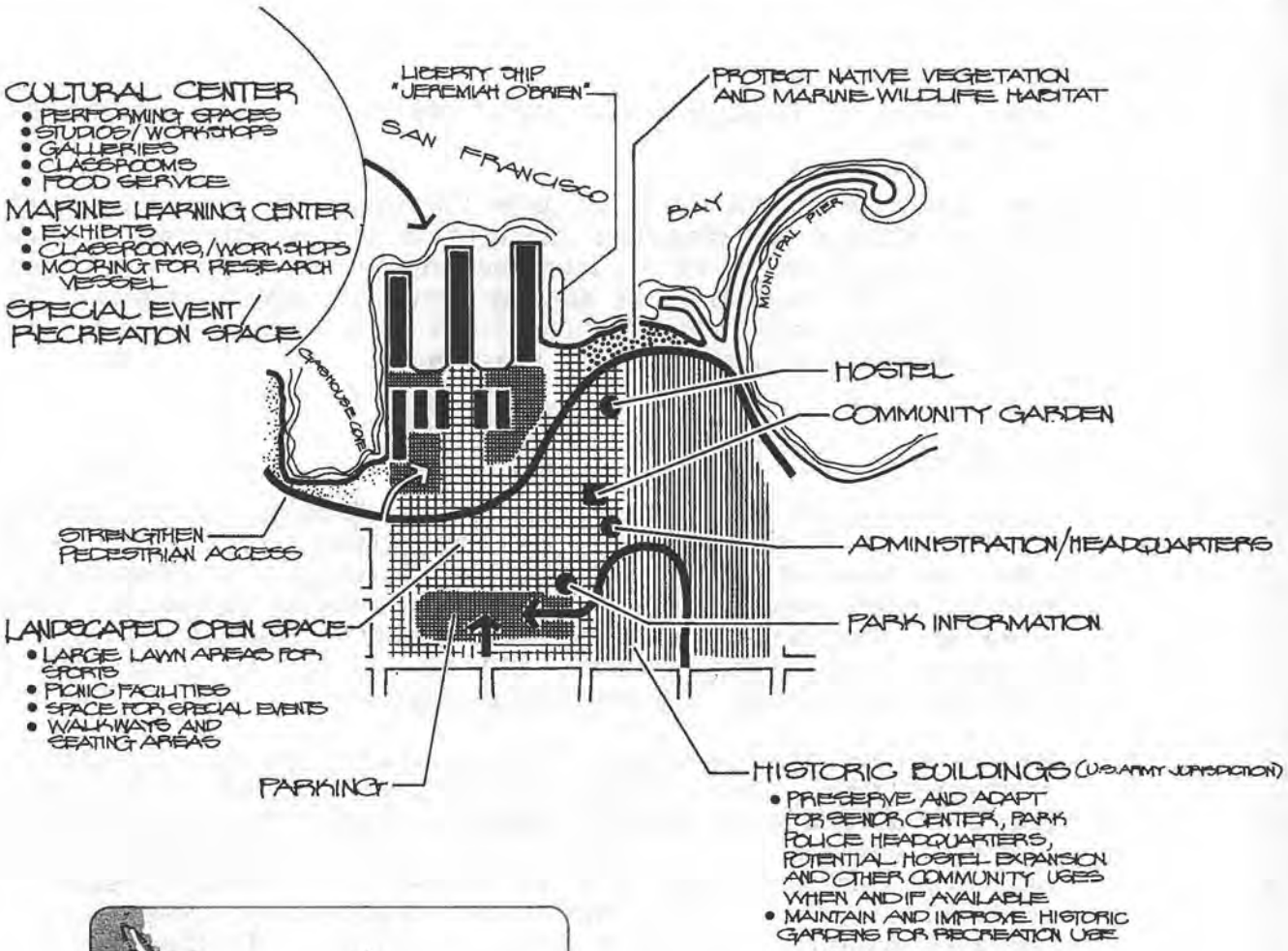

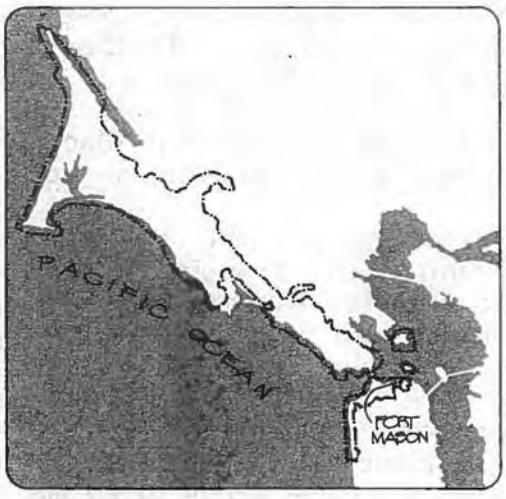

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FORT MASON

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

Fort Mason's developed waterfront space--now a stark, lifeless industrial scene--will retain its rather grand scale but will become a more pleasant place through the judicious introduction of trees and other landscaping. Specific design of these elements will consider the ability of the space to accommodate outdoor events and performances. Continued access for fishermen and people simply strolling the waterfront will be assured. As a convenience to the many people who will enjoy waterfront programs and activities at Fort Mason food service facilities will be provided.

The waterfront's former wartime role has begun to be spotlighted in a visually impressive manner. The Jeremiah O'Brien, a remarkably well-preserved World War II Liberty ship of the type that formerly docked at Fort Mason (the last of its kind) has been rescued from the scrapper's torch and is now permanently moored at Pier 3. Volunteer efforts to totally renovate the vessel and equip it with interpretive exhibits are well underway and should result in a highly appealing historic feature of the waterfront.

Limited parking for Fort Mason visitors will be provided in the pier area and at the southwest corner of the fort. In conjunction with optimum transit access, these facilities should adequately serve average parking demand. Parking for special events will continue to be satisfied in cooperation with the army through shuttle service and remote parking areas in the Presidio.

The pleasant historic plantings within the military residential areas along the eastern side of Fort Mason provide a starting point for the greening of the rest of the site. Many old building foundations and unnecessary roadways have been removed from the west side to make way for landscaping, but known prehistoric cultural materials beneath have been preserved. Elements of the new "upper fort" will include large lawn areas suited for sports and other activities, paved areas with benches and wind shelters for socializing, picnic facilities for both groups and individuals, a garden designed for community participation, a small children's play area, a through-path for walkers, joggers, and cyclists, and a modest park information center and park police headquarters.

The old post hospital building (later the port of embarkation headquarters) will continue to serve as National Park Service administrative offices. Across the historic parade ground (to be restored) the old Civil War barracks has become a hostel. In the future, this type of overnight facility might also be offered in the nearby historic residences overlooking Aquatic Park. Because these and other structures on the east side are still under the jurisdiction of the army, park uses for them will not be contemplated beyond this brief discussion until it has been determined that the army has no further use for them. When any of these structures do become available, they will be specifically analyzed for potential historical interpretation and adaptation into

various community program facilities. The senior activity center now located in Aquatic Park will be one of the uses considered for this location. When buildings are available, relocation will take place over a long-term transition period.

On one hand, people have continually requested that the open space within Fort Mason be maximized; on the other hand, Fort Mason contains numerous historic buildings which need preservation. While the structures in the southeast corner of Fort Mason have been nominated to the National Register of Historic Places, they are visually the least attractive and probably are the most difficult to adapt for public uses. If park uses cannot be found for these buildings which justify the cost of their maintenance and the loss of the open space they occupy, selected structures may be removed as permitted by NPS management policies.

The National Park Service central maintenance facility, serving warehousing as well as fabrication and repair functions, is presently located in pier 1 at Fort Mason. The Park Service has long recognized that this is an inappropriate use for a location with such a high potential for public use; however, there are simply no suitable alternative sites under National Park Service jurisdiction offering either the physical space or isolation to accommodate this potentially obtrusive operation. In spite of decentralization efforts, the facility will continue to be comparatively large. The ideal solution to this dilemma would be for the National Park Service to negotiate with the army for a site or facility with minimal visibility and minimal potential for public use within the Presidio of San Francisco. A second, but less desirable, location might be found in Fort Baker. (See "Management Facilities" section.)

Crissy Field

The flat barren expanses of Crissy Field will be transformed through a subtle blend of natural and manicured landscaping into a setting that will greatly enhance its recreational potential and remarkable views of the Golden Gate.

The primary components of this semicivilized shoreline will be a sandy beach and broad expanses of lawn. These grassy areas will be designed in various configurations to accommodate active recreation, programs, special events, picnicking, and even sunbathing when the weather allows. Tables and charcoal grills for family picnicking will be located on and adjacent to these green spaces. Walkways, boardwalks, and seating areas will create pleasant spaces for strolling, viewing the bay, and socializing.

Most of the area will remain level, but some dune-like earth berms planted with natural-appearing ground covers will be created to increase the natural appearance and to help provide wind protection

and visual screening. Trees will be carefully introduced into the scene to also act as windbreaks without blocking desirable views. In recognition of the historical value of the old airfield, new landscaping will avoid significantly changing the present openness of the area. In response to known needs for safe water play opportunities, detailed design studies will also consider the creation of a lagoon, possibly connected with the bay.

Because there are no historic structures suitable for adaptation for indoor space within the Crissy Field 45-acre permit area, most existing structures will be removed. (Many nearby historical buildings relating to Crissy Field remain under the jurisdiction of the army and will be appropriately preserved.) The nearby historic Fort Point lifesaving station could possibly accommodate a small information station and public restrooms. Discussions will be initiated with the Coast Guard to determine the possibility of a space-sharing arrangement. If this is not feasible, those services and also minor food service and recreation equipment rental will be contained in a new structure.

Beach erosion is a continuing problem at Crissy Field. In the past the army has controlled it by placing concrete and asphalt rubble along the shore. However, this solution will be aesthetically unacceptable as the area becomes more parklike, and future design work for Crissy Field will include engineering studies to determine the best methods of stabilizing a natural-appearing beach in this location.

Army plans for further development of commissary and administrative facilities adjacent to this area should be carefully coordinated with recreation use patterns and plans, with a particular concern for access points and parking.

Cliff House

Despite the deteriorated condition of both the land and facilities in this area, everything that has made it one of the world's most popular coastal overlooks for more than 100 years is still here--the sea lions, the wave-swept expanses of Ocean Beach, and views across the Golden Gate to the wild and rugged Marin coastline. The intent here will be to rejuvenate the unsightly development and green up the landscape--and to recapture the spirit of another era when San Franciscans flocked here to frolic in the water, promenade along the beach, or enjoy elegant dining made special by the sights and sounds of the Pacific.

If necessary further study determines that the present Cliff House, built in 1909, still possesses sufficient structural soundness and historical integrity (the building has been altered significantly), the exterior facade will be restored to its former appearance. The

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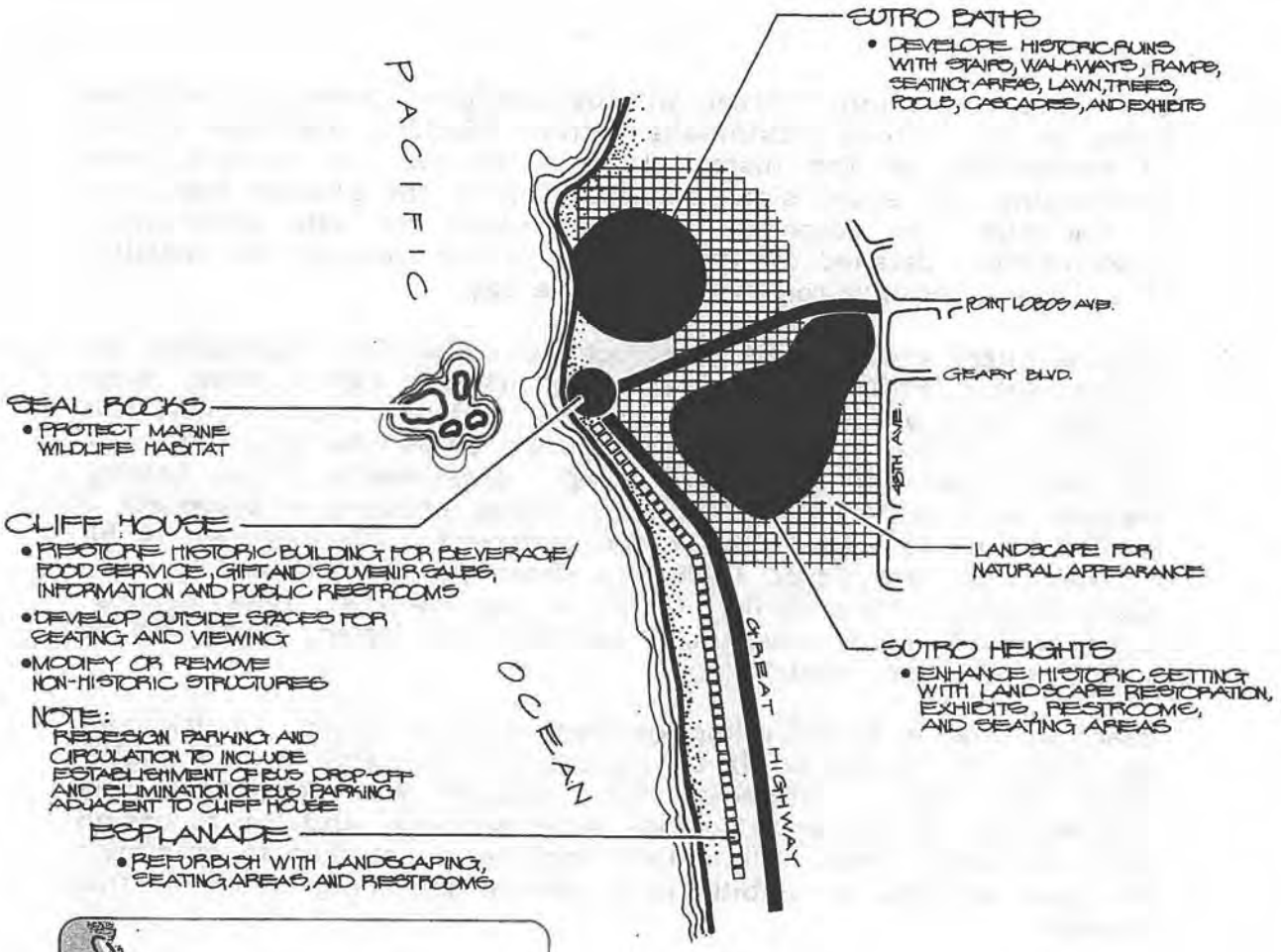

CLIFF HOUSE

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

building will continue to be used as a restaurant, lounge, and gift shop. It will also house exhibits relating to the historic role of the Cliff House, public restrooms, and a National Park Service visitor information and publication sales facility. In conjunction with the exterior restoration, other structures in the vicinity that do not appropriately fit into the historic setting will be removed or modified.

If restoration of the old Cliff House does not prove feasible, design and construction of a contemporary version will be considered as an alternative. A new building should assume an entirely new aspect, as has each of the succession of structures built here since the 1850s. But it should also aspire to generate the same kind of excitement that the 1896 French chateau version prompted, without emulating the visual dominance and opulence of that structure.

Whatever final choice is made for the Cliff House itself, the site's primary value as an overlook will be increased by adding attractive exterior paving and seating areas for those who come only to enjoy the view.

The former site of Sutro Baths will be improved as a setting for enjoying the seaside a little longer, closer, and more privately than the nearby Cliff House overlook will allow. This picturesque, barren, eroding cove filled with crumbling concrete ruins will become a safe and attractive space, easily accessible from the Cliff House. A system of stairs, walkways, ramps, and seating areas will be placed around selected elements of the bath ruins. The special visual appeal and symbolism of the ruins will be complemented by the addition of decorative pools and cascades. A few outdoor exhibits with photos and text will help visitors envision the baths as they once existed.

Landscape improvements will increase the natural appearance of the site. Some alteration of terrain will be needed to accommodate the development described above, to provide for visitor safety, to bury undesirable components of the ruins, to protect prehistoric sites, and to enhance the natural character of the setting. New planting will include Monterey pine and cypress and native shrubs, ground covers, and herbaceous plants. Consideration will be given to the possibility of restoring the small sandy beach that once fringed the cove.

With the hope of reviving its former dignity without disturbing present users, the seawall/esplanade stretching from the Cliff House south to Golden Gate Park will receive a substantial facelift, including new plantings, seating areas, restrooms, and street furniture (benches, lighting fixtures, waste containers, etc.). The National Park Service will continue to work with the city of San Francisco toward the goals of improving pathways for pedestrians

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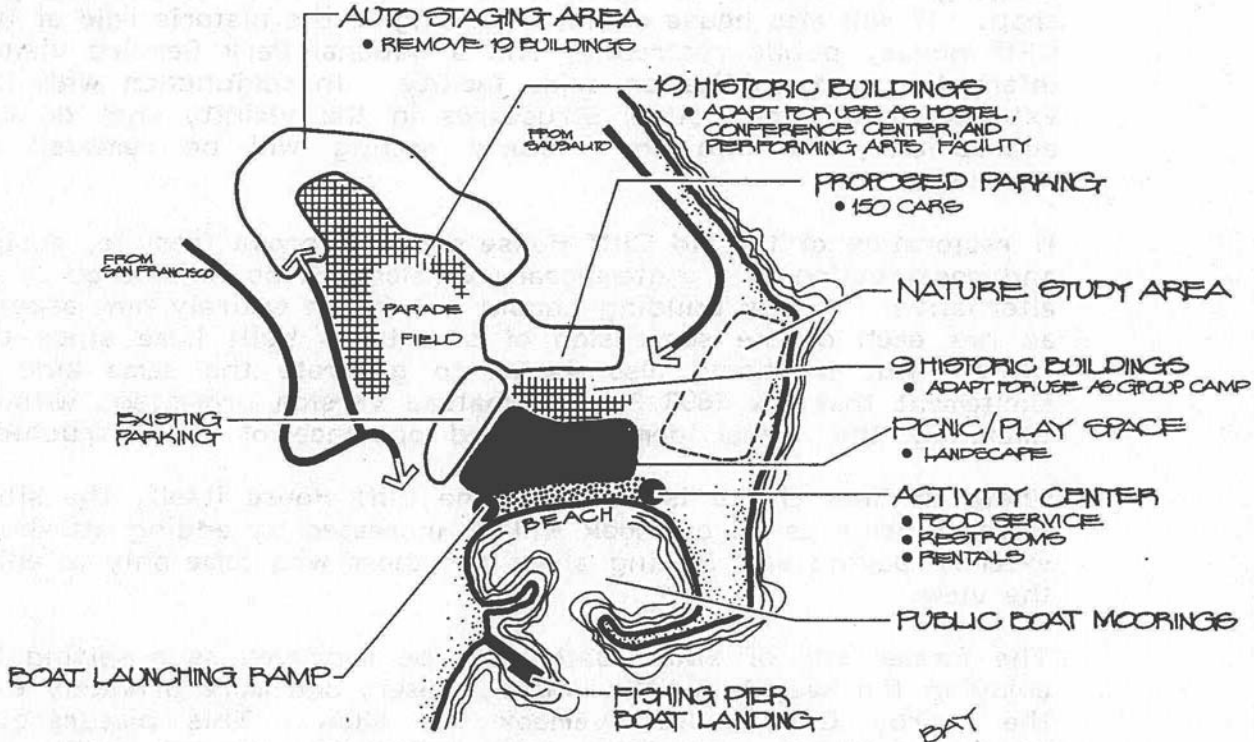

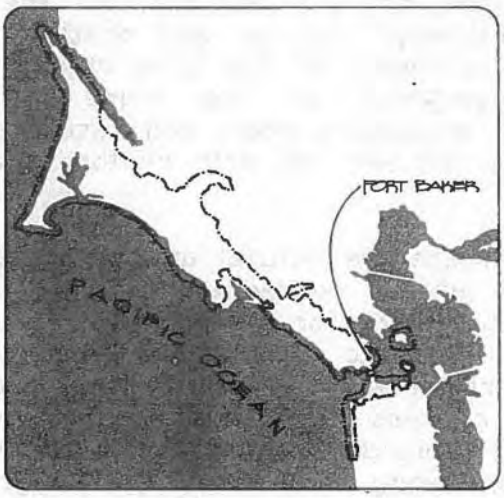

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FORT BAKER

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

and cyclists and strengthening the visual connection between the beach and Golden Gate Park.

Sutro Heights Park will retain its quiet neighborhood orientation. The plantings and statuary of Adolph Sutro's garden will be partially restored, and modest exhibits will explain who he was. Improved overlooks with comfortable benches will help visitors to better enjoy the views. A restroom will be provided.

Future design efforts will focus on rectifying the unsafe, congested, and unsightly conditions created by existing parking and circulation arrangements. Possible improvements might include remote bus parking with a drop-off area in front of the Cliff House, and a safe on-grade pedestrian crossing between the Cliff House and Sutro Heights Park.

Fort Baker

This secluded bowl-shaped valley and quiet-water cove nestled at the foot of the Golden Gate Bridge could become one of the most attractive recreation spots in the Bay Area. Although predominant U.S. Army jurisdiction over this area is expected to continue into the foreseeable future, many improvements in public accessibility and usability could happen relatively soon.

The 6-acre waterfront area now occupied by deteriorated nonhistoric frame buildings and protected by a wood and rubble seawall will be cleared and graded to make way for a sandy beach backed by grass and trees. (Prior to seawall removal a study will be conducted to determine potential beach erosion problems in this location, although it appears that the original shoreline configuration will be restored, and the cove will continue to be protected by two breakwaters.) Backed by a village of historic buildings grouped around a 10-acre parade field, and fronted by 10 acres of quiet bay waters, this spot should become an instant success with picnickers, swimmers, fishermen, sunbathers, and boaters.

If and when it is no longer utilized by the military, the Presidio Yacht Club building will be converted to a day center serving this exciting new activity area. The structure would be modified to contain a food service facility with indoor and outdoor eating space, areas for socializing and playing games, comfort stations, and a place for rental of equipment such as fishing tackle, bicycles, and volleyballs and nets. The yacht club finger piers would be made available to all boaters for one-night berthing. On the opposite side of the cove, the existing boat-launching ramp will be repaired and resurfaced, and the nearby historic pier will be improved with new railings, benches, comfort stations, and fish-cleaning stations. Ferry boat passengers bound for Marin Headlands destinations could

disembark at this pier. An adjacent building will be adapted for use as an information station.

In addition to their great visual appeal, Fort Baker's historic turn-of-the-century buildings also offer abundant program space. In the event of the army's release of these structures a group of them will be converted to a conference/seminar center with classroom, workshop, conference, and short-term residential facilities provided for the study, discussion, and teaching of conservation, ecology, and other park-related subjects. Other structures in the same area could be converted for use as hostel facilities for the general public as well as conferees. The former post industrial center, including a blacksmith shop, bakery, stable, and warehouses, is conveniently located adjacent to the proposed waterfront park. Its interior spaces could be refurbished to create classrooms, dormitories, and work/play areas for the use of school, church, and other groups who may reserve space for their own environmental education or recreation programs. Space in and around nearby Battery Cavallo, an earthwork fortification located on what appears to be a piece of untouched natural bay shoreline, could be used as an environmental study area and overnight campsite by groups occupying the education/recreation center. Extra care will be exercised in the siting of trails and tent sites to protect the earthworks from erosion.

As part of, or at least related to, the Fort Barry artists-in-residence program, several suitable historic buildings at Fort Baker could be adapted to accommodate the performing arts. The old post gymnasium is a likely candidate for this kind of use. If and when the army ceases to use the 19 nonhistoric residential units located behind the parade field, Fort Baker could become a staging area for use by visitors bound for Rodeo Valley. Removal of the structures would provide a parking area with a design capacity of 700 cars for use when Rodeo Valley is closed to private vehicles and is accessible only by transit. Preservation of existing trees and additional plantings will mitigate the visual impact of this parking facility. Some redesign of intersections and circulation routes will be required for adequate access.

Rodeo Valley

The Marin Headlands area is a frontier--an impressive rugged mass of land thrusting the great outdoors almost to the heart of the city. Rodeo Valley, the historic and geographic center of the headlands, is totally isolated from the urban scene, yet it is only a few minutes away. Development here is intended to facilitate the enjoyment of this "accessible wilderness" by people who are unaccustomed to this kind of setting as well as by experienced backcountry users. A scattering of historic army buildings and former building sites will be the primary objects of this effort.

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These are confined in two distinct clusters--Fort Barry and Fort Cronkhite.

Fort Cronkhite occupies the north side of Rodeo Lagoon and provides access to the popular Coast Trail and Rodeo Beach. Of the more than 40 structures clustered in this area, a distinct group of 25 World War II vintage barracks has been determined to be historically significant, and these will eventually be adapted to accommodate environmental education and community recreation programs. Selected structures may possibly be removed to help improve the appearance and usability of exterior spaces, but care will be taken to ensure the preservation of the historical visual integrity of the complex.

The remaining structures have no historic or architectural value, and most of them will eventually be removed. Because of their good condition some of these buildings have recently been adapted as classroom, dormitory, and conference space for environmental education programs, and they will not be removed until these improvements have been amortized sufficiently.

Within the open space resulting from building removal the area furthest away from the lagoon will be developed as a parking area, screened from view by planting and topography. This will replace the existing lot directly adjacent to the beach and allow the removal of nearly a half mile of roadway bordering the lagoon. The 10 acres directly fronting on the lagoon will be enhanced by the addition of natural-appearing plant materials. More Monterey pines, cypress, grass, and picnic tables will transform this old development site into a park setting that will appeal to a wide variety of people. Of the existing structures located within the confines of this proposed picnic/play space, one or more will be retained to provide for a ranger station, restrooms, minor food service, and the rental of bicycles.

The former Nike missile support facilities located on the hillside to the north of the lagoon are considered historically significant structures, and they will continue to be adaptively used for park maintenance and other administrative activities.

Like Fort Baker, Fort Barry lies within a bowl-shaped valley and contains an old parade field rimmed with red-roofed buildings. These structures will be adapted to accommodate a hostel and an artists-in-residence program. The hostel will provide individual and family accommodations and facilities suited for group retreat-type gatherings. The artists-in-residence program will take advantage of the park setting as an inspiration to the creation of the visual arts and the active sharing of that process with park visitors. Actual short-term residencies will be limited. All artists' studios, workshops, and galleries will be open to the public at specified times.

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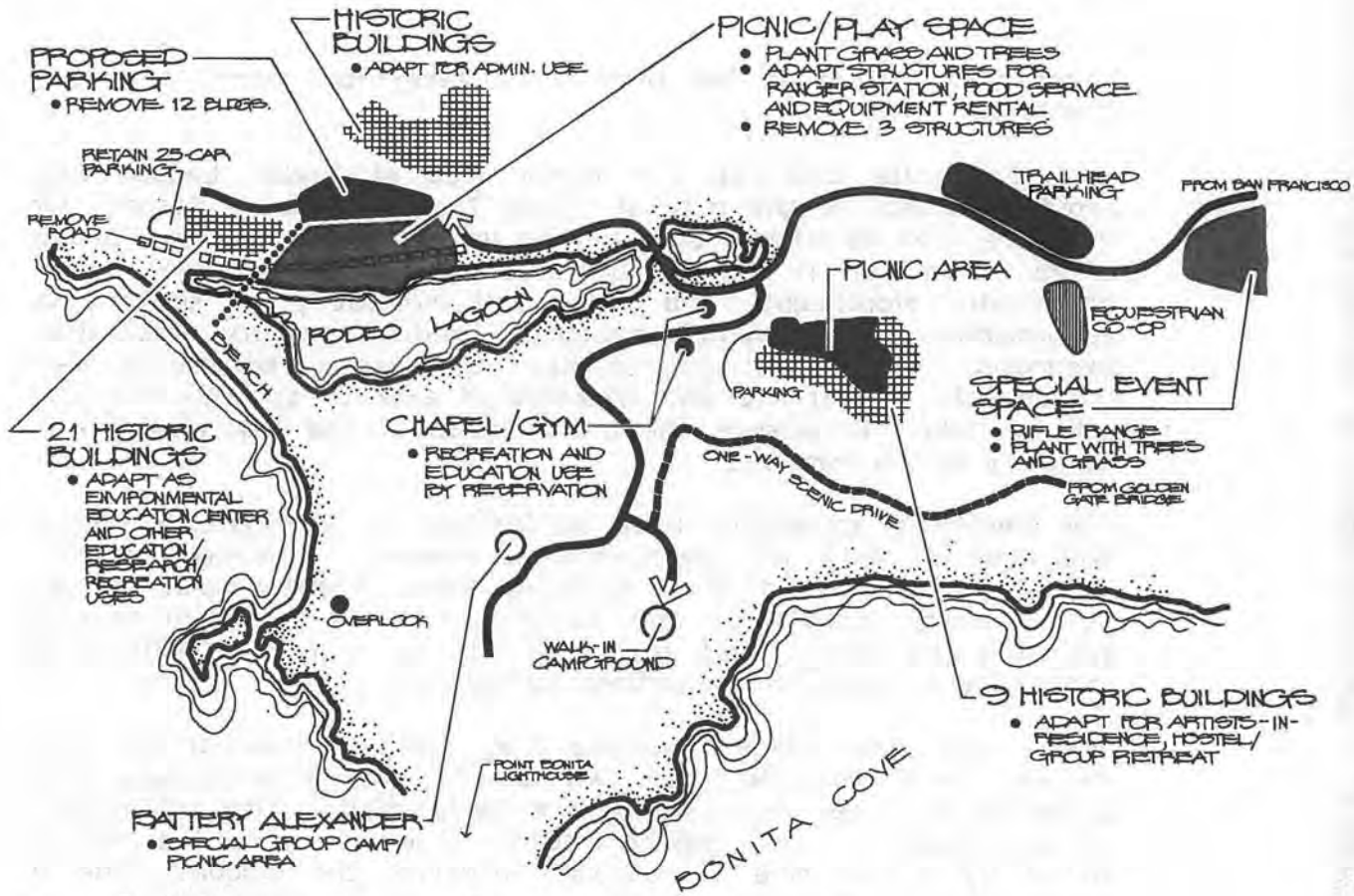

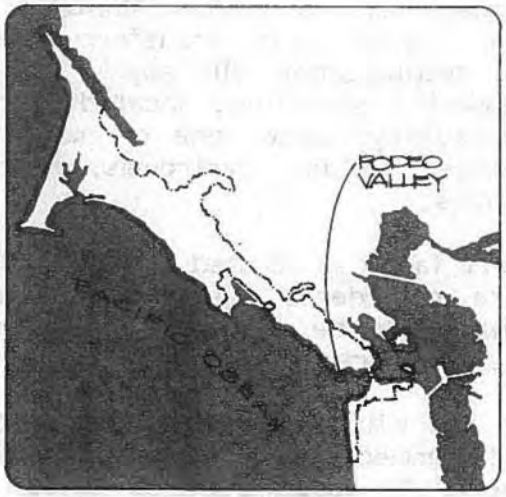

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UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

RODEO VALLEY

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

The parade field and adjacent open space will be used primarily as a picnic area with tables, restrooms, charcoal grills, and a small parking area at the edge.

The chapel and gymnasium at the head of the lagoon will be available by reservation to community groups. Farther up the valley, the stables will be retained as a public horse-boarding cooperative with a small complement of rental animals, and the historic balloon hangar will continue to be used as an indoor riding ring. Across the road from the stables a 7-acre site formerly occupied by army quarters will be converted to a well-screened trailhead and interim parking area for use until full public transit service is implemented. Some 400 spaces will be delineated by planting and surfaced with native grasses. This will provide clearly defined but temporary special event and peak use parking that will not be an intrusion during low and normal use periods. The spacious but barren rifle range will receive modest landscape improvements to create an ideal setting for special events such as folk festivals and symphony performances. When not serving this function it will double as a picnic area and playfield. During landscaping efforts, care will be taken to ensure that the former shape and size of the rifle range will remain sufficiently intact to allow adequate historic interpretation.

The 16-acre army Capehart housing area near the Baker-Barry tunnel, with its generous supply of irrigated lawns and trees, will make a fine picnic area. Large open areas suited for sports activities will make it especially attractive to groups. All military housing facilities located in the Marin Headlands currently occupied by the army will continue to be used for this purpose into the foreseeable future. When and if they become available, plan proposals affecting them should be carefully reevaluated.

Back toward the lagoon, Battery Alexander will be adaptively used as a small picnic area, day camp, and overnight facility reserved for special groups such as inner-city children, the elderly, and the handicapped.

Muir Woods

Muir Woods National Monument contains some of the world's tallest trees and it is an international attraction. Nearly all development needs relate to one objective--to eliminate the inconvenient and unsightly congestion that now plagues the entrance to the monument during its ever-increasing heavy use periods. The following proposals are essentially a reiteration of those contained in the monument's current master plan, reconfirmed through the public involvement process.

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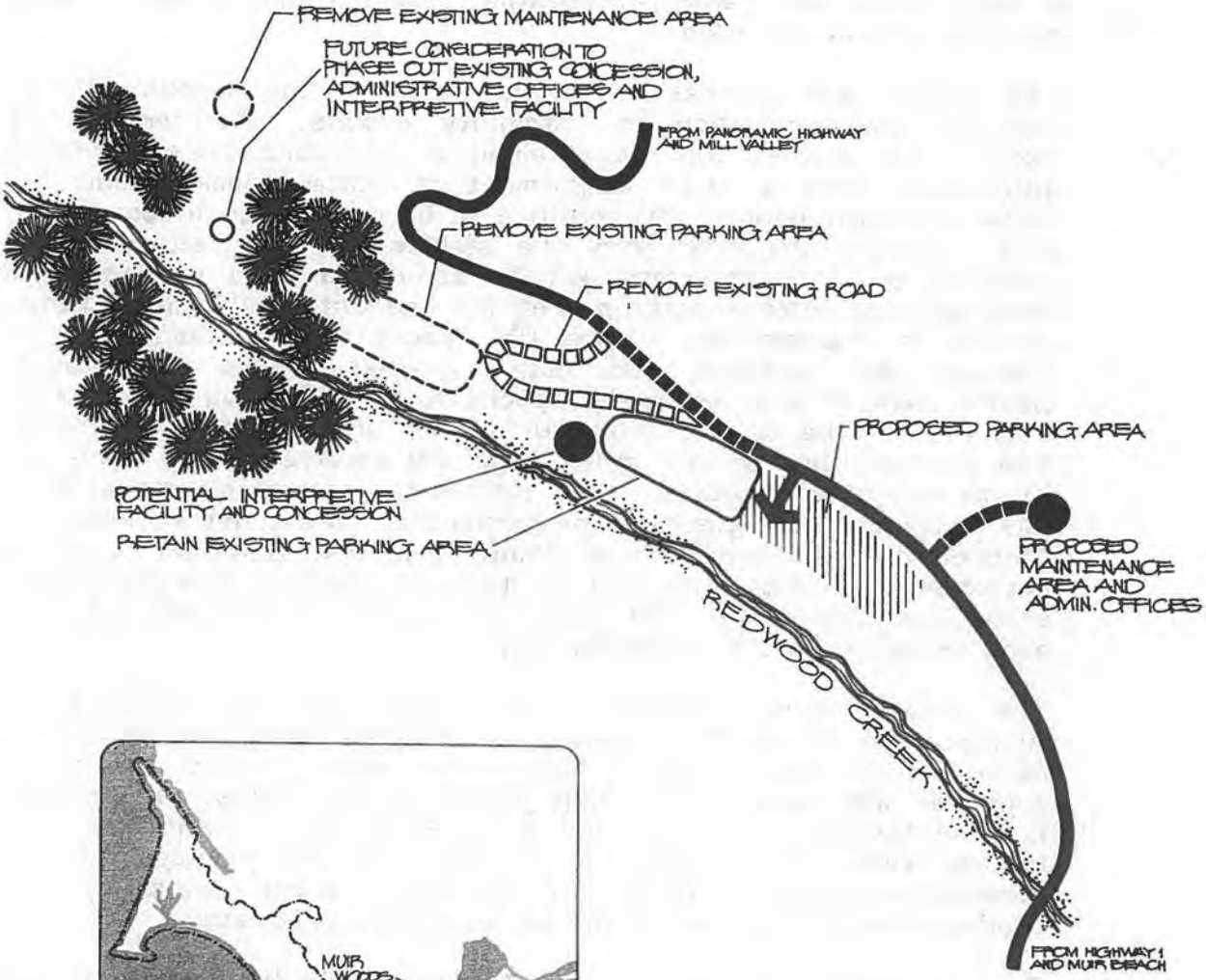

MUIR WOODS

DEVELOPMENT CONCEPT

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

To improve circulation patterns and to remove auto congestion from the immediate vicinity of the big trees, the 100-space parking lot located within the redwood grove will be removed, and the area it occupies will be restored to a natural condition. The resulting parking deficit will then be corrected by providing 100 new spaces in the open area adjacent to the remaining parking lot.

To ease a mutually disruptive association between visitors enjoying the woods and Park Service functional activities, the maintenance facilities and administrative offices will be relocated to a small canyon at the extreme eastern end of the monument, well removed from areas of heavy visitor use. Space made available by moving office functions can then be used for information and interpretive facilities.

Because they may cause visitors to stay longer in the grove and therefore aggravate congestion, the excellent restaurant and gift shop now located adjacent to the NPS offices should not be expanded or modified to significantly increase their capacities. In the future when the investment in the existing structure has been sufficiently amortized, or when major repairs or refurbishment are required, consideration should be given to removing the facility and replacing it with a new structure outside the woods at the west end of the parking area. The interpretive center may be relocated at the same time to the same location.

Stinson Beach

No finer swimming beach can be found on the north coast and none offers a more spectacularly beautiful setting than Stinson Beach. These assets help to generate many pleasant park experiences, but as always, this kind of success brings congestion.

Stinson Beach has only one significant development need--to find a way to move hordes of cars in and out of the beach parking lot without directly mixing that flow with the nonvisitor traffic and pedestrians of the adjacent town. In an attempt to solve this problem, a new parking lot entrance is proposed to be developed south of the town to intercept most beach visitors before they drive through the community.

Bear Valley

To the many wilderness travelers and beach-goers who frequent Point Reyes National Seashore, Bear Valley may only be a functional spot--a place to park for a hike in the forests of Inverness Ridge, a place to catch the shuttle bus to Limantour Beach, a restroom stop on the way to Drakes Beach, or a place to buy a needed map or book. But to those who may not have the time or the ability to

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fully explore the seashore's expanses (like the out-of-towner passing by) Bear Valley may be the highlight of his or her visit.

The rich blend of rural and natural scenery in this area is already supplemented by fine interpretive facilities such as the Morgan horse ranch, the Miwok Indian village, the Woodpecker Trail and the Earthquake Trail. Nevertheless, some expansion of interpretive programs is in order, particularly to help first-time visitors.

The public's expressed desire is that onsite interpretive facilities should be kept to a minimum throughout the park. Therefore, instead of providing major informational services onsite, programs and exhibits will be expanded at the Bear Valley information center.

A new information center will be developed to offer improved personal information services, an audiovisual introduction to the seashore, an easily grasped geographic orientation to activities and scenery, and additional publications such as maps, books, and pamphlets. The new structure will be modest in size and appropriate to the rural setting in appearance. Its location should provide a degree of isolation from administrative and maintenance areas, which are now a very visible aspect of Bear Valley.

Other minor actions that will significantly increase visitor convenience in this location include the conversion of pit toilets to flush toilets at the heavily used trailhead, expansion of the small picnic area near the trailhead parking lot, and provision of enough food service to satisfy the minimal needs of transit dependent visitors who may reach this distant point by bus without having thought to bring their lunch.

DISPERSED DEVELOPMENT

Hostels and Campgrounds

In keeping with National Park Service policies, most park visitor needs for overnight accommodations will be satisfied through the numerous motel facilities in San Francisco and eastern Marin County. This will not only accrue tax benefits to the local community but will also help to spare the parks' valued scenic qualities from new intrusions.

Despite the sizable unmet demand for all types of camping facilities in the region, environmental and aesthetic constraints seriously limit the ability of the National Park Service to significantly alleviate the shortage.

As previously mentioned, most proposals for facilities outside the developed areas are for small campgrounds and hostels. Hostels are intended to provide low-cost overnight accommodations for hikers

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and cyclists of all ages, but car-driving visitors would not be turned away. Whenever possible, these hostels will be developed within historic buildings designated for preservation. Depending upon the structures to be adapted, hostels may offer one of two types of facilities. Army barracks and barns are particularly suited to become dormitory-type facilities, where overnight guests will share common sleeping quarters and kitchen facilities. Ranch houses and old army family quarters are better adapted as places where a family can obtain an individual room.

Proposed hostels have been located no more than a day's travel apart to create a system, that will be reasonably convenient to hikers and cyclists. Because all of the structures that might be adapted as hostels north of Rodeo Valley are still leased and occupied by their former owners, only general hostel locations are indicated in this plan. When a building within these general locations is vacated, it will be determined if it is architecturally and environmentally suitable for a hostel.

Campgrounds are proposed, not as a convenience for people passing through the park, but because the activity of camping is considered an important aspect of a park experience here. Thus, the location, size, and number of campgrounds proposed in this plan reflect a concern for the quality of the camping experience rather than an attempt to satisfy the demand for camping facilities--which probably could never be satisfied at any rate.

All campgrounds in the park will be relatively small and are proposed in locations with minimum visibility from well-used trails and roadways (see General Development map for specific campground proposals). All camps will be used on a permit/reservation basis. No open fires will be permitted.

Hike-in campgrounds are intended for use by backpack campers and will be accessible only by trail. Some will include tables and a few sites will offer simple shelters consisting of a shingled roof over a wood deck to provide protection from fog drip, wind, and rain. All camps will be equipped with sanitary facilities and trash receptacles.

Walk-in campgrounds will be identical to hike-in camps except that the campsites will be clustered within walking distance of a small central parking area (generally 100 to 500 feet). These are intended for use by people with tent-camping equipment that can be carried from the parking area to the campsite. Facilities will include tables, charcoal braziers, restrooms, trash receptacles, and shelters in select locations. One particular campground site in the north end of the Olema Valley offers the space and visual isolation suited for a relatively large group of camp shelters.

Because many people and organizations have expressed a serious concern over increased use in the Olema Valley, facilities in this

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area should be developed with great caution only after the complete development of similar facilities in other areas of the park. Conservation organizations, county planners, and local people should be directly involved in the specific siting and design of these facilities. The most important aspect of the proposals as they appear in this document is their character, number, and general distribution.

The proposed walk-in camp at Morse's Gulch should be developed only after satisfactory resolution of concerns for harbor seal habitat voiced by the staff of the Point Reyes Bird Observatory and the Marine Mammal Commission.

The idea of establishing primitive camping zones at Point Reyes, where backpackers would be permitted to camp in generally specified areas with no provision of sanitary facilities, was strongly advocated by most workshop and public meeting participants. However, park management and some organizations are concerned about the potential for fire hazard and water pollution. After the proposals for conventional campgrounds have been implemented, a special study will fully analyze the feasibility of zone camping. The study will focus primarily on the success or failure of zone camping in other park and wilderness settings, with comparative interpretations developed for Point Reyes's unique combination of conditions (climate, accessibility, terrain, resource sensitivities, etc.). If the study results are positive, an experimental zone camping program, including regular monitoring and evaluation, will be instituted based on study recommendations. The success of such an experiment and subsequent establishment of primitive zones could require the elimination of some conventional campgrounds.

Trails

This plan contains no specific proposals for expansion of trail systems in GGNRA/Point Reyes. Because both parks were originally endowed with extensive low-standard military and agricultural roads, effective riding and hiking trail systems have been created largely through designation only. In a few isolated instances short connecting trails have been constructed. Trail improvement for correcting safety and erosion problems is an ongoing management program.

Most of the credit for the difficult job of designating routes compatible with the differing needs of hikers and horsemen is due to the efforts of the Citizens' Ad Hoc Trail Committee and the trails committee of the GGNRA Citizens' Advisory Commission. The work of these committees is partly reflected in the main trails indicated on the General Development map. The basic goal of the ad hoc committee in more than three years of regular meetings was to establish continuous trail access from Fort Funston in San Francisco

to the tip of Tomales Point, providing wherever possible the choice between a ridge route and a coastline route.

Little has been done so far toward designating bicycle routes. A detailed analysis of existing roadways is needed first to determine which ones can accommodate a bicycle lane. Factors to be considered in such a study will include speed and volume of auto traffic, accident occurrences, pavement widths, gradients, scenic qualities, and connections with transit systems. At the same time, separate bike trails will also be considered as a means of increasing safety for cyclists, creating opportunities to visit more remote areas, and providing easier gradients. Good opportunities for separate bike trails seem to exist in the Marin Headlands and the Olema Valley. Bike trails may be paved; however, use of other surfaces, such as stabilized soil, will be explored.

Plans for bicycle trails will be coordinated with the plans of state and local agencies and local bicycle clubs. Both Marin County and the city of San Francisco have bicycle route plans, and these will be regarded as an important basis for GGNRA/Point Reyes bike trail planning.

All future trail and transportation planning should be sensitive to the need to coordinate transit routes and stops with trail routes and related facilities.

Other Facilities

Minor improvements in existing picnic facilities will be accomplished at Fort Funston, West Fort Miley, Baker Beach, and Muir Beach. A small picnic area with associated play equipment is proposed for East Fort Miley, and there will also be a new picnic area at Oakwood Valley in the Marin Headlands that will include some facilities suitable for group use.

Only a few interpretive facilities will be located outside of the major developed areas. Subsequent to full development of a consolidated environmental education center in Rodeo Valley, if there is enough demand to warrant two such facilities, the historic buildings of Rancho Bolinas at the head of Bolinas Lagoon may be adapted as another center to accommodate the outdoor education programs of Bay Area schools. A wayside exhibit explaining the ecological importance of the lagoon may be located along Highway 1 near the mouth of McKinnan Gulch in accordance with the Bolinas Lagoon plan and the recommendations of the lagoon advisory committee.

Somewhere in the Tennessee Valley area a small barn and corral will be moved in from another location and stocked with a representative collection of farm animals as the basis for a children's educational program serving drop-in visitors and organized school groups.

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The historic Octagonal House in West Fort Miley will be adapted to house exhibits covering its role in San Francisco maritime history and nearby interpretive and recreational opportunities. A space including a small campfire circle will also be developed at West Fort Miley, to accommodate community day camp activities and occasional group overnights.

There will be interpretive exhibits and tours provided at the Point Bonita lighthouse.

At Point Reyes, exhibits will be expanded at the Drakes Beach center, and special tours and programs may be conducted at both the Pierce Point Ranch and the lifeboat station. Most new exterior signing and wayside exhibits at the seashore will be for necessary resource and visitor protection purposes.

The lack of suitable restroom facilities can ruin an otherwise enjoyable park experience, particularly for young children and the elderly. Although it may seem obvious that all visitor facilities, including backcountry campgrounds, should have suitable public restroom facilities, some current deficiencies indicate that this point needs additional emphasis. For example, at the Cliff House area, the only restrooms available are those inside the restaurant--an inconvenient situation for the concessioner as well as for visitors who are not interested in concession services. At Limantour Beach in Point Reyes visitors don't seem to mind a moderately long walk from the parking area to the beach, but they do object to repeating that walk throughout the day to avail themselves of the restrooms. All areas of the park will be carefully analyzed for these kinds of deficiencies, and appropriate steps will be taken to correct them.

Responding to the horseback-riding opportunities available in the park, and to an apparent shortage of boarding facilities in the region, individual horse owners have organized cooperative stables in three southern Marin County locations. These facilities will continue to operate in their present general locations; but whereas they were originally conceived and operated to only offer boarding services to members, they will now be modified to provide such services to the general public as horse rental, overnight boarding, and trailer parking. In addition, application of their membership policies and regulations will be monitored regularly to ensure against discriminatory practices.

Particularly in Marin County areas of GGNRA much of the development proposed in the plan is of a dispersed, small-scale nature. Many of these projects may be accomplished with operating funds or through work programs such as the Young Adult Conservation Corps. Some may be done using funds provided by other organizations or agencies occupying space or conducting programs in the parks.

Although these small projects basically will be programmed in response to known demand and the availability of funds, it is important to recognize an additional consideration that will control the appropriate timing of their implementation. Because of the area's inherent appeal and the unusual proximity of a large number of people, there is a high potential for overuse in the rural and primitive areas of the park. Therefore, no development proposal that could result in significant increases in visitation should be undertaken without sufficient assurances that staffing levels are or will become adequate to properly manage the increase.

STATE PARK DEVELOPMENT

Certain lands within the authorized boundary of GGNRA and Point Reyes are outside the jurisdiction of the National Park Service (see special use zone under "Management Zoning" section), but the Park Service maintains a protective interest in these areas and will continue to exert whatever influence is necessary to ensure that natural, historic, and scenic values are preserved and recreational opportunities complement what is available in other park areas. Within this context, the Park Service recommends that a hikers' campground and a hostel be located within the southern limits of Mount Tamalpais State Park, where they will be key links in a system of overnight facilities serving people without cars. The Park Service also endorses moderate expansion of visitor facilities on Angel Island in accordance with the current state park plans.

PRELIMINARY RECOMMENDATIONS FOR EXPANSION AREAS

Expansion of the boundaries of both Golden Gate and Point Reyes was recently accomplished through Public Law 95-625 and Public Law 96-199. Additional lands may be included through further legislation. Most of the resulting additions will simply provide for protection of scenic and ecological values. Some of the larger areas will be suited for hiking, horseback riding, and informal picnicking, but for the most part these new areas are unsuited for development or extensive use. A major walk-in campground and/or hostel should be considered for the Cheda Ranch, and scattered roadside pullouts and picnic facilities (tables, trash cans, and chemical or vault toilets) might be established along Lagunitas Creek. Potential impacts upon this important salmon spawning area will be carefully considered before any of these ideas is implemented. Study of the possible development or extensive use of these lands should proceed cautiously until a reasonably firm northern boundary is established. When this has been done, facilities proposed in the Olema Valley should also be reviewed to determine what, if any, influence new use and development

proposals might exert upon them. Cautious consideration is also being given to the establishment of access trails within the Bolinas Mesa addition to Point Reyes with particular attention being paid to the high sensitivity and existing accessibility of Duxbury Reef. The small addition in the Stinson Beach area will facilitate construction of the proposed southern entrance to the beach parking area. New acquisitions adjacent to Sutro Heights Park, now barren and unsightly, will be extensively planted.

MANAGEMENT FACILITIES

Office Space

Under the terms of a current administrative agreement, the superintendent of Point Reyes, who has management authority over all of the national seashore, also has operational authority over the Olema Valley portion of GGNRA north of the Bolinas-Fairfax Road. As long as this agreement is in effect, the headquarters in Bear Valley will continue to be the center of operations for Olema Valley as well as the seashore. The superintendent of GGNRA, based at headquarters facilities at Fort Mason, has administrative supervision over all National Park Service lands south of the Bolinas-Fairfax Road.

Ranger stations will be required at the following locations:

Alcatraz
Aquatic Park
Fort Mason
Fort Point
East Fort Miley
Fort Baker
Fort Cronkhite
Tennessee Valley
Muir Woods
Stinson Beach
Hagmaier Ranch
Tomales Point
Drakes Beach
Point Reyes lighthouse

With the exception of Muir Woods, all ranger stations will be housed within existing structures. In addition, at least minimal office space will be required wherever permanently manned interpretive or information facilities exist or are proposed.

Maintenance

Maintenance operations for the parks are presently supported by two major work and storage centers at Fort Mason and Bear Valley.

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The Fort Mason center occupies a considerable amount of space for which there is a clear demand for recreational use (see Fort Mason development proposals). Therefore, it will be phased out in conjunction with the development of a new storage and repair/fabrication center in a location to be negotiated with the army, preferably within the Presidio. This facility will be kept as small as possible through the strengthening of smaller centers in the following locations:

Alcatraz
Aquatic Park
Fort Mason
Fort Point
East Fort Miley
Fort Baker (unless the primary maintenance center is located here)
Muir Woods
Stinson Beach

As supplements to the Bear Valley center, the following existing maintenance substations in Point Reyes National Seashore will continue in operation:

Hagmaier Ranch
Tomales Point
Drakes Beach
Point Reyes lighthouse

At Fort Funston a small previously disturbed area will be used for the purpose of propagating plants to be used in dune stabilization and other erosion control efforts.

U.S. Park Police

Visitor protection services for the San Francisco portions of the park will continue to be provided by park police based at their present headquarters at Fort Mason. Stable facilities for their horse patrols will remain at East Fort Miley in conjunction with a substation serving police functions for the San Francisco Headlands and Ocean Beach areas. Adaptive use of gun batteries for administrative purposes in this area should be pursued in a manner that would not foreclose future in-depth historical interpretation of those resources.

Emergency Equipment

The National Park Service will maintain fire-fighting and search and rescue equipment at the following locations:

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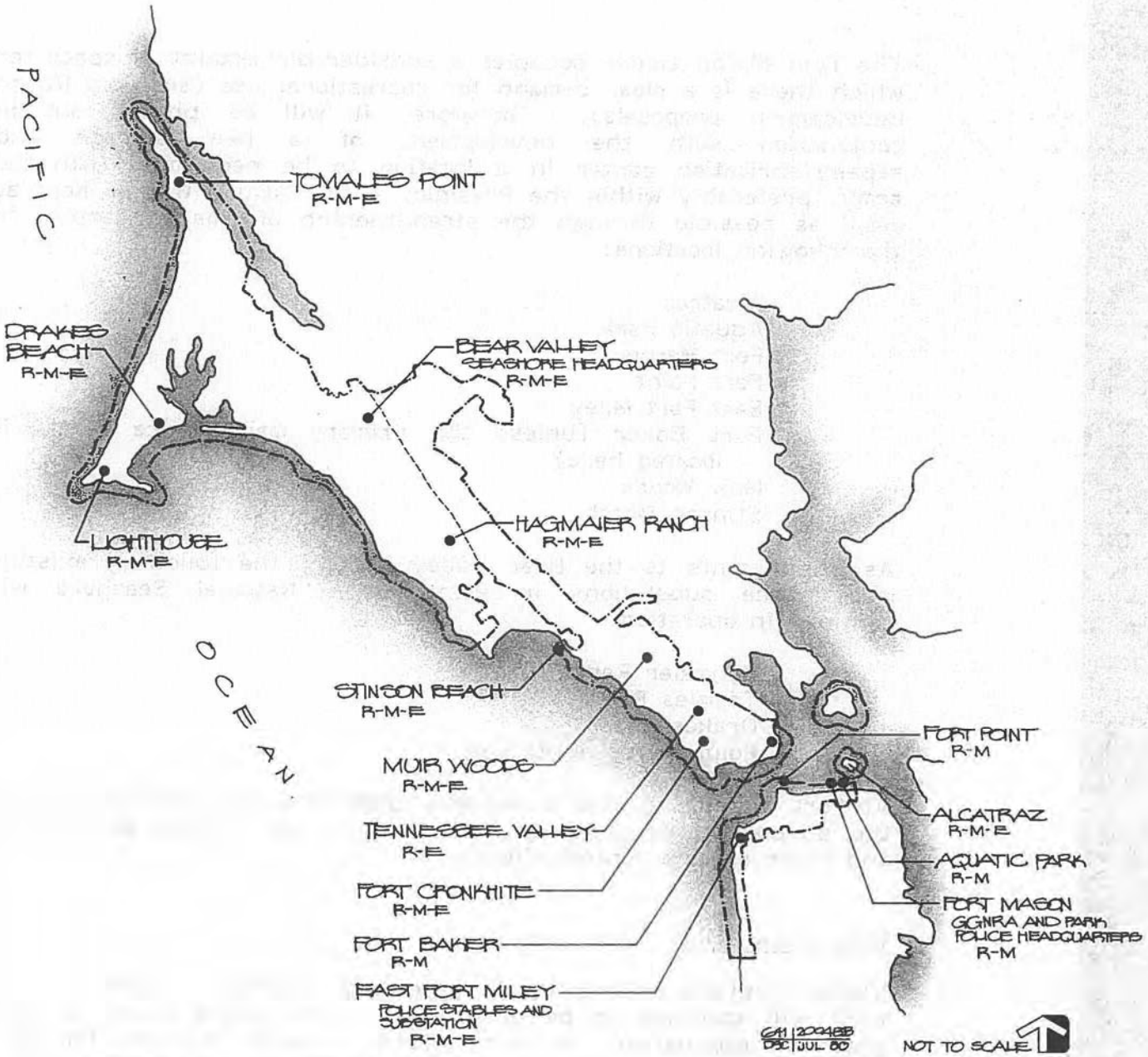

MANAGEMENT FACILITIES

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

Alcatraz
Fort Point
East Fort Miley
Fort Cronkhite
Tennessee Valley
Muir Woods
Stinson Beach
Hagmaier Ranch
Bear Valley
Tomales Point
Drakes Beach
Point Reyes lighthouse

Employee Housing

Generally speaking, Bay Area employees of the National Park Service will reside in the community outside park boundaries. Whenever possible, the many residential structures to be retained in the parks will be used for visitor activities. However, there will be exceptions to this policy for purposes of resource or visitor protection--for example, situations where no other reasonable use can be immediately determined for a vacant historic structure or where 24-hour employee availability is deemed desirable. All nonhistoric structures presently functioning as employee housing but not serving essential management needs will be removed as soon as possible or converted to public use.

UTILITIES

Utilities are a major concern at GGNRA/Point Reyes and will be an important consideration in the future use and management of the parks. In some areas no systems exist; in many other areas, particularly former military sites, the existing systems are deteriorated and need substantial upgrading. Sewage disposal is currently handled by a combination of conventional sewage systems and treatment plants, leachfields and septic tanks, composting and pit toilets, and portable self-contained chemical or vault toilets. Water is provided by means of conventional pumping stations and water mains, creek and spring diversions, and wells. Gas, telephone, and electric service are provided by conventional service lines.

The National Park Service will adhere to all applicable provisions of Executive Order 11752 for the prevention, control, and abatement of environmental pollution for all facilities under its jurisdiction. This includes adequate sewage collection and disposal, solid waste collection and disposal, and protection of the quality of waters within, or flowing through, the area. To accomplish this goal, wherever possible sewage and water systems will be connected to

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public utilities. The National Park Service will strive to sell or transfer government-owned electrical, telephone, and natural gas distribution systems to public utilities.

San Francisco Parklands

For the most part, the existing utility systems have the capacity to provide the level of service required by the plan. Existing water systems will be modified or extended when possible. The provision of water in sufficient quantity for moderate amounts of washing, drinking, and toilet use should not be difficult. However, when existing systems are not available, alternative means of supplying water will be studied. These may include the use of cisterns and rain catchments, importation, and tank storage.

Existing sewers will be modified or extended wherever feasible. However, where the existing onsite or adjacent sewer is inadequate to serve present or potential needs, alternative systems, including composting and chemical toilets and treatment plants, will be considered.

In San Francisco, a more detailed technical analysis of utility requirements for existing as well as proposed facilities will be undertaken to determine present conditions and the appropriate source for utility service.

Alcatraz is unique in its utility demands. Present utilities include chemical toilets, imported freshwater (for limited washing, irrigation, and emergencies), an onsite generator, and radio for communications. Consideration will be given to converting water and electrical systems to those more appropriate for site conditions (water cisterns, stormwater catchments, wind and solar generators). Additionally, extension of telephone lines will be considered.

Marin County Parklands

In Marin County, expected levels of visitation will be adequately served by the upgrading of existing wastewater facilities or, if necessary, the development of new facilities. Proposed walk-in, hike-in, and group campgrounds, as well as picnic areas and trailheads, will be served by self-contained toilets.

Wherever possible, wells will be used to supply water. Water storage will be provided where necessary for visitor accommodation and fire protection. Where water cannot easily be provided to proposed camps, they will be operated as "dry camps" with no water provided. Where feasible, septic tanks and leachfields will be installed or upgraded to meet the disposal needs of all proposed

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indoor overnight accommodations. Secondary treatment will be preferred for major proposed beach comfort facilities. However, where no secondary treatment is available and the ground conditions are acceptable, beach comfort facilities will be serviced by septic tanks and leachfields.

At this time there is not enough information to declare specific solutions for the provision of water and sewer services to larger areas and facilities in Marin. A separate study will be undertaken to determine the most appropriate methods of service. Preliminary findings suggest that the following approaches to utilities may be desirable:

Marin Headlands:	Sewer -	New sewage collection system. Hookup with Sausalito system.
	Water -	Possible long-term noninterruptible water service commitment from Marin Municipal Water District, or use of local water sources with storage for peak periods.
Mount Tamalpais:	Sewer -	Develop new onsite disposal or vault system. Existing service adequate at Muir Woods.
	Water -	Cooperative development of new water sources with Stinson Beach for village and park use, or separate water supply and storage system. Existing service adequate for Muir Woods.
Olema Valley:	Sewer -	Where feasible, expansion of existing septic tank systems.
	Water -	Development of new sources or upgrading of wells, with storage for peak periods.
Point Reyes:	Sewer -	Expansion of existing system at Bear Valley.
	Water -	Existing service adequate.

In Marin County, if future studies show that visitor needs exceed the ability of an area to provide adequate water, facilities will be relocated to more suitable sites or scaled down to a level consistent with available supply. Groundwater sites that have shown a concentration of solids due to seawater intrusion will not be utilized as water sources. Groundwater utilized for drinking will be treated.

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TRANSPORTATION

THE APPROACH

Transportation issues are critical, for their resolution will affect how successfully the park provides an enjoyable recreational experience for a diverse group of people. Unless action is taken, expected visitation increases will result in too many people coming to the park by car. More auto traffic will contribute to more congestion, more impacts on adjacent communities, and more frustration for people traveling to the park. Unfortunately, time will not make transportation problems disappear; it will only make them more apparent. Meanwhile, for those without automobiles, a sizable population in the Bay Area, the park will remain largely inaccessible.

The National Park Service, with the cooperation of other interested agencies, must respond to these problems. This section outlines the transportation proposals that the National Park Service feels merit the most consideration--by itself and by other agencies. The aim of these proposals is to alleviate existing problems and minimize potential ones in the interest of making park access as pleasant, safe, and convenient as possible.

No issue facing the future of GGNRA/Point Reyes has been studied as thoroughly or scrutinized as constantly as transportation. The 3½-year Golden Gate Recreational Travel Study (GGRTS) explored this complex subject with the assistance of many agencies and citizen groups. The GGRTS now serves as the basic blueprint for action, describing what transportation changes are needed, suggesting which agencies are responsible, and designating priorities for implementation. With some minor exceptions, this plan coincides with National Park Service thinking and contains the transportation proposals that are essential to proper development of the park. This general management plan contains few proposals that differ from the GGRTS plan; it does, however, more adequately discuss the transportation proposals derived in conjunction with the other park proposals.

The plan will not solve every foreseeable transportation problem facing GGNRA/Point Reyes. Every congested roadway will not be cleared, in many cases because park visitors cause only a portion of a much larger traffic congestion problem. In fact, long-range, more elaborate planning approaches aimed at addressing the whole problem, although attempted by the GGRTS, were troublesome because of projected expense, lack of conclusive data, and the need for a great deal of interagency cooperation. Also, more drastic solutions were difficult to agree upon, both because of a paradoxical public sentiment about cars (I want to drive there, but

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everyone else should take the bus) and the real unpredictability of future transportation influences, from gas shortages to new transit systems to available funding.

Because of this, both GGRTS and NPS planning recognize the need to occasionally reevaluate the transportation picture, and each suggests long-range considerations to be kept in mind as more immediate problems are relieved.

This represents a twofold approach to transportation planning. First, immediate consideration has been given to problems that can be alleviated soonest, easiest, and with the least expense. There are recommendations for new transit systems, adjustments in existing transit service, and adjustments in roads and parking. Some of these proposals will have to be implemented through cooperative efforts by several agencies, and some the National Park Service can implement alone. These recommendations are considered to be practical responses to park transportation problems that can be implemented within a 5-year time frame.

Second, long-range strategies have been identified for solving anticipated problems or current problems that are especially difficult to rectify because of expense, general complexity, lack of conclusive data, or the need for extensive cooperation between affected agencies or publics. These options, which would involve many agencies and basic changes in how people travel to recreational sites, may be considered if more immediate actions prove to have little effect on park access problems.

IMMEDIATE CONSIDERATIONS

Improve Transit

The National Park Service and other agencies with influence over park-related transportation will work cooperatively to improve transit service to the park. This improved access will serve two main audiences: the transit dependent, many of whom live in neighborhoods with high recreational needs; and park visitors who wish a transit alternative to driving on congested access roads. The goal is to provide some form of transit reaching almost every park site. The proposed transit improvements will be implemented concurrently with proposals for necessary parking and access adjustments discussed in the next section. Proposals for better transit service include the following.

Improve Transit Service to the Park. Better scheduling and direct routing of weekend public transit to the park (in many cases simply extending an existing bus route three to five blocks) will greatly improve the probability of greater reliance on transit for park access. The following improvements are recommended:

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Improved service connecting southeast San Francisco neighborhoods and San Francisco parklands; route connections to the Southern Pacific and East Bay terminals.

Extended routes and expanded service from San Francisco to Marin County park destinations (Stinson Beach, Mount Tamalpais, and Point Reyes); route connections to the Larkspur ferry terminal

"Recreation specials" - expanded service by public carriers or charter companies to allow point-to-point travel between specific neighborhoods and the park; weekend express bus service

Bus connections to the Mount Tamalpais unit and Point Reyes from the Larkspur ferry terminal

Provide Transit Service Within the Park. To complement improved transit service to the park, park shuttles are proposed to give visitors a more flexible and complete system for getting around inside the park. These within-park shuttles will connect different park destinations and essentially expand the reach of transit service ending at the park's boundary. They will also help alleviate some of the potential problems in parts of the park where parking deficits are forecast and will extend the range of the hiker by facilitating more one-way outings. They could either operate separately from external transit systems or be an extension of one of these routes into the park. The following shuttles are proposed:

A shuttle connecting the San Francisco bayfront parklands from Aquatic Park to Fort Point and continuing across the Golden Gate Bridge to the Marin Headlands

A shuttle connecting the western San Francisco waterfront of GGNRA, starting in the Ocean Beach unit and terminating at the Golden Gate Bridge toll plaza. This shuttle will allow for transfer to the Marin Headlands shuttle. Eventually, if demand is adequate, this shuttle can also continue to the Marin Headlands

A shuttle to connect the major visitor destinations in the Point Reyes/Olema Valley units: the Point Reyes lighthouse, Drakes Beach, Limantour, Bear Valley, Five Brooks, Palomarin, and Ridgecrest

A shuttle connecting parklands along the northern San Francisco waterfront utilizing the beltline railroad right-of-way. This shuttle, which may utilize historic San Francisco trolley cars, will travel along the existing railroad

TRANSPORTATION

IMMEDIATE CONSIDERATIONS

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

tracks from Aquatic Park to Crissy Field and may be extended as far as Fort Point. This shuttle will be closely coordinated with current considerations by the city of San Francisco to operate a similar system along the northeastern waterfront, which would create a continuous rail link from the Bay Bridge (S.F. terminal and BART station) to the Golden Gate Bridge. Incremental implementation of this proposal will be done only after extensive consultation with neighborhood residents concerned over its potential traffic impacts.

Special shuttles connecting Fort Mason and other special event locations with remote parking areas within the Presidio (coordinate with U.S. Army)

Expand Ferry Service. The increasing weekend traffic on the Golden Gate Bridge is making recreational travel more and more difficult for many park visitors. Ferry service could avoid this problem area and also provide a travel means that people view as part of a recreational outing, not a difficult prelude to one. The following ferry service improvements are recommended:

A new ferry route from San Francisco to Fort Baker. This service will provide access to the Marin Headlands and aim at increasing the appeal of this Marin County park area, possibly diverting attention from more heavily used areas to the north.

Weekend service by the Larkspur ferry on a schedule attractive to those wishing to visit the Mount Tamalpais, Olema Valley, or Point Reyes units. This service would have to be timed to coincide with bus service from the terminal to park destinations.

A ferry terminal located in or near park sites. Two locations in San Francisco (the Embarcadero ferry terminal and Fisherman's Wharf) currently serve ferries and might be used for the new service between San Francisco and Fort Baker until a suitable landing within the park could be provided at one of the Fort Mason piers. Before in-park ferry service is established, the ability of Fort Mason to handle its own traffic will be tested. The option of eventually providing ferry service from this location will be delayed until the traffic situation of an operating park can be analyzed. Initially, the within-park landing would be used as a point of origin for people going to the Marin Headlands via ferry; of secondary importance, but included for consideration in this proposal, is the utilization of this landing as a point of origin for Alcatraz visitors. The estimated number of peak-hour ferry users who would funnel through either Fort Mason or Aquatic Park, depending on which pier was chosen for a landing site, is 1,200--600 bound for or returning from Fort Baker, and 600

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bound for or returning from Alcatraz. This estimate assumes that the same percentage of Marin Headlands visitors will continue to come through San Francisco, and that half of the people who use public transit will take the ferry. Modification of one of the Fort Mason piers will be required to adapt one or two slips for recreational ferry use. The three main piers were originally designed for movement of military men and materials and they would require only minor modification. The Alcatraz pier near Aquatic Park would require more extensive modification.

Develop an Information System and Transfer Stations. An important element will be an information program to publicize transit access. In particular, this program will assist schools in using their buses to transport school children to the park and assist peer groups (like senior citizens, teenagers, and neighborhood organizations) in organizing discovery bus programs.

In addition to media publicity, brochures, and communications to neighborhood organizations and service clubs, park access information will be provided by exhibits or onsite personnel at transit transfer stations at the following locations:

Van Ness Avenue (Aquatic Park): Juncture of five Muni lines, extended Golden Gate Transit line, and National Park Service shuttle

Upper Fort Point/toll plaza: Juncture of 97 Golden Gate Transit round trips, Muni recreation line, and National Park Service shuttle

Point Lobos Avenue (Merrie Way): Juncture of four Muni lines and National Park Service shuttle

San Francisco zoo area: Juncture of streetcar line, Muni line, and Golden Gate Transit line

Fort Baker: Juncture of Golden Gate Transit lines, National Park Service shuttle, and ferry system

Larkspur ferry terminal: Juncture of ferry system and Golden Gate Transit line

Bear Valley headquarters: Juncture of Golden Gate Transit lines and National Park Service shuttle

Design and Schedule Transit Systems for Recreational Travel. Making transit access attractive to a wide range of park visitors will require modifications and innovations in design and scheduling. Transit systems will have to be scheduled to allow ease of transfer

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between one route and another. Pricing schedules will also have to be coordinated to permit transfers from one system to another without additional costs. Group rates will be developed. Transit stops will have to be equipped with shelters, benches, and refuse containers. Transit vehicles will be modified to transport bicycles and other forms of equipment visitors will want to use after they reach the park.

Improve Auto Access

While the improvement of transit access will have the most effect on visitation to the park units, some proposals for improving auto access can be accomplished which will contribute to making total park access a better situation.

Adjust Parking Capacities. The following parking proposals represent a maximum--they indicate how much parking the National Park Service feels can be supplied onsite without seriously damaging the visitor's enjoyment of the park or the scenic quality of the area. This parking limit may not always be reached; parking will only be developed in response to a demonstrated need, either to relate directly to newly developed facilities or to partially accommodate major visitation increases.

In some park areas, there will not be enough parking to accommodate projected numbers of visitors, but surplus parking in other areas of the park will be connected by shuttle service to special event areas, and if necessary, overflow parking will be provided on lawn areas and along roadsides on a few peak use days each year.

All proposed San Francisco parking lots will be considered permanent, but the situation in Marin is different. There, the availability of transit service will greatly affect the location and size of needed parking areas, and some will be used on an irregular basis; therefore, most parking developed in Marin County will be considered nonpermanent. Grass or gravel will be used instead of asphalt surfacing to allow for relocation or removal as appropriate and to create a more aesthetic appearance when areas are not being fully utilized.

Throughout the review process the parking requirements calculated for the Olema Valley have generated substantial comments of concern from the public. Therefore the final parking capacity of this area will be formulated within the limits of the calculated figure on a site-by-site cumulative basis with the direct involvement of local officials and other concerned people.

TABLE 2. PARKING PROPOSALS

Unit	Number of Parking Spaces Existing	Proposed
Alcatraz	0	0
Aquatic Park	85	0
Fort Mason	514	614
Marina Green	1,200	1,200
Crissy Field	50	400
Fort Point	210	270
Baker Beach	200	330
Lands End	480	480
Cliff House	335	335
Ocean Beach	220	220
Fort Funston	165	300
Marin Headlands	1,480	1,565
Mount Tamalpais	1,946	1,910
Olema Valley	100	400
Point Reyes	2,095	2,595

Relieve Traffic Congestion Points: Cliff House and Stinson Beach. Traffic congestion is currently severe at two park areas as a direct result of visitor traffic. In San Francisco, traffic congestion at the nationally famous Cliff House is compounded by a curve in the roadway, poor visibility, and parking problems created by automobiles and tour buses at this site. To alleviate this problem, some of the car parking space in front of the Cliff House will be removed and replaced in a lot farther east. A tour bus drop-off station only will be available at the Cliff House, and bus parking will be provided in the Ocean Beach lot. Most visitors will reboard their buses in a turnout in the lower Sutro lot. Pedestrian connections across Point Lobos Avenue will be improved.

In Marin County, the village of Stinson Beach suffers from the traffic that must proceed through the town in order to enter the beach parking area. A southern entrance to the Stinson Beach parking area is proposed to divert park-bound traffic from village roads.

Develop a Marin Headlands Staging Area. The Marin Headlands is attracting an enthusiastic and growing group of local, regional, and national visitors. Given the rapid rate of visitation increase and the level of use that this area will receive in the future, a program to restrict auto access during peak times will be implemented before visitor access patterns become too well established. To accomplish this, a staging area with a design capacity of 700 cars will be developed in East Fort Baker, and shuttle bus service will be

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provided to locations in Rodeo Valley. The rest of the Marin Headlands will continue to be accessible by auto.

LONG-RANGE CONSIDERATIONS

Within the next 10 years, many economic, social, and technological changes, including rising gas costs, more free time, and transit improvements, will probably affect how people travel. These changes will also affect transportation planning for the park. Because of this, the National Park Service has separated the transportation options that appear long range in approach from those that can be implemented more quickly. The considerations contained in this section have been formulated in a tentative way, recognizing the need for continual reevaluation and adjustment.

Long-range considerations reach beyond park boundaries to resolve the potentially extreme transportation problems facing recreational travel. Because in some cases park attractions represent only a portion of the factors that will create future congestion and parking problems, it is recognized that transportation solutions must be regional in nature. Marina Boulevard and the Golden Gate Bridge corridor are two primary places where park travelers will be caught up in traffic largely generated by others. The park's transportation actions can have only limited effect on these problems unless measures are implemented that affect all the contributors to the situation. Regardless, projections indicate that within 10 years the above roads and Route 1 (where park visitors are a more significant element of the problem) will receive heavy traffic congestion. The main question that long-range considerations address is how far the National Park Service can go to resolve these problems, or at least to give park visitors a way around them.

Long-range options to address these problem areas will generally be considered in the following order.

Expanded Ferry Service

The concept of expanded ferry service addresses some of the large-scale transportation issues related to Marin County access. Emphasizing ferry access would reduce recreational automobile traffic in Marin County park areas and provide a travel means to avoid the Golden Gate Bridge corridor and portions of Marina Boulevard. However, the location of the terminal would create additional traffic related to ferry use in San Francisco areas of GGNRA, in a sense shifting auto traffic out of the north to a ferry terminal in the south.

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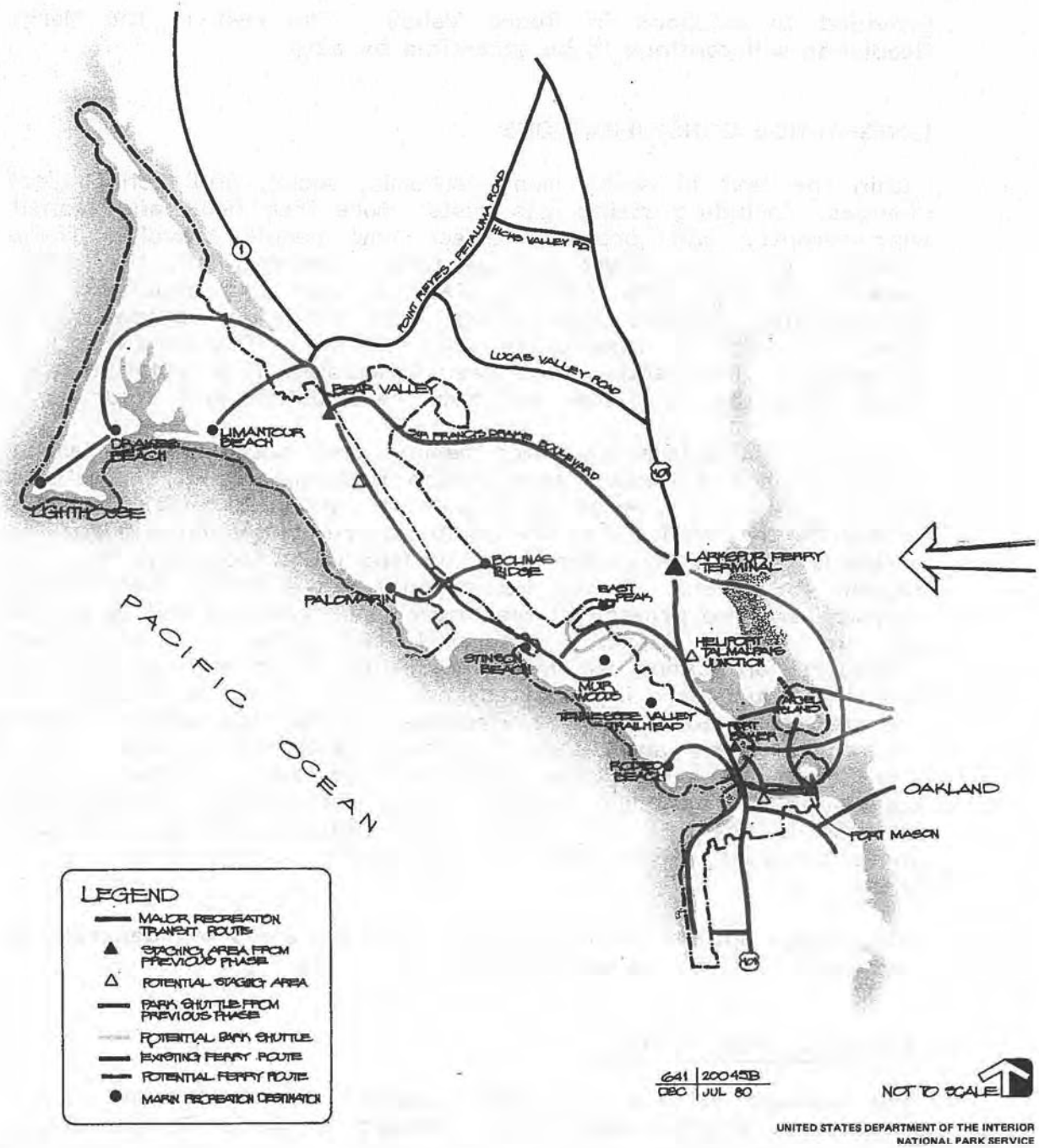

TRANSPORTATION
LONG-RANGE CONSIDERATIONS
EXPANDED FERRY AND SHUTTLE SERVICE
GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

Ferry adjustments could include:

Expand ferry service to Fort Baker as Marin Headlands visitation increases and auto access is more controlled

Develop service to Fort Baker from the East Bay

Develop an additional ferry stop at Crissy Field to handle increases in ferry use

Develop ferry service to provide a waterfront loop connecting Fort Mason, Crissy Field, Fort Baker, and Angel Island

Expand ferry service to the Larkspur ferry terminal as bus service to Mount Tamalpais and Point Reyes becomes more available from this point

Have recreational ferries bound for the Larkspur terminal use Fort Mason as a point of departure

Two ferry landings within the park would be considered--Crissy Field and Fort Mason. If ferry use expanded as hoped, ferry users would demand almost all available onsite parking spaces in the bayfront units; these users would compete with visitors to south GGNRA for available spaces. Additionally, traffic in this area would increase. The impact could be adjusted by either reducing site visitation, reducing ferry service, expanding parking, or developing remote parking areas for ferry users.

Crissy Field has some advantages as a park ferry landing, given its relative isolation from residential areas. However, parking would still be a problem. Special ferry parking could probably be provided in the Presidio, and a short shuttle connection could be provided to the ferry terminal (possibly a variation of the bayfront shuttle route). There are also spaces potentially available in the parade ground adjacent to Crissy Field and in the proposed commissary complex. Their use for GGNRA purposes would have to be negotiated with the Presidio. There would be three transfers required, but visitors would be inside the park, and time lags would be minimal.

Another possibility for handling ferry traffic would be to develop remote staging areas--parking places outside the park boundary that would provide shuttle connections to the park ferry terminal. The difficulty with a shuttle for ferry passengers is that a large number of people would need to be accommodated at one time. Also, several transfers would be required (i.e., from car to remote shuttle, shuttle to ferry, ferry to shuttle, and shuttle to destination), and considerable time would elapse before people reached their destinations.

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A number of ferry service increases are possible, and given the above conditions, careful decisions would be required about which to expand. The ferry from East Bay to the Marin Headlands would not have a major impact at its landing site, most likely the Berkeley Marina. This ferry could expect reasonable patronage, because almost 25 percent of Marin Headlands visitors arrive from East Bay.

The Larkspur ferry route (connecting to bus access to the park) already has an established terminal (Embarcadero), but relocating it to a park site would be expected to increase its recreational patronage. However, the ability of this route to draw recreational travelers at its current origin should be tested before relocation is considered.

Transit Preferential Lanes

Increasing transit access to the park would have little advantage to visitors if buses were caught up in the traffic created by automobile drivers. Travel times would be lengthened to such an extent that park visitors would have little incentive to use transit. To give transit riders an advantage as traffic on park access roads increases, the following options could be considered:

For Muni connections to the park, explore the possibility of transit preferential lanes, particularly in the following congested areas: Aquatic Park, Van Ness Avenue, Marina Boulevard, 19th Avenue, and the Cliff House area.

In the Golden Gate Bridge corridor, explore the feasibility of preferential lanes for weekend afternoon southbound buses from San Rafael to the Golden Gate Bridge.

This system, in some cases, would severely tax automobile drivers in order to give transit riders a competitive advantage in travel time. In San Francisco, auto drivers might move to other roadways as main thoroughfares became congested, possibly affecting residential areas. Auto travel time would be extended on the Golden Gate corridor, perhaps significantly, depending on the length and location of the transit preferential lane.

Expanded Shuttle Service

Unless visitation to the Mount Tamalpais area is stabilized, people traveling along Route 1 can expect increasing congestion, possibly to the point of continual weekend stop-and-go traffic within the next 10 years. Although park-bound visitors do create a significant portion of the problem, the situation is not easily rectified due to the fact that all roads are through-routes to other

destinations. Any reduction in traffic, however, would help alleviate a growing problem, and long-range transportation recommendations related to this situation could include the following:

Develop shuttle service to this unit from a staging area at Tamalpais Junction where visitors could leave their cars before entering the park. Auto access to East Peak would be closed, and the shuttle would serve this and other Mount Tamalpais destinations. Parking availability at Mount Tamalpais would be gradually reduced to encourage transit access. Information and road signing would direct visitors to the Tamalpais Junction staging area.

Develop shuttle service to Tennessee Valley from the above staging area.

If properly designed, shuttle service from the Tamalpais Junction staging area might provide an alternative way to sightsee in the Mount Tamalpais unit. To make the shuttle successful, additional auto disincentives--high parking fees, limitations on parking time, ticketing for illegal parking, reduced parking areas--would need to be employed. Closed access to East Peak would remove some auto traffic (estimated 800 cars/summer day) and serve as an incentive to utilize the shuttle service. This could dramatically affect well-established use patterns in this unit. The shuttle would provide many advantages for hikers by connecting to various trailheads. The shuttle could not eliminate through-traffic, but it could significantly reduce the presence of moving and parked cars at Mount Tamalpais destinations. The entire system would be very costly and address mainly a summer weekend problem. If the staging area could be utilized for commuter day travel also, the benefit of the project would be extended.

Remote Staging Areas

Potential remote staging areas would be places that offer good regional and local transit connections and have substantial amounts of existing parking. These areas could serve another purpose on weekdays so long as they were generally available for park visitors on weekends when recreation demands would be greatest. In addition, the intercept sites would be located in the areas that have less weekend traffic congestion than communities adjacent to the park. From the intercept point, expanded shuttle or transit service to the park would be required. Potential locations are listed below:

TRANSPORTATION
LONG-RANGE CONSIDERATIONS
EXPANDED STAGING AREAS
GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

San Francisco

South city areas - BART station, Stonestown, or San Francisco State (for connection to BART and southern peninsula traffic)

Civic Center (for connection to BART, southern peninsula, and San Francisco traffic)

Embarcadero (for connection to ferry terminal, East Bay terminal, and East Bay traffic)

Upper Fort Point/toll plaza (for Marin visitors to San Francisco and San Francisco visitors to Marin)

Marin (all located along the Highway 101 corridor)

Fort Baker (parking for Rodeo Valley destinations when transit-only restrictions are in effect)

Tamalpais Junction/Shoreline Highway (as discussed before--see "Expanded Shuttle Service")

Larkspur ferry terminal

San Rafael bus terminal

Marin Civic Center

Hamilton Air Force Base

The general concept of remote auto intercepts raises fundamental questions related to people's attitudes about transit, changing modes of travel, and park arrival. Auto intercepts in areas remote from the ultimate destination might never be fully used simply because visitors would not associate the intercept sites with the park. Proper design of the staging areas and shuttle system would help make this association, but creating a sense of park arrival at the intercept sites would be a difficult task. Intercepts might be ignored, and people arriving at the park finding onsite parking full might search for spaces in adjacent neighborhoods. Simple modification of an existing bus service might not be readily accepted as part of a park experience. Perhaps transit access to the park could be more easily associated with park arrival if the transit system had a unique recreational characteristic identified with GGNRA (for example, a special bayfront rail system such as the beltline, specially designed buses, or a cog railroad incorporated into existing rail and road systems.)

Directly related to acceptance of a transit ride as a park experience are the number of transfers and the amount of time required to

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arrive at desired destinations. The more transfers and time required, the more discouraging the trip would be. Therefore, if the intercepts were close to destinations with direct shuttle connections to key sites, they would be more successful than if they were remote with multiple transfers. This would seem to indicate that intercepts related to specific park zones, each with a separate and direct shuttle service, would be desirable.

IMPLEMENTATION

The imminent shift in focus from planning to implementation is timely because it will test the direction that planning has taken. With a four-year $400,000 transportation study completed, everyone is hopeful that transit service will be improved soon, that auto traffic will be carefully controlled and monitored, and that all responsible agencies will periodically investigate the park's changing transportation picture to update transit solutions. The most important new information about travel in the park will come from the observation of working transit systems. Once the initial recommendations get off the ground, thoughts about more complex solutions will become more meaningful.

Different people have indicated different priorities for implementation. The transit dependent are most concerned about effective bus routes to the park; park neighbors emphasize auto controls (some feeling that proposals aren't strong enough in this regard); hikers want shuttle systems between trailheads. Despite these various perspectives, everyone agrees that the total package of proposals (as outlined in GGRTS and this plan) is worth pursuing. The only real issue in the public's mind is who is going to get the ball rolling and how soon?

Unfortunately, the GGRTS plan has not fully prepared everyone for the obstacles facing implementation: legislative mandates, administrative procedures, shrinking budgets. The real issue is now a question of responsibility. Generally, GGRTS recommends that the National Park Service cover the cost of within-park transit (mainly shuttles, but including some responsibility for ferry service), park transportation developments (such as ferry terminals and staging areas), and information programs. Transit operating agencies are given the main responsibility for improving routes to the park. The National Park Service, with the recent legislative direction for park transportation from Congress, will continue to actively request funds to implement the transportation proposals for which it is responsible.

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CHARACTER AND STATUS OF CULTURAL RESOURCES

The cultural resources of Golden Gate National Recreation Area and Point Reyes National Seashore are immense. They represent two hundred years of history and an indeterminate amount of prehistory revolving around one of the world's most spectacular seaports. Reflected is the area's evolution from Indian villages to a major metropolitan area. Historic themes include the Spanish Empire frontier, Mexico's legacy, the disruption of California's coastal Indians, America's westward expansion, the gold rush, international relations, a number of wars, the evolution of coastal fortifications, maritime history, military history and architecture, agriculture, commerce, transportation, industry, natural disasters, the development of a great city, and many others.

Today, tangible evidence of these themes can be found throughout GGNRA/Point Reyes. Cultural resources are an integral part of the park environment. The historic sites and structures include military fortifications, a notorious prison, century-old ranches, recreational facilities from the 1890s, lighthouses, and lifesaving stations. Less conspicuous, but also numerous, are archeological resources--buried indications of the park's historic and prehistoric inhabitants.

Prehistoric resources include evidence of aboriginal, or native, occupation of parklands. The complete story of northern California Indians is represented--from prehistory to European contact. One hundred three sites are known to exist within the planning area.

Historic resources follow the history of the area since the arrival of European man. The majority of historic resources relate to one of the following land uses:

> Coastal Defense. For 200 years, the San Francisco Bay has been viewed as a key to the defense of the Pacific Coast. Spanish and Mexican governors established and maintained the Presidio of San Francisco as a northern outpost in a network of frontier garrisons. Later the Americans also recognized that the magnificent harbor was essential to defense of the Pacific shores. San Francisco became an important port of embarkation for the Spanish-American War, the Philippine Insurrection, the Boxer Rebellion, World War I, and the Siberian Intervention. Then, during World War II and the Korean War, army installations in the Bay Area evolved into an immense funnel that dispatched millions of troops and millions of tons of supplies to the length and breadth of the Pacific. After the Korean War, Nike missiles reared skyward to protect

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the great harbor and its cities. Structures representative of all these events are contained within the former military lands facing San Francisco Bay. The Presidio lands, within GGNRA boundaries but still retained by the army, relate to historic themes beyond coastal defense representative of the Presidio's involvement in West Coast events since 1776.

Agriculture. Early settlers of Marin County recognized the area's suitability for agricultural production. Today, portions of northern park areas depict rural settings typical in American history and provide important reminders of Marin County's agricultural industry.

Maritime. Because of the park's critical relationship to the ocean and the bay, many maritime-related structures are found within its boundaries: lighthouses, lifesaving stations, seawalls, even a collection of historic ships, the largest in the United States. The resources are scattered throughout the park, primarily near important and hazardous navigational points. The maritime museum contains one of the finest maritime libraries in the world, consisting of books, drawings, photographs,and tape-recorded materials, as well as one of the outstanding collections of maritime artifacts in the United States.

Recreation. Leisure-time pursuits were important in the history of the area even before it became a park. Many historic resources, including recreational railroad grades, trails, 1890 recreational facilities, WPA projects, and the site of an international exposition, relate to this theme.

Although these categories are not all-inclusive, they provide a general description of the park's cultural resources. Research to date has focused on properties that may be eligible for the National Register of Historic Places. The national register is an authoritative guide used to identify the nation's cultural resources and to indicate what properties should be protected from destruction or impairment. Approximately 410 structures in the park have been identified as historically significant structures. Many are already contained on the national register; others will be nominated to the national register, either individually or as historic districts.

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TABLE 3. STATUS OF CULTURAL RESOURCES
(November 1978)

Properties on the National Register of Historic Places

Fort Baker, Fort Barry, and Fort Cronkhite
Fort Point
Fort Mason
Alcatraz
Point Lobos archeological sites
Haslett Warehouse
Olema lime kilns
Historic ships (each ship is a separate entry): Wapama, C.A. Thayer, Balclutha, Alma, Eureka, Tugboat Hercules
Six-inch rifled gun no. 9 (Baker Beach)
Lewis Ark
Tubbs Cordage Company office

Properties on the National Register
(but not administered by Golden Gate)

Angel Island
Presidio of San Francisco
San Francisco cable cars system (Aquatic Park)
San Francisco pumping station No. 2
Steamship Jeremiah O'Brien

Properties Determined Eligible for the National Register

Fort Miley
Sarah Seaver Randall house

Properties Nominated to the National Register

Point Reyes archeological sites and districts
Fort Mason (revision)
Fort Mason archeological sites
Point Reyes light station (lighthouse) & Point Reyes lifesaving station
Olema Valley ranches
Aquatic Park historic district
Point Bonita lighthouse
Hill 640

Properties in Process of Being Nominated to the National Register

Forts Baker, Barry, Cronkhite (revision)
Presidio fortifications (to be part of a joint U.S. Army/NPS nomination)
Point Bonita lifesaving station
Point Lobos marine lookout station
Sutro Baths ruins and site
Sutro Heights Park

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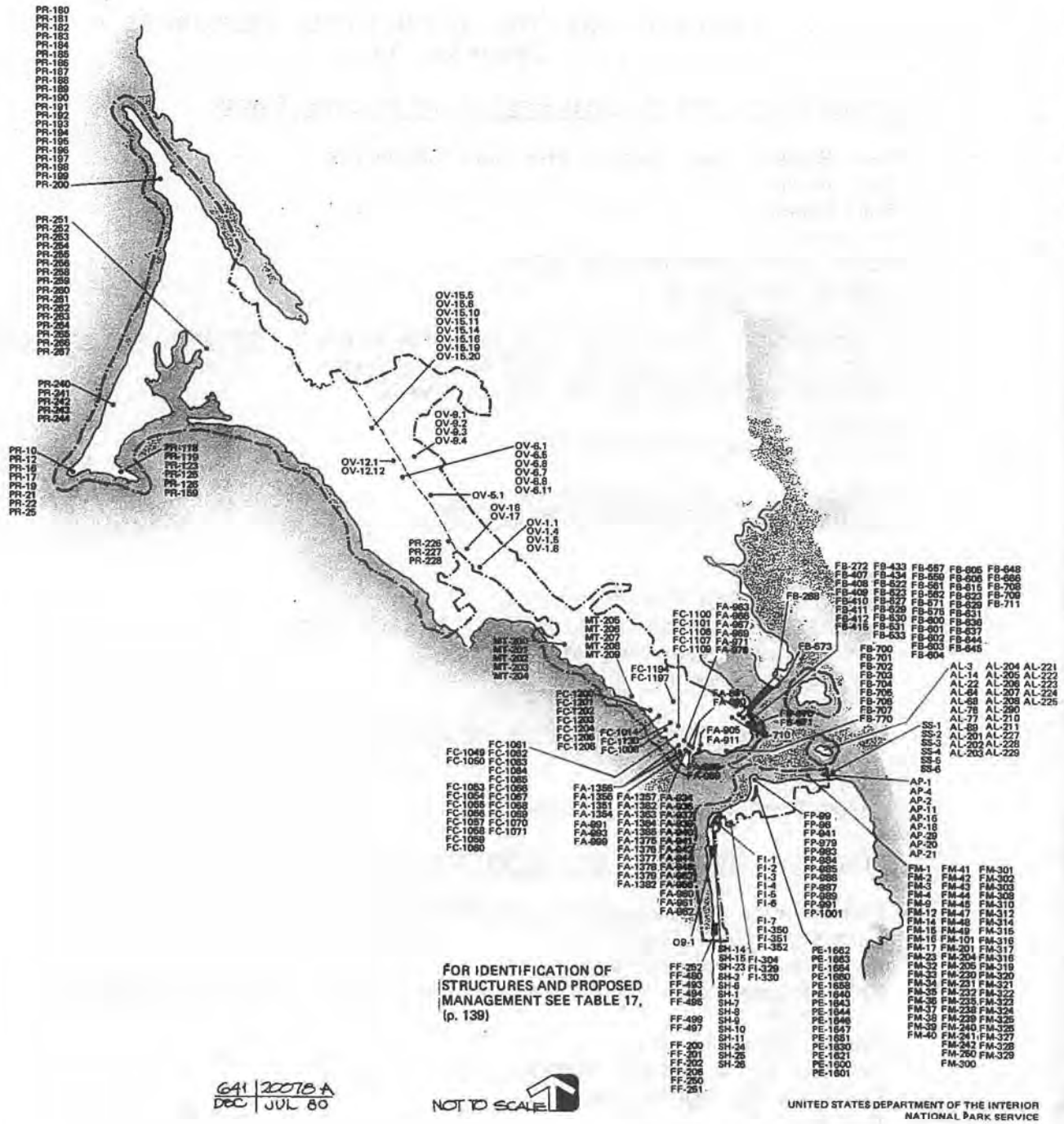

CULTURAL RESOURCES

GOLDEN GATE NATIONAL RECREATION AREA
POINT REYES NATIONAL SEASHORE

Properties That Appear to be Eligible for Nomination to the National Register

Pierce Point Ranch
Home Ranch
Point Reyes lifesaving stations (2)
Fort Point lifesaving station
Point Bonita lifesaving station site
Point Bonita light station

PROPOSED MANAGEMENT STRATEGIES

Historic Structures

The National Park Service recognizes the importance of managing cultural values within GGNRA/Point Reyes. In accordance with the legislation establishing these parklands and the Act of 1916 establishing the National Park Service, all sites, objects, and structures of historic, architectural, or engineering significance will be maintained and preserved. No removal of historic structures is envisioned.

Preservation of historic resources will include stabilization, arresting decay, and/or mothballing to prevent further deterioration. Examples of where this action will be used are the Alcatraz fortifications and prison ruins, the historic ships at Aquatic Park, most of the batteries and fire control stations throughout the park, outbuildings of the Olema Valley and Point Reyes ranches, and various archeological sites.

Adaptive restoration for park use is also proposed for many of the historic structures, which will involve modifications to meet basic life safety codes, structural standards, and handicapped access. Every attempt will be made to design changes to avoid effects on the quality and character that qualifies the property for the national register and to design changes to be reversible in nature. Adaptive use is very important if many of the 410 historic structures are to be maintained and preserved over a long term. Structures to be adaptively used for community program space, hostels, interpretive displays, recreational space, museums, environmental education centers, administrative offices, and other park facilities include the Haslett Warehouse in Aquatic Park, the Cliff House, most military quarters and administration buildings, some fortifications, and the main ranch buildings in the Olema Valley and Point Reyes. Some historic landscape features, such as the Fort Barry rifle range and the Fort Mason parade ground, will be adaptively used in a way that will enable their general historic appearance to be retained.

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Restoration, which involves complete rehabilitation of a structure or scene to its most historically significant condition, is the most expensive form of management and will not be applied to many structures. Some places that will be restored are the Point Reyes lighthouse, Fort Point, Sutro Heights Park grounds, and a few fortifications in various key locations.

Many of the structures have deteriorated in their harsh marine environment. Additional studies and evaluations will determine the alternatives, cost, and feasibility of preserving specific structures, and while no historic structures are proposed to be removed, some may be found to be unpreservable. In such cases, consultation with the state historic preservation officer and the Advisory Council on Historic Preservation would be undertaken, in full compliance with the National Historic Preservation Act of 1966.

Historic Settings

The historic scene around many historic structures is in a highly deteriorated and sometimes hazardous condition. Rubble from demolished structures and remains of former utility systems and foundations have not been removed, and there is widespread crumbling of concrete, advanced deterioration of metal, and undercutting of viewpoints by natural erosion. In these places, action will be taken to improve the historic settings and create a safe environment for people, but full restoration of historic settings is not considered feasible, due mainly to cost and the changes in use which will occur (from military and agricultural to park use). As improvements are made, close and careful consideration will be given to the resources for which the parks were established, to ensure preservation of all cultural, natural, scenic, and recreational values.

New plantings will be compatible with whatever remains of the historic landscape. Minor facilities such as trails, walkways, benches, picnic tables, and comfort stations will be designed and sited in appropriate consideration of historic values and styles.

The open grasslands characteristic of pastoral landscapes, which have long provided a pleasing contrast with the park's forests and brushlands, are not necessarily self-sustaining. The most historically accurate condition for these lands includes the presence of grazing animals. This will be appropriate in some cases, but natural resource management considerations will not support grazing in all areas where it has occurred historically. Consequently the maintenance of grasslands for their historic value will occur only where it is ecologically feasible and may sometimes be accomplished by mechanical means (such as mowing).

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Prehistoric Sites

Prehistoric sites will be preserved, and where natural or human forces are causing erosion of these resources, professional studies will be accomplished to determine how to eliminate the adverse effects. All lands not adequately surveyed for archeological resources will be surveyed prior to beginning projects involving land disturbance. The National Park Service procedures for archeological clearance will be followed for documentation of projects having no effects, and projects involving adverse effects or potential effects will be submitted for consultation under the procedures of the Advisory Council on Historic Preservation.

Museum Collections

The maritime museum collections will be preserved and carefully expanded to include only objects highly relevent to the subject. Specially trained librarians and curators will be needed to preserve the rare books and maintain the historic ships.

RESEARCH

Archeological and historical studies of GGNRA and Point Reyes have located, inventoried, and identified a great variety of cultural resources. These studies have also designated resources that may meet the criteria of the National Register of Historic Places. Where necessary, future research will be conducted to determine an appropriate level of treatment for individual structures based on their present condition and degree of significance. The following research programs have been completed or will soon be completed.

Archeological Overview

This study focuses on the understanding of cultures through the technological materials of both prehistoric and historic periods. Prehistoric times--periods lacking in historical documentation--and more recent centuries when records were made combine to form a very long period during which parklands were occupied by various peoples. The overview identifies already known or potential resource locations where archeological mapping, testing, description, and comparison can be used to more fully evaluate cultural resources.

Prior archeological research within GGNRA has been limited, particularly in San Francisco areas. Although within the past 100 years 31 archeological sites have been recorded within the city and county of San Francisco, only 6 remain. Research in Marin County

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has been more extensive, but the total data base of aboriginal presence within the park has been severely damaged over time. However, additional aboriginal sites may be discovered because much of the area, especially interior valleys, ridges, and drainages, has not yet been sampled or extensively examined. Consequently, the archeological overview study recommends further research and survey, especially prior to any park development that might affect an area's cultural resources. So far, specific management and research recommendations of this study include:

Intensive Surveys

Wilkins Gulch to Stinson Beach
Rocky Point and Slide Ranch
South Rodeo Lagoon and Bird Island coastal areas
Buried coastal fortifications of Fort Baker

Sample Surveys

Eastern Olema Valley (stratification between ridge and stream-side environments)
Uplands between Route 1 and Ridgecrest Boulevard
Uplands of Mount Tamalpais
Green Gulch
Redwood Creek to Muir Woods National Monument
Coyote Ridge
Ridges between Gerbode Preserve and Tennessee Valley
Rodeo Creek drainage and Gerbode Preserve
San Francisco coastal headlands and Baker Beach

Action Plans for Resource Management

Angel Island
Alcatraz Island
Fort Point (for preservation of buried deposits and structures)
Point Lobos (vertical and horizontal mapping of archeological sites)

The Exercise of Caution During Any Land Alteration

Aquatic Park
Fort Mason
Marina Green/Crissy Field

In contrast to GGNRA, Point Reyes is well along in archeological research. Approximately 70 percent of the peninsula has been adequately examined, yielding a total of 95 archeological sites. About 36 of these sites have been tested, extensively examined, or sampled by archeologists who were largely motivated by interest in Drake's landing.

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As a general management action, the archeological overview recommends formulation of a parkwide system for identification, description, and preservation of all archival documents, archeological specimens, and resource terrain, as well as continued use of the national register and compliance procedures as a planning tool.

Historic Resource Study

This study presents a thorough park history. Although overlapping with some areas of the archeological study, this research focuses primarily on post-aboriginal settlement, or historic periods with written documentation. The study includes a description of intangible park historic resources such as folklore, lifestyle, and traditions. Additionally, the report identifies physical historic resources, analyzes their significance, and completes necessary nominations to the National Register of Historic Places.

The historic resource study will be a major aid in future planning, management, and interpretation. This study has not included resources within the parts of GGNRA not under the administration of the National Park Service. The study will be enlarged to include them only if they become the management responsibility of the National Park Service.

List of Classified Structures

The history of GGNRA/Point Reyes is richly portrayed by some 1,500 park structures. Many of these structures are historically valuable because of their associations with military, agricultural, or recreational land use. The list of classified structures documents these resources through photograph and physical description. This list analyzes the significance of each structure and recommends a future management treatment (e.g., preservation of the structure in its current condition, restoration to its former historic appearance, or reconstruction). The 410 park structures now on this list will be treated as though they had been nominated to the National Register of Historic Places until a final determination of their eligibility is made. This list does not contain any structures from the state parklands within GGNRA, but initial recommendations regarding significant structures in these areas have been made. These structures will be added to the list of classified structures only if the state parklands are transferred to the National Park Service.

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INTERIM PROTECTION OF RESOURCES

As cultural resources are tentatively identified, it will be necessary to maintain their current character until they have been fully evaluated in relationship to national register criteria and the detailed planning proposals of the general management plan. Even now, as previously private or military structures are transferred to the park, interim vacancies raise their susceptibility to vandalism. Numerous actions will be required to maintain these structures. Possible actions include public education about cultural resource values, restriction of visitation in sensitive resource areas, guarding by uniformed personnel, formulation of compatible maintenance activities, and adaptive use of structures.

AUTHORITIES

The cultural resources of GGNRA/Point Reyes will be managed in accordance with the Antiquities Act of 1906, Historic Sites Act of 1935, Historic Preservation Act of 1966, National Environmental Policy Act of 1964, Historical and Archeological Data Preservation Act of 1974, Executive Order 11593, and the American Indian Religion Act of 1979.

The federal regulations, standards, and guidelines of the secretary of the interior (established to carry out the above cited legislation) will be used.

The National Park Service management policies, standards, directives, and procedures for cultural resource management will also be applied. The latter includes the "Policy Guidelines for Native American Cultural Resource Management."

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NATURAL RESOURCE MANAGEMENT

CHARACTER OF NATURAL RESOURCES

Much of Point Reyes National Seashore retains its natural character, but most of the land in GGNRA has been altered by man in some way. Coastal defense installations have reshaped much of the shoreline and have introduced many new species of trees and shrubs. On the San Francisco side there remains only a few hundred feet of original bay shoreline. Waterfront areas such as Aquatic Park and Crissy Field are in fact constructed out into the bay on large landfills. In the Marin areas of GGNRA most of the parklands have historically been grazed or cut over since the days of early Spanish habitation. Through the years, only a few areas like Muir Woods have been spared some form of economic utilization.

Fortunately, most of these past uses have neither compromised the spectacular visual qualities of these parklands nor reduced their potential for recreational opportunities. In fact, the park characteristics we enjoy today and perhaps assume to be natural are, in most cases, the result of some degree of human intervention with natural processes. Most of the trees at Baker Beach and Lands End, for example, were planted by the army, and the steep open grasslands so characteristic of coastal Marin may have been in some measure perpetuated by livestock grazing. To maintain these qualities as we know them may require continued intervention or management.

Even natural settings such as Muir Woods and Point Reyes will require some manipulation of the environment to assure that future generations of visitors will be able to enjoy them. In the future, careful management will also be needed to protect areas such as campgrounds and trails from overuse. Campgrounds, for example, may have to be relocated from time to time.

PROPOSED MANAGEMENT STRATEGIES

Different landscapes invite different experiences. For example, the Monterey cypress trees at Baker Beach provide shelter from the wind and an excellent setting for picnicking. The following types of landscapes will be favored, and the park staff will develop a plan of management actions to maintain these various settings. First consideration should always be given to native species for any new plantings in the park.

The natural appearance of Ocean Beach, Fort Funston, East and West Fort Miley, Lands End, and Baker Beach will be maintained. Wooded areas from the Golden Gate Bridge to the Cliff House will be

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protected, and wherever possible along the ocean shoreline the dune environment will be restored. These lands will continue to have a relatively natural character, but intensive management actions such as reforestation of the Monterey cypress stands may be required to preserve wooded areas. This part of the park will attract people seeking closer contact with nature within the city.

Crissy Field, Fort Mason, Aquatic Park, Alcatraz, and Sutro Heights Park will be developed and managed as urban park settings, with special attention given to preserving the historic character of many of these areas. Sutro Park, for example, will have its traditional formal gardens partially restored, and Crissy Field will receive new turf areas and tree planting for wind protection and recreational activities. These areas should draw the most people and will be intensively managed to encourage a variety of park programs and activities.

The GGNRA land in Marin County south of Olema Valley will be managed to preserve a diversity of settings. The mosaic coastal scrub and prairie will be maintained. To achieve this may require a prescribed program of mowing, grazing, and burning. It is particularly important that grasslands be maintained or even expanded near facilities in the Marin Headlands and along access roads to encourage casual uses of open space.

Muir Woods will be managed to protect and interpret the large redwood trees. To do this will require continued intervention in the normal ecological succession of the forest. This may involve, for example, the planting of new trees and the selective thinning of old stands, or even prescribed burning.

The pastoral landscape of the northern Olema Valley reflects the important role that dairying has played in the cultural history of the valley. This area will be managed to preserve the visual contrast between woodland and open grassland so characteristic of a pastoral setting.

Most of Point Reyes National Seashore is either legally designated as wilderness or is under lease or permit for grazing purposes in accordance with its enabling legislation. Within the legal and administrative constraints imposed by these two designations, the unusual variety of scenic qualities and biotic communties that make the seashore attractive to scientists as well as recreationists will be aggressively maintained. Although the majority of the seashore is generally viewed as a wild area where natural processes are allowed to predominate, manipulation of those processes through methods such as selective thinning, burning, and mowing will be cautiously pursued when necessary to protect its scenic, ecological, and recreational values. Restoration of historic natural conditions (such as reestablishment of Tule elk) will continue to be implemented when such actions will not seriously diminish scenic and recreational values.

There are very important habitat areas throughout the park, including the habitats of several threatened or endangered species, that will require special management efforts. Salmon spawning streams, tide pools, and bird habitats have been identified as areas warranting special protection, and visitor use will be carefully controlled in and near these areas. A joint federal and state management program, for example, will be developed to protect Redwood Creek from overfishing. Another important area of concern is the apparent decline in the integrity of Pine Gulch Creek, the principal source of freshwater flow into the critical wildlife habitat of Bolinas Lagoon.

FUTURE RESEARCH AND PLANNING REQUIREMENTS

Point Reyes and Muir Woods both have approved natural resources management plans, but research and additional planning is needed to complete such a document for GGNRA. It is intended that this be accomplished in the near future and that the plan will prescribe specific management actions, including research and monitoring. The plan will also present projects in priority order so that the most critical actions will be carried out first, as funds become available. At this time it appears that the following areas will be high in priority.

Vegetation Management Plan

Symptomatic of the need for a parkwide vegetation management plan are the dramatic spread of thistle throughout the Marin Headlands and the rapid encroachment of brooms moving in from road cuts and disturbed areas adjacent to the park. The expansion of thistle has resulted in the loss of much valuable grassland in the Marin Headlands over the last three years. Unless steps are taken to better manage these grasslands, the wide variety of vegetation communities we wish to preserve may be diminished over the next several years.

As an important first step in an overall vegetation management plan, research on the life-cycle of exotic thistles will provide the park with a clearer understanding of colonization of these species throughout the headlands and potential management measures that can influence that change. Experimentation with different control methods will lead to the most effective means to accomplish large scale eradication.

French, Scotch, and Spanish brooms, with their attractive yellow flowers, present a less obvious, but potentially much greater, threat to the native flora. With no natural enemies, these aggressive plants spread steadily into grasslands and chaparral,

over-shading and crowding out native plant varieties. Fortunately several groups, including the California Native Plant Society and the Marin Garden Club, are recognizing the potential threat of and are organizing work parties to remove these plants from open space lands throughout the county. Pampas grass also presents a major concern. The vegetation management plan will address actions for control of these problem exotic species.

Other topics that will be addressed in the vegetation management plan will include suitability of plant species for landscaping and revegetation of disturbed sites, fire management, and habitat requirements and status of threatened, and endangered species.

A monitoring program will be developed to quantify human impacts on plant communities and to identify nondestructive limits for different areas of the park.

Grazing Management Plan

Thousands of acres of GGNRA land are currently leased for grazing, in part to smooth the transition from private to public ownership, as most of this land has been previously grazed. No plan or guidelines now exist for the issuance of grazing permits, nor are there monitoring procedures to ensure that proper range management practices are followed.

Developed concurrently with a vegetation management plan, the grazing plan will

Monitor current grazing operations to determine suitability of grazing tracts based on forage production capability, management objectives, and visitor use levels

Identify any additional land where grazing could be utilized for vegetation management

Draw up a comprehensive grazing allotment plan, including a rotational schedule if required

Determine proper purposes, such as brush reduction, for grazing levels for each unit

Set up a monitoring system to observe the effects of grazing on the land, with the particular objective of eliminating all overgrazing, improving range conditions to good or excellent, and making better use of grazing as a vegetation management tool

Unless this plan is prepared and implemented, overgrazing will probably continue in some areas, resulting in soil erosion, loss of wildlife habitat, and destruction of desirable vegetation types.

The Soil Conservation Service has recommended a moratorium on grazing from Tennessee Valley to Green Gulch to allow the recovery of overgrazed grasslands. Some experts have also expressed particular concern over the past effects of grazing on the Bolinas Lagoon watershed and the southern portions of the Olema Valley.

Shoreline Monitoring Program

The city of San Francisco has proposed to construct a major wastewater storage and transport culvert along the eastern boundary of the Ocean Beach unit of GGNRA. From August 1 to 3, 1978, a panel of experts in coastal processes, ecology, and engineering convened at Fort Mason to prepare recommendations to guide the National Park Service response to the city's plans and also to prepare a plan for managing the shoreline at Ocean Beach. The concerns expressed over the sewer proposal and the magnitude of the recession of the shoreline has spotlighted the immediate need for more basic data on dune and beach behavior. The Park Service's Ocean Beach Erosion Control Conference Report found that "the lack of a systematic data base on shoreline processes and previous human modification of the shoreline has severely limited the panel's ability to make more definite recommendations." The Erosion Conference Panel recommended that a data collection and beach monitoring program be designed and implemented immediately.

The Littoral Environment Observation Program (LEO) will be initiated at Ocean Beach and expanded to other areas along the park shoreline where resource management decisions will soon be necessary. Areas now identified as needing monitoring include Crissy Field, Aquatic Park, Fort Baker, and Stinson Beach. The data collected will be correlated with information gathered by the Army Corps of Engineers, California Coastal Data Collection Program.

Other Research

The vegetation management and grazing plans and the Ocean Beach monitoring program are the park's most immediate priorities. Future resource management planning will include but will not be limited to the following additional studies:

Developing measures for the protection of critical habitats for endangered species and other sensitive resources such as the intertidal zones

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Developing wildlife censusing and management strategies for certain wildlife species (this may be determined somewhat by vegetation management strategies)

Developing measures to provide for the recolonization of native species such as the sea otter and elephant seal

Continued monitoring of environmental parameters to assess the impacts of use on the recreation area

Part Two: Environmental Analysis

INTRODUCTION

Four alternatives for visitor use were presented and evaluated in an Assessment of Alternatives published in May 1977. The plan presented in part one is a melding of these four alternatives--programs and facilities were taken from each and were combined with new ideas that resulted from public review. Tables summarizing the alternatives considered are included in the Appendix.

The impacts of the plan on the social, cultural, and natural environments are analyzed in this section. The impact analysis is organized by component of the environment affected by the plan as a whole. To refresh the reader's memory and to make cross-referencing between elements of the plan and impacts easier, a summary table of the development proposals and existing conditions precedes the impact analysis (table 4).

Several environmental issues were of concern to the public during the review of the assessment and position papers and to preliminary reviewers of this environmental analysis. At this point, most of these issues have been resolved by strengthening the environmental analysis, reviewing and redefining proposals, or giving more consideration to check points, monitoring studies, or mitigating measures that will reduce potential impacts. For example, more thought has been given to possible effects of increased visitor use levels on air quality, water consumption, and residents of surrounding communities.

The plan contains a number of conditional actions that will require careful study and review of all available options before a specific course of action can be chosen. Analysis of impacts of these actions at this time would be sketchy at best. Therefore, these actions are singled out in a separate section for special treatment. These actions will not be undertaken until appropriate studies and environmental documentation have been completed and reviewed by the public.

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TABLE 4. DEVELOPMENT SUMMARY

Area	Existing	Proposed
Alcatraz	Museum (50 people)	Museum and historic structures (300 people)
	Ranger tour area (5.5 acres, 300 people)	Landscaped open space with picnic areas, walking trails (22.5 acres, 300 people)
	Ferry terminal	Ferry terminal
	Protected wildlife habitat (5 acres)	Protected wildlife habitat (5 acres)
Aquatic Park	Hyde Street pier and historic ships (5 ships, 500 people)	Historic ships docked at new facilities near Hyde Street and municipal piers (12 ships, 850 people)
		New breakwater protecting lagoon (Army Corps of Engineers)
		Ship maintenance area near docking facilities
		Entry plaza between Hyde Street pier and Haslett Warehouse
	Maritime museum (250 people)	Maritime museum relocated to Haslett Warehouse, and information center added (1,000 people)
	Senior center (200 people)	Senior center relocated to Fort Mason
	Rowing and swimming clubs	Public rowing, swimming, and sailing facilities in aquatic center (400 people)
	Sea Scout facilities	Building removed, Sea Scouts to meet in aquatic center
	Food concession	Upgrade food concession

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Area	Existing	Proposed
Aquatic Park (cont.)	Municipal pier (250 people)	Municipal pier with fish cleaning stations (250 people)
		Waterfront shuttle along Belt Line Railroad right-of-way
	Beach with comfort station	Beach with comfort station (1 acre, 500 people)
	Recreation space - includes lawn, bleachers, bocce ball courts (5 acres)	Recreation space - includes lawn, bleachers, bocce ball courts (10 acres, 1,100 people)
	Cable car turnaround (240 people)	Cable car turnaround with interpretive kiosk (240 people)
	Roads and parking - includes Jefferson Street west of Haslett Warehouse, Hyde Street north of Beach Street, Van Ness north of Kodak building	Roadways removed, landscaped open space (1 acre)
Fort Mason	Open space (21.5 acres)--includes picnic area, community garden, lawn	Open space (25 acres)--includes lawn and picnic areas, community garden, walkways, and seating areas (3,000 people)
	Pier area - includes park maintenance headquarters, special events, interim educational and cultural programs	Pier area - includes cultural center, indoor recreation space, marine learning center, food service (4,100 people). Fort Mason piers modified to accommodate recreational ferry
	Historic residences and grounds and nonhistoric structures - includes visitor center and hostel. Some still in use by military	Historic structures adapted for uses such as senior center, community rooms, hostel, NPS offices. Nonhistoric structures removed for more open space (515 people)
	Existing roads, parking, and trails	Most interior roads removed, major access roads relocated to the south, redesigned parking space, improved bicycle and pedestrian paths

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Area	Existing	Proposed
Crissy Field	Open space - includes picnic area, runway for game courts (36 acres)	Open space - includes large lawn areas, picnic areas, trails, walks, plazas (38 acres, 2,900 people)
	Beach (7 acres)	Beach and a lagoon (6 acres, 1,400 people)
	Coast Guard structures	Adapted for small interpretive facility and comfort stations or New building added for interpretive facility, comfort stations, small food service, sports equipment rental
		Bicycle path (1.25 miles) and jogger path (1.25 miles)
		Parking (400 cars)
Cliff House	Cliff House complex - includes food and beverage service, gift sales and amusement facilities (770 people), National Park Service information station	Cliff House restored to 1909 appearance (if feasible) - includes food and beverage service, gift sales, exhibits, collections (770 people)
	Sutro Baths - ruins	Water oriented park with stabilized ruins, walkways, plazas, decorative pools, interpretive exhibits, small beach (13 acres, 730 people)
	Sutro Heights Park - neighborhood park	Restored historic garden and landscaping, minor interpretive displays, seating areas (21.5 acres, 350 people)
	Parking lots and circulation patterns	Redesigned parking and circulation, bus drop-off, pedestrian crossing from Cliff House to Sutro Heights Park
Fort Baker	Presidio Yacht Club	Adapted for day use center with food service, bait sales, equipment station, and places for game tables and socializing

	Beach and open space	Rubble removed, new sandy beach and landscaping (6 acres, 900 people)
	Historic structures	15 historic structures adapted for educational conference center and artists-in-residence program (350 people); 8 structures adapted for a group camp and environmental study area (150 people); 5 structures adapted for hostel (200 people)
	Nonhistoric structures	4 removed and an NPS maintenance facility built; 19 removed and site regraded for a 700-car parking lot; 1 adapted as a ranger information station
	Pier	Ferry landing (600 people), pier with fish-cleaning station, railings, and rod holders for fishermen
	Yacht club piers	Public overnight berthing (1 night only), and day use slips (50 slips)
	Parade grounds	Adapted as field for sports and informal activities (10 acres, 300 people)
	Satterlee breakwater	Parking for fishermen (50 cars), fish-cleaning station, comfort stations
Rodeo Valley	Parade grounds (Fort Barry)	Picnic area with tables, grills, and comfort stations (250 people)
		400-car trailhead parking at former housing area adjacent to Presidio stables (7 acres)
	Riding co-op	Riding co-op/public stables
	9 historic structures at the parade grounds	Hostel/group retreat (125 people), artists-in-residence program (150 people)

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Area	Existing	Proposed
	Rifle range (Fort Barry)	Special event space (9 acres, 15,000 people)
	Chapel and gym (Fort Barry)	Group recreation and education facilities (reservation only)
	Battery Alexander (Fort Barry)	Special group picnic and camp area (reservation only, 50 people)
	Theater (Fort Barry)	Removed
	Nonhistoric structures (Rodeo Lagoon)	Most nonhistoric structures removed, picnic area with turf play areas north of Rodeo Lagoon, one or more structures adapted for a comfort station, food service, and equipment rental facility, adjacent parking area (6 acres)
	Rodeo Beach	Rodeo Beach (10 acres, 1,500 people)
	15 historic structures at Rodeo Lagoon	Adapted as environmental education center with classrooms, labs, and dormitories (300 people)
	10 historic structures at Rodeo Lagoon	Preserved for future uses, possibly center for alternative energy and technology research
	Roadway (½ mile) and paved parking (75 cars, 3/4 acre) at Rodeo Lagoon	Paved parking (25 cars, ¼ acre); landscaping (2½ acres)
	Historic former Nike missile support facilities	Adapted for park maintenance and other administrative activities
	Nike missile launch site, Battery 88	Continue public tours
	Historic balloon hangar	Adapted for indoor riding rink

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Area	Existing	Proposed
	Fort Barry Capehart military housing	33 nonhistoric structures removed, group picnic area (15 acres, 400 people)
	Kirby Cove group camp	Group camp (120 people)
	Nonhistoric structures on Hill 88	Removed
		Gerbode Valley hike-in camp (60 people)
		Oakwood Valley picnic area (350 people)
		Educational farm in Oakwood Valley (1 acre, 50-75 people)
	Tennessee Valley trailhead, riding co-op	Tennessee Valley trailhead, riding co-op/public stables
		Tennessee Valley hike-in camp (60 people)
	Point Bonita	Point Bonita tours and exhibits
	Overhead utilities	All utilities buried underground
Mount Tamalpais	Morses Gulch	Walk-in camp (60 people)
	Old Mine (Bolinas Ridge)	Hike-in camp (60 people)
		Exhibit at Bolinas Lagoon as proposed by lagoon advisory committee
Muir Woods	Concession, administrative offices, visitor contact facility in grove	Possible relocation of interpretive facility and concession near the existing southern parking lot (long-term potential plan), administrative offices relocated with the new maintenance facilities SE of the new parking lot
	Parking lot in grove, adjoining road	Parking removed, road realigned, area restored to its natural condition

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Area	Existing	Proposed
		New parking area (100 spaces) just south of the existing parking area
	Maintenance area	Maintenance area relocated in new building with administrative offices SE of the new parking lot
		Hostel (50 people, long-range plan)
Stinson Beach	Access road	New entrance
	Beach with parking (1,100 spaces), comfort station, food service, ranger station, maintenance substation	Beach with parking (1,100 spaces), comfort station, food service, ranger station, maintenance substation
Muir Beach	Beach with parking and comfort station	Beach with parking, improved comfort station, mobile food service, picnic area (80 people)
Olema Valley	Five Brooks trailhead, public stables, picnic area	Five Brooks trailhead, public stables, picnic area, walk-in camp (20 sites, 80 people, 20 parking spaces)
	Truttman Ranch	Walk-in camp (40 sites, half with tent frames, 160 people, 40 parking spaces)
	Bolinas Ridge	Hike-in camp east of Five Brooks (15 sites, 60 people)
	Historic structures	Two historic structures at north and south ends of valley adapted for hostels (50 people each, long-term), other structures maintained through use as park staff housing or management facilities, Rancho Bolinas adapted as environmental education center (30-50 people)

Area	Existing	Proposed
	Local ranches	Current agricultural enterprises continued, a working ranch used to interpret historical agricultural use of the valley
Point Reyes	Bear Valley visitor center-interpretation, information and comfort station, picnic area, Morgan horse farm, trailhead, Miwok Village, self-guiding trails	Bear Valley visitor center - expanded interpretive activities, improved comfort stations, food service, picnic area, Morgan horse farm, trailhead, Miwok Village, self-guiding trails
	Drakes Beach information center	Drakes Beach information center - exhibits expanded
	Tours and exhibits at lighthouse	Tours and exhibits at lighthouse
		Tours and programs at Pierce Point Ranch
		Tours and programs at lifesaving station
	Beach access at North Beach, South Beach, Drakes Beach, Limantour	Beach access at North Beach, South Beach, Drakes Beach, Limantour
	Environmental education center along Limantour Road	Environmental education center along Limantour Road
	Hostel at Laguna Ranch	Hostel at Laguna Ranch
		Hostel along Highway 1
	Mount Vision overlook	Mount Vision overlook
	Johnson's Oyster Farm	Johnson's Oyster Farm
	Sky camp	Sky camp
	Glen camp	Glen camp
	Coast camp	Coast camp
	Wildcat camp	Wildcat camp

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Area	Existing	Proposed
		Home Ranch hike-in camp
		Muddy Hollow Ranch hike-in camp
		Marshall Beach boat-in camp
	Palomarin trailhead	Palomarin trailhead

IMPACTS ON VISITORS

Changing Activities and Use Levels

Opportunities for visitor use will be greatly expanded by the plan. New recreational activities, educational and interpretive programs, and visitor services will be provided, primarily by using existing facilities and structures. As the kinds of activities in various areas change, the visitors who are attracted to these areas will change also.

Visitation throughout GGNRA/Point Reyes could increase by as much as 200 percent over existing visitation as a result of park development. The increase is expected to be about 230 percent for the San Francisco parklands and about 160 percent for the area north of the Golden Gate, based on the maximum number of people possible in every facility at each location at any one time. An exception to this general projection of increased visitation is the heavily used Mount Tamalpais area, where use is already in excess of desired capacity and will hopefully decrease by about 6 percent.

Wherever increased use levels are not accompanied by a corresponding increase in facilities, visitor enjoyment will be affected. In the case of parking, for example, a deficit of 1,180 parking spaces during peak use periods in the San Francisco Bay waterfront area will decrease the enjoyment of visitors who have to search for parking some distance from their destination. However, the use levels used for assessing impacts on visitors are generally higher than what will actually occur because they are based upon the assumption that all available facilities and spaces will be used at their maximum capacities at the same time. In reality, all facilities will not be filled simultaneously; for example, a beach will be full at midday, but a campground will not be full until evening.

Carrying capacities established in the plan will be continuously reevaluated to assure that visitor satisfaction and enjoyment are not compromised to an unacceptable extent by large numbers of visitors. Visitors will expect high use levels in the southern units because of the structured setting, maintained landscapes, proximity to the city, and high use levels that have already been established. North of the Golden Gate Bridge, however, feelings of overcrowding may be intense for visitors expecting solitude, even when visitor levels are relatively low.

Alcatraz. Activities on Alcatraz will be greatly increased. Currently, visitors are allowed on only about 25 percent of the island. As more of the island is opened, however, both the level

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of use and types of visitors will change. People interested in the prison's history, the focal point of present tours, will continue to be attracted to the island. Expanded tours (from a current maximum of 225 people to 300 people), and interpretation of additional historic buildings will provide increased opportunities for visitors to see more of the important structures and gain a better understanding of the area's history. At the same time, an increase in unstructured activities may attract different visitors, such as artists, sightseers, and people interested in a day's outing on an island. New activities will provide additional opportunities for people to enjoy Alcatraz Island and will accommodate a larger number of users.

TABLE 5. ACTIVITIES, ALCATRAZ

Activity	Present Use	Expanded	New Activity
Guided tours	X	X	
Interpretation/exhibits	X	X	
Strolling			X
Picnicking			X
Bird watching			X
Photography, painting, sketching			X
Frisbee, kite flying			X

While the maximum number of people allowed on the island will be 600 (double current use figures), crowding to the detriment of visitor enjoyment is not expected, since much more of the island will be open to visitors.

Aquatic Park. As this area is developed into the front door of GGNRA, some established patterns of use will be disrupted. As facilities are relocated, removed, or adapted for new uses, people who use them will be shifted to new areas, but generally to improved locations within Aquatic Park. For example, some of the pier area now used by swimmers, fishermen, and boaters will no longer be available to them because of the mooring of up to seven additional historic ships. Also, the removal of the rowing clubs (if and when their ownership is transferred to the National Park Service) and the removal of the Sea Scout building will cause temporary inconvenience to the users of these facilities. However, new facilities to support swimming, rowing, sailing, and fishing (including rentals, lockers, and showers) will be developed on the ground floor of the proposed Aquatic Recreation and Education Center. The former rowing club members will be accommodated here, and in a new Hyde Street Pier facility, along with the general public. Sea Scout meetings and programs will also be transferred to this building. If any of the ships are anchored in the center of

the lagoon, great care will be taken to avoid conflicts with swimmers and rowers.

The municipal pier will be upgraded, and restrooms and modest fish-cleaning stations will be added, enhancing its usability for fishermen.

Since the capacity of the lagoon and pier for water-oriented activities has not yet been reached, those who traditionally used the piers for fishing will not be affected by the minor loss of space. The development of a promenade through the area will provide a more attractive setting for sitting, strolling, and board games, thus attracting additional local visitors and tourists to the area.

Additional activities in the Aquatic Recreation and Education Center will enhance educational and recreational opportunities available to all visitors, and encourage programs for all ages and for community-oriented groups.

Over a gradual period of time, the senior citizen's center will move to a new location at Fort Mason. The senior center at Aquatic Park will phase out only as the membership itself shifts to the Fort Mason center, so no impact on members is anticipated. Since the new location will be equally convenient to projected public transportation and parking, be less congested, and provide more outdoor space, it should be a more comfortable and pleasant setting for senior programs.

The conversion of the Haslett Warehouse from office space to a museum and information center will cause the displacement of approximately 70 tenants. By the time adaptation of the warehouse to a visitor facility begins, however, it is anticipated that few, if any, of the tenants will remain and have to move. The benefits of this conversion will be substantial. Expansion and improvement of the maritime museum will increase the educational and cultural experiences of visitors. The inclusion of a major park information and interpretation center will provide much needed direction to both local and national visitors, decrease their confusion, enhance their understanding of the parks' resources, orient them to other opportunities available in the region, and add to their knowledge of the historical significance of the area.

New artifact collections and exhibits, additional ships, and the waterfront shuttle will attract more regional and national visitors to Aquatic Park, and increase opportunities for interpretive and educational activities.

The removal of the rowing clubs and the Sea Scout building, the possible redevelopment of the Hyde Street pier area, development of

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a common entry plaza at the intersection of Hyde and Jefferson streets, improvement of the promenade, cleaning up of the municipal pier and bleachers, and closure of some areas to automobile transportation will greatly improve the aesthetic value of the area, thus further highlighting and enhancing visitors' experiences. The overall effect of these various improvements and additions will substantially benefit both local residents and tourists.

TABLE 6. ACTIVITIES, AQUATIC PARK

Activity	Present Use	Retained	Expanded	Phased Out
Sitting and socializing	X		X	
Strolling	X		X	
Sunning	X		X	
Picnicking	X		X	
Eating out	X	X		
Fishing	X		X	
Senior center activities	X			X
Jogging	X	X		
Bocce ball	X	X		
Water-oriented recreation	X		X	
Kite flying	X	X		
Bongo drums	X	X		
Board games	X	X		
Maritime museum	X		X	
Environmental education	X		X	
Interpretation/ information	X		X	

Visitation to this area of the park is expected to more than double, from 2,000 people to 4,340 people maximum at any one time. These visitors will be accommodated in both additional structures and increased open space along the waterfront. Much of the anticipated use will be concentrated in the new maritime museum and at the expanded collection of historic ships. Because these maximum use levels will be reached only on occasion and because the setting is in San Francisco, where large numbers of people are expected, crowding is not anticipated to be a problem a majority of the time. However, parking will not be available anywhere in Aquatic Park and during peak use periods, if all facilities are being used, as many as 678 parking spaces may have to be found in surrounding areas (see table 15 in the section "Impacts on Surrounding

Communities," which includes auto traffic projections and possible parking deficits). The search for parking will delay and inconvenience visitors and require them to walk farther to participate in activities.

Fort Mason. An increase in the number and variety of activities (recreational, cultural, and educational) will make all areas of Fort Mason more attractive to visitors. New opportunities will include overnight visits at the hostel, activities for seniors, indoor recreational activities, and limited food service.

TABLE 7. ACTIVITIES, FORT MASON

Activity	Present Use	Retained	Expanded	New Activity
Strolling	X		X	
Sitting	X		X	
Bicycling	X		X	
Jogging	X		X	
Sightseeing	X		X	
Fishing	X	X		
Arts/crafts	X	X		
Picnicking	X		X	
Eating out				X
Lawn sports	X		X	
Dog running	X	X		
Sunbathing	X		X	
Community gardening	X		X	
Hostel				X
Senior center activities				X
Cultural center activities	X		X	
Environmental education	X		X	
Indoor recreation				X
Special events	X		X	
Interpretation/ information	X		X	

By moving maintenance facilities from the Fort Mason pier area to a more suitable location, valuable waterfront space will be made available for visitor uses, expanding the kinds of opportunities available in the pier area.

The main emphasis of change in this area is on providing day-to-day recreational opportunities for local and regional residents. The diversity and range of uses provided will attract a wide variety of local groups. While national visitors will certainly

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find much to do here, they are not expected to be the primary users.

With the exception of the pier area, Fort Mason is largely unused at present. The large projected increase in visitation from 1,900 to 7,615 reflects this underutilized condition.

During planning, concern was expressed by many groups that Fort Mason keep its tranquil and unstructured qualities. Consequently, care will be taken to ensure that certain times and places are reserved for visitors to enjoy a peaceful park setting by carefully scheduling events and frequently monitoring the effects of crowds.

Visitor parking at Fort Mason will be limited to 614 spaces to preserve as much open space as possible. This amount of parking will be inadequate during special events and peak use periods when activities in the pier sheds and unstructured recreational activities are all occurring simultaneously. During such periods the demand for parking may exceed the number of available spaces by 1,000 or more. Visitors will be inconvenienced by losing time looking for parking spaces and by having to walk or take public transportation from distant parking to Fort Mason. Lack of parking may discourage some visitors from using the area after initial visits. The peak use periods when parking will be a problem are expected to occur on summer weekends and evenings when special events are planned, 25 to 50 days each year. Special attention has been placed on providing alternative forms of transportation to help mitigate the impact of this problem.

Crissy Field. The overall purpose of the plan for Crissy Field is to provide much needed open space. Because it is so underutilized now, recreational use is expected to increase dramatically. The area will be much more accessible and conducive to a number of water and shoreline activities, especially with the possible creation of a lagoon. Both local and regional residents will be drawn to the area for a wide variety of outdoor recreational activities.

Two environmental education programs will be displaced to more suitable park areas. The Applied Aquatic Resources, which in 1978 had 3,710 visitors, will possibly be relocated to Fort Barry, to the center for alternative technology demonstrations and research. The Promenade Classroom, which had 2,185 visitors (138 groups) in 1978, will possibly be relocated to the Fort Point area. These moves will cause a temporary disruption to the organizations and users. However, because of the provision of new facilities, the impact is expected to be slight.

TABLE 8. ACTIVITIES, CRISSY FIELD

Activity	Present Use	Retained	Expanded	Phased Out	New Activity
Strolling	X		X		
Bicycling	X		X		
Jogging	X		X		
Dog walking	X	X			
Fishing	X	X			
Picnicking	X		X		
Sunbathing	X		X		
Environmental education	X			X	
Boat launching	X	X			
Water play (lagoon)					X
Lawn sports					X
Sitting					X
Self-guided nature tour					X

Use at Crissy Field is expected to grow from the current number of 100 people to a maximum of 4,300 people at any one time. It is not expected that high use levels will lead to uncomfortable overcrowding for several reasons. The park is in an urban area, where there is higher tolerance of crowds than exists in the northern, more rural parklands. The activities will usually be unstructured, allowing people to space themselves and use the park when it is not crowded. Design of lawn areas, walkways, and earth berms will separate areas for intensive recreation from more secluded and quiet settings.

Minimal amounts of parking (400 spaces) will be provided at Crissy Field. Overflow parking will occur either on grassy areas of Crissy Field or in nearby army lots. In the future, improved transit service to Crissy Field, the proposed waterfront shuttle service, and improved pedestrian and bicycle access will help avoid traffic congestion and should ensure that a high level of visitor satisfaction is attained.

Cliff House. The rejuvenation of this area will substantially enhance visitors' enjoyment of both existing and newly available activities by creating a more aesthetically pleasing setting. Improvement of the parking and circulation arrangements will also improve visitors' enjoyment of the area by reducing congestion.

During the restoration of the Cliff House to its 1909 appearance, or during the construction of a new building if restoration is not feasible, visitors will experience some inconvenience if the facility is

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temporarily closed. However, either action will increase the building's attractiveness and reduce its commercial character. The food and beverage service at the Cliff House will be appropriate to a reasonable range of tastes and incomes.

Pedestrian access to the Sutro Baths ruins will be easier and more attractive, drawing more visitors into the area and providing an enjoyable and safe visit.

The Cliff House unit will attract both regional and national visitors. A major interpretation and information center will provide an understanding of the history of the area and the available recreational opportunities.

TABLE 9. ACTIVITIES, CLIFF HOUSE

Activity	Present Use	Retained	Expanded	New Activity
Fishing	X	X		
Exploring	X	X		
Strolling	X		X	
Sitting	X		X	
Picnicking				X
Eating out	X	X		
Sightseeing	X	X		
Shopping	X	X		
Interpretation/ information	X		X	

Once all improvements are completed, this area will have a maximum one-time capacity of 1,850 people. Most of the total increase in visitation for the area will be absorbed by the new Sutro Baths Park, with little change in visitation at the Cliff House itself. The total parking will remain at 335 spaces. Traffic congestion and parking are problems even now, when the area has a capacity of only 700 people; however, improvement of parking facilities, relocation of bus parking to the upper Ocean Beach esplanade, and establishment of a pedestrian crossing from the Cliff House to Sutro Heights Park should help alleviate congestion in the future.

Sutro Heights Park is currently a quiet neighborhood park. Traditional users may be disturbed as more people are drawn in and create a busier, less tranquil atmosphere.

Marin Headlands. The Marin Headlands, covering approximately 4,700 acres, currently has a maximum visitation of 1,167 visitors at any one time. This is expected to increase to a maximum of 5,466 visitors at any one time with proposed improvements at Fort Baker and Rodeo Valley.

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During periods of peak use, when Rodeo Valley is closed to automobile traffic and shuttle service is operating from Fort Baker, there will be a total of 1,565 parking spaces available to visitors, which will be sufficient to accommodate projected auto traffic. However, parking lots and roads may occasionally become congested on peak use weekends, thus causing visitor inconvenience and dissatisfaction.

Fort Baker is currently under the jurisdiction of the army; thus, few recreational use patterns have been established and no traditional users will be displaced. Opportunities for fishing, about the only current use, will be expanded and improved by the plan. This area could become one of the most attractive recreation spots in the Bay Area and will serve as the transportation hub for the Marin Headlands portion of the park. The interpretation/ information center will provide a key link in the parkwide system intended to expand awareness of GGNRA/Point Reyes and the historical importance of the area. The wide range of activities planned will substantially increase the recreational, cultural, and educational options available to visitors.

TABLE 10. ACTIVITIES, FORT BAKER

Activity	Present Use	Retained	Expanded	New Activity
Sunbathing and swimming				X
Jogging	X	X		
Fishing	X		X	
Strolling				X
Sitting				X
Picnicking				X
Eating out				X
Hostels				X
Conferences/ seminars				X
Day camps				X
Performing arts				X
Environmental education				X
Boat launching and berthing				X
Lawn sports				X
Bicycling				X
Special events	X		X	
Interpretation/ information				X

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The proposed beachfront will increase visitation in the area to approximately 1,900 people at any one time. In addition, many other visitors will be passing through from the ferry terminal and parking lot to other parts of the headlands. Visitors seeking low-density recreation will not find Fort Baker suitable, but they will find suitable areas in nearby Rodeo Valley.

Proposed improvements in Rodeo Valley will enhance opportunities for the wide range of park activities already occurring there and make the area more appealing to visitors from the inner cities. The educational centers, special event area, rental equipment, hostel, stables, food service, and cultural programs are intended to attract a large variety of users, and visitation could increase to a maximum of 2,926 people at one time (the combined capacities of Fort Cronkhite, Fort Barry, and the Capehart picnic area). This area is one of the most sensitive to crowding, since traditional users have come to expect few people and little activity. Traditional visitors will experience varying degrees of resentment over sharing the headlands with more people. However, development will be consolidated in a few small areas, and the majority of visitors will stay in these locations. Therefore, the hills and some beachfront will remain open to those seeking a more natural setting for hiking and picnicking.

TABLE 11. ACTIVITIES, RODEO VALLEY

Activity	Present Use	Retained	Expanded	Restricted	New Activity
Beachcombing	X	X			
Strolling	X	X			
Sitting	X		X		
Sunbathing	X	X			
Picnicking	X		X		
Eating out					X
Beach sports	X		X		
Sightseeing	X	X			
Dog walking				X	
Hiking	X		X		
Jogging	X	X			
Birdwatching	X		X		
Fishing (ocean)	X		X		
Hostels	X		X		
Camping	X		X		
Bicycling	X	X			
Environmental education	X		X		
Artists-in-residence program					X
Water activities	X		X		
Horse riding	X		X		
Special events	X		X		
Interpretation/ information	X		X		

Special events at the rifle range will disturb users of adjacent areas. Until transit service is implemented, special events may cause traffic congestion and competition for available parking spaces. When transit service is operating, visitors bound for other destinations in the valley may be inconvenienced by having to park at Fort Baker at times when large special events are scheduled.

Members of the horseback riding co-ops in Rodeo Valley and Tennessee Valley will not be affected, except that their organizations will have to make arrangements to provide five to ten horses for public rental. These rental animals will provide riding opportunities for park visitors who do not own horses.

Two other organizations operating in Rodeo Valley, the YMCA and Yosemite Institute, will continue their programs in their current locations until the facilities are amortized. At such time, these organizations will move to historic structures at Fort Cronkhite, thus consolidating all environmental education program facilities in the valley. With the exception of increased visitation, little impact on these organizations is expected from the plan.

Mount Tamalpais Area. The increase in visitor use of both Marin Headlands to the south and Olema Valley to the north should reduce the pressure on the well-established, heavily used Mount Tamalpais area and allow a more enjoyable visit for traditional users. Very few changes in activities or use levels are foreseen for Muir Woods and Stinson Beach.

Expansion of the interpretive program to include information about all of GGNRA/Point Reyes and other recreational areas in the region will provide a needed link between Muir Woods and the rest of the parks and help visitors become aware of the opportunities available to them.

When and if the restaurant and gift shop are replaced outside the grove, additional food and shopping services will be provided. Service may be temporarily disrupted during the move.

TABLE 12. ACTIVITIES, MUIR WOODS

Activity	Present Use	Retained	Expanded
Strolling	X	X	
Interpretation	X		X
Jogging	X	X	
Eating out	X		X
Shopping	X		X

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A new entrance to the parking lot at Stinson Beach will benefit both visitors and townspeople by reducing conflicts between town and visitor traffic. No change in activities is expected at Stinson Beach.

TABLE 13. ACTIVITIES, STINSON BEACH

Activity	Present Use	Retained
Sunbathing	X	X
Picnicking	X	X
Swimming	X	X
Beachcombing	X	X
Fishing	X	X
Wildlife observation	X	X
Beach sports	X	X

Two new campgrounds will allow visitors to hike through the Mount Tamalpais area on a journey that could last for several days.

Olema Valley. This area currently accommodates around 250 people at one time. Even if the theoretical use capacity of 1,615 people at a time is attained, the overall average visitor density will still be only 1 person per 8 acres. Ease of access at the northern end will cause an uneven distribution of visitors, with visitation expected to be lighter in southern areas of the valley. This area is expected to be attractive to those persons seeking a more isolated type of experience. New campgrounds will allow visitors to stay overnight and hike through this area on a journey that could last for several days.

Congestion may occur along the roadway, particularly the section between Five Brooks and Bolinas Lagoon. The proposed shuttle and improved transit should help alleviate congestion that would otherwise occur along the roadway. The acquisition of additional lands at the northern limits of the park could raise future use levels in this area.

Point Reyes. Visitation to Point Reyes is currently 6,720 people at any one time on a peak day and is expected to increase to 10,080 people when the entire plan is implemented. The approximate acreage of Point Reyes is around 55,000 acres, making the overall average density less than one person per 5 acres. Use is expected to spread throughout the seashore, with small concentrations of people along the beaches, in campgrounds, and at the Bear Valley visitor center. Six new campgrounds and two new hostels will greatly expand overnight opportunities and complete the system of

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accommodations designed to allow visitors to hike from San Francisco to Point Reyes in a continuous journey.

Improved information and interpretation at Bear Valley will help people become aware of the historical and ecological significance of Point Reyes and the recreational opportunities available at different locations.

TABLE 14. ACTIVITIES, BEAR VALLEY

Activity	Present Use	Retained	Expanded
Picnicking	X		X
Informal sports activities	X	X	
Interpretation	X		X

Traditional users seeking a low-density wilderness experience may feel Point Reyes is crowded, especially at the new campground sites. However, it is expected this use level will still allow for relatively secluded recreation. Careful monitoring of visitor levels and sensitivity to crowding will ensure that the quality of recreation at Point Reyes remains high.

Effects of Construction

Throughout the parks, construction activity to adapt structures, update facilities, and provide for new uses will inconvenience visitors. The movement of material, increase in noise levels, and closure of some park areas until construction activities are complete will be disturbing. These inconveniences, however, will all be temporary. Construction projects will result in vastly improved conditions for visitors.

Effects of Transportation Changes

The proposal emphasizes use of mass transit, shuttle buses, and other forms of public transportation. While having the advantages of reducing congestion, pollution, visual intrusions, and oil consumption, and increasing access for those without cars, public transportation also causes some inconvenience to visitors. Users will have to plan ahead and arrive earlier for events and wait longer to get to different areas. They will have to carry things with them and be aware of schedules and transit routes. Each of these conditions could potentially reduce visitors' satisfaction with their park experience.

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Visitor Safety

Development proposals will correct a number of existing safety hazards, primarily by removing deteriorated structures and by constructing safer trails and access. However, more visitors will be attracted to an area that contains many natural hazards--steep cliffs, unpredictable ocean currents and waves, and earthquake zones.

Rehabilitation of historic structures for new park uses and removal of other structures will reduce possible safety hazards to visitors who might otherwise explore deteriorating buildings and batteries. Hazards will be most significantly reduced on Alcatraz when nonhistoric structures are removed. At present, weakened structures and rubble necessitate closing off most of the island, but use of the island can be expanded after these potential hazards are removed. Removal of abandoned structures in Rodeo Valley and Fort Baker will eliminate other major hazards.

Trail improvements throughout the park, but especially in the San Francisco Headlands, will rectify a dangerous potential for sliding in areas of unstable and slumping coastal cliffs.

Use of coastal areas throughout the park is inherently hazardous because of instability of coastal cliffs, possibility of landslides, and potential for earthquake-related flooding along low-lying coastal areas. While only minor new visitor facilities are proposed for coastal areas, some risk will be taken to provide for visitor use of beaches and the adjacent coastal zone. However, this risk is not considered to be sufficient to preclude shoreline recreation use. As required by Executive Order 11988, areas subject to 1 percent or greater chance of tsunami flooding in any given year (100-year frequency) were identified in the Information Base as flood-prone areas. The following new or existing facilities are planned for use within these areas:

Aquatic Park
- New ship maintenance facility
- Hyde Street pier (existing, to be replaced)
- Maritime museum and information center in Haslett Warehouse (existing structure, new use)
- Aquatic Recreation and Education Center in Aquatic Park bathhouse (existing structure, new use)

Fort Mason
- Pier buildings (existing structures)

Crissy Field
- New information station

Information about tidal flood prone areas is not available for Marin County; however, several facilities may be located in flood prone areas:

Fort Baker
- Beach/picnic/play area
- Pier and improvements for restrooms, fish-cleaning station (existing structure, new use)
- Historic structures adaptively used for food service, equipment rental (existing structures, new uses)

Fort Cronkhite
- Historic structures adaptively used for environmental education center (existing structures, new uses)

Muir Beach
- Picnic area

Stinson Beach
- All existing facilities

None of these facilities is expected to harm floodplain natural values and none is particularly detrimental to human safety, health, or welfare. Tsunami run-up may cause some flooding of lower floors, but building stability is not expected to be affected. The structures of concern are either existing as part of previously developed areas, or are support facilities that will provide for recreational use of beach and shoreline areas. Use of existing historic structures in the flood zone is considered, in spite of their coastal locations, because of a mandate to utilize historic structures, because their functions often require a water-oriented location, and because their use is not hazardous to visitors. For example, the Haslett Warehouse was acquired to function as a major visitor information center and maritime museum because of its location near the popular Fisherman's Wharf and because of its proximity to the bay, water recreation facilities, and historic ship collection. Similarly, the Aquatic Recreation and Education Center (old Aquatic Park bathhouse building) will house water recreation and education facilities that require a waterfront location. In the rehabilitation of historic structures for adaptive uses, the flood-prone nature of their locations will be taken into account to decrease the potential for visitor injury. To assure compliance with Executive Order 11988, the review procedure described in the order will be followed.

Structural damage and visitor injury are real possibilities throughout most of the park in the event of a major earthquake. While no new facilities will be built in seismically unstable areas, existing facilities in Olema Valley lie close to the San Andreas fault

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and could be damaged by activity along the fault. Whenever work is undertaken on historic structures to make them suitable for adaptive uses, they will be brought up to structural standards to make them more capable of withstanding seismic activity.

Summary

The plan will provide a wide range of high quality recreational, educational, and cultural opportunities for local and national visitors. Areas in San Francisco and Marin will be cleaned up, new activities will be provided, access will be increased, and community service will be stressed. From the maritime museum at Aquatic Park in downtown San Francisco, to the windswept beaches of Point Reyes, the park will provide recreational experiences for a wide variety of users.

The plan was shaped by careful attention to both existing uses and public demand for new activities. Visitor use levels will be monitored to ensure that overcrowding does not become a problem. Public transportation to and from park areas, as well as routes and parking for private autos, will be improved to provide access for all users. Information centers will focus on recreational opportunities in the entire region. Old and unsafe buildings will be torn down, and rubble will be removed. Currently unused areas in prime locations will be rejuvenated and utilized for new activities. These additions and improvements will greatly enhance visitor experiences and recreational opportunities in the San Francisco Bay Area.

IMPACTS ON SURROUNDING COMMUNITIES

Traffic Congestion and Parking

Traffic along park access roads is often congested on weekends, especially on the Golden Gate Bridge and Route 1, where traffic periodically exceeds the roads' capacities. Whether or not the plan is implemented, recreational traffic will increase; however, traffic along certain access roads will increase at a more rapid rate as a result of the plan. Periods when traffic is above the capacity of the Golden Gate Bridge and Route 1 will increase in frequency. Roads such as Marina Boulevard, Point Lobos Avenue, and Sir Francis Drake Boulevard, where traffic is presently below the road capacities, will become more congested and reach their capacities sooner. Increased traffic congestion will affect local residents and commuters who regularly use park access roads by reducing travel speeds and increasing the number of times they will be ensnarled in traffic jams. Planned transit systems will reduce potential traffic congestion by reducing the number of private cars being driven through and parked in adjacent communities, but the amount of slow

moving buses pulling in and out of traffic will also affect road travel speeds.

The traffic congestion problem will be noticeably improved in the town of Stinson Beach once heavy park traffic is diverted around the community. The town will no longer be disturbed by excessive traffic, noise, or parking on public streets following the modification.

There will be a parking deficit on peak use days in the San Francisco waterfront units, with the largest deficit occurring in the Aquatic Park/Fort Mason area. The designed parking capacity will provide for more than 50 percent of peak visitation and will be adequate most of the time. However, on peak use days the burden of providing overflow parking will fall on adjacent communities that may not be willing or able to handle the parking problem. Local residents will be harassed by competition for parking and illegal parking in their driveways. It is expected that peak use periods, when parking could be a problem along the San Francisco waterfront, will occur on as many as 25 to 50 days each year; most likely on sunny summer weekends or when special events are planned.

The northern waterfront area can reasonably be examined as a whole in terms of parking requirements because a shuttle system, the waterfront beltline railroad, will be available to transport visitors from their cars to the desired activity area. A total of 4,290 parking spaces will be required between Aquatic Park and Fort Point on a peak use day, based upon the estimates of the number of visitors who will arrive by car (see table 15). This total figure also assumes that ferry service to Alcatraz and Fort Baker will be provided at Fort Mason and includes the parking requirements of ferry users. There will be only 2,480 spaces available in the waterfront section of the park and an additional 630 adjacent spaces available outside of the park; so there will be a deficit of 1,180 parking spaces.

While this deficit appears large, especially in the Aquatic Park/Fort Mason area where an additional 1,300 parking spaces would be required, the impacts on surrounding communities are not expected to be severe for the following reasons. Deficits are calculated based upon peak capacities and assume that all facilities are in operation at one time, but this will not be the case. For example, up to 50 percent of the activities in the Fort Mason piers are scheduled for evening, when outdoor activities will not be taking place, reducing the amount of parking needed by Fort Mason users at any one time. In addition, the period of peak use will be of a limited frequency and duration--a few hours on 25 to 50 days each year. The plan provides for a number of mitigating measures that will prevent excessive impacts on surrounding communities.

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TABLE 15. QUANTIFICATION OF TRANSPORTATION IMPACTS
(at one time/peak day)

Existing

Park Unit	Visitation	Modal Split Percent Auto/Transit/Other	Parking Spaces	Parking (Deficit) Surplus	Traffic (cars)	Transit (people)	Other (people)
Alcatraz	300	60/20/20	0	(60)	60	60	60
Aquatic Park	2,000	60/20/20	85	(290)	375	400	400
Fort Mason	1,900	77/11.5/11.5	514	65	450	220	220
Marina Green	3,400	75/12.5/12.5	1,200	400	800	425	425
Crissy Field	100	85/7.5/7.5	50	25	25	10	10
Fort Point	650	94/3/3	210	20	190	20	20
Baker Beach	950	80/10/10	200	(40)	240	95	95
Lands End	600	90/5/5	480	325	155	30	30
Cliff House	700	50/45/5	335	225	110	315	35
Ocean Beach	2,000	75/12.5/12.5	220	(250)	470	250	250
Fort Funston	350	84/8/8	45	(45)	90	30	30
Marin Headlands	1,167	86/10/4	1,480	1,166	314	117	46
Mount Tamalpais	9,334	91/6/3	1,946	(504)	2,450	547	217
Olema Valley	250	95/2/3	100	25	75	5	8
Point Reyes	6,720	95/3/2	2,095	375	,720	200	134

Proposed/Potential

Park Unit	Visitation	Modal Split Percent Auto/Transit/Other	Parking Spaces	Parking (Deficit) Surplus	Traffic (cars)	Transit (people)	Other (people)	Available Adjacent Parking
Alcatraz	600	0/100/0	0	0	0	600[a]	0	
Aquatic Park	4,340	50/30/20	0	(678)	678[a,b]	1,302	868	315
Fort Mason	7,615	67/21.5/11.5	614	(980)[a,b]	1,594[a,b]	1,636	876	
Marina Green	3,400	65/22.5/12.5	1,200	500	700	765	425	
Crissy Field	4,300	75/17.5/7.5	400	(600)	1,000	763	322	315
Fort Point	1,200	85/12/3	270	(48)	318	244	36	
Baker Beach	1,500	70/20/10	330	0	330	300	150	
Lands End	1,000	80/15/5	480	230	250	150	50	
Cliff House	1,850	50/45/5	335	45	290	833	92	146
Ocean Beach	4,020	75/12.5/12.5	220	(722)	942	500	500	1,265
Fort Funston	800	77/15/8	300	146	164	120	64	
Marin Headlands	5,466	72/22/6	1,565[c]	335	1,230	1,200	328	
Mount Tamalpais	8,800	81/15/4	1,910	(210)	2,125	1,317	350	
Olema Valley	1,615	84/11/5	400	0	400	178	81	
Point Reyes	10,080	87/10/3	2,595	225	2,370	1,008	302	

[a]Assumes that Alcatraz and Fort Baker ferry terminals are located at Fort Mason.

[b]Includes 250 parking spaces for ferry users.

[c]Parking accessible at one time with Rodeo Valley closed to auto traffic.

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Surplus parking in other areas of the park and overflow lots will be connected by shuttle to special events areas. If necessary, overflow parking will be provided on lawn areas or along roadsides on a few peak days each year. In the case of special events, a set carrying capacity will not be exceeded by event crowds and two large events will not be scheduled for the same day to minimize parking and traffic congestion problems.

Exploring the possibility of constructing a multi-level parking structure at the northern terminus of Van Ness Avenue could result in significant alleviation of the northern waterfront parking deficit.

As the waterfront parks are developed and visitation rises, the parking situation will continuously be reevaluated. If parking problems become apparent, parking options will be reassessed before the following actions are implemented:

termination of military use of buildings at Fort Mason and initiation of visitor use

opening of Haslett Warehouse as a maritime museum/information center

development of Crissy Field

initiation of ferry service from Fort Mason to Alcatraz and Fort Baker

extension of transit service west of Aquatic Park.

Parking deficits are also indicated for Ocean Beach and northern Marin, but adjacent communities will not be affected. At Ocean Beach a large amount of adjacent parking is available, and it will more than compensate for the lack of parking space within the boundary. Proven parking deficits in northern Marin areas eventually may be gradually alleviated through the development of additional off-road parking facilities. To as great an extent as possible, additional off-road parking will not intrude visually on roads or major trails and will be concentrated in major impact areas such as Bear Valley and Five Brooks, with transportation to surrounding areas provided by shuttle buses. As an interim step, before adequate shuttle bus service is available, some additional parking in northern Marin will be provided by dispersed roadside parking.

Community Services and Utilities

The park will rely on surrounding communities for municipal services such as water, power, waste removal, and fire control.

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TABLE 16. SOLID WASTE DISPOSAL REQUIREMENTS

Area	Structures to be Removed	Type of Material	Possible Disposal Methods	Approx. Amount of Material (cubic yards)
Alcatraz	Rubble piles (from 8 structures) Nonhistoric buildings (5)	Concrete Steel	Landfill Use on site Offshore ocean dumping in approved area	10,000
Aquatic Park	Road section Nonhistoric buildings (2)	Asphalt Wood	Wood salvage Use on site	-
Fort Mason	Road sections Concrete foundations	Concrete Asphalt	Use on site	-
Crissy Field	Temporary buildings Concrete shoreline revetment Road sections	Concrete Wood Asphalt	Army to remove structures in permit area	-
Fort Baker	Bulkhead Temporary buildings (23)	Concrete Wood	Wood salvage Landfill	2,400 (bulkhead) 350 (structures)
Fort Barry (Capehart)	Nonhistoric buildings (33)	Wood	Army to remove structures	-
Fort Cronkhite	Temporary buildings (15)	Wood Concrete	Wood salvage Landfill	500
Muir Woods	Nonhistoric buildings (2) Parking lot	Concrete Wood Asphalt	Wood salvage Landfill	200
			Total	13,450

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Demands will not be excessive, and the National Park Service will pay for services rendered. Due to the isolation and large numbers of buildings at Forts Barry and Cronkhite, the National Park Service must provide its own structural fire protection in those areas.

Water. Water consumption within the park will increase as visitation increases (see "Impacts on Water Resources" for water demand rates and water sources). Marin Municipal Water District (MMWD) supplies water to Marin Headlands and Mount Tamalpais. During drought years, the park will face the possibility of having a reduced water supply or having the water supply to the park cut off entirely if emergency conditions exist so that other customers can be served. A greater reliance on local water resources or curtailment of park activities may result under such a situation.

Watersheds for the Stinson Beach County Water District and Muir Beach Community Services District are almost wholly contained within the boundary of the park. It is not anticipated that park proposals will affect the potential of these watersheds to supply water to the communities of Stinson Beach and Muir Beach. The National Park Service will make every effort to cooperate with these communities to ensure an adequate and dependable water supply. These water districts supply park users at Muir Beach and Stinson Beach as well as community residents. In the event of a drought and insufficient water supply, the park will curtail use if necessary so that residential demands can be met without adverse effects on the communities.

Solid Waste Disposal. Rubble and a number of structures (buildings, road sections, paved parking, and bulkheading) will be removed from the park as a result of the plan. Waste material from demolition will have to be disposed of, possibly in a community landfill, or recycled for use on or off the site. The majority of the solid waste will be generated on Alcatraz from the demolition of nonhistoric structures and the removal of existing rubble piles. Material from Fort Baker (bulkheading and temporary buildings), Fort Cronkhite (temporary buildings), and Muir Woods (buildings and parking lot) will also require disposal. Existing structures at the Capehart housing area in Fort Barry and the Crissy Field permit area will not be needed for park uses and will be removed by the army before the areas are turned over to the National Park Service; therefore, the solid waste disposal requirements of these actions have not been calculated.

Possible disposal methods for waste material are listed in table 16. At Fort Mason and Aquatic Park, all waste material can be either used onsite as part of landscaping plans or salvaged. But in the case of Alcatraz, large amounts of rubble and concrete foundations need to be removed from the island. Disposal of the large quantity

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of material from Alcatraz will cause special problems because of possible transport difficulties on both land and water. Several alternative disposal methods are being investigated, but traditional disposal in an existing landfill appears to be the most feasible at the present time. However, a combination of disposal methods including use onsite and disposal in either a landfill or offshore in an approved ocean dumping area may be the final solution to the waste problem. Recycling, which would be preferable to disposal, was investigated, but the desirability and need of the material for control of shoreline erosion or for creation of bay marine habitat appears to be limited at the present time.

A total of up to 14,000 cubic yards of material may be disposed in area landfills. Material will be "clean" construction material, free of hazardous wastes that could contaminate surrounding water or air. Disposal in an existing local landfill, such as Mountain View landfill, will reduce the capacity of the facility for community use by the amount of material deposited, but otherwise community services and residents will not be affected.

Fire Control. Fire control within the park is provided by municipal fire departments and by trained personnel at both Point Reyes and Golden Gate. As the number of visitors and park activities increases, so will the potential for accidental fires requiring suppression. The prohibition of open fires and the provision of charcoal braziers should limit fire potential within the park, but fire-fighting services could be required periodically and could temporarily strain resources of nearby fire departments. Special precautions will be taken to prevent fire during special events in the northern park areas, but stand-by fire control service may occasionally be required for special event areas. All fire suppression costs for fires initiating within the park will be assumed by the National Park Service.

Other Impacts

Higher visitor use levels will increase the demand for commercial services--food, lodging, and souvenirs--in surrounding areas as well as increase vehicular and pedestrian traffic and crowding of establishments. Businesses in the surrounding areas will be stimulated, but most are already tourist oriented and may experience little noticeable change. This is especially true of business along the San Francisco waterfront and in Sausalito. Smaller towns such as Point Reyes Station, Olema, and Inverness may experience some increased demands for visitor services, but provision of a food service at Bear Valley will reduce the potential for change in these communities. The plan will not promote growth or change growth patterns in any adjacent communities.

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Reserved rights of residency have been retained by a number of landowners in Olema Valley and Point Reyes. Increased use by campers and hikers could result in an invasion of the privacy of these residents.

Property owners in the Paradise Cay/Greenbrae Boardwalk vicinity near the Larkspur ferry terminal have voiced complaints and drawn up a legal suit stating that high wave action generated by ferry operations at Larkspur has damaged their property and significantly eroded the shoreline. The high speeds of the ferries create greater wave height and agitation in Corte Madera Bay, which in turn produces more disturbance of the shore. Increased use of Larkspur by the addition of park-related ferries could potentially contribute to this property damage. Studies have determined measures which will mitigate the effects of wave action from ferry operation. Hopefully these measures will be in effect before park-related ferry operations are initiated. If they are not, the speed of park-related vessels will need to be regulated in order to avoid any adverse effects on private property and residents.

Summary

The parks are not self-sufficient and must rely on surrounding communities for parking, utilities, and municipal and visitor services, but they will not unduly strain these services or adversely change any community. As the attractiveness of the parks increases, so will traffic and congestion in surrounding neighborhoods. Some inconvenience to local residents is bound to result even though the plan provides for a transit system and other mitigating measures to reduce traffic problems.

IMPACTS ON CULTURAL RESOURCES

Overall, the plan provides for maximum maintenance and preservation of significant cultural resources and for adaptive uses of historic structures that will not affect either their quality or character. Every historic structure in the park and the way it will be managed to protect its historical value is listed in table 17 at the end of this section. All historic structures will either be preserved, adaptively used, or restored in accordance with applicable legislation; none will be removed. All archeological sites will be protected and preserved.

Preservation

Techniques to stabilize resources and arrest decay will assure the long-term preservation of valuable historic resources and lengthen

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their life for visitor use and scientific study. Significant structures on Alcatraz, the historic ships at Aquatic Park, batteries throughout the park, and ranch out-buildings in Olema Valley and Point Reyes will be preserved and maintained.

In some cases preservation techniques, such as stabilization, may result in a change in the quality of a resource or in physical damage. For example, stabilization of the cell house on Alcatraz might change the structure itself or damage the historic citadel beneath the cell house. Both are significant historic structures, but the preservation of one may result in the loss of the historical and structural integrity of the other. A preliminary study indicates that it may be possible to stabilize the main cell house and citadel without major loss of either structure, but future structural studies will be needed to determine the final proposal and its impacts on the cell house/citadel complex.

Fortifications and batteries throughout the park will be preserved by securing and "mothballing" for the time being, but the structures will still continue to deteriorate as a result of the weathering by the elements, visitor use, and vandalism.

If lagoon modifications or breakwater construction prove feasible, the provision of calm mooring for the historic ships will greatly lengthen their lives and reduce the amount of maintenance they require, thus aiding in the preservation of the fleet.

Adaptive Use

Using historic structures whenever possible for traditional and new uses will increase visitation to these structures and people's appreciation of them. Most of the habitable historic structures in the park will be adaptively used. The majority of these structures are old military quarters or ranch houses. While utilization and maintenance will retard deterioration and reduce security problems, some modifications of historic structures will be necessary to make them suitable for park uses, safe for visitor occupancy, and free of physical barriers for the handicapped. These modifications may result in the alteration of historic fabric or may introduce elements that are out of character with the rest of the structure.

Most alterations to allow visitor use will be interior changes and will not visibly alter exterior historic values. In cases where the interior as well as the exterior of a structure is significant, alterations will be reversible in nature to minimize adverse effects. For example, adaptation of the bathhouse building at Aquatic Park to provide classrooms, laboratories, and meeting rooms may require the use of temporary or movable partitions to minimize adverse effects.

Modifications to bring historic structures such as the Haslett Warehouse up to structural earthquake standards will involve some alteration of historic fabric.

The dramatic increase in use that will accompany adaptive rehabilitation of most structures could increase the wear and tear on historic fabric. In the case of Battery Cavallo, use of the area as a group campsite may disturb the earthworks of a post-Civil War coastal defense structure. Public education about cultural resource values and the presence of park staff in adaptively used structures should prevent destructive vandalism, but periodic maintenance of structures will still be necessary.

Adaptation of a historic structure will, in some cases, also include exterior restoration. For example, the Cliff House, proposed for adaptive use, will also be restored to its exterior 1909 appearance if feasible. This restoration will re-create the historic setting, facilitate historical interpretation of the area, and preserve the historic remains, as well as provide for adaptive use of the building as a restaurant, information center, and gift shop.

Historic grounds, ruins, and landscape features will also be adapted for recreational uses. For example, the Sutro Baths ruins will be preserved in a recreational park setting. While park elements (walkways, benches) could detract from the historical value of the ruins, they will also allow long-term preservation of the ruins and facilitate visitation.

Adaptive use of grounds areas (rifle range, parade grounds) will allow the historic scene to be preserved, but in a new role as space for recreational use. For example, the rifle range maintained in turf will appear much as it did historically, but the use of the area for special events will be radically altered.

Restoration

Restoration or complete rehabilitation of a structure or scene will result in slight modifications of historic fabric when it has been altered in the past or requires structural rehabilitation, but it will greatly enhance the historical aspects of the area. Restoration of a few key structures, the Point Reyes lighthouse, Fort Point, a few fortifications, and the grounds of Sutro Heights Park, will heighten the visual historical character of these areas and greatly aid historical interpretation.

Removal

No removal of historic structures is planned. However, some historic structures may have to be removed in the future if they

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cannot be preserved or adaptively used in their present form. Additional structural studies will be necessary to determine the final proposal for at least two structures. If the cell house on Alcatraz has deteriorated to such an extent that it is not feasible to stabilize and preserve it, removal may be required. Similarly, if sufficient historic fabric and structural integrity is not present to allow restoration of the 1909 Cliff House, it may be removed and replaced with a modern structure. If it appears that either of these buildings should be removed, the public will be made aware of the situation and the National Park Service will consult with the state historic preservation officer and the Advisory Council on Historic Preservation, in full compliance with the National Historic Preservation Act of 1966, to determine the final solution and all possible techniques for mitigating the loss of historic resources.

Protection and Preservation of Historic Scenes

Historic scenes at Alcatraz and the Fort Mason piers will be somewhat modified by landscaping. However, historical values will be protected by making only modest use of landscaping that could screen or change the scene and use of historical gardens when possible. Removal of unsightly conditions and deteriorated structures will improve the scene around historic structures throughout the park, especially when temporary military structures are removed from the three forts in the Marin Headlands and from Fort Mason and when nonhistoric structures and rubble are removed from Alcatraz. Demolition and construction activities will disrupt the historic scene by introducing noise, machinery, and dust, but these effects will be temporary and local in nature.

Preservation of Archeological Resources

The plan will preserve known archeological sites, including three native American sites at Fort Mason and a site near the Cliff House. Construction activities proposed near these sites will be carefully designed to avoid archeological resources, but an archeologist will be onsite during the construction period to ensure that no impacts on important archeological resources will result. All other archeological resources throughout the park will be protected in compliance with applicable federal legislation. All lands not adequately surveyed for archeological and historical archeological resources will be surveyed prior to the implementation of any project involving land disturbance. The National Park Service procedures for archeological clearance will document determinations of no effect on archeological resources and will pinpoint projects where caution or monitoring is necessary. Any project which is found to involve adverse or potential adverse effects will be submitted for consultation under the procedures of the Advisory Council on Historic Preservation.

TABLE 17. PROPOSED MANAGEMENT OF HISTORIC STRUCTURES

Area	Structure No.	Name	P	AR	R	National Register
Alcatraz	AL-3	Lighthouse	X			1
	AL-14	Guard tower	X			1
	AL-22	Guardhouse	X		X	1
	AL-64	Barracks, casemates	X	X	X	1
	AL-68	Prison	X			1
	AL-76	Commandant's quarters/ warden's house	X			1
	AL-77	Guardhouse, apts.	X		X	1
	AL-89	Prison, salvage storehouse/ electrical shop	X		X	1
	AL-201	Stockade, exercise yard	X			1
	AL-202	Fortification arch & bombproof	X			1
	AL-203	Fortification arch & magazine	X			1
	AL-204	Fortification arch & magazines	X			1
	AL-205	Fortification wall	X			1
	AL-206	Fortification wall	X			1
	AL-207	Fortifications and tunnel			X	1
	AL-208	North Caponier & fortifications			X	1
	AL-209	Fortifications under indust. bldg.	X		X	1
	AL-210	Parade ground	X			1
	AL-211	Wharf dock		X		1
	AL-227	Road from wharf to NW end of island	X			1
	AL-228	Road from guardhouse to top of island	X			1
	AL-221*	Ruins of officers' qtrs. #7 & gardens	X			1
	AL-222*	Ruins of officers' qtrs. #8 & gardens	X			1

Key: P = preservation
AR = adaptive restoration
R = restoration

1 = on register
2 = nominated to register
3 = being nominated

*indicates new number of structures that did not have a number

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Area	Structure No.	Name	P	AR	R	National Register
Alcatraz	AL-223*	Ruins of officers' qtrs. #9 & garden	X			1
	AL-224*	South Battery	X			1
	AL-225*	Citadel retaining wall & steps	X		X	1
	AL-229*	Three-Gun Battery	X			1
Aquatic Park	AP-1	Bathhouse		X		2
	AP-2	West restroom	X			2
	AP-4	Municipal pier	X			2
	AP-11	East restroom	X			2
	AP-16	Amphitheater	X			2
	AP-18	Seawall	X			2
	AP-19	West speaker tower	X			2
	AP-20	East speaker tower	X			2
	AP-21	Haslett Warehouse		X		1
	SS-1	C.A. Thayer Schooner	X			1
	SS-2	Schooner Wapama	X			1
	SS-3	Ferry Eureka	X			1
	SS-4	Scow Schooner Alma	X			1
	SS-5	Tugboat Hercules	X			1
	SS-6	Balclutha	X			1
Fort Mason						
	FM-1	McDowell Hall		X		1
	FM-2	Officers' qtrs. #2		X		1
	FM-3	Officers' qtrs. #3		X		1
	FM-4	Officers' qtrs. #4		X		1
	FM-9	NCO quarters		X		1
	FM-12	Entrance gate, Van Ness and Bay	X			1
	FM-14	Tennis court		X		1
	FM-15	Searchlight shelter	X			1
	FM-16	Pier 4	X			1
	FM-17	Waiting room, Pier 4	X			1
	FM-23	Mine casement	X			1
	FM-32	Laundry	X			1
	FM-33	Officers' qtrs.	X			1
	FM-34	Officers' qtrs.	X			1
	FM-35	Officers' qtrs.	X			1
	FM-36	Officers' qtrs.	X			1
	FM-37	Officers' qtrs.	X			1
	FM-38	Officers' qtrs.	X			1
	FM-39	Officers' qtrs.	X			1

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Area	Structure No.	Name	P	AR	R	National Register
Fort Mason	FM-40	Waiting station	X			1
	FM-41	Officers' qtrs.		X		1
	FM-42	Officers' qtrs.		X		1
	FM-43	Officers' qtrs.		X		1
	FM-44	Officers' qtrs.		X		1
	FM-46	Officers' qtrs.		X		1
	FM-47	Officers' qtrs.		X		1
	FM-48	Officers' qtrs.		X		1
	FM-49	Officers' qtrs.		X		1
	FM-101	Post headqtrs.		X		1
	FM-201	Admin. offices		X		1
	FM-204	NCO qtrs.		X		1
	FM-205	Flagstaff	X			1
	FM-230	Chapel		X		1
	FM-231	NCO qtrs.		X		1
	FM-232	NCO qtrs.		X		1
	FM-234	NCO qtrs.		X		1
	FM-235	NCO qtrs.		X		1
	FM-238	NCO qtrs.		X		1
	FM-239	NCO qtrs.		X		1
	FM-240	Barracks		X		1
	FM-241	Transient BOQ		X		1
	FM-242	Battery Burnham	X			1
	FM-250	1898 magazine	X			1
	FM-300	Railroad tunnel	X			1
	FM-301	Gate to piers	X			1
	FM-302	Provost marshal's office		X		1
	FM-303	Guard station		X		1
	FM-308	Repair shops		X		1
	FM-310	Storehouse D		X		1
	FM-312	Storehouse C		X		1
	FM-314	Storehouse B		X		1
	FM-315	Storehouse A		X		1
	FM-316	Pier #1	X			1
	FM-317	Pier #1 shed		X		1
	FM-318	Pier #2	X			1
	FM-319	Pier #2 shed		X		1
	FM-320	Pier #3	X			1
	FM-321	Pier #3 shed		X		1
	FM-322	Battery charging station		X		1
	FM-323	Parade ground		X		1
	FM-324*	MacArthur Ave.		X		1
	FM-325*	McDowell Ave.		X		1
	FM-326*	Franklin St.		X		1
	FM-327*	Van Ness retaining wall	X			1

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Area	Structure No.	Name	P	AR	R	National Register
Fort Mason	FM-328*	Retaining wall dock area		X		1
	FM-329*	East & West Batteries	X			1
		Beltline railroad tracks through Aquatic Park, Fort Mason & Marina Green	X			1
Presidio (Permit to NPS)						
	PE-1600	Old mine casemate	X			1
	PE-1601	New mine casemate	X			1
	PE-1621	Battery Chamberlain			X	1
	PE-1630	Battery Crosby & fire control station for Battery Chamberlain	X			1
	PE-1640	Magazine	X			1
	PE-1643	Magazine	X			1
	PE-1644	Radio hut	X			1
	PE-1646	Magazine	X			1
	PE-1647	Battery Godfrey	X			1
	PE-1651	Battery Boutelle	X			1
	PE-1658	Battery Marcus Miller	X			1
	PE-1660	Battery Marcus Miller	X			1
	PE-1662	Fire control station	X			1
	PE-1663	Fire control station	X			1
	PE-1664	Fire control station	X			1
Cliff House	SH-1	Cliff House		X		3
	SH-3	Sutro Baths ruins		X		3
	SH-6	Tunnel	X			3
	SH-7	Well house Sutro Heights	X			3
	SH-8	Base end station	X			3
	SH-9	Parapet	X			3
	SH-10	Parapet stairway	X			3
	SH-11	Rocks & steps	X			3
	SH-14	Marine exchange lookout		X		3
	SH-15	USS San Francisco memorial	X			3
	SH-23	Railroad remains	X			3
	SH-24	Sutro Heights Park grounds			X	3

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Area	Structure No.	Name	P	AR	R	National Register
	SH-25	Fire control station	X			3
	SH-26	Fire control station	X			3
Ocean Beach						
	OB-1	Seawall	X			3
Fort Miley						
	FI-1	Battery James Chester #3	X			3
	FI-2	Battery James Chester #1 and #2	X			3
	FI-3	Powerhouse, Battery Chester	X			3
	FI-4	Battery Construction #243	X			3
	FI-5	Flagpole	X			3
	FI-6	Base end station, 2 connected units	X			3
	FI-7	Searchlight station	X			3
	FI-304	Ordnance storehouse		X		3
	FI-329	Battery Livingston & observation station		X		3
	FI-330	Battery Springer #3 and #4		X		3
	FI-350*	Fire control station	X			3
	FI-351*	Fire control station	X			3
	FI-352*	Fire control station	X			3
Fort Funston						
	FF-200	Nike missile battery	X			3
	FF-201	Nike missile battery	X			3
	FF-202	Nike missile battery	X			3
	FF-206	Nike missile warhead bldg.		X		3
	FF-250*	Fire control station	X			3
	FF-251*	Fire control station	X			3
	FF-252*	Fire control station	X			3
	FF-480	Battery Bluff (Pamona Mounts)	X			3
	FF-493	Magazine, AA Battery	X			3

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Area	Structure No.	Name	P	AR	R	National Register
	FF-494	Casemated concrete structure	X			3
	FF-495	AA Battery #3		X		3
	FF-497	Plotting room, Battery Davis	X			3
	FF-499	Battery Davis	X			3
Fort Baker						
	FB-268	Fort Baker-Fort Barry tunnel	X			1
	FB-272	Sentry station		X		1
	FB-407	Mine storehouse		X		1
	FB-408	Unknown structure	X			1
	FB-409	Mine powerhouse	X			1
	FB-410	Mine explosives magazine	X			1
	FB-411	Mine explosives magazine	X			1
	FB-412	Mine loading rooms	X			1
	FB-415	Mine wharf		X		1
	FB-433	Fire control station	X			1
	FB-434	Fire control station	X			1
	FB-522	Hospital stewards' quarters		X		1
	FB-523	NCO qtrs.		X		1
	FB-527	NCO qtrs.		X		1
	FB-529	NCO qtrs.		X		1
	FB-530	NCO qtrs.		X		1
	FB-531	NCO qtrs.		X		1
	FB-533	Hospital		X		1
	FB-557	Bakery		X		1
	FB-559	Quartermaster & subsistence storehouse		X		1
	FB-561	Wagon shed		X		1
	FB-571	Battery George Yates	X			1
	FB-573	Battery Duncan	X			1
	FB-575	Battery Cavallo	X		X	1
	FB-600	Parade ground	X			1
	FB-601	Enlisted men's barracks		X		1
	FB-602	Enlisted men's barracks		X		1
	FB-603	Post headquarters		X		1
	FB-604	Commanding officer's qtrs.		X		1
	FB-605	Officers' qtrs.		X		1
	FB-606	Officers' qtrs.		X		1

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Area	Structure No.	Name	P	AR	R	National Register
Fort Baker						
	FB-615	Guardhouse		X		1
	FB-623	Post exchange & gymnasium		X		1
	FB-629	Officers' qtrs.		X		1
	FB-631	Officers' qtrs.		X		1
	FB-636	Enlisted men's barracks		X		1
	FB-637	Commissary storehouse		X		1
	FB-644	Blacksmith shop		X		1
	FB-645	Carpenter & paint shop		X		1
	FB-648	Flagstaff	X			1
	FB-666	Ordnance storehouse		X		1
	FB-670	Mine cable tank building		X		1
	FB-671	Pumphouse	X			1
	FB-700*	Battery Kirby (incl. Gravelly Beach Battery)	X			1
	FB-701*	Battery Gravelly	X			1
	FB-702*	Battery Kirby Beach	X			1
	FB-703*	Battery Orlando Wagner	X			1
	FB-704*	Ridge Battery	X			1
	FB-705*	Battery Spencer	X			1
	FB-706*	Fire control station above Battery Wagner	X			1
	FB-707*	Fire control station above Battery Wagner	X			1
	FB-708*	East Road	X			1
	FB-709*	Murray Circle	X			1
	FB-710*	Conzelman Road	X			1
	FB-711*	Moore Road	X			1
	FB-770	Casemate	X			1
Fort Barry						
	FA-773	Battery Construction #129		X		1
	FA-830	Departmental rifle range		X		1
	FA-831	Departmental pistol range		X		1
	FA-905	Balloon hangar		X		1
	FA-911	Batteries Rathbone & McIndoe	X			1
	FA-934	Officers' qtrs.		X		1

Area	Structure No.	Name	P	AR	R	National Register
Fort Barry						
	FA-936	Commanding officer's qtrs.		X		1
	FA-937	Officers' qtrs.		X		1
	FA-939	Officers' qtrs.		X		1
	FA-940	Post headquarters		X		1
	FA-941	Post hospital		X		1
	FA-942	Hospital stewards' qtrs.		X		1
	FA-944	Barracks		X		1
	FA-945	Barracks		X		1
	FA-952	Gymnasium & post exchange		X		1
	FA-955	NCO qtrs.		X		1
	FA-956	NCO qtrs.		X		1
	FA-960	Quartermaster & sub-sistence storehouse		X		1
	FA-961	Ordnance storehouse		X		1
	FA-962	Bakery		X		1
	FA-963	Air defense missile site, San Francisco 88L		X		1
	FA-966	San Francisco 88L	X			1
	FA-967	San Francisco 88L	X			1
	FA-969	San Francisco 88L	X			1
	FA-971	San Francisco 88L	X			1
	FA-976	San Francisco 88L	X			1
	FA-985	Fire Control Station Wallace	X			1
	FA-989	Fire Control Station Wallace	X			1
	FA-991	Magazine	X			1
	FA-993	Storeroom	X			1
	FA-999	Battery Wallace	X			1
	FA-1351	Battery O'Rourke	X			1
	FA-1353	Firing booth, Battery Alexander	X			1
	FA-1354	Batteries Guthrie & Smith	X			1
	FA-1355	Firing booth, Battery Alexander	X			1
	FA-1356	Battery Alexander	X			1
	FA-1357	Searchlight shelter	X			1
	FA-1362	Fire control station	X			1
	FA-1363	Fire control station	X			1
	FA-1364	Battery Mendell	X			1
	FA-1365	Mining casemate	X			1

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Area	Structure No.	Name	P	AR	R	National Register
	FA-1375*	Fire control station	X			1
	FA-1376*	Fire control station	X			1
	FA-1377*	Fire control station	X			1
	FA-1378*	Fire control station	X			1
	FA-1379*	Double fire control station	X			1
	FA-1380*	Antiaircraft Battery #2 (ruins only)	X			1
	FA-1381*	Antiaircraft weapon emplacement	X			1
	FA-1382	Searchlight shelter	X			1

If and when the Coast Guard transfers the structures at the Point Bonita light station to the National Park Service, their historical value and potential for public use will be carefully evaluated.

Fort Cronkhite

FC-1008	Plotting room, Battery Townsley	X			1
FC-1014	Battery Townsley	X			1
FC-1049	Mess hall		X		1
FC-1050	Administration bldg.		X		1
FC-1054	Barracks		X		1
FC-1055	Barracks		X		1
FC-1056	Barracks		X		1
FC-1057	Barracks		X		1
FC-1058	Barracks		X		1
FC-1059	Barracks		X		1
FC-1060	Administration bldg.		X		1
FC-1061	Barracks		X		1
FC-1062	Barracks		X		1
FC-1063	Barracks		X		1
FC-1064	Barracks		X		1
FC-1065	Barracks		X		1
FC-1066	Recreation bldg.		X		1
FC-1067	Mess hall		X		1
FC-1068	Administration bldg.		X		1
FC-1069	Administration bldg.		X		1
FC-1070	Mess hall		X		1
FC-1071	Recreation bldg.		X		1

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Area	Structure No.	Name	P	AR	R	National Register
	FC-1100	Nike missile battery		X		1
	FC-1101	Nike missile battery		X		1
	FC-1106	Missile assembly shop		X		1
	FC-1107	Missile assembly shop		X		1
	FC-1109	Nike missile warhead bldg.		X		1
	FC-1130	Townsley reserve magazine	X			1
	FC-1194	Nike missile tracking tower	X			1
	FC-1197	Nike missile tracking tower	X			1
	FC-1200*	Antiaircraft battery #1	X			1
	FC-1201*	Fire control station	X			1
	FC-1202*	Fire control station	X			1
	FC-1203*	Fire control station	X			1
	FC-1204*	Fire control station	X			1
	FC-1205*	Fire control station	X			1
	FC-1206*	Fire control station	X			1
Mount Tamalpais						
	MT-200*	Fire control station, Hill 640	X			2
	MT-201*	Fire control station, Hill 640	X			2
	MT-202*	Fire control station, Hill 640	X			2
	MT-203*	Fire control station, Hill 640	X			2
	MT-204*	Fire control station, Hill 640	X			2
	MT-205*	Radar set SCR 296, Frank Valley	X			2
	MT-206*	Fire control station, Frank Valley	X			2
	MT-207*	Fire control station, Frank Valley	X			2
	MT-208*	Fire control station, Frank Valley	X			2
	MT-209*	Fire control station	X			2

Area	Structure No.	Name	P	AR	R	National Register
Olema Valley						
	OV-1.1	Rancho Bolinas house		X		2
	OV-1.4	Rancho Bolinas creamery		X		2
	OV-1.5	Rancho Bolinas barn		X		2
	OV-1.6	Rancho Bolinas buggy shed		X		2
	OV-5.1	Randall Ranch house		X		2
	OV-6.1	Giacomini Ranch house		X		2
	OV-6.5	Giacomini Ranch shed		X		2
	OV-6.6	Giacomini Ranch loafing barn		X		2
	OV-6.7	Giacomini Ranch main barn		X		2
	OV-6.8	Giacomini Ranch bunkhouse		X		2
	OV-6.11	Giacomini Ranch storage shed		X		2
	OV-9.1	Old Lupton Ranch house		X		2
	OV-9.2	Old Lupton Ranch barn		X		2
	OV-9.3	Old Lupton Ranch creamery		X		2
	OV-9.4	Old Lupton Ranch water tank	X			2
	OV-12.1	Stewart Ranch house		X		2
	OV-12.12	Stewart Ranch barn, west		X		2
	OV-15.5	Truttman Ranch dairy shed		X		2
	OV-15.6	Truttman Ranch calf shed	X			2
	OV-15.10	Truttman Ranch dairy shed		X		2
	OV-15.11	Truttman Ranch dairy shed		X		2
	OV-15.14	Truttman Ranch dairy shed		X		2
	OV-15.16	Truttman Ranch bunkhouse		X		2
	OV-15.19	Truttman Ranch horse barn		X		2
	OV-15.20	Truttman Ranch hay barn		X		2
	OV-16	Copper mine	X			3
	OV-17	Copper mine	X			3

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Area	Structure No.	Name	P	AR	R	National Register
Point Reyes						
	PR-12	Lighthouse stairway & cable track	X			2
	PR-14	Lighthouse lower water shed and cistern	X			2
	PR-16	Lighthouse powerhouse	X			2
	PR-17	Lighthouse multipurpose garage bldg.	X			2
	PR-19	Lighthouse water shed & cistern	X			2
	PR-21	Lighthouse original pumphouse	X			2
	PR-22	Lighthouse pumphouse	X			2
	PR-25	Lighthouse			X	2
	PR-110	Olema lime kilns	X			1
	PR-116	Lifeboat station water tank	X			2
	PR-117	Lifeboat station water tank	X			2
	PR-118	Lifeboat station garage	X			3
	PR-119	Lifeboat station pumphouse	X			2
	PR-120	Lifeboat station stone-faced wall	X			2
	PR-121	Lifeboat station water tank	X			2
	PR-122	Lifeboat station water tank	X			2
	PR-123	Lifeboat station fire pumphouse	X			2
	PR-124	Lifeboat station rock wall	X			2
	PR-125	Lifeboat station & dock		X		2
	PR-126	Three-stall garage		X		2
	PR-159	Lifeboat station qtrs.		X		2
	PR-180	Pierce Ranch house		X		3
	PR-181	Pierce Ranch washroom		X		3
	PR-182	Pierce Ranch north bunkhouse		X		3
	PR-183	Pierce Ranch schoolhouse		X		3
	PR-184	Pierce Ranch outhouse	X			3
	PR-185	Pierce Ranch open-front shed	X			3
	PR-186	Pierce Ranch west bunkhouse		X		3
	PR-187	Pierce Ranch west garage		X		3

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Area	Structure No.	Name	P	AR	R	National Register
Point Reyes						
	PR-188	Pierce Ranch calf shed		X		3
	PR-189	Pierce Ranch hay barn		X		3
	PR-190	Pierce Ranch new dairy house		X		3
	PR-191	Pierce Ranch old horse barn		X		3
	PR-192	Pierce Ranch old garage		X		3
	PR-193	Pierce Ranch old wagon shed		X		3
	PR-194	Pierce Ranch chicken house A	X			3
	PR-195	Pierce Ranch chicken house B	X			3
	PR-196	Pierce Ranch old creamery	X			3
	PR-197	Pierce Ranch garage		X		3
	PR-198	Pierce Ranch corral fences	X			3
	PR-199	Pierce Ranch tank house	X			3
	PR-200	Pierce Ranch lath house	X			3
	PR-201	Pierce Ranch road to Tomales Bay	X			3
	PR-202	Pierce Ranch road to Lower Ranch	X			3
	PR-203	Pierce Ranch entrance road	X			3
	PR-204	Pierce Ranch cattle guard	X			3
	PR-226	Texeira Ranch house		X		2
	PR-227	Texeira Ranch loafing barn		X		2
	PR-228	Texeira Ranch barn		X		2
	PR-240	Lifesaving station (Great Beach) compass station	X			3
	PR-241	Lifesaving station lookout station	X			3
	PR-242	Lifesaving station storage bldg.	X			3
	PR-243	Lifesaving station old pumphouse	X			3
	PR-244	Lifesaving station small shed	X			3
	PR-251	Home Ranch house		X		3
	PR-252	Home Ranch barn & silo		X		3
	PR-253	Home Ranch storage shed		X		3
	PR-254	Home Ranch pig shed	X			3
	PR-255	Home Ranch freezer shed	X			3
	PR-256	Home Ranch residence		X		3

Area	Structure No.	Name	P	AR	R	National Register
Point Reyes						
	PR-257	Home Ranch shop		X		3
	PR-258	Home Ranch hospital barn		X		3
	PR-259	Home Ranch heifer barn		X		3
	PR-260	Home Ranch old hog shed & storage shed	X			3
	PR-261	Home Ranch water tank	X			3
	PR-262	Home Ranch storage shed		X		3
	PR-263	Home Ranch garage		X		3
	PR-264	Home Ranch pumphouse	X			3
	PR-265	Home Ranch granary	X			3
	PR-266	Home Ranch horse barn		X		3
	PR-267	Home Ranch road	X			3
Fort Point						
	FP-96	DeRussy's & Elliot's seawalls			X	1
	FP-99	Fort Point			X	1
	FP-941	Battery East	X			1
	FP-979	Mine storage		X		1
	FP-983	Engineer storehouse		X		1
	FP-984	Torpedo mine wharf	X			1
	FP-985	Loading room	X			1
	FP-986	Loading road	X			1
	FP-987	Mine explosives room		X		1
	FP-989	Engineer plumbing shop		X		1
	FP-991	Lighthouse	X			1
	FP-1001	Andrews road	X			1

Summary

No known adverse impacts will result from the proposal based upon historical resource studies, archeologcial research studies, and an archeological overview completed for the area. No significant historic structures will be unavoidably adversely affected, and no known historic or prehistoric archeological sites will be disturbed. National Park Service clearance procedures will be implemented as appropriate to document no effect and monitor projects. Since some actions are not yet specific as to structure or location, such actions must be further defined before the extent of impacts can be fully determined. Procedures of the Advisory Council on Historic Preservation and National Park Service management policies will be used to analyze possible impacts of all proposed actions on cultural

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resources. Since detailed plans for preservation, restoration, and adaptive use of resources are still being developed, any significant changes in the proposals could change the potential effects upon cultural resources. If significant changes in proposals occur, or if a proposal is deemed infeasible following further study, and an adverse effect results from another course of action, the state historic preservation officer and the Advisory Council on Historic Preservation will be consulted prior to undertaking the new action.

The National Park Service has consulted with the state historic preservation officer. The two agencies have formulated a proposal for a programmatic memorandum of agreement and are now waiting for approval of the proposal and a subsequent ratified agreement from the Advisory Council on Historic Preservation. This agreement will be appended to this document.

IMPACTS ON VEGETATION AND SOILS

Impacts on vegetation and soils can be broadly grouped into several general categories: those caused by construction and demolition, increases in visitor use and changes in visitor activities, and changes in resource management programs. Soils and vegetation have been grouped for impact analysis because they are closely related resources and are affected by similar actions. Any disturbance or restoration of the surface--whether by construction, visitors, or changes in management--will affect both vegetation and soils.

Construction and Demolition Disturbance

General. The adaptive use of existing structures will minimize the need to construct new facilities to serve visitors and therefore will also minimize surface disturbance of vegetation and soils. Most new disturbance will be on a small scale, primarily for walk-in or hike-in camps and picnic areas, or for facility expansion within an existing developed area. The following general impacts will result wherever construction and demolition take place.

General impacts on vegetation and soils as a result of construction include removal of all vegetation on the construction site and disturbance of surface soils. Grading, digging for foundations, and cutting and filling for road construction will alter soil profiles, increase the potential for erosion caused by surface runoff from exposed soils, and reduce soil fertility by burying productive top soils and exposing subsurface soils. Structures and other impermeable surfaces that cover soils will change the moisture conditions of soils and potentially alter the physical, chemical, and biological conditions by compacting the soils, decreasing oxygen content, and adding chemicals through leaching and runoff from paved surfaces. Sites that are covered by asphalt or structures

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will not revegetate, but areas surrounding the facility will revegetate to varying degrees by natural succession or will be replanted with native or cultivated vegetation. Soils and vegetation in areas adjacent to construction sites may also be affected by heavy machinery movement and materials storage, which could compact soils and disturb any vegetation growing nearby.

Wherever soils and vegetation are disturbed, exotic and weedy species will have a competitive advantage over native and recreationally desirable species. Therefore, some effort will usually be needed to revegetate areas surrounding developments so that pest species, such as thistles, do not become established. Planting and sometimes irrigation will be required to establish a new vegetative cover.

Nonhistoric structures that have no planned visitor uses and paved surfaces that are no longer needed will be removed in several areas of the park. Demolition and removal of structures will initially have many of the same effects on vegetation and soils as construction. Surrounding soils will be compacted by heavy machinery, plants surrounding the structure will be removed, and exposed surfaces will have a high erosion potential from runoff. Following structure removal, most areas will be restored with native plants or cultivated landscaping, which will stabilize soils and increase the amount of native, naturalized, or manicured vegetation in the area.

Acreages of construction disturbances and restoration are summarized in table 18.

Alcatraz. There are no natural soils or vegetation on Alcatraz. All of the vegetation on the island is exotic, the remains of former military and prison gardens, and will not be significantly affected. Landscaping of approximately 15 acres of the island with a mixture of native coastal plants and cultivated species will enhance the historic scene and create a park atmosphere.

Aquatic Park. Restoration and landscaping of several segments of former roadways will increase the area of cultivated vegetation (grass and trees) by 2 acres.

Fort Mason. Grading for restoration of the Fort Mason grounds will temporarily disturb soils and some existing vegetation (primarily grass and weeds), but the site has already been extensively disturbed in the past and these effects will be minimal. Approximately 21 acres that were developed in the past will be landscaped to create a park atmosphere.

Crissy Field. There are no natural soils or vegetation at Crissy Field--it is composed of fill and has been intensively developed in the past. Therefore, while earth movement will be required to

create a new shoreline and for berming, landscaping, and possible creation of a lagoon, there will be no adverse effects on soils or vegetation. About 25 acres that were developed will be restored to a mixture of natural appearing coastal communities, manicured landscaping, and shoreline.

Cliff House. The only effects on soils and vegetation in this developed area will occur at Sutro Baths. The development of this new park will involve limited earth movement to provide for walkways and landscaping. The area has already been extensively trampled and eroded, so disturbance of natural vegetation and soils will be minimal. The construction of walkways will reduce vegetation trampling by encouraging visitors to stay on the paths and will allow recovery of the area by natural vegetation and landscaping. Approximately 11 acres will be restored, either by recovery of natural vegetation or through plantings.

Fort Baker. The proposals for Fort Baker will not affect existing vegetation. All modifications (building removal, provisions for new uses) will occur in existing facilities or disturbed areas. The provision of open picnic/play space along the waterfront will increase manicured landscaping by 6 acres.

Rodeo Valley. Vegetation and soils will be minimally affected by construction and demolition activities because most such activities will be confined to previously disturbed areas. Some disturbance of the native northern coastal scrub vegetation will occur in areas immediately surrounding developments. Where structures or parking are to be removed, a total of 20 acres will be restored by planting native and naturalized vegetation or by allowing natural succession to proceed. The spread of thistle and broom in the Marin Headlands, currently a resource management problem for the area, could be aggravated wherever the surface is disturbed by building demolition and grading.

Muir Woods. The relocation of administration offices and maintenance facilities and the creation of a new parking area will disturb approximately 4 acres of grassland and broad-leaved evergreen forest. However, by moving these facilities from the redwood grove into an area of more typical vegetation, pavement and buildings can be removed from an outstanding biological resource. The removal of facilities and impermeable surfaces will allow rehabilitation and extension of the grove by restoring natural soil moisture conditions and by replanting redwood and Douglas-fir in the areas now occupied by parking and structures.

Stinson Beach. Until the alignment of the new entrance road to Stinson Beach is determined, effects on vegetation and soils cannot adequately be assessed. Because the new alignment will generally follow a service road that is lined with exotic vegetation, little or no effect on native vegetation will result.

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Bear Valley. Development of the Bear Valley information center and expansion of the picnic area will disturb a total of about 2 acres or less of grassland and broad-leaved evergreen forest. Vegetation loss will be minimal and confined to a previously developed area.

Other Areas. Development of new camps and picnic areas throughout the park will require some clearing of understory species. In most cases, trees and shrubs will remain to provide screening between sites, shade, and landscaping. It is estimated that vegetation will be disturbed on approximately one-half the area covered by the new campgrounds and picnic areas. Vegetation lost as a result of camp and picnic area construction will be relatively low because most sites are walk-in or hike-in areas that will not require access roads. Vehicle parking is either provided in existing developed areas at some distance from the site or along an existing roadside that will require widening for parking.

Some realignments in the existing trail system may result from more detailed studies and could require additional vegetation loss.

Special Status Species. Any disturbance, whether caused by construction, demolition, or change in use, has the potential to affect special status plant species (threatened, endangered, rare, or candidates for such status) if they are found in an area to be affected. A list of special status plant species known to occur in GGNRA/Point Reyes has been compiled by the U.S. Fish and Wildlife Service and is found in the Appendix. Based upon present knowledge of the general locations of these species, the plan proposals could disturb special status plants or their habitat. Therefore, all new construction or provisions for new activities will be preceded by a site-specific survey of special status plants to confirm that there will be no effect on special status species when such plants are known to occur in the vicinity of the project site. The U.S. Fish and Wildlife Service has provided a map of the distribution of these species to aid in that determination. If any overlap is found, activity and project locations will be adjusted to avoid these species and to prevent disruption of their habitat. Any impact from recreational activity to special status plants will be avoided by redirecting visitor use from known habitat areas. Site specific plant surveys will be required for at least the following plan projects or activities to make sure that there will be no impact on special status species:

park development of Crissy Field (Presidio clarkia)

expansion of picnic area and use at Baker Beach (San Francisco owlclover, Raven's manzanita, coast rockcress, Presidio clarkia)

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landscaping at Sutro Baths and Cliff House (dune tansy)

additional visitor use of Fort Funston (Laural Hill manzanita, two-fork clover)

any development in Marin Headlands and Muir Woods (Tiburon buckwheat)

site rehabilitation of Fort Cronkhite (dune tansy)

relocation of Muir Woods facilities (San Francisco wallflower, Presidio clarkia)

environmental education center at Rancho Bolinas (coast dichondra)

increased use and improvements at Bear Valley (California bottlebrush grass)

increased interpretive use of Pierce Point Ranch (Point Reyes blennosperma, Point Reyes Indian paintbrush, swamp harebell)

increased use through lighthouse interpretive programs (San Francisco owlclover)

trail construction throughout GGNRA/Point Reyes

The National Park Service will consult with the U.S. Fish and Wildlife Service, both formally and informally, on a project-by-project basis in compliance with section 7 of the Endangered Species Act whenever a project could affect a species that is on or proposed for addition to the threatened or endangered species list.

TABLE 18. SUMMARY OF VEGETATION CHANGES CAUSED BY CONSTRUCTION AND DEMOLITION

Area	Acreage Disturbed	Vegetation Type	Acreage Restored	Vegetation Type
Developed Area				
Alcatraz	0	-	15	Gardens, native coastal species
Aquatic Park	0	-	2	Lawn and trees
Fort Mason	0	-	21	Lawn and trees
Crissy Field	0	-	25	Manicured and native landscaping
Cliff House	0	-	11	Manicured and native landscaping
Fort Baker	0	-	6	Lawn and trees
Rodeo Valley	0	-	20	Coastal scrub, lawn and trees
Muir Woods	4	Grassland, broad-leaved evergreen forest	1	Redwood, Douglas-fir forest
Stinson Beach	1	Exotic trees	0	-
Bear Valley	3	Grassland, broad-leaved evergreen forest	0	-
Dispersed Developments				
Baker Beach (picnic, day camp)	2	Pine/cypress, shrub	0	-
East Fort Miley (picnic and play)	0	-	2	Lawn and trees
West Fort Miley (picnic, day camp)	2	Pine/cypress, shrub	0	-

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Area	Acreage Disturbed	Vegetation Type	Acreage Restored	Vegetation Type
Fort Funston (picnic, environ. (ed.)	3	Grasses, ground covers	0	-
Oakwood Valley (picnic, children's farm)	4	Coastal scrub	0	-
Tennessee Valley (equestrian co-op)	0	-	0	-
Muir Beach (picnic)	2	Riparian	0	-
Point Bonita (camp)	2	Coastal scrub	0	-
Gerbode Preserve (camp)	1	Coastal scrub, exotic trees	0	-
Tennessee Valley (camp)	2	Coastal scrub, exotic trees	0	-
Morses Gulch (camp)	2	Redwood, broad-leaved evergreen forest, grassland	0	-
McKinnan Gulch Mine (camp)	2	Orchard, grassland	0	-
Five Brooks (camp)	2	Broad-leaved evergreen forest, grassland	0	-
Bolinas Ridge (camp)	2	Redwood, Douglas-fir forest	0	-
Truttman Ranch (camp)	4	Grassland, broad-leaved evergreen forest	0	-
Home Ranch Creek (camp)	1	Broad-leaved evergreen forest	0	-
Muddy Hollow Ranch (camp)	1	Grassland	0	-
Totals	40		103	

Increases in Visitor Use and Changes in Visitor Activities

Visitor use impacts on vegetation and soils, while more difficult to quantify than construction impacts, are important considerations since increasing visitor use levels and new activities are proposed. The distance visitors will wander from trails or developments, and therefore the radiating impacts on vegetation and soils, will vary with the attractiveness of views and features found off trails and the suitability of the terrain and vegetation for cross-country travel. The following general effects can be expected to varying degrees around camps, activity areas, and trails.

Trampling by people and horses will reduce plant mass and plant vigor by breaking plants at or below the surface. Visitors may eventually trample and remove vegetation between and around campsites and picnic areas. Vegetation reproduction will be reduced and possibly eliminated in some areas. Change in vegetation composition and a shift toward earlier successional stages, species more resistant to trampling, and weedy species may result. Areas disturbed by visitor use will constantly provide footholds for exotic or pest species such as thistles. The potential for man-caused fires, which are temporarily destructive to vegetation, will increase.

The loss of soil-binding plant cover will result in increased soil erosion by wind and water around camps and along trails. Approximately 145 miles of trails in GGNRA and 144 miles in Point Reyes National Seashore could experience increased erosion. These effects will be pronounced in dune areas where sandy soils are exposed and blowouts could result. Erosion, channeling, and trail width will increase as more people utilize trails. Soil compaction, which increases soil density, alters soil structure, and cuts off air and water to plant roots, will be increased by foot and horse traffic.

Soil compaction and potential damage to vegetation and soils will be most pronounced in wet areas, along streams and bodies of water, where soils are moist and pliable. For this reason, almost all visitor activities are planned for upland areas, while stream courses and water bodies will receive special protection as areas of biotic sensitivity in the management zoning plan.

The denuded soils of high visitor use areas will not have a vegetative cover that would otherwise contribute organic material to the soil. Soil development will be prevented or greatly slowed by the lack of vegetation and the interruption of the normal decomposition processes.

These effects of visitor use will be additive throughout the visitor season. Monitoring of the effects of visitor use on vegetation and soils is planned so that unacceptable resource degradation can be

detected and corrected by a number of management techniques. These could include modifying use levels, rotating use areas, adding patrols, signing, reseeding, or even installing physical barriers where fragile resources could be threatened. Facility designs will take into account possible effects on resources and the potential for erosion. Adverse impacts will be controlled through maintenance of appropriate gradients, surfaces, and drainage structures, and of course by locating new facilities in areas that have been previously disturbed or that are not sensitive to visitor use.

An increase in numbers of visitors to beach areas could hinder or reverse erosion-control efforts or could initiate dune erosion by disturbing dune vegetation. Additional study will be done in most beach areas to determine what management action should be taken to control erosion. Some loss of dune vegetation and a potential increase in erosion can be expected at heavily used beaches at Ocean Beach, Point Reyes, and Stinson Beach.

The continued and possibly increased use of horses in Rodeo, Tennessee, Frank, and Olema valleys has the potential to denude vegetation along 64 miles of riding trails, to compact soils, and to increase erosion. Accelerated loss of soils could result. To mitigate soil loss, trails that are steep or improperly drained will gradually be shifted to more suitable locations.

Large special events will be staged at Fort Mason, Aquatic Park, the Fort Baker parade grounds, and the rifle range in Rodeo Valley. Intensive use of these sites for special events will not affect vegetation or soils because they all have mowed lawn areas that can be irrigated to promote rapid recovery following events. Other more natural areas will be considered for special events, but the conditions of the site, possible impacts on vegetation and soils, and the merits of the event will be reviewed before events will be held in these more sensitive areas.

The potential for fire and short-term loss of vegetation will increase slightly during special events. While fire hazard on the mowed rifle range will be low, the surrounding area, depending on climatic conditions and the moisture content of the vegetation, could be susceptible to fire. The potential for fire danger will be considered when permits for special events are issued, and necessary precautions to reduce fire danger will be taken, such as educating all visitors of the hazard, enforcing smoking and fire restrictions, and stationing fire-fighting equipment and staff at the event site.

Known and suspected distributions of threatened and endangered species, both candidates and listed, have been mapped by the U.S. Fish and Wildlife Service. This map will aid the park in efforts to monitor and avoid impacts on special status plants as a result of increasing levels of visitor use.

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Resource Management

The resource management objectives that affect vegetation and soils are very general and will require further definition of methods and site-specific actions in the resource management plan before actual impacts on vegetation and soils can be determined.

The plan protects fragile and unique vegetation types (such as dunal, riparian, and redwood communities) and special status species (rare, threatened, endangered, or candidates for such status) both by avoiding development and use of areas where valuable vegetation is found and by actively protecting such areas through the land management zoning plan. Because critical and unique vegetation areas were defined by the information base prior to the development of planning alternatives, sensitive areas were avoided.

A reevaluation of all grazing operations and the production of a grazing plan will eliminate overgrazing and the use of unsuitable range sites. As a result, erosion and the amount of exposed and erodible soils in the northern units will be reduced. Following the development of a grazing management plan, grazing will continue to be used as a vegetation management tool to maintain the pastoral quality of the landscape and to control shrub invasion. A mix of vegetation communities with increased species diversity and an expansion of kinds of habitat available for wildlife will result. Elimination of overgrazing will increase range grass cover in denuded areas as grazing pressure is decreased. The opportunity for thistle invasion, which is prompted by overgrazing and disturbances that expose soil, will be reduced.

The relocation of horse grazing operations in Frank Valley to a confined 50- to 75-acre irrigated pasture will allow recovery of the surrounding nonirrigated vegetation to a more natural, ungrazed condition. Shrubby species could increase as a result of discontinuation of grazing.

At present, fire is not used or proposed for use as a vegetation management tool in GGNRA, even though some of the objectives for resources management (maintenance of a pastoral scene, restoration of grasslands) could be achieved by the use of fire. Until more information allows preparation of a detailed fire management plan that could include use of prescribed burns to maintain desired vegetation communities, vegetation changes as a result of fire will be small.

Active research and implementation of management strategies aimed at elimination of undesirable exotic species, especially thistles, brooms, and pampas grass, will reduce the amount of nonnative vegetation, which is visually and ecologically incompatible with the surrounding natural vegetation of the Marin County areas. Methods

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chosen for exotic species removal will not cause acceleration of erosion or loss of soil and will not chemically affect nontarget plants and animals in the area.

The health and continued existence of the redwood grove at Muir Woods will be assured by continuing to manage the forest. Thinning to encourage regeneration and planting when necessary will allow revegetation of previously disturbed areas.

Summary

New disturbance as a result of construction will be greatly outweighed by the amount of land that will be restored to more natural or landscaped conditions following building and pavement removal. Visitors will have an effect on vegetation and soils, but careful management of use and temporary closure of areas that show signs of unacceptable damage by visitors will keep visitor use impacts under control. While resource management objectives are only developed in a very general way in the plan, the goal is to eventually restore much of the park to more natural vegetative conditions.

IMPACTS ON WILDLIFE AND MARINE ORGANISMS

General effects on wildlife are directly associated with the loss or gain of habitat and the sensitivity and adaptability of wildlife to human use.

Changes in the Amount of Wildlife Habitat

Removal or restoration of vegetation will change food and shelter availability and will affect both primary consumers and predators who inhabit the area. Changes in terrestrial habitat as a result of construction and restoration are summarized in table 18 in the section "Impacts on Vegetation and Soils." Habitat types to be lost by new construction activities are typical to coastal California, and no particularly valuable wildlife habitat is included in the 43 acres that will be disturbed. Restored areas, planted with a variety of woody and herbaceous species, will provide food and shelter for birds and small mammals. The value of this restored habitat, totaling 102 acres, will depend upon the species planted. Overall the acreage to be restored will exceed the amount of habitat to be disturbed by construction.

Marine habitat will be temporarily disturbed by proposed modification of piers at Aquatic Park and Fort Baker. While some additional study will be needed to refine proposals and to determine

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specific impacts, any construction activity in a marine area will have the following general impacts to varying degrees of magnitude depending upon the size of the project. During construction activity, fish will migrate out of the area. Disturbance of bottom sediments will directly affect sessile benthic organisms by crushing them with machinery or by burying them with settling silt. Filter feeders will be affected by suspended sediments that could clog feeding mechanisms. Recolonization of disturbed marine areas will occur, but if conditions are also changed, a different assemblage of species will occupy the area after disturbance than before. Recolonization is usually rapid, so that characteristic fauna and flora are found in the area within a year after disturbance. Any additions of artificial underwater structures, such as pilings for piers, will provide additional habitat for sessile species such as barnacles and for game fish that often concentrate around artificial underwater structures.

The following specific proposals will affect marine fauna: lagoon modification to protect the historic ships, construction of a new Hyde Street pier and boat storage and maintenance facilities, and removal of the Sea Scout pilings and rowing club pier, all of which will occur at Aquatic Park; and removal of the bulkheading and repair of the pier at Fort Baker. Modifying the Aquatic Park lagoon and constructing a new Hyde Street pier will require additional study to determine methods and impacts. Modifications could include lagoon dredging and construction of a breakwater. Detailed impacts will be analyzed separately, after the lagoon study is complete.

A proposal to remove bulkheading at Horseshoe Cove in Fort Baker and replace it with a more natural sand beach also requires additional shoreline study to assure that the proposal is feasible. Removal of the bulkheading will remove an artificial, but rich, habitat for marine organisms such as barnacles and crabs. Replacement with a sand beach will change the kinds of organisms that will colonize the area.

Freshwater habitat could potentially be disturbed by construction activity to move the Muir Woods visitor parking and administrative and maintenance facilities. Unless erosion and runoff are carefully controlled, construction could potentially increase siltation into nearby Redwood Creek, which supports a significant migration of silver salmon and steelhead, and depending on the time of year, it could reduce the suitability of the Muir Woods area as an anadromous fish spawning area. Redwood Creek is the only coastal stream in the area that is used by silver salmon. To prevent damage to salmon and steelhead and their habitat, construction will be undertaken during periods of the year when the fish are in coastal offshore waters or in low numbers in coastal streams. Upstream migration and spawning occur from January 15 through

March 15 for steelhead and from December 15 through February 15 for silver salmon. Allowing 60 days for eggs to hatch, the construction period should be between May and October. Because this is also the season of heaviest visitor use, the proposal will result in disruption of normal park use for at least one summer season. Construction will either be completed by the spawning period or measures will be taken to stabilize any potentially erodible areas or to collect runoff before it reaches the creek.

Effects of Construction Activity and Noise

Noise and human activity associated with construction, demolition, and structure removal will disturb animals that would otherwise feed, rest, or nest near the activity area. Most animals will migrate out of the area while activities are ongoing, but they will probably return later unless increases in visitor use following construction activity force more timid species out of the area entirely. Noise and activity associated with demolition and rubbish removal on Alcatraz will temporarily disturb birds such as gulls, cormorants, ducks, and pelicans, and also harbor seals and sea lions that would normally haul out on the rocks around the island. Similarly, birds will be disturbed at Rodeo Lagoon during demolition and modification of structures at Fort Cronkhite.

Visitor Disturbance of Fauna

Many of the long-term impacts on wildlife and marine organisms are related to visitor use and the potential for disturbance by increased volumes of people and new recreational uses in an area. Species in remote areas that are not accustomed to people or that are attractive to collectors will be most affected.

Collection of shore and intertidal invertebrates and disturbance of shore habitats will increase with the number of visitors near the shore at Fort Mason, Crissy Field, Sutro Baths, and other beaches and rocky intertidal shores throughout the park.

Backcountry developments, such as hike-in camps at Gerbode, Tennessee Valley, Morses Gulch, McKinnan Gulch Mine, Bolinas Ridge, Home Ranch Creek, and Muddy Hollow Ranch may cause populations of some wildlife species to decline by increasing the presence of people and reducing quiet spots for wildlife to breed, feed, rest, and bear young. Species in these areas are not as accustomed to the presence of humans as are species in more commonly used areas, such as Rodeo Valley. Nocturnal species could be especially disturbed by overnight use of camp areas. The Marin County units, where this impact will be most important, supports a wide variety of wildlife, including terrestrial and marine

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mammals, reptiles, amphibians, and birds, that could be disturbed by backcountry use.

Rodeo Lagoon contains important habitat for shorebirds, waterfowl, and migratory birds, and has been identified by the management zoning map as a biotically sensitive area. The overall increase in visitation in the vicinity will increase the amount of visitor activity on and around Rodeo Lagoon. While past uses of the lagoon included canoeing and fishing, and the adjacent area historically housed large numbers of military personnel, use of the area has been limited in recent years and wildlife may not now be accustomed to high use levels. Therefore, activities will be closely controlled and seasonally limited so that valuable wildlife habitat will not be disturbed.

A migratory population of up to 250 California brown pelicans, an endangered species, seasonally feeds in the lagoon and roosts on Bird Island and along the coast. They do not nest in GGNRA. The largest population of pelicans is found in the area during July and August, and almost all of the birds migrate out of the area by December. This seasonal use pattern will allow visitor use during certain periods when it will not be detrimental to the pelican population. Other birds found in the lagoon area are a variety of ducks, coots, egrets, herons, cormorants, and migratory land and shore birds. The potential exists for disturbance of feeding habits and resting and breeding habitat for a large number of species if increased visitor use proves to be detrimental.

Management actions will be undertaken to limit or relocate activity in the picnic/play area if ongoing monitoring by the park staff determines that wildlife is being affected by visitor use in that location. Therefore, there will be no effect on the lagoon's or lake's resident and migratory birds, including the endangered brown pelican, as a result of the proposal. The National Park Service will initiate formal consultation with the U.S. Fish and Wildlife Service in compliance with section 7 of the Endangered Species Act concerning the effect of the proposals on the brown pelican.

As visitation levels in coastal locations increase, the potential for increased harassment of marine mammals hauling out in park areas--particularly during sensitive pupping periods--will also increase. Sensitive harbor seal hauling and pupping areas are found at Double Point, Bird Rock, Point Reyes Headlands, Drakes Estero, Limantour Estero and Spit, and Bolinas Lagoon. To mitigate any potential threats posed by harassment of marine mammals by visitors, the National Park Service will monitor visitor impacts and take necessary actions to assure that these animals are not affected. These measures may include placement of warning signs at visitor access areas, increased patrol, or temporary closure of areas during particularly sensitive periods.

The provision of better fishing facilities at Aquatic Park and Fort Baker (fish-cleaning stations and piers) and continued access for fishing at Fort Mason will result in a small increase in the pressure on sport fish in the area. This increase in fishing is not expected to have any significant effect on sport fish populations in the San Francisco Bay.

Hiking and horseback riding along trails will continue to contribute to trail erosion in the Marin County areas of the park. Sediments from this source will increase the siltation load of streams and could potentially reduce spawning suitability for salmon and steelhead. Trail use near Redwood, Pine Gulch, and Olema creeks has the greatest potential to affect spawning areas since all of these creeks contain active spawning runs (only Redwood Creek is a spawning area for silver salmon). These important habitat areas are protected by designation as biotically sensitive areas in the management zoning plan. Therefore, trail use that is detrimental to fisheries will not be allowed. Use will be monitored to determine what, if any, changes visitors are causing so that management actions can be taken to modify trail locations or uses.

An environmental education center at Rancho Bolinas at the head of Bolinas Lagoon and a wayside exhibit on Highway 1 along the lagoon near McKinnan Gulch will bring people near the sensitive wildlife habitat area of the lagoon. Careful supervision of school groups will assure that increased use in this area with excellent educational opportunities will not disturb habitat used by shorebirds, seals, fish, shellfish, and other invertebrates.

Informal canoe launching at Johnson's Oyster Company will be allowed to continue, but no new facilities for launching will be constructed. While the continuation of canoeing at a low level will have some effect on the invertebrates, fish, and harbor seals found in the area, the impact will be minimal.

Wildlife will not be disturbed by special events at the rifle range in Rodeo Valley because the area has no significant wildlife habitat value. Noise at the special event site and an increase in the numbers of people visiting the area could, however, temporarily drive birds and small mammals away from Rodeo Valley and into quiet side canyons. Effects on wildlife of special events to be held at other locations will have to be evaluated on a case-by-case basis.

The known and suspected distributions of candidate, proposed, and listed endangered or threatened species that occur in the park area have been mapped by the U.S. Fish and Wildlife Service. A listing of these species is found in the Appendix. While there is a potential for developments and increased levels of visitors to jeopardize threatened and endangered species found within specific project areas, formal consultation with the U.S. Fish and Wildlife

Service indicates that jeopardy to these species can be avoided if concerted attention is given to these species and their sensitive habitat as more specific site plans are developed. The following potential areas of conflict will have to be resolved through more detailed planning and site specific surveys:

Construction areas in Rodeo Valley and other shoreline areas may temporarily displace California brown pelican individuals. This activity is not expected to pose a threat to the species.

Increases in visitor use of shoreline areas may affect California brown pelican roosting areas. Pelicans occur within the area in large numbers from August to November. Monitoring of visitor and pelican use will assure that this species is not affected by changes in visitor use.

Public use on the Point Reyes peninsula may adversely affect two invertebrate species and future monitoring of visitor use may be necessary.

Any increase in visitor use of the marshes of Tomales Bay and Bolinas Bay could affect the California clapper rail which now occasionally visits these areas.

The above potential conflicts and any other conflict areas will be resolved and avoided through additional investigation into the ecology, range, and occurrence of listed and candidate species and informal and formal consultation with the U.S. Fish and Wildlife Service as more specific plans are developed.

Summary

Construction activities will disturb some additional habitat, both terrestrial and marine, but more habitat will be restored than lost. Increased noise levels and activity during construction or demolition will temporarily discourage wildlife use of a much larger area than is directly disturbed by construction. Construction activity near Redwood Creek, which contains anadromous fish, will be carefully controlled and monitored to ensure that spawning fish are not disturbed by increased stream siltation. Any jeopardy to species listed as threatened or endangered will be avoided by considering these species as more specific site plans are developed.

Besides keeping use levels low in sensitive wildlife areas, a number of management techniques will be utilized to reduce impacts of visitors. The effects of visitor use will be monitored throughout the park so that unacceptable impacts can be detected early and corrective action can be taken. Monitoring of marine resources in the intertidal zone and of important bird habitat will provide

information upon which to base closure of certain shoreline sections or other use limitations necessary for protecting sensitive wildlife and marine organisms.

IMPACTS ON VISUAL QUALITY

Changes in visual quality will result primarily from removal of existing structures, many of them temporary military structures or deteriorated buildings that are unsightly, and the creation of additional open space. A park appearance will be greatly enhanced in the southern units by expanding vistas and landscaping new open areas. A general cleanup, renovation of existing facilities, and compatible design for new facilities will increase the aesthetic appeal of the parks.

The plan provides for limited development in undisturbed areas, primarily campgrounds and picnic areas in Mount Tamalpais, Olema Valley, and Point Reyes. These developments will result in partial disturbance of the areas they cover, but the overall visual character will remain unchanged.

At Muir Woods, where the parking lot and other facilities will be relocated out of the redwood grove, the visual quality of the grove will be improved at the expense of creating a new visual intrusion in a previously undisturbed woodland and grassland area nearby.

Visual integrity will be an important factor in the placement and design of all new park facilities, including parking lots, campgrounds, and picnic areas.

IMPACTS ON AIR QUALITY

Effects of Park-Related Traffic

As more people visit almost all sections of the park there will be an increase in the total amount of park-related vehicle traffic--both on access roads to the park and on roads within the park. There is a potential for degradation of air quality because of this increase in vehicle use. Other sources of pollutants (new facilities unrelated to vehicular traffic) will not be created by the plan.

To determine the effects of increased park automobile and transit traffic on the air quality of the park and surrounding region, air quality analyses at two sites were undertaken using worst-case conditions. Sites were chosen that would illustrate the impacts of the plan on the air quality of two contrasting environments with different visitor use levels--the natural environment of Point Reyes and the urban environment of San Francisco. Possible changes in

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air quality for other areas in the park can be surmised from these analyses.

One analysis site is a steep section of Limantour Road in Point Reyes National Seashore which passes through a corridor separating mandatory Class I wilderness areas, where no degradation of air quality values will be allowed. During existing peak traffic periods, when traffic density is 250 vehicles per hour, the worst-case concentrations for major automotive pollutants (carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, and total suspended particulates) are far below the applicable standards and much less than concentrations known or suspected to cause damage to any flora, fauna, or other air quality related values (see the air quality analysis in the Appendix). Even if automobile and transit traffic increases by 33 percent along the road during peak periods, to the maximum theoretical carrying capacity of the area, air quality related values will not be affected, and Class I air quality increments will not be approached for the Point Reyes area. Park automotive emissions are the primary pollution source and will not act cumulatively with other point or line sources to produce a significant effect on air quality. In addition, emission factors are expected to be lower in the future as more new cars meeting stringent emission standards are on the road and as a greater portion of visitors arrive and tour the park via transit systems. Therefore, no degradation of the Class I air quality will occur. The calculated values for the Point Reyes road section were so slight that air quality related values would not be affected even in similar situations where traffic volume was more than 10 times greater. Such intensive traffic volumes are not present now and are not anticipated in the Marin County park units.

The second analysis site is located within the city of San Francisco along heavily traveled Marina Boulevard. A section of Marina Boulevard between Laguna Street and Doyle Drive immediately adjacent to Golden Gate National Recreation Area was selected because it is the most heavily traveled road segment affecting the park and because it carries the greatest volume of park-related traffic. Visitation in the adjacent San Francisco Bay waterfront area is projected to increase 2½ times. Marina Boulevard also lies within a nonattainment area for carbon monoxide and oxidants (an area that does not meet the ambient air quality standards), requiring that any change in emissions of these pollutants be given special consideration.

Based upon present recreational and commuter traffic and the maximum projected traffic for 1986, carbon monoxide and hydrocarbon concentrations were calculated for peak traffic conditions (see the air quality analysis in the Appendix). Hydrocarbons were calculated to get an indication of ozone levels, which are difficult to calculate, since it is known that hydrocarbons and ozone levels are generally related. When compared with the

national ambient air quality standards, emissions of carbon monoxide on Marina Boulevard during peak traffic periods did not exceed the standards in 1976 and will not exceed them in 1986. In fact, while total traffic will increase, total emissions of carbon monoxide will be less in 1986 than at present. Emissions at peak 1-hour and 8-hour periods will total less than 20 percent of the total concentration allowed by the standards.

Park-related traffic in 1986 will not exceed the standards for hydrocarbons, but total use during weekday mornings, when commuter traffic is high but park-related traffic is low, will exceed the standard for hydrocarbons. (The peak 3-hour concentration will be 180 ug/m^3 (micrograms per cubic meter) while the standard is 160 ug/m^3.) The total hydrocarbon concentration will be lower in 1986 than it was in 1976.

Park-related emissions will contribute to air pollution outside the park by increasing the amount of recreational traffic on access roads. In the San Francisco units, park-related emissions are additive with other urban pollution sources, while in the northern units recreational traffic may contribute most of the emissions along an access road. Based upon the two reported air quality analyses, park-related emissions should not significantly affect air quality outside of the park as a result of the plan. Even without GGNRA/Point Reyes or the plan, recreational traffic would be expected to increase at a rate of 5.7 percent each year. The presence of parklands that are close to home and serviced by transit systems will ultimately reduce overall recreational traffic and related emissions.

Air quality will be affected in a minor way by several other components of the plan. By not providing sufficient parking to satisfy all of the potential demand in the San Francisco waterfront area, two counteracting effects on air quality could occur. On one hand, visitors arriving in the waterfront area in private cars may drive around in surrounding areas looking for parking. Emissions from stopping and starting vehicles circling the area will increase pollution levels. On the other hand, visitors will be encouraged to use transit systems to reach the park. Because of enthusiastic response to experimental transportation systems established in the past, general acceptance of transportation systems in the Bay Area, and the number of families in San Francisco that lack private vehicles, it is assumed that when funding is available and transportation systems are established, visitors will use them. As a result, lower levels of emissions will be generated by visitors arriving by transit vehicles than by visitors arriving by private vehicles.

Use of shuttle systems and closure of some areas, such as Rodeo Valley, to private automobiles during heavy use periods will greatly

reduce the potential for deterioration of air quality. Improvements in parking and circulation patterns in the Cliff House area will reduce congestion and reduce air pollution from automotive emissions.

Construction and demolition activities throughout the park will temporarily increase noise and dust levels, as well as emissions from construction machinery. These effects will be short lived and will affect a local area only.

Summary

Automotive pollution, the only effect of the plan on air quality, will not significantly degrade air quality. Assuming successful implementation of transportation plans for making effective use of transit and shuttle systems to bring people to the park and connect the different park units, there will be little or no adverse effect on air quality and, in fact, there could be a beneficial effect in some areas. The contribution of park traffic to any deterioration in air quality will decrease between 1976 and 1986 because more stringent emission standards will decrease future emissions per car. Federal and state air quality standards will not be exceeded. The Class I airshed of the wilderness area of Point Reyes National Seashore will not be affected by the plan.

IMPACTS ON WATER RESOURCES

Water Quality

Almost any construction activity has the potential to decrease water quality in a local area as sediments are transported into surrounding waters by runoff. Suspended sediments will temporarily increase the sediment load, decrease clarity, increase turbidity, and lower the oxygen content of water. In most cases sedimentation increases will not significantly affect water quality because of the large size of the receiving water body and the small amount of sediment that will be contributed. Where large bodies of water are affected (the bay or ocean), the sediment contributions from small construction and demolition sites will be insignificant compared to the sediment load that is constantly present. The San Francisco Bay receives a total of 6 million cubic yards of sediment a year from large upland watersheds, and wave action causes coastal erosion and keeps turbidity high.

Bay and ocean water quality will be affected in a very minor way by sediment runoff from the following projects: demolition and rubble removal at Alcatraz, removal of structures and landscaping at Fort Mason, landform modification and shoreline stabilization at Crissy Field, earth movement to create a park at Sutro Baths, and

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bulkhead removal and restoration of a sandy beach at Fort Baker. The effects on bay water quality of modifying the lagoon at Aquatic Park for the protection of historic ships cannot be determined until further study results in the definition of a feasible solution to the problem. However, the potential for temporary and long-term degradation of local water quality exists, depending on the extent of modification, the need for dredging, and the characteristics of the bottom sediments. These impacts of ship protection will be discussed in a separate analysis after feasible alternatives have been defined.

A temporary decrease in water quality of streams and other surface waters will also result from construction disturbance. Movement of the Muir Woods facilities and parking will increase erosion and siltation into Redwood Creek and therefore lower stream-water quality. Mitigating measures described in the section "Impacts on Wildlife" should minimize the effects on water quality and fisheries resources. A minor decrease in water quality of Rodeo Lagoon and Rodeo Lake will result from structure removal and landscaping at Fort Cronkhite. While siltation will temporarily increase, it will not decrease the life of the impoundment, significantly reduce water quality, or limit use of the area by wildlife or as a fisheries resource.

More serious than temporary construction disturbances to water quality will be the long-term disturbances resulting from continuous and often increasing levels of visitor use. Increased use of trails by hikers and horseback riders will increase erosion and sedimentation of surrounding waters.

During special events, the large influx of visitors into an area could temporarily affect local water quality. The combined use of portable sanitary facilities and the planned central sewer system facilities should provide for removal of human waste without affecting water quality at the rifle range in Rodeo Valley. However, if portions of the site are denuded by use, an increase in erosion and sedimentation could result. Plans for immediate revegetation of any denuded areas will decrease the likelihood of degradation of water quality.

An increase in backcountry hiking and camping will increase the potential for contamination of water resources by human wastes. A drinking water source will be affected if visitor use extends onto adjacent watersheds managed by the Marin Municipal Water District. If a problem occurs and any contamination results from hiker spillover into these lands or illegal camping, the boundary will be patrolled.

Horse use will not only increase sedimentation from erosion, but could also introduce fecal material into the waters of the Marin County areas of the park. Contaminated surface runoff from

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stables in Rodeo, Tennessee, and Olema valleys will be intercepted and treated prior to entering tributary streams. However, horse waste along trails will contaminate surface water to some extent in the Marin Headlands, Mount Tamalpais, and Olema Valley. Watersheds providing municipal water for the towns of Stinson Beach and Muir Beach are within the park and will continue to be affected by horse use.

A reduction in livestock waste contamination of watersheds will occur in areas where grazing levels are lowered to prevent overgrazing. Contamination of runoff in important watersheds such as the Bolinas Lagoon, Stinson Beach, and Muir Beach watersheds, which are used as municipal water sources, and in other critical watersheds, such as Tomales Bay, Drakes Estero, and Limantour Estero, will probably be reduced if numbers of livestock are reduced. In addition, sediment introduction into watercourses will decrease as erosion problems are reduced and previously denuded areas near stock water supplies and trails are revegetated.

The continued and expanded use of ferry boats to transport visitors will cause some localized pollution of the bay from gasoline and oil discharge, especially at takeoff and landing sites. New ferry operations at Fort Baker and possibly at Fort Mason, the expanded ferry operations at Alcatraz, and potential expansion of ferry service to Larkspur ferry terminal could affect local bay and ocean water quality. When the size of the bay and the amount of other boat traffic is considered, however, the contribution to water pollution by park-related vessels will be insignificant.

Increased park-related private boater use of Fort Baker will have a similar minor effect on water quality of Horseshoe Bay, as petroleum by-products are introduced by boats berthed in the area. The potential for deterioration of water quality from human wastes will also exist when private boat use increases. To help ensure that boaters do not empty holding tanks containing human and chemical wastes into the bay, a dumping station will be provided at Fort Baker.

Nutrient levels in runoff may increase periodically near landscaped areas where fertilization and irrigation are necessary to establish a new plant cover or maintain manicured gardens and landscapes. Fertilization will be avoided in areas where open surface waters could receive an influx of nutrients that could affect aquatic organisms or decrease aesthetic values of open water by eutrophication. If it is created, the Crissy Field lagoon may experience eutrophication unless adequate flushing and water exchange are provided. This problem will be solved by appropriate design.

The water quality of all new water sources will comply with Environmental Protection Agency primary drinking water regulations that have been established pursuant to the Safe Drinking Water Act. Almost all new water sources are associated with new camping areas. If water sources cannot provide water of sufficient quality to comply with the maximum contamination standards allowable by the regulations and if treatment is not feasible, consideration will be given to either relocating the camp or designating the area as a dry camp where visitors must bring in water from surrounding areas. Wherever wells are to be used to supply water, groundwater supplies will be monitored for early detection of any saltwater intrusion. Should saltwater intrusion occur, immediate action will be taken to restrict water use or limit visitor numbers.

Bacterial contamination of water resources will not result from increased visitor use in developed areas because all new developments will contain adequate sewerage systems and comfort stations (see table 19 for proposed sewage disposal systems). Reconstruction of deteriorated sewerage systems will improve water quality in Rodeo Valley, where an existing sewage treatment problem resulting from an overflowing septic tank will be corrected by installation of a new central collection system and treatment outside the park. Overall, this action will greatly improve water quality of Rodeo Lagoon and Lake. Use limitations and other precautionary measures will minimize the occurence of overflows until the new system is constructed. The proposal to improve sewerage systems in Rodeo Valley has been covered in a separate environmental summary.

The resources management plan, to be developed subsequent to the general management plan, will contain a section on water resources management, which is required through a memorandum of understanding with the Environmental Protection Agency. An analysis of present water use and quality and a classification of water for future use will be included in the resource plan. Future monitoring to ensure nondegradation of the established water standards will be necessary.

Water Demand

San Francisco. Water for all developments in the San Francisco mainland units is provided by existing municipal water sources that supply the city of San Francisco and the U.S. Army water system serving Baker Beach, Crissy Field, and Fort Point. These sources are adequate to meet present and projected water demands without significantly affecting either local or regional water supplies. No new development of water sources will be required.

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TABLE 19. WATER SUPPLY AND SEWAGE DISPOSAL

Area	Water Source	Existing (E) Proposed (P)	Estimated Water Demand (peak use, gallons per day)	Sewage Disposal System	Existing (S) Proposed (P)
MARIN HEADLANDS					
Fort Baker, central Rodeo Valley (Forts Barry and Cronkhite)	Marin Municipal Water District (MMWD), from distribution system on interruptible basis; will seek noninterruptible service	E	168,000 - visitor use 81,000 - irrigation	collection system and treatment by Sausalito-Marin City Sanitary District	E for Fort Baker, P for central valley (analyzed in environmental summary 6/78)
Kirby Cove camp	MMWD and low-flow well	E	3,000	vault toilets	E
Gerbode Preserve camp	well or diversion	P	1,000	composting or vault toilets	P
Tennessee Valley co-op stables and trailhead	low volume springs	E	6,000	vault toilets, septic tank/leach-field	E (expand)
Tennessee Valley camp	well or diversion	P	1,000	vault toilets	P
Oakwood Valley farm and picnic area	well or diversion	P	10,000	vault toilets, septic tank/leach-field	P
		Total	270,000 gpd (including irrigation)		
MOUNT TAMALPAIS					
Muir Beach	Muir Beach Community Services District	E	8,000	chemical toilets	E
Muir Beach horse boarding	Muir Beach Community Services District	E	6,000	septic tank/leach-field	E
Muir Woods	North Marin County Water District, transferable to MMWD well	E	50,000	septic tank/leach-field	E
Stinson Beach	Stinson Beach Co. Water District, may develop additional source	E	84,000	septic tank/leach-field	E

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Area	Water Source	Existing (E) Proposed (P)	Estimated Water Demand (peak use/ gallons per day	Sewage Disposal System	Existing (E) Proposed (P)
Morses Gulch camp	well or diversion	P	1,000	vault toilets	P
Old Mine camp	well or diversion	P	1,000	vault toilets	P
Mount Tamalpais State Park and Audubon Canyon Ranch	MMWD, various individual systems and diversions	E	113,000	septic tank/leachfield	E
		Total	263,000 gpd		
OLEMA VALLEY					
Rancho Bolinas environ. ed. center	water diversion, well	E	2,000	septic tank/leachfield	E
Bolinas Ridge camp	diversion, well	P	1,000	vault toilets	P
Five Brooks camp, stables, trailhead	diversion, well	E (expand)	28,000	septic tank/leachfield	E (expand)
Truttman camp	diversion, well	E	4,000	vault toilets	P
Hostels (general location)	diversion, well	E	6,000	septic tank/leachfield	E
		Total	41,000 gpd		
POINT REYES					
Bear Valley	North Marin Water District	E	65,000	vault toilets, septic tanks/leachfields	E (expand)
Wildcat camp	well	E	1,000	vault toilets	E
Glen camp	well	E	5,000	vault toilets	E
Coast camp	well	E	1,000	vault toilets	E
Sky camp	well	E	1,000	vault toilets	E
Marshall Beach camp	well, diversion, or bring your own	P	1,000	vault toilets	P

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Area	Water Source	Existing (E) Proposed (P)	Estimated Water Demand (peak use/ gallons per day	Sewage Disposal System	Existing (E) Proposed (P)
Home Ranch Creek camp	well, diversion, or bring your own	P	500	vault toilets	P
Muddy Hollow Ranch camp	well, diversion, or bring your own	P	500	vault toilets	P
Laguna Ranch area environ. ed. center and hostel	Limantour water system	E	6,000	septic tank/leach-field	E
Limantour Beach	well	E	10,000	vault toilets, septic tank/leachfield	E
Drake Beach, North Beach, South Beach	well	E	10,000	evaporation lagoon, septic tanks/leach-fields	E
Lighthouse	well	E	2,000	vault toilets, septic tank/leachfield	E
Pierce Ranch	well	E	2,000	vault toilets, septic tank/leachfield	P
Lifesaving station	well	E	2,000	vault toilets, septic tank/leachfield	P
Palomarin trailhead		--	-------	vault toilets	E
		Total	107,000 gpd		

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The island of Alcatraz has no local freshwater, and all water is imported by ferry from San Francisco and stored on the island. As a result, only drinking water will be available to visitors to encourage water conservation. Continued use of chemical toilets will limit water demand. The water requirements of proposed plantings will be taken into account in landscaping plans so that irrigation, water transport, and water storage capacity can be kept at a minimum.

Marin County. Park areas in Marin County are presently supplied by municipal systems and local water developments. Water consumption from existing sources will increase as a result of the plan, and several new local water developments will be required for new facilities where new hookups to municipal water sources are not available. Peak use water demand at full plan implementation for park areas in Marin County is indicated in table 19. (The methodology used in determining water demand is included in the Appendix).

Marin Headlands. In the Marin Headlands, peak daily water demand will total 270,000 gallons per day (gpd) when all requirements for visitors, irrigation, and administration are totaled. If irrigation needs are not considered, peak daily water demand for visitor use will total 189,000 gpd, with about 171,000 gallons supplied by Marin Municipal Water District (MMWD) to Fort Baker and central Rodeo Valley, and 18,000 gallons provided by existing or proposed development of groundwater sources.

Increases in water consumption as a result of special events attendance were not taken into account in peak water demand calculations because onsite water will not be needed. Portable chemical toilets will be brought in and drinks will generally be sold at the special event site.

Water service is provided to the park on an interruptible basis. In times of water shortage and drought the park will face the prospect of having this source cut off. If irrigation water is provided by MMWD, its use will be cut off first, but if sufficient water is still not available, visitor services will have to be drastically curtailed, with the possibility that portions of the headlands will be temporarily closed or some activities will be suspended.

Very few local water sources have been developed in the Marin Headlands area with the exception of low-flow springs. Groundwater use has been limited, but extensive testing has been undertaken. From test hole information it appears that sufficient groundwater is available to meet the visitor needs in this area.

Approximately 42 acres will be irrigated at the Fort Baker and Fort Barry parade grounds, rifle range, Fort Cronkhite playfield, and

Capehart picnic area. Peak water demand for irrigation will be 81,000 gpd, assuming one-half inch of water a week is applied on the 42 acres. Irrigation will be needed for about six months each year. The source of irrigation water will be either the MMWD, if sufficient water is available, or the Sausalito-Marin City Sanitary District, if its wastewater treatment plant is upgraded to provide recycled water. If recycled water becomes available, the park will consider recycled water for uses other than irrigation, such as toilet flushing, to reduce consumption of water supplied by other local and municipal sources.

Total water consumption will be reduced somewhat, in Marin Headlands and throughout the park, by the installation of water-saving devices, through the use of drought-tolerant native plant species, and encouragement of water conservation practices. Water-saving faucets, reduced flush-volume toilets, and chemical toilets and demonstration alternative sewage systems that do not require water, such as composting toilets, will be installed whenever possible.

When turf areas are restored, species will be chosen that have low water requirements and that are capable of withstanding drought periods. Landscaping that is adapted to coastal precipitation patterns and will not require irrigation after establishment will be used to revegetate all other areas.

Mount Tamalpais. Because use levels are anticipated to decrease, peak daily water demand will also decrease. Total water demand is anticipated to be approximately 263,000 gpd, while present demand may be as high as 312,000 gpd. Most of the water for the area will be provided by existing municipal water systems, with the exception of two new local water systems that will be required to serve new camps.

Park areas serviced by municipal sources may be subject to water service interruption during periods of low rainfall so that sufficient water can be reserved for the communities of Stinson Beach and Muir Beach. Beach use facilities may need to be closed if supply becomes limited, but water resources themselves will not be affected.

The new camps requiring water development will have low water demand. If water is present in the area, a groundwater well or a diversion should not affect local water sources. However, as is the case in Marin Headlands, until an attempt is made to develop a local water source, the potential to supply water to these camps will remain unknown.

Olema Valley. The existing water supply in Olema Valley comes from local wells and diversions. Water demand in the valley

will be greatly increased as a result of the plan. Although the potential yield of existing wells is not known, test wells in the area yield up to 85,000 gpd, more than twice the required peak water demand of 41,000 gpd. Thus, it appears that local sources in the valley will be able to meet this water demand. Most of the water demand will be generated in the Five Brooks area, the initiation point of most of the activity in the valley.

Point Reyes. Water demand at Point Reyes will increase as a result of the plan to a total peak demand of 107,000 gpd, in comparison with an existing peak demand of 92,000 gpd. The only new water developments that will result from the plan will be to provide water to the proposed camps. Consumption at new camps will be low, and if water is developed it will not affect local water sources. Most of the increased water consumption will occur at Bear Valley, which is supplied by the North Marin Water District. Sufficient water capacity is available within the seashore to meet the projected demand.

Floodplain and Wetlands Management

There will be no adverse impacts on water resources associated with the occupancy or modification of a floodplain or wetland. The only structures in the park that are subject to flooding are in coastal areas subject to tsunami flooding. The presence and continued use of these buildings in the floodplain will pose a limited threat to the structures and the people using them (see "Impacts on Visitors, Visitor Safety"). No new structures will be constructed in wetland areas.

Summary

An insignificant deterioration of water quality will result from the introduction of sediments from construction area runoff and trail erosion. Increases in visitation and horse use could introduce both fecal material and sediments to surface and ground waters. Improvements in water quality will result when existing sewage collection and treatment problems are corrected and when livestock numbers are reduced to eliminate overgrazing.

Water consumption will increase with increases in visitor use levels. During drought periods, demand may exceed the ability of municipal water sources to provide water, resulting in the temporary closure of some park facilities. However, both local and municipal water supplies should be sufficient to meet visitor demand most of the time, except during time of severe drought. New water development, primarily to serve camps, appears to be feasible based upon small water demand at these facilities, past water production, and hydrogeologic features.

Water conservation, phased development, and plan modification if needed will assure that development and use levels will not exceed the potential of the area and surrounding communities to provide water.

ENERGY EFFICIENCY

Making adaptive use of existing structures to accommodate park functions and activities, rather than building new structures, will reduce construction-related energy requirements. While refurbishment and some modification of structures will be required to make them suitable for visitors, the requirements will be less than for new construction. On the other hand, the operation of historic structures that are adapted for new uses may not be as energy efficient as the operation of new structures that could be designed with a consideration for cool and foggy coastal climatic conditions.

As historic buildings are refurbished, energy saving materials and features (insulation, efficient heating systems) will be incorporated into the structures. Individual meters for each facility will be installed to measure incoming fuel, water, and electricity to aid in monitoring and regulating use of these commodities. Wasteful use can be pinpointed and corrected if energy use measurements are made for each facility.

A Bay Area center for environmental awareness and alternative energy technology is being considered as an appropriate use for some of the historic structures at Fort Barry. Interested groups will be invited to carry on research, demonstrate, and explain alternative energy technology and conservation measures. Methods will be tested and demonstrated in hostels and at other facilities throughout the park to decrease energy consumption within the park. As an educational tool, the alternative energy center will also encourage investigation of new energy-saving measures by the general public.

The implementation of a transportation system will allow visitors to reach the park and travel from one area to another within the park with a lower expenditure of gasoline per visitor.

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FUTURE STUDIES

The impacts of a number of actions discussed in the plan cannot be adequately analyzed at this time for a number of reasons including (1) information is unavailable because studies have not been completed; (2) site-specific proposals have not been defined; (3) additional coordination with other agencies or individuals is needed; or (4) a final decision has not been made because it seems desirable to leave options open for the future. Some of these actions have the potential for causing significant environmental impacts, but only further study will reveal the actual extent of impact and the feasible alternatives that may be available. Impact analysis at this time, in other than a very general way, would result in an incomplete, and possibly inaccurate, picture of the future environment. The plan does not commit the National Park Service to any of these actions if impacts are considered significant, and the development of a range of alternatives including no action will precede final decisions on these issues. A separate environmental analysis and additional public involvement may be needed for the following actions. By going ahead with the plan even when several issues are not completely resolved, the entire general management plan will not be delayed while waiting for future studies and final resolution of these issues.

PRESERVATION OF THE ALCATRAZ CELL HOUSE/CITADEL COMPLEX

The cell house and military citadel upon which the cell house rests are rapidly deteriorating. The feasibility of their preservation will depend upon the extent of structural problems, the extent of necessary modifications, and projected costs. A structural analysis of the complex will be necessary before a decision of how to preserve the resources can be reached. Depending upon the outcome of this study, a number of options for the preservation of the cell house and citadel may result. These options could even include the removal of the cell house if repair work would substantially alter its historic fabric or appearance.

Following the study, an impact analysis of the various options will be prepared to aid in making the final decision. Any future action will comply with the procedures established by the Advisory Council on Historic Preservation.

If preservation efforts would result in substantial alteration of one or the other of the citadel or cell house, or if preservation is impossible and the cell house has to be removed, significant impacts on cultural resources would result. Because the results of the structural analysis are not known at this time, the evaluation of the

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significance of the impacts on these structures will be deferred until later. It is possible that additional documentation of environmental impacts will be required, as well as compliance with the procedures established by the Advisory Council on Historic Preservation.

AQUATIC PARK LAGOON MODIFICATION

The historic ships now moored at the Hyde Street pier in Aquatic Park lagoon are subject to constant deterioration brought about by wind and tidal surge. Various methods for protecting the ships need to be investigated to determine their feasibility and impacts. Options for protection could include construction of a breakwater, physical modification of the lagoon, construction of a new Hyde Street pier, alternative mooring methods, or a combination of these. A study is needed that will gather physical and biological data including wind, wave action, tidal current, and bottom conditions; composition of bottom sediments; the amount of dredging that could be required; disposal sites for dredged material; maintenance requirements and their costs; and the anticipated effects on marine organisms and water quality. This information will also be needed to determine the feasibility of a floating stage at Aquatic Park.

The Port of San Francisco now owns the Hyde Street pier, which would be altered or replaced during lagoon changes. Modification of the pier would require its transfer to the National Park Service or an agreement as to design and operation of the structure. This problem is yet to be resolved.

Without the benefit of necessary data or the resolution of ownership, a valid impact analysis cannot be made. An impact analysis of the possible options for protecting the ships, based upon the study results, will be completed before a final decision is made.

FERRY SERVICE FROM FORT MASON

The final decision to implement ferry service from Fort Mason to Alcatraz will be delayed in order to allow time to first monitor the use of the park, observe the traffic situation, and establish mass transit service to the area. By keeping the option for ferry service open, the final decision can later be based upon observations of the operating park over a longer period.

If monitoring of traffic and parking conditions indicates that surrounding areas would not be adversely affected, ferry service to Alcatraz from Fort Mason will be proposed. An impact analysis will be prepared before any action is taken to initiate service.

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POSSIBLE REMOVAL OF HISTORIC STRUCTURES AT FORT MASON OR FORT CRONKHITE

During site-specific design planning, it may be desirable to remove a small number of historic structures for aesthetic purposes or because the buildings are not needed for park activities and are costly to maintain. However, before any historic structure is removed, the environmental impacts will be analyzed, and removal will be in compliance with the procedures established by the Advisory Council on Historic Preservation.

ACCESS INTO CRISSY FIELD

The best access into Crissy Field and the relationship of access to facilities is yet to be determined. The National Park Service will cooperate with the army, San Francisco Department of City Planning, MUNI, San Francisco Department of Public Works, and the Golden Gate Bridge District to work to resolve the access problem.

SHORELINE EROSION AND LAGOON FEASIBILITY STUDY FOR CRISSY FIELD

A study will be undertaken to determine the present causes of instability of the shoreline, methods for stabilizing the beach and restoring a natural appearance to the area, and costs and maintenance requirements. Results of this study may affect the site design for the beach area. Following engineering studies and development of feasible alternatives, additional environmental analysis will be required. The feasibility of creating a lagoon for water play will also require additional study. The size and flushing characteristics to prevent eutrophication will have to be considered.

CLIFF HOUSE HISTORIC STRUCTURE ANALYSIS

The proposal for restoration of the 1909 Cliff House assumes that restoration is feasible and that the restored structure will accommodate existing uses. A structural analysis will be required to determine the condition of the structure, what modifications have taken place, the amount of remaining historical fabric, the feasibility of restoration, the capability of the historic structure to accommodate the proposed uses, and the cost of restoration. If the study determines that either structural deterioration or destruction of historic fabric has advanced to a point of making the historic restoration of the building infeasible, the possibility of constructing a new Cliff House will be considered. An impact analysis will precede any decision to change the proposal to restore the 1909 Cliff House.

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EROSION OF OCEAN BEACH

Control of shoreline erosion at Ocean Beach and future opportunities for recreation will directly relate to a proposal by the city of San Francisco to construct a major wastewater storage and transport facility along Ocean Beach just east of the park boundary and to replace the Great Highway. In order to prepare a response to the city's plans, the National Park Service hosted a conference on Ocean Beach erosion control which brought together a panel of experts in the fields of coastal processes, ecology, and engineering. The panel made several recommendations concerning location of the facility, structural requirements of the walls, disposal and stabilization of excavated material, maintenance of the facility, and monitoring of shoreline processes. The National Park Service will continue to work with the city to arrive at the best solution of the problem.

The National Park Service will need to issue a permit to the city for disposal of sand on the beach in the national recreation area. Because a decision on the city's proposal has not yet been made and because the storage facility is to be built outside of the park, decisions on the management of Ocean Beach cannot be made at this time. Before a National Park Service permit is issued to dispose of sand on the beach, a thorough analysis will be prepared to determine the effect of the proposal.

MODIFICATION OF FORT BAKER BEACH

The changes in the shoreline that will result when the seawall is removed and replaced with a sandy beach will be subject to additional study and impact analysis before construction proceeds. The difficulty of maintaining the new beach (which existed before bulkheading was installed) will be evaluated as well as what site-specific impacts on coastal dynamics and marine organisms will result from construction activity.

INCREASED VISITOR ACTIVITY AT RODEO LAGOON

The effects of increased visitor use on the wildlife of Rodeo Lagoon and Lake will be monitored as visitor use levels increase. Baseline information on the kinds of birds present now and their numbers will be compared with future observations so that changes in seasonal use or management techniques can be made if necessary to prevent visitor impacts.

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NEW SOUTHERN ENTRANCE TO STINSON BEACH

A new road alignment will be constructed to provide a southern entrance for park visitors to Stinson Beach so that they no longer drive through the village of Stinson Beach. At present, traffic must proceed through the town in order to enter the beach parking area. A feasibility study is being planned by the Federal Highway Administration for 1980 to determine options for the alignment of this new road section. At that time, the site-specific environmental impacts of the new road will be analyzed.

ZONE CAMPING

A feasibility study to determine the potential impacts (increased fire potential, water pollution, impacts on vegetation and soils) will be undertaken prior to making a decision to allow primitive zone camping at Point Reyes.

CONSTRUCTION PROJECTS

All construction projects included in the plan will be preceded by an additional review and site-specific analysis of their impacts in an environmental assessment. This review will assure either that impacts were adequately covered in this environmental analysis or that additional impacts based on new information or changing conditions or publics are taken into account and documented before the site is finally committed to development. Detailed surveys required for compliance with NPS policies and federal laws will be undertaken at that time. These surveys will include site-specific archeological surveys and surveys to verify endangered species occurrences. The U.S. Fish and Wildlife Service will be consulted whenever conflicts with endangered or threatened species are encountered necessitating reinitiation of procedures under section 7 of the Endangered Species Act. Locations of facilities may be slightly altered or appropriate mitigating measures adopted to reduce impacts as a result of these site-specific analyses.

VEGETATION MANAGEMENT

A vegetation management plan is needed to guide programs for maintaining vegetative diversity, controlling exotics, protecting fragile environments, and other resource management goals. Additional studies will be necessary before specific proposals can be made.

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GRAZING

As part of the vegetation management studies, additional study of the effects of grazing will be required to determine where this activity can be used as a resource management technique for maintaining grasslands. Based on results of this study, a plan will be developed for the issuance of grazing permits.

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CONCLUSIONS

Major changes in human activity and land use occurred when Point Reyes National Seashore and Golden Gate National Recreation Area were established as units of the National Park System by congressional action. Recreational use patterns that have now become established on former military, state, city, and private lands are going to continue at a higher use level with no new significant environmental impacts. The planned uses of the resources are primarily for recreational activity, consistent with the reasons for establishment of the areas.

Relevant environmental factors have been considered in evaluating the significance of the environmental impacts of the plan. The magnitude of change to the natural environment is expected to be small. The emphasis on utilizing existing structures and limiting new development to areas that have already been physically altered in the past will reduce the amount of new disturbance to a very small portion of the 100,000-acre area. Urbanization, along with its attendant development and pollution has already affected the quality of natural resources to some extent, making the changes proposed by the plan relatively insignificant.

The maintained environment and structures of the San Francisco units have a greater ability to absorb impacts than the more northern areas, and consequently most development and use is proposed for these units. In the northern units, where environmental sensitivity is often high, few actions that could affect natural resources are proposed. Exclusive protection of areas where natural values are high, little or no modification of remaining resources in areas that have been stressed by past uses, restoration to more natural conditions when possible, and use of already disturbed sites will allow long-term preservation of natural resource values. No significant adverse effects on habitat or endangered or threatened species will result. Unique areas or areas of special designation such as wilderness areas, ecologically critical areas, or Class I airsheds, will not be affected.

Energy consumption will be as low as possible with the provisions for transit systems and adaptive use of existing structures. The plan will not violate any laws or standards that have been imposed to protect the environment.

A large number of historic structures are going to be affected in a minor way by the plan. Changes in historic structures are necessary in order to adaptively use and preserve them over the long term. Modifications of historic structures to allow adaptive uses will usually be interior changes and will be reversible in

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structures that have interior significance. Significant impacts on the area's cultural environment will not result. No significant adverse impacts will affect areas listed on or eligible for listing on the National Register of Historic Places.

The tourist-oriented and urban character of the area surrounding the park will not be significantly affected. Heavy vehicular and pedestrian traffic is already present, and large numbers of businesses are already established to provide visitor services. The plan will not promote growth or change growth patterns in any adjacent community. Public health and safety will not be adversely affected.

The cumulative direct and indirect impacts of the proposal that can be determined at this time are not significant to either the locales of site-specific actions or to the region. A number of unresolved actions requiring more study may or may not be significant, but without further study and definition of the proposal, no determination can be made. The proposal does not commit the National Park Service to future actions which could be significant. There are no known other proposed actions, either inside the park or in the area, which considered along with the proposal will be significant. The controversial impacts have been resolved by compromise or plan alteration.

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NATIONAL PARK SERVICE
GOLDEN GATE NATIONAL RECREATION AREA, CALIFORNIA
AND POINT REYES NATIONAL SEASHORE, CALIFORNIA
GENERAL MANAGEMENT PLAN

FINDING OF NO SIGNIFICANT IMPACT

In accordance with the provisions of the National Environmental Policy Act and The regulations of the Council on Environmental Quality (Federal Register, Volume 43, Number 230, November 29, 1978) an Environmental Assessment was prepared for the General Management Plan for Golden Gate National Recreation Are and Point Reyes National Seashore.

The Environmental Assessment was released in August, 1979 and received extensive public and agency review. Proposals cover development and restructured use in the San Francisco and Marin County units of the recreation area; concepts for natural and cultural resources management; and proposals for transportation to and within the areas. Plan emphasis is to place urban recreational development in areas where natural landscapes have been modified and have low density use with minimal impact in areas retaining substantial material integrity. Cultural resources are considered in the plan which proposes that historic structures be stabilized and used adaptively rather than being demolished or extensively restored and that non-historic building be removed and setting relandscaped to increase outdoor recreational opportunities and improve the scer Agreement has been reached with the State Historic Preservation Officer and Advisory Council on Historic Preservation concerning proposals with effect on cultural resources. Overall responses have been in support of the plan and no recommendations for substantial revisions were made.

As a result of the assessment and review of comments received, it is believed th no substantial controversies exist and that the plan does not have the potential to cause significant adverse impacts on the quality of the human environment. Therefore, based on these reviews an Environmental Impact Statement will not be prepared.

The Environmental Assessment is on file and may be viewed at the following offices: General Superintendent, Golden Gate National Recreation Area, San Francisco, California; Superintendent, Point Reyes National Seashore California; and National Park Service, Western Regional Office, San Francisco, California.

Approved Howard H. Chapman
Regional Director, Western Region

9-24-80
Date

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ENVIRONMENTAL REVIEW

FOR THE

GENERAL MANAGEMENT PLAN
AND
ENVIRONMENTAL ANALYSIS

Golden Gate National Recreation Area
Point Reyes National Seashore

May 1, 1980

Recommended: _____ 5/1/80

John H. Davis
Acting General Superintendent

Date

Approved: _____ 6/9/80

For Howard H. Chapman
Regional Director
Western Regional Office
National Park Service

Date

The planning process and the alternatives considered throughout its course for which this environmental review signifies a milestone of completion can be described best by an excerpt from the draft General Management Plan itself:

> Planning has involved extensive discussions with public agencies and conservation organizations and also more than one hundred workshops in Bay Area communities. About 10,000 people of all ages, incomes, and lifestyles have directly participated in this process through these public workshops, letters, and meetings with the planning staff over the past four years.
>
> In conjunction with this extensive public dialogue, the planning team has carefully compiled and analyzed information about the wildlife, vegetation, soils, history, socioeconomic setting, and other subjects that are key factors in making decisions about the parks' future (Preliminary Information Base, four volumes, October 1975.) Public preferences and feelings were carefully filtered through this collection of knowledge. An important intermediate product of this process was the Assessment of Alternatives for the General Management Plan (May 1977), supplemented by a popular summary, A People's Guide to the Future of the National Parks Next Door. These publications presented up to four alternative scenarios for the future of fourteen goegraphic units of the park. Each alternative related to one of the four basic park philosophies expressed by the public (1) minimum visible change--things are O.K. the way they are today; (2) maximum natural appearance--wherever possible restore natural qualities and hold development to a minimum; (3) education history--the park is an ideal learning environment and visitors need a lot of help to get maximum enjoyment and benefit from it; (4) recreation-the park is a place that offers many opportunities for leisure activities. All of the alternatives protected ecologically sensitive natural areas, retained significant historic structures, and proposed facilities only in areas suitable for development. Each alternative was accompanied by a thorough environmental analysis describing the potential results of each proposal.
>
> During the public review of the Assessment of Alternatives, people were encouraged to interchange the individual proposals to design the park system they preferred. Public responses to the alternatives were gathered in five hearings held by the GGNRA Citizens' Advisory Commission (CAC) and through individual's and group's letters and worksheets. These responses were analyzed to determine areas where people were in general agreement and areas where issues were still to be resolved. These determinations and the recommendations of the planning staff were submitte in a series of position papers to the public and CAC, which voted approval of the recommendations and resolved the few remaining conflicts through additional meetings and committee work.
>
> The analysis of public responses to the planning alternatives revealed that a surprising number of proposals received nearly unanimous support from reviewers. These were generally recommended, and proposals that

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received little or no endorsement were rejected. There was one critical exception of this decision-by-vote process. Many key participants, such as the elderly, who were contacted early in the planning process through aggressive efforts to reach into the community, did not return to comment on the alternatives. Nevertheless, to fullfill their commitment to serve a variety of constituents, the planning team carefully considered the needs of these groups in the formulation of the plan.

When public preference for the future of a particular area was split, some basic valuations seemed to prevail in the decision-making process. On the one hand, emphasis was placed on urban recreational development in areas where the natural landscape has already been significantly disturbed. On the other hand, the proposals lean toward low-intensity use and minimal facilities in areas that retain substantial natural integrity.

Decisions were also tempered by a preference for stabilization and adaptive use of historic structures rather than alternatives for extensive demolition or authentic restoration of buildings and settings. At the same time, the plan favors tearing down nonhistoric buildings to increase outdoor recreational opportunities and enhance the natural scene.

As much as possible, the plan attempts to sustain park uses that are occurring now. However, some activities will be shifted to new locations where they will be more compatible with park resources and other uses.

The draft plan (both full text and summary) was distributed to the public in June of 1979. The following hearings were then conducted by the Golden Gate National Recreation Area Advisory Commission to receive comments from the public:

September 25, 7:30 PM, Fort Mason
September 29, 9:30 AM, Fort Mason
October 4, 7:30 PM, Berkeley
October 9, 7:30 PM, Mill Valley
October 13, 9:30 AM, Point Reyes Station

Generally, comments and suggestions offered by agencies, organizations, the Advisory Commission, and the public were supportive and primarily oriented toward clarifying the intent of plan proposals. There were no controversies or recommendations for substantial plan revisions apparent in any of the hearings or in any of the letters and position papers submitted in response to the plan.

Specific suggestions for numerous minor modifications are contained in the text of the following Advisory Commission committee reports:

Education/Recreation - 3 reports - September 25, October 21, and November 13
Land's End/Fort Funston - September 25
Marin Headlands - September 25
Northeast Waterfront - September 25
Olema Valley/Mt. Tamalpais - September 25
Point Reyes - September 25
Trails - September 25
Transportation - September 25

These reports, which were approved by the full commission on November 15, 1979, resulted from an exhaustive page-by-page review and analysis of the draft plan by the committees prior to the public hearings. Subsequent to the hearings, two staff reports were submitted to the full commission responding to relevant issues and questions raised by the public in both written and verbal testimony.

At their December 8, 1979 meeting, the Commission unanimously voted final approv of the General Management Plan subject to recommended modifications contained in the ten committee reports and the two staff reports.

Of all the constructive suggestions contained in the committee reports, only a few appear to be of sufficient magnitude to warrant mention in this review. The serious concern of the Marin Headlands Committee for protection of the natural resources of Rodeo Lagoon and Lake (particularly bird populations) motivated them to ask that the proposals for canoe rentals, a fishing dock and a stocking program be dropped from the plan. Noting the widespread opinion that it would be impractical, the Point Reyes Committee asked that the proposal to operate an ocean-going ferry to the seashore be deleted from the transportation section of the plan. As is the case with all of the Advisory Commission recommendations we propose that the above suggestions be accepted in full.

Written comments from the Marine Mammal Commission and the Point Reyes Bird Observatory included an objection to a proposed walk-in campground due to its proximity to important harbor seal habitat in Bolinas Lagoon. Because the campground is proposed in a canyon, the mouth of which is separated from the lagoon by a busy highway, we recommend that the proposal be retained in the plan with the condition that final siting and implementation will be contingent upon resolution of these concerns directly with appropriate staff of the Point Reyes Bird Observatory.

With respect to National Environmental Policy Act compliance, the following statement was contained in two prominent locations within the text of the draft plan:

> As in the past, public review of the plan and its environmental analysis and consideration of all comments will precede the commitment to a final plan of action and a decision as to the significance of its environmental consequences. These decisions will be recorded in an environmental review. If this review of public and agency comments and the environmental analysis reveals that the environmental consequences of the plan will not cause a significant adverse impact on the quality of the human environment and are not substantially controversial, then a finding of no significant impact will be part of the environmental review and the plan will be approved. If this is not the case, then a decision will be made to prepare an environmental impact statement on the proposed action and approval of the plan will await its evaluation.

None of the plan's reviewers either advocated preparation of a full environmental impact statement or stated in their review comments that the consequences of the document would be substantially controversial or would result in significant adverse impacts. Therefore, it is recommended that a finding of no significant impact should be determined at this time and that the plan should be approved by the Regional Director subject to modifications recommended by the Advisory Commission.

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CONSULTATION AND COORDINATION WITH OTHERS

The plans and policies of other public agencies in the San Francisco Bay region influence management and planning decisions for GGNRA/Point Reyes, and vice versa. The National Park Service has worked with all the following agencies in development of this plan, and their review of the plan is requested. The agencies that have been and continue to be most closely associated with park planning can be separated into the following categories.

CO-MANAGERS

Currently, not all land within the park's boundary is managed by the National Park Service. Co-managers include the United States Army and Coast Guard, state and local park agencies, and two nonprofit groups.

Major portions of the recreation area are former United States Army lands, which were immediately transferred to the National Park Service upon establishment of the park. The act provides that the military can retain certain rights on portions of these lands, including areas within Fort Mason, the Presidio, and the Marin Headlands. The Presidio of San Francisco in its entirety and the eastern half of Fort Baker are included within the boundary of the park; however, they will remain under the jurisdiction of the Department of Defense until such time as that department determines that any substantial portion is excess to its needs. Two areas within the Presidio have been irrevocably permitted to the National Park Service for recreational use--45 acres of bayfront land at Crissy Field and 100 acres of land at Baker Beach. The act also provides that "reasonable public access" will be granted to the Secretary of the Interior at Horseshoe Bay in East Fort Baker "together with the right to construct and maintain such public service facilities as are necessary for the purposes of this act."

Many plan proposals, especially those related to transportation and access routes, will require coordination with the army. Also, many National Park Service proposals are dependent on gradual phaseout of various army operations in the Marin Headlands.

The act also specifies continued military use of the following facilities operated by the U.S. Coast Guard on lands within the national recreation area: Fort Point Coast Guard Station (by permit), Point Bonita, Point Diablo, Lime Point, and two areas of Point Reyes National Seashore.

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Seven park units owned by the city and managed by the San Francisco Department of Recreation and Parks were included within the boundary of the southern portion of the recreation area, and were intended by the Congress for donation to the federal government. Six of these units (Fort Funston, Ocean Beach, Sutro Heights, Lands End, Fort Miley, and Aquatic Park) have already been transferred to the National Park Service, leaving only the Marina Green area still under city jurisdiction.

Nine units of the California State Park System totaling approximately 7,700 acres were also included in the recreation area boundary, and also intended for donation to the federal government. In July 1976, an act providing for the transfer of five of these units to the National Park Service was passed by the state legislature and signed by the governor. This act also allowed for the transfer of three additional units at the discretion of the governor, who has subsequently agreed to transfer two. This leaves Angel Island State Park, which can be transferred at the governor's discretion, and Mount Tamalpais State Park, which was completely excluded from the current act. Regardless of the status of the various state park units, it is clear that these parklands are an integral part of a cohesive coastal resource and should be managed and developed in close coordination with the lands now in federal ownership.

Although they are not specifically cited in the enabling legislation, hearing records show that two properties within the recreation area boundary were clearly intended by the Congress to be exempt from purchase as long as their use remains compatible with the purposes of the park. The Zen Center, a 106-acre tract along Route 1 immediately south of the community of Muir Beach, serves as headquarters for a religious organization, providing central living accommodations for about 25 people. In addition to their religious activities, truck farming constitutes the group's primary activity. Trails lead through the area, and visitors are welcomed. The Audubon Canyon Ranch is a 1,014-acre nature preserve owned and operated by a private nonprofit conservation organization. The purpose of the ranch is the protection and interpretation of important egret and heron rookeries located in the canyon.

BAY AREA PARK AND RECREATION AGENCIES

As the primary regional source of recreational opportunities, GGNRA/Point Reyes will be planned and managed as one element of a Bay Area park system. Therefore, regional supply and demand factors must be considered. This defines the second category of agencies exerting an influence on decisionmaking--other park planners and managers in the region, including not only San Francisco and Marin County Departments of Parks and Recreation

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and the East Bay Regional Park District, but also the park departments of seven additional counties in the Bay Area as well as the California Department of Parks and Recreation.

Particular interrelationships occur where other public park areas are adjacent to the national parkland, as are the zoo and Golden Gate Park in San Francisco. The Marin Municipal Water District lands are also contiguous with GGNRA/Point Reyes and share common access roads and trail systems. The cross-Marin trail proposed by the county will pass through both county and national parklands.

Review by these agencies of national park proposals will define the role of GGNRA/Point Reyes in local, regional, and state park systems.

REGIONAL PLANNING AGENCIES

The third category of organizations whose plans and policies exert an important influence on GGNRA are the several regional planning agencies of the Bay Area. The California Coastal Zone Commission and the Bay Conservation and Development Commission have both produced policies and guidelines for the proper use and development of the shoreline. These policies will be regarded as important constraints that will help guide all future considerations affecting the waters of the bay and ocean and the lands bordering them. Generally, policies of both commissions support recreational use as a priority for shoreline areas and do not appear to be in conflict with National Park Service policies. Similarly, the plans and recommendations of the Association of Bay Area Governments must be taken into account as a valuable consolidated regional attitude and articulation of needs toward such subjects as transportation systems, open space, and recreation facilities. Initial consultation with these agencies indicates general conformance of plans and policies; review of this plan will continue this coordination.

Additional consultation with the regional offices of the Environmental Protection Agency, U.S. Fish and Wildlife Service, California Regional Water Quality Control Board, Bay Area Pollution Control District, and the California Department of Fish and Game may be necessary to ensure compliance with environmental quality regulations and laws.

LOCAL PLANNING AGENCIES

Two important local planning agencies are concerned with the park--the Marin County and San Francisco Planning Departments.

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Parklands within GGNRA/Point Reyes comprise more than a third of the total land area and most of the coastline in Marin County, and all of San Francisco's oceanfront and most of its northern bay waterfront are part of GGNRA--which is especially significant in light of the city's peninsular nature and the aesthetic influence of the water. Also, two of the city's most well-known landmarks occur within the park--Alcatraz and (although it is owned and managed by others) the Golden Gate Bridge.

The master plan of the city of San Francisco is recognized for its influence on planning and management decisions. Additional projects of the city of San Francisco related to the park include a wastewater management plan and proposals to modify the Great Highway and establish connections between Golden Gate Park and Ocean Beach. A memorandum of understanding between the city and the National Park Service ensures their review of park proposals, particularly those related to transit systems, proposed construction, and sand incursion upon roadways adjacent to the park.

The General Plan for Marin County is a basic guide for coordination. In addition to this county plan, many communities adjacent to the park have articulated their needs and concerns in community plans that will affect decisions about park proposals. Major plan elements requiring coordination include transportation, trails, and visitor services. A memorandum of understanding between the National Park Service and Marin County specifies that both parties will consult with the other on all planning and management issues of mutual concern.

TRANSPORTATION AGENCIES

Perhaps the most critical park planning issue is transportation. Initial park legislation recognized this fact and specially funded a 2-year study, the Golden Gate Recreational Travel Study (GGRTS), to coordinate the ideas of numerous Bay Area and state transportation agencies. The proposals of this study have been incorporated into the transportation approach outlined in this plan.

The Metropolitan Transportation Commission is a regional planning agency that develops Bay Area transportation policies and reviews funding requests. Proposals related to park transportation will require their assistance as well as review by the local transportation departments of San Francisco and Marin Counties.

Roads within the park are maintained by numerous agencies. Proposals affecting these roadways could require assistance from the California State Department of Transportation (CALTRANS), and the Marin or San Francisco Department of Public Works.

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The major Bay Area transit systems with park-serving potential are Golden Gate Transit for Marin, Municipal Railway (MUNI) for San Francisco, and Alameda-Contra Costa (AC) Transit for Alameda/Contra Costa Counties. Although Bay Area Rapid Transit and Southern Pacific Railway do not connect to the park, their scheduling may increase transit possibilities for East Bay and peninsula residents.

THE PUBLIC

Numerous groups and individuals have shaped this plan. Workshops with both organized groups and the general public were held from October 1974 to November 1975 to identify planning issues and citizens' feelings as to what topics the plan should address. Workshops recorded the preferences and feelings of about 10,000 people. All of the information gathered was considered in the development of the Assessment of Alternatives for the General Management Plan, which was distributed to the public in 1977.

The public was again asked to express their preferences in 1977; this time on the four alternatives expressed in the assessment and its summary, which received wide public distribution. Comments were gathered through hearings, letters, and worksheets from interested citizens. Some issues still remained to be resolved following analysis of responses to the assessment. The public and the GGNRA Citizens' Advisory Commission resolved these conflicts through additional discussions.

This plan, the final result of a planning effort that has relied heavily on public response, is also available for public review.

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DISTRIBUTION OF THE PLAN

Copies of the General Management Plan/Environmental Analysis will be available for review at National Park Service offices in the Bay Area as well as in the main public libraries. In addition, copies have been sent to the following government agencies (federal, state, regional, and local) and groups for their review and comments. These agencies and groups also received copies of the Assessment of Alternatives.

FEDERAL AGENCIES

Advisory Council on Historic Preservation
Environmental Protection Agency, Region IX
Department of the Army
    Corps of Engineers, San Francisco District
    Corps of Engineers, South Pacific Division
    Sixth Army Headquarters
    Presidio of San Francisco
    Oakland Army Base
Department of Commerce
    National Oceanic and Atmospheric Administration
Department of the Interior
    Heritage Conservation and Recreation Service
    Fish and Wildlife Service, Regional Office
Department of Transportation
    Coast Guard, 12th Coast Guard District
    Federal Highway Administration, Region Nine
    Urban Mass Transportation Administration, Region Nine

STATE AGENCIES

California State Clearinghouse
San Francisco Bay Conservation and Development Commission
California Coastal Zone Conservation Commission
- North Central Coast Region

Fish and Game Department
Department of Parks and Recreation
    Office of the Director
    San Francisco Area Manager
State Historic Preservation Officer
Department of Navigation and Ocean Development

REGIONAL, COUNTY, AND MUNICIPAL AGENCIES

Association of Bay Area Governments
Bolinas Public Utilities District

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City of San Francisco
- Board of Supervisors
- Planning Commission
- Planning Department
- Northeastern Waterfront Planning Advisory Committee
- Recreation and Park Department
- Recreation and Park Commission
- Department of Public Works

East Bay Regional Park District
Larkspur Planning Department
Marin County
- Board of Supervisors
- Comprehensive Planning Department
- Planning Commission
- Park and Recreation Department
- Park and Recreation Commission
- Department of Public Works

Marin Municipal Water District
Mill Valley Planning Department
Sausalito Planning Department
Stinson Beach County Water District
Transportation Agencies
- Metropolitan Transportation Commission
- Golden Gate Recreational Travel Study
- Golden Gate Bridge and Transportation District
- Golden Gate Transit
- San Francisco Municipal Railway

ORGANIZATIONS

Audubon Canyon Ranch
Audubon Society
Bolinas Planning Group
California State Historical Society
Citizens Ad Hoc Trails Committee
Coalition of San Francisco Neighborhoods
Coastal Parks Association
Environmental Action Committee of West Marin
Foundation for San Francisco's Architectural Heritage
Friends of the Earth
Inverness Planing Group
League of Women Voters
Marin Conservation League
Marina Civic Improvement and Property Owners Assocation
Muir Beach Improvement Assocition
People for a Golden Gate National Recreation Area
Planning Association for Richmond
Point Reyes Bird Observatory

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Point Reyes Station Planning Group
Save San Francisco Bay Association
San Francisco Maritime Museum
San Francisco Planning and Urban Research Association
San Francisco Tomorrow Club
Sierra Club
S.P.E.A.K
Stinson Beach Village Association
Tam Valley Improvement Association
Tamalpais Conservation Club

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APPENDIXES

A: MAJOR DEVELOPMENT PRIORITIES AND COST SUMMARY

B: SUMMARY OF ALTERNATIVES CONSIDERED IN THE DEVELOPMENT OF THE PLAN

C: APPLICABLE FEDERAL LAWS AFFECTING PLANNING

D: RARE, THREATENED, OR ENDANGERED PLANTS AND ANIMALS OF GGNRA AND POINT REYES NATIONAL SEASHORE

E: AIR QUALITY DATA

F: WATER DEMAND DATA

G: MEMORANDUM OF AGREEMENT WITH STATE HISTORIC PRESERVATION OFFICER AND ADVISORY COUNCIL ON HISTORIC PRESERVATION

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APPENDIX A: MAJOR DEVELOPMENT PRIORITIES AND COST SUMMARY

The following list represents the major development priorities for the parks. The numerical ranking of the projects is based on a number of considerations including legislative mandates to preserve cultural and natural resources as well as the responsibility to deliver safe recreation opportunities to the public.

FORT POINT NATIONAL HISTORIC SITE

1.	seawall rehabilitation	$500,000
2.	historic restoration of fort	$2,000,000

MUIR WOODS NATIONAL MONUMENT

1.	relocate maintenance and administrative facilities	$300,000
2.	relocate 100-car parking area, construct new restrooms	$400,000

POINT REYES NATIONAL SEASHORE

1.	BEAR VALLEY new visitor information center	$1,500,000
2.	LIMANTOUR repair/rehabilitation of utilities, roads, parking area, and visitor facilities	$2,700,000
3.	LIGHTHOUSE historic preservation and rehabilitation of visitor facilities	$401,000
4.	PARK ROAD SYSTEMS repair and rehabilitation of roadways and improved trailhead facilities	$6,580,000
5.	MISC. INTERPRETIVE IMPROVEMENTS	$270,000
6.	LIFEBOAT STATION historic preservation and adaptation for public use	$1,137,000
7.	PIERCE POINT RANCH historic preservation and adaptation for public use	$1,460,000

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8.	BACKCOUNTRY CAMPGROUNDS construct three new camps and rehabilitate existing facilities	$505,000
9.	TOMALES BAY boat dock and ranger station	$235,000
10.	BEAR VALLEY administrative and maintenance facilities	$3,270,000

GOLDEN GATE NATIONAL RECREATION AREA

1.	FORT MASON adaptation of historic buildings for public use, landscaping, and site improvement	$5,000,000
2.	AQUATIC PARK repair and rehabilitation of historic ships	$5,000,000
3.	AQUATIC PARK ship protection, mooring, and repair facilities	$3,000,000
4.	ALCATRAZ historic structure preservation	$4,000,000
5.	MARIN HEADLANDS sewage system	$1,700,000
6.	FORTS BARRY AND CRONKHITE historic structure preservation	$1,000,000
7.	STINSON BEACH new entrance to beach parking area	$500,000
8.	ALCATRAZ building demolition, rubble disposal, and hazard abatement	$2,500,000
9.	FORT BAKER waterfront improvements	$2,000,000
10.	AQUATIC PARK new maritime museum--Haslett Warehouse	$15,000,000
11.	ALCATRAZ landscaping and site improvements	$3,000,000
12.	SUTRO BATHS park development	$6,000,000

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13.	CRISSY FIELD landscaping and site improvements	$2,000,000
14.	CLIFF HOUSE AREA esplanade rehabilitation	$1,000,000
15.	AQUATIC PARK site improvements	$2,000,000
16.	CLIFF HOUSE historic restoration	$3,500,000

Of the congressional acts that established Point Reyes, Fort Point, and Golden Gate, only those for Fort Point and Golden Gate specified an amount not to be exceeded in the development of each park. Those amounts were $5,250,000 (February 1970 prices) for Fort Point and $58,000,000 (May 1971 prices) for Golden Gate. As of 1980 these figures were approximately doubled through adjustments for inflation. Based on current plan proposals, total development costs will easily remain within the ceilings.

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APPENDIX B: SUMMARY OF ALTERNATIVES CONSIDERED IN THE DEVELOPMENT OF THE PLAN

ALCATRAZ

A	B	C
Museum (50 people)	Museum (50 people)	*Museum (250 people)
Ranger tour area (12 acres/300 people)	*Ranger tour area (6 acres/150 people)	Ranger tour area (12 acres/300 people)
*Informal recreation space (3.5 acres)	*Informal recreation space (6 acres)	*Informal recreation space (2 acres)
*Open space (6 acres)	*Open space (9 acres)	*Open space (6 acres)
Ferry terminal (400 people/0.2 acre)	Ferry terminal (400 people/0.2 acre)	*Ferry terminal (800 people/0.3 acre)
	*Wayside exhibits and interpretive area (30 people/1 acre)	*Wayside exhibits
		*Self-guiding trails and interpretive areas (60 people/2 acres)

*New facility or condition

Capacity figures indicate number of people at one time.

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AQUATIC PARK

A	B	C	D
Hyde Street Pier and historic ships (4 ships/450 people)	Hyde Street Pier and historic ships (4 ships/450 people)	*Historic ships (12 ships/850 people)	Hyde Street Pier and historic ships (4 ships/450 people)
		**Environmental living program	
Maritime Museum (250 people)	Maritime Museum (250 people)	Maritime Museum (500 people)	**Maritime Museum relocated to Haslett Warehouse (1,000 people)
		*Wayside exhibits	
Senior center (200 people)	Senior center (200 people)		
Private office space in Haslett Warehouse			**Indoor senior center in old Maritime Museum building (450 people)
Rowing and swimming clubs	**Rowing and swimming clubs relocated to Haslett Warehouse	Rowing and swimming clubs	*Public rowing, swimming, and sailing facilities
Sea Scout facility	Sea Scout facility	Sea Scout facility	
Beach comfort facility	Beach comfort facility	Beach comfort facility	*New beach comfort facility
Food service	Food service	Food service	Food service
Municipal fishing pier (250 people)	Municipal fishing pier (250 people)	*Municipal fishing pier with cleaning stations (250 people)	*Municipal fishing pier with cleaning stations (250 people)

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A	B	C	D
		*Bait and tackle sales and rental	*Bait and tackle sales and rental
Recreation space – includes lawn, beach, bleachers, bocce ball courts (5-6 acres)	Recreation space – includes lawn, beach, bleachers, bocce ball courts (6-8 acres)	Recreation space – includes plaza, lawn, beach, bleachers, bocce ball courts (5-7 acres)	Recreation space – includes plaza, lawn, beach, bleachers, bocce ball courts (5-7 acres)
Other open space (3 acres)	Other open space (3 acres)	Other open space (3 acres)	Other open space (3 acres)
Waterfront promenade	Waterfront promenade	Waterfront promenade	Waterfront promenade
			*Bike path
Parking (85 spaces/0.8 acre)	*Transportation juncture	*Transportation juncture	*Transportation juncture
Cable car turnaround (240 people)	Cable car turnaround (240 people)	Cable car turnaround (240 people)	Cable car turnaround (240 people)

*New facility or condition

** New adaptive use of historic structure

Capacity figures indicate number of people at one time

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FORT MASON

A	B	C	D
Visitor center in Bldg. 201 (90 people)	**Visitor center (150 people)	**Visitor center/Bay Area history center (460 people)	**Visitor center (200 people)
		**Senior center (200 people)	
Historic residential district retained by Army (7.3 acres)	**Historic residential district – adaptive uses determined when buildings become available (7.3 acres/140 people)	**Historic residential district-restoration/exhibits/adaptive use considered (7.3 acres/ 1,100 people)	**Historic residential district – adaptive uses determined when buildings become available (7.3 acres/140 people)
*Wayside exhibits	*Wayside exhibits	*Wayside exhibits	
	**Environmental education center (250 people)	**Marine museum/ environmental education center (500 people)	
		*Historic ships at piers	*Visiting ships (500 people)
**Art facilities by permit in piers and warehouses (200 people)	*Landscaped pier (500 people)	**Performing arts facilities/outdoor program space (3,300 people)	*Performing arts facilities/outdoor amphitheater (2,400 people)
		**Arts and crafts facilities (1,300 people)	**Arts and crafts facilities (1,300 people)
	**Community educational and cultural programs (500 people)		**Day camp/community educational and cultural programs (500 people)
			**Indoor recreation space (1,000 people)

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A	B	C	D
**Hostel in warehouse (180 people)		**Hostel and group retreat (230 people)	**Hostel (330 people)
		**Food service – 2 (400 people)	**Food service (200 people)
			**Recreational equipment rental
Fishing piers (100 people)	*Fishing piers (170 people)	Fishing piers (100 people)	*Fishing piers with fish-cleaning stations (100 people)
*Lawn area (23 acres)	*Lawn area (27 acres)	*Lawn area (15-20 acres)	*Lawn area (10-15 acres)
Picnic area (2 acres)	*Picnic area (5 acres)	*Picnic area (3 acres)	*Picnic area (5 acres)
			*Plaza (5 acres)
*Other open space (25 acres)	*Other open space (25 acres)	*Other open space (25 acres)	*Other open space (25 acres)
Waterfront promenade (0.4 mile)	Waterfront promenade (0.4 mile)	Waterfront promenade (0.4 mile)	Waterfront promenade (0.4 mile)
*Bike path (0.4 mile)	*Bike path (0.4 mile)	*Bike path (0.4 mile)	*Bike path (0.4 mile)
*Parking lot (514 spaces/5 acres)	*Parking lot (350 spaces/3.5 acres)	*Parking structure (1,000 spaces/2-3 acres)	*Parking structure (1,000 spaces/2-3 acres)
		*Parking lot (350 spaces/3.5 acres)	*Parking lot (350 spaces/3.5 acres)
*Ferry landing (1,000 people)	*Ferry landing (920 people)	*Ferry landing (1,400 people)	*Ferry landing (1,400 people)

*New facility or condition

**New adaptive use of a historic structure

Capacity figures indicate number of people at one time

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CRISSY FIELD

A	B	C	D
Environmental education center (15 people)	**Environmental education facility (25 people)	**Educational facilities (80 people)	**Educational facilities (80 people)
Wayside exhibits	Wayside exhibits	Wayside exhibits	Wayside exhibits
	*Interpretive area (5-10 acres)	**Aviation museum (320 people/1 acre)	
Beach (7 acres)	*Natural appearing shoreline — beach/dunes/ marsh (30-35 acres)	Beach (7 acres)	*Beach (5 acres)
		*Beach comfort facility	*Beach comfort facility
Picnic area (2 acres)		*Picnic area (3-5 acres)	*Picnic area (5 acres)
		*Lawn (10-15 acres)	*Lawn (5-10 acres)
Use of runway for game courts (1 acre)			*Hard-surfaced sports area (3 acres)
			*Swimming lagoon (5 acres)
			*Children's play area (0.25 acre)
Other open space (29 acres)		*Other open space (10 acres)	*Other open space (10 acres)
		*Food service (25 people)	*Food service (25 people)
			*Recreation equipment rental

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A	B	C	D
*Waterfront promenade (1.25 miles/1.5 acres)	*Trail or boardwalk (2 miles/2 acres)	*Waterfront promenade/wind shelters, benches (1.25 miles/3 acres)	*Waterfront promenade (1.25 miles/3 acres)
			*Plaza along promenade
*Bike path (1.25 miles)	*Bike path (1.25 miles)	*Bike path (1.25 miles)	*Bike path (1.25 miles)
Parking lot (50 spaces/0.3 acre)	*Parking lot (150 spaces/2 acres)	*Parking lot (300 spaces/3 acres)	*Parking lot (300 spaces/3 acres)
*Pedestrian and equestrian connection with Presidio	*Pedestrian and equestrian connection with Presidio	*Pedestrian and equestrian connection with Presidio	*Pedestrian and equestrian connection with Presidio

*New facility or condition

**New adaptive use of a historic structure

Capacity figures indicate number of people at one time

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SAN FRANCISCO HEADLANDS

	A	C	D
General	Informal recreation space (38 acres)	*Informal recreation space (41 acres)	*Informal recreation space (41 acres)
	Other open space -- hillsides, cliffs, vegetated areas (195 acres)	Other open space (195 acres)	Other open space (195 acres)
	*Trails (3 miles)	*Trails (3-5 miles)	*Trails (3-5 miles)
	Parking (680 spaces/7 acres)	*Parking (865 spaces/9 acres)	*Parking (865 spaces/9 acres)
Baker Beach	*Wayside exhibits	*Wayside exhibits	*Wayside exhibits
		*Beach comfort facility	*Beach comfort facility
	Picnic area (5 acres)	Picnic area (5 acres)	Picnic area (5 acres)
			**Food service facility
Lands End	*Wayside exhibits	*Wayside exhibits	Wayside exhibits
		*Self-guiding trail (5 miles)	
Phelan Beach	Beach comfort facility		Beach comfort facility
West Fort Miley		**Interpretive facilities (200 people)	**Interpretive facilities (100 people)
		*Campfire circle/campground (200 people)	*Amphitheater (400 people)

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	A	C	D
West Fort Miley (cont.)	*Wayside exhibits *Picnic area (3 acres)	*Picnic area (3 acres)	*Wayside exhibits *Picnic area (3 acres) *Structured recreation space (includes game courts and jogging areas) (3-5 acres)
East Fort Miley			

*New facility or condition

**New adaptive use of a historic structure

Capacity figures indicate number of people at one time

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CLIFF HOUSE

A	B	C	D
*Wayside exhibits at Cliff House, Sutro Baths, and Sutro Heights	*Wayside exhibits at Cliff House, Sutro Baths, and Sutro Heights	*Wayside exhibits at Sutro Heights	*Wayside exhibits at Cliff House, Sutro Baths, and Sutro Heights
Cliff House complex (770 people): – Food and beverage service – Gift sales – Amusements	Cliff House complex (770 people): – Food and beverage service – Gift sales – Amusements	*1890s Cliff House (1,500 people): – Food and beverage service – Overnight accommodations	**Cliff House complex (850 people): – Food and beverage service – Gift sales – Amusements – Information kiosk – Wind shelter, viewing area, cafe – Bicycle rental
Informal recreation space (15.5 acres): – Sutro Heights Park (10.5 acres) – Sutro Baths ruins (5 acres)	Informal recreation space (15.5 acres): – Sutro Heights Park (10.5 acres) *– Restored ocean shoreline (5 acres)	*Informal recreation space at Sutro Heights (10.5 acres)	*Informal recreation space (20-25 acres): – Sutro Heights Park (10.5 acres) – Lawn, picnic area, plaza, viewing station at Sutro Baths ruins (10-15 acres)
Other open space (14.5 acres)	Other open space (14.5 acres)	Other open space (14.5 acres)	*Other open space (5-10 acres)
Parking at Merrie Way (100 spaces/1.4 acres)	*Parking at Merrie Way (50 spaces/0.7 acre)	*Parking in Merrie Way/Sutro area (250 spaces)	Parking at Merrie Way (100 spaces/1.4 acres)

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A	B	C	D
*Transportation juncture in Merrie Way area	*Transportation juncture in Merrie Way area	*Transportation juncture in Merrie Way area	*Transportation juncture in Merrie Way area
Parking at Sutro Heights (85 spaces/1.7 acres)	Parking at Sutro Heights (85 spaces/1.7 acres)	Parking at Sutro Heights (85 spaces/1.7 acres)	Parking at Sutro Heights (85 spaces/1.7 acres)
Parking outside park near Cliff House (146 spaces)			*Parking outside park near Cliff House (75 spaces)
Waterfront promenade (½ mile)	Waterfront promenade (½ mile)		*Improved waterfront promenade (½ mile)
		*Sutro Baths reconstruction (24,000 people)	
		*Sutro-era museum at Sutro Baths	
			*Pedestrian overpass from Cliff House to Sutro Heights

*New facility or condition

**New adaptive use of a historic structure

Capacity figures indicate number of people at one time

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OCEAN BEACH

A	B	C	D
*Wayside exhibits throughout the area	*Wayside exhibits throughout the area	*Wayside exhibits throughout the area	
Informal recreation space including beach, dunes (150 acres)	Informal recreation space including beach, dunes (150 acres)	*Informal recreation space including beach, dunes (137 acres)	*Informal recreation space including beach, dunes, plaza space along promenade, landscape connection to Golden Gate Park (132 acres)
Other open space (180 acres)	Other open space (180 acres)	Other open space (180 acres)	Other open space (180 acres)
Waterfront promenade (1 mile)	Waterfront promenade (1 mile)	*Improved waterfront promenade (1 mile)	*Improved waterfront promenade (1 mile)
	**Interpretive programs		
		*Beach comfort facilities at north Ocean Beach	*Beach comfort facilities at north Ocean Beach
		*Group picnic area at Funston (3 acres)	*Group picnic area at Funston (3 acres)
		*Group campground at Funston (50 people)	*Group campground at Funston (50 people)
		**Overnight education facilities at Funston (100 people)	
		*Bicycle path (1 mile)	*Bicycle path (1 mile)

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A	B	C	D
		*Pedestrian and bicycle overpasses to Golden Gate Park	
		*Information kiosk near zoo	*Information kiosk near zoo
Parking (265 spaces/2.6 acres)	Parking (265 spaces/2.6 acres)	*Parking (370 spaces/3.7 acres)	*Parking (520 spaces/5.2 acres), includes equestrian trailer parking

*New facility or condition

**New adaptive use of a historic structure

Capacity figures indicate number of people at one time

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MARIN HEADLANDS

	A	B	C	D
General	Hiking trails (33 miles)	*Hiking trails (37 miles)	*Hiking trails (37 miles)	*Hiking trails (37 miles)
	Riding trails (17 miles)	Riding trails (17 miles)	Riding trails (17 miles)	Riding trails (17 miles)
	Parking (1,480 total spaces)	Parking (1,480 total spaces)	Parking (1,480 total spaces)	Parking (1,480 total spaces)
	Campground (1)	Campgrounds (3)	Campgrounds (3)	Campgrounds (5)
			Picnic areas (2)	Picnic areas (6)
Conzelman Road	Hill 129 viewing area with *wayside exhibits	Hill 129 viewing area with *wayside exhibits	Hill 129 viewing area with *wayside exhibits	Hill 129 viewing area with *wayside exhibits
			*Food service (25 people)	*Food service (25 people)
				*Self-guiding trail along Headlands Ridge
Kirby Cove	Walk-in group campground (3 sites/120 people)	*Hike-in campground (15 sites/60 people)	Walk-in group campground (3 sites/120 people)	Walk-in group campground (3 sites/120 people)
Point Bonita			*Wayside exhibit at lighthouse	*Walk-in campground (20 sites/80 people)
East Fort Baker		**Information center (100 people)	**Visitor center (200 people)	**Information center (150-200 people)
			**Educational conference center (300 people)	
				**Hostel (30 people)

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	A	B	C	D
East Fort Baker (cont.)	Lawn area (5 acres)	Lawn area (5 acres)	*Lawn and picnic area/outdoor program space (5 acres)	*Lawn and picnic area/outdoor program space (5 acres)
	Fishing pier (40 people)	*Fishing pier with rest rooms, cleaning stations, etc. (40 people)	*Fishing pier with rest rooms, cleaning stations, etc. (40 people)	*Fishing pier with rest rooms, cleaning stations, etc. (40 people)
			*Bicycle rental	*Sports and fishing equipment rental
				Food service (25 people)
	Private boat mooring slips (65 boats)	*Public boat mooring slips (50-75 boats)	*Public boat mooring slips (50-75 boats)	*Public boat mooring and berthing slips (50-75 boats)
	*Ferry landing (600 people)	*Ferry landing (600 people)	*Ferry landing (600 people)	*Ferry landing (600 people)
Rodeo Valley	**Environmental education facility (50 people)	**Environmental education and research facilities (200 people)	**Environmental education facilities (100 people)	
	Lawn area at Fort Barry parade ground (5 acres)	*Walk-in group camp at Fort Barry parade ground (2 sites/80 people)	**Artists-in-residence program at Fort Barry parade ground (7 structures, 5 acres)	**Group retreat at Fort Barry parade ground (75 people) and lawn and picnic area (5 acres)
		*Road terminus and parking at abandoned housing area across from stables (650 cars)	*Picnic area at abandoned housing area across from stables (3 acres)	*Picnic area at abandoned housing area across from stables (3 acres)
	Private stables (25 horses)	*Public boarding and rental stables (50 horses)	*Public boarding and rental stables (50 horses)	
			*Riding courses at old rifle range site	*Remove private stables

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	A	B	C	D
Rodeo Valley (cont.)				*Auto campground at old Capehart housing site (60 sites/240 people)
Rodeo Lagoon/Lake/ Beach	Interpretive facility (15 people)	Interpretive facility (15 people)	Interpretive facility (15 people)	Interpretive facility (15 people)
				*Beach comfort facility
			**Hostel (30 people)	**Hostel (30 people)
			**Food service (25 people)	**Food service at beach (25 people)
				**Environmental education facilities (100-200 people)
	Access road		Access road	Access road
	Parking area		Parking area	*Lawn and picnic area at old parking site (8 acres)
				*Parking area at abandoned building site upslope from lagoon
		*Self-guiding trail	*Self-guiding trail	*Self-guiding trail
			*Boardwalk at Rodeo Lake	
				*Fish stocking in lake
				*Equipment rental

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	A	B	C	D
Rodeo Lagoon/Lake/ Beach (cont.)			*Wayside exhibit at Bird Island overlook	*Wayside exhibit at Bird Island overlook
Tennessee Valley	Private stables (80-100 horses)		*Children's farm at old stables site (50-75 people)	*New horse boarding and rental stables (80 horses)
				*Fish stocking in stock ponds
			*Hike-in campground (15 sites/60 people)	*Hike-in campground (15 sites/60 people)
				*Picnic area (3 acres)
Oakwood Valley				
Gerbode Preserve		*Primitive camping zone (10 sites/40 people)	*Hike-in campground (15 sites/60 people)	*Hike-in campground (15 sites/60 people)
		*Self-guiding trail		*Self-guiding trail
				*picnic area (3 acres)
Hill 88			*Wayside exhibit	

*New facility or condition

**New adaptive use of historic structure

Capacity figures indicate number of people at one time

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MOUNT TAMALPAIS

	A	B	C	D
General	Hiking trails (61 miles)	Hiking trails (less than 61 miles)	Hiking trails (61 miles)	Hiking trails (61 miles)
	Riding trails (17 miles)	Riding trails (17 miles)	Riding trails (17 miles)	Riding trails (17 miles)
Bolinas Ridge Area	Environmental education center at Audubon Canyon Ranch (50-60 people)	Environmental education center at Audubon Canyon Ranch (50-60 people)	Environmental education center at Audubon Canyon Ranch (50-60 people)	Environmental education center at Audubon Canyon Ranch (50-60 people)
			*Wayside exhibit at McKinnan Gulch at Route 1 with board-walk and overlook	
			*Wayside exhibits at pullouts along Shoreline Highway	
		*Hike-in campground at McKinnan Gulch Mine (15 sites)	*Hike-in campground at McKinnan Gulch Mine (15 sites)	*Hike-in campground at McKinnan Gulch Mine (15 sites)
			*Hike-in campground at Morse's Gulch (15 sites)	*Walk-in campground at Morse's Gulch (15 sites)
			*Hostel at McKinnan Gulch (30 people)	
			*Parking for picnicking and viewing along Ridgecrest Boulevard	*Parking for picnicking and viewing along Ridgecrest Boulevard
Mount Tamalpais Area	Walk-in campground at Pan Toll (18 sites)		*Picnic area at old campground site (2-3 acres)	*Picnic area at old campground site (2-3 acres)

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	A	B	C	D
Mount Tamalpais Area (cont.)	Alice Eastwood group campground (40 people)			Alice Eastwood group campground (40 people)
	Bootjack picnic area (3 acres)		Bootjack picnic area (3 acres)	Bootjack picnic area (3 acres)
	Mountain Theater for outdoor performances (5,000 people)	Mountain Theater for outdoor performances (5,000 people)	Mountain Theater for outdoor performances (5,000 people)	Mountain Theater for outdoor performances (5,000 people)
			*Wayside exhibits at East Peak	
	Parking (435 spaces)	Parking (435 spaces)	Parking (435 spaces)	Parking (435 spaces)
			*Parking for picnicking and viewing along Panoramic Highway	*Parking for picnicking and viewing along Panoramic Highway
	Ranger office at Pan Toll			
	Maintenance substation at Pan Toll			
Stinson Beach	Lawn and picnic area (5 acres)	Lawn and picnic area (5 acres)	Lawn and picnic area (5 acres)	Lawn and picnic area (5 acres)
	Beach comfort facility	Beach comfort facility	Beach comfort facility	Beach comfort facility
	Snack food service	Snack food service	Snack food service	Snack food service
				*Beach equipment rentals
	*Southern entrance to parking area	*Southern entrance to parking area	*Southern entrance to parking area	*Southern entrance to parking area

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OLEMA VALLEY

A	B	C	D
Hiking trails (30 miles)	Hiking trails (30 miles)	Hiking trails (30 miles)	Hiking trails (30 miles)
Riding trails (20 miles)	*Riding trails (25 miles)	*Riding trails (25 miles)	*Riding trails (25 miles)
*Parking at Five Brooks (75-100 spaces/1 acre)	*Parking at Five Brooks (75-100 spaces, to be expanded when needed)	*Parking at Five Brooks (75-100 spaces, to be expanded when needed)	*Parking at Five Brooks (75-100 spaces, to be expanded when needed)
Horse rental facility at Five Brooks (30 horses)	Horse rental facility at Five Brooks (30 horses)	Horse rental facility at Five Brooks (30 horses)	*Horse rental and boarding facility at Five Brooks (30 horses)
	**Hostel at north end of valley (30 people)		
	**Hostel at Five Brooks (30 people)	**Hostel at Five Brooks (30 people)	**Hostel at old Lupton Ranch (30 people)
		**Hostel at Rancho Bolinas (30 people)	**Hostel at Rancho Bolinas (30 people)
			**Hostel at Truttman Ranch (30 people)
	*Two walk-in campgrounds behind Truttman Ranch (20 sites each)	*Two walk-in campgrounds behind Truttman Ranch (20 sites each)	*Two walk-in campgrounds behind Truttman Ranch (20 sites each)
		*Walk-in campground at Five Brooks (20 sites)	*Walk-in campground at Five Brooks (20 sites)
		*Hike-in camp near Hagmaier Ranch (15 sites)	*Hike-in camp near Hagmaier Ranch (15 sites)

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A	B	C	D
	*Hike-in camp on Bolinas Ridge (15 sites)	*Hike-in camp on Bolinas Ridge (15 sites)	*Hike-in camp on Bolinas Ridge (15 sites)
			*Tent cabins south of Olema Cemetery (20 units)
			*Fish stocking in ponds near Hagmaier Ranch
			**Food service facility at Five Brooks (25-50 people)
	*Environmental education center at Rancho Bolinas (30-50 people)		
	*Information kiosk at Five Brooks	*Information kiosk at Five Brooks	*Information kiosk at Five Brooks
		*Information kiosk at Rancho Bolinas	*Information kiosk at Rancho Bolinas
		**Interpretive facility at restored historic structure (80 people)	
		*Wayside exhibits at roadside pullouts	

*New facility or condition

**New adaptive use of a historic structure

Capacity figures indicate number of people at one time.

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POINT REYES

	A	B	C	D
General	Hiking trails (100 miles)	Hiking trails (100 miles)	Hiking trails (100 miles)	Hiking trails (100 miles)
	Riding trails (46 miles)	Riding trails (46 miles)	Riding trails (46 miles)	Riding trails (46 miles)
	Parking (1,594 spaces)	Parking (1,594 spaces)	Parking (1,594 spaces)	Parking (1,594 spaces)
	Hostel (1-40 people)	Hostels (2-30 people each)	Hostels (2-30 people each)	Hostels (3-30 people each)
	Hike-in campgrounds (3-15 sites each)		*Hike-in campgrounds (4-15 sites each)	*Hike-in campgrounds (10-15 sites each)
	Group campground (1-120 people)	*Group campground (1-80 people)	*Group campgrounds (2-40 people each)	*Group campgrounds (2-40 people each)
		*Primitive camping zones (5-150 max. sites)	*Primitive camping zones (2-55 max. sites)	
North Point Reyes	Snack food service at Drakes Beach (20 people)	Snack food service at Drakes Beach (20 people)	Snack food service at Drakes Beach (20 people)	Snack food service at Drakes Beach (20 people)
	Food service at Johnson's Oyster Farm	Food service at Johnson's Oyster Farm	Food service at Johnson's Oyster Farm	Food service at Johnson's Oyster Farm
			*Food service at the fish docks (25 people)	*Food service at the fish docks (25 people)
	Beach comfort facility at Drakes Beach	Beach comfort facility at Drakes Beach	Beach comfort facility at Drakes Beach	Beach comfort facility at Drakes Beach
	Beach comfort facility at North Beach	Beach comfort facility at North Beach	Beach comfort facility at North Beach	Beach comfort facility at North Beach

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	A	B	C	D
North Point Reyes (cont.)	Beach comfort facility at South Beach	Beach comfort facility at South Beach	Beach comfort facility at South Beach	Beach comfort facility at South Beach
				*Beach comfort facility at Limantour
	Information center at Drakes Beach (10 people)	Information center at Drakes Beach (10 people)	Information center at Drakes Beach (10 people)	Information center at Drakes Beach (10 people)
		*Information kiosk at Ottinger Hill	*Information kiosk at Ottinger Hill	*Information kiosk at Ottinger Hill
			**Interpretive facility at the lighthouse (10-20 people)	**Interpretive facility at the lighthouse (10-20 people)
			**Interpretive facility at the lifesaving station (50 people)	
		**Living history ranch at Upper Pierce Point Ranch (100 people)		
		*Wayside exhibits at Limantour	*Wayside exhibits at Limantour	*Wayside exhibits at Limantour
		*Wayside exhibits at Tomales Point	*Wayside exhibits at Tomales Point	*Wayside exhibits at Tomales Point
		*Wayside exhibits at the lighthouse		

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A	B	C	D
North Point Reyes (cont.)	*Wayside exhibits at the lifesaving station	*Wayside exhibits at Upper Pierce Point Ranch	
		*Wayside exhibits at North Beach	*Wayside exhibits at North Beach
		*Wayside exhibits at Mount Vision	
		*Wayside exhibit at Point Reyes Headlands	*Wayside exhibit at Point Reyes Headlands
	**Hostel at undetermined location (30 people)	**Hostel at Upper Pierce Point Ranch (30 people)	**Hostel at Upper Pierce Point Ranch (30 people)
			**Hostel at lifesaving station (30 people)
			*Hike-in campground at Lairds Landing (15 sites)
			*Hike-in campground at Home Ranch Creek (15 sites)
			*Hike-in campground at Drakes Estero (15 sites)
			*Boat moorings (day-use) at fish docks (20 boats)

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	A	B	C	D
				*Canoe launching facility at Drakes Estero
		*Primitive camping zone – Tomales Bay (30 sites)	*Primitive camping zone – Tomales Bay (30 sites)	
		*Primitive camping zone – Mount Vision (25 sites)	*Primitive camping zone – Mount Vision (25 sites)	
South Point Reyes	Blacksmith shop at Bear Valley	Blacksmith shop at Bear Valley	Blacksmith shop at Bear Valley	Blacksmith shop at Bear Valley
	Environmental education camp (90 people)	Environmental education camp (90 people)	Environmental education camp (90 people)	Environmental education camp (90 people)
	Horse farm at Bear Valley	Horse farm at Bear Valley	Horse farm at Bear Valley	Horse farm at Bear Valley
	Coast Miwok village at Bear Valley	Coast Miwok village at Bear Valley	Coast Miwok village at Bear Valley	Coast Miwok Village at Bear Valley
	Information center at Bear Valley (15 people)	Information center at Bear Valley (15 people)	*Visitor center at Bear Valley (200 people)	Information center at Bear Valley (15 people)
	Self-guiding trails at Bear Valley (2 miles)	Self-guiding trails at Bear Valley (2 miles)	*Self-guiding trails and wayside exhibits at Bear Valley (5 miles)	*Self-guiding trails at Bear Valley (3 miles)
		*Wayside exhibits at Double Point	*Wayside exhibits at Double Point	*Wayside exhibits at Double Point

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	A	B	C	D
South Point Reyes (cont.)	Picnic area at Bear Valley (3 acres)	Picnic area at Bear Valley (3 acres)	Picnic area at Bear Valley (3 acres)	*Picnic area at Bear Valley (5 acres)
	Hostel at Laguna Ranch (40 people)	Hostel at Laguna Ranch (30 people)	Hostel at Laguna Ranch (30 people)	Hostel at Laguna Ranch (30 people)
	Group campground at Glen Camp (120 people)	Group campground at Glen Camp (80 people)	*Hike-in campground at Glen Camp (15 sites)	*Hike-in campground at Glen Camp (15 sites)
	Hike-in campground at Coast Camp (15 sites)		*Group campground at Coast Camp (40 people)	*Group campground at Coast Camp (40 people)
	Hike-in campground at Sky Camp (15 sites)		Hike-in campground at Sky Camp (15 sites)	Hike-in campground at Sky Camp (15 sites)
	Hike-in campground at Wildcat Camp (15 sites)		*Group campground at Wildcat Camp (40 people)	*Group campground at Wildcat Camp (40 people)
			*Hike-in campground at Fir-Top (15 sites)	*Hike-in campground at Fir-Top (15 sites)
				*Hike-in campground at Kelham Beach (15 sites)
				*Hike-in campground at Mud Lake (15 sites)
				*Hike-in campground at Lake Ranch (15 sites)

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A	B	C	D
South Point Reyes (cont.)			*Food service (camper store) at Bear Valley *Backpacking equipment and bicycle rental at Bear Valley
	*Primitive camping zone — Coast Trail (25 sites) *Primitive camping zone — Sky Trail (35 sites) *Primitive camping zone — Lake Ranch (35 sites)		

*New facility or condition

** New adaptive use of a historic structure

Capacity figures indicate number of people at one time

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APPENDIX C: APPLICABLE FEDERAL LAWS AFFECTING PLANNING

The general management plan must legally comply with a number of acts and executive orders. The following laws are applicable to planning at GGNRA/Point Reyes.

NATIONAL HISTORIC PRESERVATION ACT OF 1966 AND EXECUTIVE ORDER 11593

The Advisory Council on Historic Preservation has the opportunity to comment on all actions undertaken by federal agencies that might affect a property on the National Register of Historic Places. Agencies are also required to determine which historic resources are eligible for nomination to the national register so that the council can comment on undertakings that might affect them as well. Regulations for compliance with these laws have been adhered to.

PUBLIC LAW 95-341--THE AMERICAN INDIAN RELIGIOUS FREEDOM ACT OF 1979

This law requires NPS to identify any residual rights or trust obligations to Native American groups with traditional ties to the area. Future study will determine any uses of GGNRA and Point Reyes National Seashore by contemporary Native Americans.

ENDANGERED SPECIES ACT OF 1973

The National Park Service is required to consult with the U.S. Fish and Wildlife Service on projects that have the potential to affect endangered or threatened species. No action can be undertaken that would have an adverse impact on a listed species. The environmental analysis indicates potential conflicts between plan actions and listed species and their habitats. The National Park Service will initiate formal consultation with the U.S. Fish and Wildlife Service regional office in Portland concerning potential effects of the plan on threatened and endangered species and informal consultation with the Sacramento Area Office on listed or candidate species that could be affected by the plan.

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EXECUTIVE ORDER 11752--PREVENTION, CONTROL, AND ABATEMENT OF ENVIRONMENTAL POLLUTION AT FEDERAL FACILITIES

The National Park Service will comply with federal, state, interstate, and local standards and limitations relating to the quality of air, water, and land resources.

CONCESSIONS POLICY ACT OF 1965

The act establishes a contractual framework for encouraging and enabling private persons and corporations to provide and operate commercial facilities and services for the accommodation of visitors. Such development must be limited to that which is necessary and appropriate for public use and enjoyment of the national park in which it is located and consistent to the highest practicable degree with the preservation and conservation of the area.

SAFE DRINKING WATER ACT

The water quality of all drinking water sources must meet standards that have been established by the Environmental Protection Agency in response to this act. Water quality of new water supply systems proposed in the plan will meet the established standards.

COASTAL ZONE MANAGEMENT ACT OF 1972

Federal agencies conducting projects or activities affecting the coastal zone must carry them out in a manner consistent with the state's coastal zone management program. The California Coastal Zone Conservation Plan and the management policies found in the California Coastal Act of 1976 have been reviewed. This plan is consistent to the maximum extent practicable with California coastal zone management programs.

EXECUTIVE ORDER 11988--FLOODPLAIN MANAGEMENT

The National Park Service must act to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve natural values of floodplains. While new structures will not be constructed in any area subject to flooding, vsitor uses are planned for several existing historic structures subject to 100-year tsunami run-up. Use of these existing structures, even in the event of a tsunami, is not considered to be hazardous to visitors, will not affect structural integrity of the buildings, and will not decrease natural values. However, the decision to use these structures will be subject to review by the

following agencies: Environmental Protection Agency, Federal Insurance Administration, U.S. Fish and Wildlife Service, U.S. Geological Survey, Bureau of Reclamation, U.S. Army Corps of Engineers, and U.S. Soil Conservation Service.

CLEAN AIR ACT OF 1963 AND AMENDMENTS

The 1977 amendments to the Clean Air Act classified the entire country into three classes based upon the amount of allowable air quality deterioration that can take place. Under this classification, Point Reyes National Seashore was designated Class I, where almost no deterioration of air quality is allowable. Other areas in GGNRA are Class II, where allowable increment increases of pollutants are slightly larger. To assure that plan proposals will not detrimentally affect air quality, air quality analyses were completed and are reported in the environmental analysis.

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Public Law 92-589
92nd Congress, H. R. 16444
October 27, 1972

An Act

86 STAT. 1299

To establish the Golden Gate National Recreation Area in the State of California, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Golden Gate National Recreation Area, Calif.

ESTABLISHMENT

SECTION 1. In order to preserve for public use and enjoyment certain areas of Marin and San Francisco Counties, California, possessing outstanding natural, historic, scenic, and recreational values, and in order to provide for the maintenance of needed recreational open space necessary to urban environment and planning, the Golden Gate National Recreation Area (hereinafter referred to as the "recreation area") is hereby established. In the management of the recreation area, the Secretary of the Interior (hereinafter referred to as the "Secretary") shall utilize the resources in a manner which will provide for recreation and educational opportunities consistent with sound principles of land use planning and management. In carrying out the provisions of this Act, the Secretary shall preserve the recreation area, as far as possible, in its natural setting, and protect it from development and uses which would destroy the scenic beauty and natural character of the area.

COMPOSITION AND BOUNDARIES

SEC. 2. (a) The recreation area shall comprise the lands, waters, and submerged lands generally depicted on the map entitled "Boundary Map, Golden Gate National Recreation Area", numbered NRA-GG-80,003A, sheets 1 through 3, and dated July, 1972.

(b) The map referred to in this section shall be on file and available for public inspection in the Offices of the National Park Service, Department of the Interior, Washington, District of Columbia. After advising the Committees on Interior and Insular Affairs of the United States House of Representatives and the United States Senate (hereinafter referred to as the "committees") in writing, the Secretary may make minor revisions of the boundaries of the recreation area when necessary by publication of a revised drawing or other boundary description in the Federal Register.

Boundary revisions, notification of congressional committees. Publication in Federal Register.

ACQUISITION POLICY

SEC. 3. (a) Within the boundaries of the recreation area, the Secretary may acquire lands, improvements, waters, or interests therein, by donation, purchase, exchange or transfer. Any lands, or interests therein, owned by the State of California or any political subdivision thereof, may be acquired only by donation. When any tract of land is only partly within such boundaries, the Secretary may acquire all or any portion of the land outside of such boundaries in order to minimize the payment of severance costs. Land so acquired outside of the boundaries may be exchanged by the Secretary for non-Federal lands within the boundaries. Any portion of land acquired outside the boundaries and not utilized for exchange shall be reported to the General Services Administration for disposal under the Federal Property and Administrative Services Act of 1949 (63 Stat. 377), as amended: *Provided*, That no disposal shall be for less than fair market value. Except as hereinafter provided, Federal property within

Ante, p. 503.
40 USC 471 note.

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the boundaries of the recreation area is hereby transferred without consideration to the administrative jurisdiction of the Secretary for the purposes of this Act, subject to the continuation of such existing uses as may be agreed upon between the Secretary and the head of the agency formerly having jurisdiction over the property. Notwithstanding any other provision of law, the Secretary may develop and administer for the purposes of this Act structures or other improvements and facilities on lands for which he receives a permit of use and occupancy from the Secretary of the Army.

Facilities and improvements.

Forts Cronkhite, Barry, and Baker, transfer of jurisdiction.

(b) Fort Cronkhite, Fort Barry, and the westerly one-half of Fort Baker, in Marin County, California, as depicted on the map entitled "Golden Gate Military Properties" numbered NRAGG-20,002 and dated January 1972, which shall be on file and available for public inspection in the offices of the National Park Service, are hereby transferred to the jurisdiction of the Secretary for purposes of this Act, subject to continued use and occupancy by the Secretary of the Army of those lands needed for existing air defense missions, reserve activities and family housing, until he determines that such requirements no longer exist. The Coast Guard Radio Receiver Station, shall remain under the jurisdiction of the Secretary of the Department in which the Coast Guard is operating. When this station is determined to be excess to the needs of the Coast Guard, it shall be transferred to the jurisdiction of the Secretary for purposes of this Act.

Horseshoe Bay, access via Fort Baker.

(c) The easterly one-half of Fort Baker in Marin County, California, shall remain under the jurisdiction of the Department of the Army. When this property is determined by the Department of Defense to be excess to its needs, it shall be transferred to the jurisdiction of the Secretary for purposes of this Act. The Secretary of the Army shall grant to the Secretary reasonable public access through such property to Horseshoe Bay, together with the right to construct and maintain such public service facilities as are necessary for the purposes of this Act. The precise facilities and location thereof shall be determined between the Secretary and the Secretary of the Army.

Baker Beach, right of occupancy.

(d) Upon enactment, the Secretary of the Army shall grant to the Secretary the irrevocable use and occupancy of one hundred acres of the Baker Beach area of the Presidio of San Francisco, as depicted on the map referred to in subsection (b).

Crissy Army Airfield, right of occupancy.

(e) The Secretary of the Army shall grant to the Secretary within a reasonable time, the irrevocable use and occupancy of forty-five acres of the Crissy Army Airfield of the Presidio, as depicted on the map referred to in subsection (b).

Fort Point Coast Guard Station, continued-use permit.

(f) When all or any substantial portion of the remainder of the Presidio is determined by the Department of Defense to be excess to its needs, such lands shall be transferred to the jurisdiction of the Secretary for purposes of this Act. The Secretary shall grant a permit for continued use and occupancy for that portion of said Fort Point Coast Guard Station necessary for activities of the Coast Guard.

Point Bonita, Point Diablo, and Lime Point, transfer of jurisdiction.

Navigation aids, access.

(g) Point Bonita, Point Diablo, and Lime Point shall remain under the jurisdiction of the Secretary of the Department in which the Coast Guard is operating. When this property is determined to be excess to the needs of the Coast Guard, it shall be transferred to the jurisdiction of the Secretary for purposes of this Act. The Coast Guard may continue to maintain and operate existing navigational aids: *Provided*, That access to such navigational aids and the installation of necessary new navigational aids within the recreation area shall be undertaken in accordance with plans which are mutually acceptable to the Secretary and the Secretary of the Department in which the Coast Guard is operating and which are consistent with both the purposes of this Act and the purpose of existing

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statutes dealing with establishment, maintenance, and operation of navigational aids.

Fort Miley, transfer of jurisdiction.

(h) That portion of Fort Miley comprising approximately one and seven-tenths acres of land presently used and required by the Secretary of the Navy for its inshore, underseas warfare installations shall remain under the administrative jurisdiction of the Department of the Navy until such time as all or any portion thereof is determined by the Department of Defense to be excess to its needs, at which time such excess portion shall be transferred to the administrative jurisdiction of the Secretary for purposes of this Act.

New construction, limitation.

(i) New construction and development within the recreation area on property remaining under the administrative jurisdiction of the Department of the Army and not subject to the provisions of subsection (d) or (e) hereof shall be limited to that which is required to accommodate facilities being relocated from property being transferred under this Act to the administrative jurisdiction of the Secretary or which is directly related to the essential missions of the Sixth United States Army: *Provided, however*, That any construction on presently undeveloped open space may be undertaken only after prior consultation with the Secretary. The foregoing limitation on construction and development shall not apply to expansion of those facilities known as Letterman General Hospital or the Western Medical Institute of Research.

Exceptions.

Property owners, retention rights.

(j) The owner of improved property on the date of its acquisition by the Secretary under this Act may, as a condition of such acquisition, retain for himself and his heirs and assigns a right of use and occupancy of the improved property for noncommercial residential purposes for a definite term of not more than twenty-five years, or, in lieu thereof, for a term ending at the death of the owner or the death of his spouse, whichever is later. The owner shall elect the term to be reserved. Unless the property is wholly or partially donated to the United States, the Secretary shall pay to the owner the fair market value of the property on the date of acquisition minus the fair market value on that date of the right retained by the owner. A right retained pursuant to this section shall be subject to termination by the Secretary upon his determination that it is being exercised in a manner inconsistent with the purpose of this Act, and it shall terminate by operation of law upon the Secretary's notifying the holder of the right of such determination and tendering to him an amount equal to the fair market value of that portion of the right which remains unexpired.

"Improved property."

(k) The term "improved property", as used in subsection (j), means a detached, noncommercial residential dwelling, the construction of which was begun before June 1, 1971, together with so much of the land on which the dwelling is situated, the said land being in the same ownership as the dwelling, as the Secretary shall designate to be reasonably necessary for the enjoyment of the dwelling for the sole purpose of noncommercial residential use, together with any structures accessory to the dwelling which are situated on the land so designated.

42 USC 4623-4626.

(l) Whenever an owner of property elects to retain a right of use and occupancy as provided for in the Act, such owner shall be deemed to have waived any benefits or rights accruing under sections 203, 204, 205, and 206 of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (84 Stat. 1894), and for the purposes of those sections such owner shall not be considered a displaced person as defined in section 101(6) of that Act.

42 USC 4601. Contract authority.

(m) Notwithstanding any other provision of law, the Secretary shall have the same authority with respect to contracts for the acquisition of land and interests in land for the purposes of this Act as was

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given the Secretary of the Treasury for other land acquisitions by section 34 of the Act of May 30, 1908, relating to purchase of sites for public buildings (35 Stat. 545), and the Secretary and the owner of land to be acquired under this Act may agree that the purchase price will be paid in periodic installments over a period that does not exceed ten years, with interest on the unpaid balance thereof at a rate which is not in excess of the current average market yield on outstanding marketable obligations of the United States with remaining periods to maturity comparable to the average maturities on the installments. Judgments against the United States for amounts in excess of the deposit in court made in condemnation actions shall be subject to the provisions of the Act of July 27, 1956 (70 Stat. 624) and sections 2414 and 2517 of title 28, United States Code.

40 USC 261. Installment payments; interest rate.

70 Stat. 694; 84 Stat. 782. 31 USC 724a. 75 Stat. 415; 62 Stat. 979.

ADMINISTRATION

SEC. 4. (a) The Secretary shall administer the lands, waters and interests therein acquired for the recreation area in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1, 2–4), as amended and supplemented, and the Secretary may utilize such statutory authority available to him for the conservation and management of wildlife and natural resources as he deems appropriate to carry out the purposes of this Act. Notwithstanding their inclusion within the boundaries of the recreation area, the Muir Woods National Monument and Fort Point National Historic Site shall continue to be administered as distinct and identifiable units of the national park system in accordance with the laws applicable to such monument and historic site.

Police and fire protection, cooperative agreements.

(b) The Secretary may enter into cooperative agreements with any Federal agency, the State of California, or any political subdivision thereof, for the rendering, on a reimbursable basis, of rescue, firefighting, and law enforcement and fire preventive assistance.

Water resource developments.

(c) The authority of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary and the Secretary of the Army and which are consistent with both the purpose of this Act and the purpose of existing statutes dealing with water and related resource development.

Transportation system, study.

(d) The Secretary, in cooperation with the State of California and affected political subdivisions thereof, local and regional transit agencies, and the Secretaries of Transportation and of the Army, shall make a study for a coordinated public and private transportation system to and within the recreation area and other units of the national park system in Marin and San Francisco Counties.

ADVISORY COMMISSION

Establishment; membership.

SEC. 5. (a) There is hereby established the Golden Gate National Recreation Area Advisory Commission (hereinafter referred to as the "Commission").

(b) The Commission shall be composed of fifteen members appointed by the Secretary for terms of three years each.

(c) Any vacancy in the Commission shall be filled in the same manner in which the original appointment was made.

(d) Members of the Commission shall serve without compensation, as such, but the Secretary may pay, upon vouchers signed by the Chairman, the expenses reasonably incurred by the Commission and its members in carrying out their responsibilities under this Act.

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(e) The Secretary, or his designee, shall from time to time, but at least annually, meet and consult with the Commission on general policies and specific matters related to planning, administration and development affecting the recreation area and other units of the national park system in Marin and San Francisco Counties.

(f) The Commission shall act and advise by affirmative vote of a majority of the members thereof.

(g) The Commission shall cease to exist ten years after the enactment of this Act. Termination date.

APPROPRIATION LIMITATION

SEC. 6. There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act, but not more than $61,610,000 shall be appropriated for the acquisition of lands and interests in lands. There are authorized to be appropriated not more than $58,000,000 (May 1971 prices) for the development of the recreation area, plus or minus such amounts, if any, as may be justified by reason of ordinary fluctuations in construction costs as indicated by engineering cost indices applicable to the type of construction involved herein.

Approved October 27, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-1391 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 92-1271 accompanying S. 3174 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 118 (1972):
Oct. 11, considered and passed House.
Oct. 12, considered and passed Senate, in lieu of S. 3174.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 8, No. 44:
Oct. 28, Presidential statement.

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of 1978, the Secretary of the Interior is authorized to acquire for purposes of the recreation area established under this Act all lands and interests therein within the exterior boundaries of the area depicted on the drawing referred to in this subsection (including any lands within such exterior boundaries designated for acquisition by the Secretary of the Army in connection with the project referred to in this subsection). In exercising such authority, the Secretary of the Interior may permit the retention of rights of use and occupancy in the same manner as provided in the case of acquisitions by the Secretary of the Army under subsection (d). On the date of enactment of the National Parks and Recreation Act of 1978, the acquisition authorities of any other Federal agency contained in this subsection shall terminate and the head of any other Federal agency shall transfer to the Secretary of the Interior jurisdiction over all lands and interests therein acquired by said agency under the authority of this Act, or any other authority of law which lands are within the exterior boundaries of the area depicted on the drawing referred to in this subsection. On the date of enactment of the National Parks and Recreation Act of 1978, all unexpended balances available to any other Federal agency for acquisition of land within the exterior boundaries referred to in the preceding sentence shall be transferred to the Secretary of the Interior to be used for such purposes. In carrying out his acquisition authority under this section the Secretary shall give priority to the following:

Use and occupancy rights, retention.

Authority, termination and transfer.

Funds, transfer.

Acquisition priorities.

"(1) completion of acquisition of lands for which condemnation proceedings have been started pursuant to the authorization of the project referred to in this subsection;

"(2) acquisition of lands of beneficial owners, not being a corporation, who in the judgment of the Secretary would suffer hardship if acquisition of their lands were delayed;

"(3) acquisition of lands on which, in the judgment of the Secretary, there is an imminent danger of development that would be incompatible with the purposes of the recreation area;

"(4) acquisition of lands of beneficial owners, not being a corportion, who are willing to sell their lands provided they are able to continue to use it for noncommercial residential purposes for a limited period of time which will not, in the judgment of the Secretary, unduly interfere with the development of public use facilities for such national recreation area, pursuant to the authorization for such area;

"(5) acquisition of scenic easements when, in the judgment of the Secretary, such easements are sufficient to carry out the purposes for which such national recreation area was authorized; and

"(6) acquisition of lands necessary to preserve the integrity of the recreation area.".

GOLDEN GATE NATIONAL RECREATION AREA

Composition and boundaries. 16 USC 460bb-1.

SEC. 317. (a) Subsection 2(a) of the Act of October 27, 1972 (86 Stat. 1299), as amended (16 U.S.C. 459), is further amended to read as follows: "(a) The recreation area shall comprise the lands, waters, and submerged lands generally depicted on the map entitled: 'Revised Boundary Map, Golden Gate National Recreation Area', numbered NRA-GG-80,003-K and dated October 1978. The authority of the Secretary to acquire lands in the tract known as San Francisco Assessor's Block number 1592 shall be limited to an area of not more

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than one and nine-tenths acres. Notwithstanding any other provision of this Act, the Secretary shall not acquire the Marin County Assessor's parcels numbered 199-181-01, 199-181-06, 199-181-08, 199-181-13, and 199-181-14, located in the Muir Beach portion of the recreation area.".

(b) Section 3(i) of such Act is amended to read as follows:

New construction, limitation. 16 USC 460bb-2. *Ante*, p. 3484.

"(i) New construction and development within the boundaries described in section 2(a) on lands under the administrative jurisdiction of a department other than that of the Secretary is prohibited, except that improvements on lands which have not been transferred to his administrative jurisdiction may be reconstructed or demolished. Any such structure which is demolished may be replaced with an improvement of similar size, following consultation with the Secretary or his designated representative, who shall conduct a public hearing at a location in the general vicinity of the area, notice of which shall be given at least one week prior to the date thereof. The foregoing limitation on construction and development shall not apply to expansion of those facilities known as Letterman General Hospital or the Western Medical Institute of Research.".

Notice and public hearing.

Exception.

(c) Subsection 3(j) of such Act is amended to read as follows:

Use and occupancy right, retention.

"(j) The owner of improved residential property or of agricultural property on the date of its acquisition by the Secretary under this Act may, as a condition of such acquisition, retain for himself and his or her heirs and assigns a right of use and occupancy for a definite term of not more than twenty-five years, or, in lieu thereof, for a term ending at the death of the owner or the death of his or her spouse, whichever is later. The owner shall elect the term to be reserved. Unless the property is wholly or partly donated to the United States, the Secretary shall pay to the owner the fair market value of the property on the date of acquisition minus the fair market value on that date of the right retained by the owner. A right retained pursuant to this section shall be subject to termination by the Secretary upon his or her determination that it is being exercised in a manner inconsistent with the purposes of this Act, and it shall terminate by operation of law upon the Secretary's notifying the holder of the right of such determination and tendering to him or her an amount equal to the fair market value of that portion of the right which remains unexpired. Where appropriate in the discretion of the Secretary, he or she may lease federally owned land (or any interest therein) which has been acquired by the Secretary under this Act, and which was agricultural land prior to its acquisition. Such lease shall be subject to such restrictive covenants as may be necessary to carry out the purposes of this Act. Any land to be leased by the Secretary under this section shall be offered first for such lease to the person who owned such land or who was a leaseholder thereon immediately before its acquisition by the United States.".

Payment.

Termination and notification.

Federally-owned land, lease.

(d) In subsection 3(k) of such Act, following "June 1, 1971." insert "or, in the case of areas added by action of the Ninety-fifth Congress, October 1, 1978.": and at the end of the subsection, add the following new sentence: "The term 'agricultural property' as used in this Act means lands which are in regular use for agricultural, ranching, or dairying purposes as of January 1, 1978, together with residential and other structures related to the above uses of the property as such structures exist on said date."

"Agricultural property."

(e) Section 3 of such Act is amended by adding the following at the end thereof:

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Management.

"(n) The Secretary shall accept and shall manage in accordance with this Act, any land and improvements adjacent to the recreation area which are donated by the State of California or its political subdivisions. The boundaries of the recreation area shall be changed to include such donated lands.

Payment deferral, scheduling, and interest rate.

"(o) In acquiring those lands authorized by the Ninety-fifth Congress for the purposes of this Act, the Secretary may, when agreed upon by the landowner involved, defer payment or schedule payments over a period of ten years and pay interest on the unpaid balance at a rate not exceeding that paid by the Treasury of the United States for borrowing purposes.".

Administration. 16 USC 460bb-3. Fees or admission charges.

(f) Section 4 of such Act is amended by adding the following at the end thereof:

"(e) No fees or admission charges shall be levied for admission of the general public to the recreation area except to portions under lease or permit for a particular and limited purpose authorized by the Secretary. The Secretary may authorize reasonable charges for public transportation and, for a period not exceeding five years from the date of enactment of this legislation, for admission to the sailing vessel Balclutha.

Certain rental proceeds, crediting.

"(f) Notwithstanding any other provisions of law, in the administration of those parcels of property known as Haslett Warehouse, Cliff House Properties and Louis' Restaurant, the Secretary shall credit any proceeds from the rental of space in the aforementioned properties to the appropriation, if any, bearing the cost of their administration, maintenance, repair and related expenses and also for the maintenance, repair and related expenses of the vessels and the adjacent piers comprising the National Maritime Museum, for major renovation and park rehabilitation of those buildings included in the Fort Mason Foundation Cooperative Agreement, and for a coordinated public and private access system to and within the recreation area and other units of the national park system in Marin and San Francisco Counties: *Provided*, That surplus funds, if any, will be deposited into the Treasury of the United States: *Provided further*, That notwithstanding any other provision of law, in the administration of said parcels the Secretary may, if he deems appropriate, enter into a contract for the management of said parcels of property with such terms and conditions as will protect the Government's interest, with excess funds being used as set forth above.".

Management contract.

16 USC 460bb-4.

(g) Section 5(b) of such Act is amended by changing the word "fifteen" to "seventeen".

POINT REYES NATIONAL SEASHORE

Area description. 16 USC 459c-1.

SEC. 318. (a) Section 2(a) of the Act of September 13, 1962 (76 Stat. 538) as amended (16 U.S.C. 459) is further amended as follows:

"SEC. 2. (a) The Point Reyes National Seashore shall consist of the lands, waters, and submerged lands generally depicted on the map entitled 'Boundary Map. Point Reyes National Seashore', numbered 612-80,008-E and dated May 1978.

Map, availability.

"The map referred to in this section shall be on file and available for public inspection in the Offices of the National Park Service, Department of the Interior. Washington. District of Columbia. After advising the Committee on Interior and Insular Affairs of the United States House of Representatives and the Committee on Energy and

Public Law 87-657
87th Congress, S. 476
September 13, 1962

An Act

76 STAT. 538.

To establish the Point Reyes National Seashore in the State of California, and for other purposes.

California.
Point Reyes National Seashore.
Establishment.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to save and preserve, for purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped, the Secretary of the Interior (hereinafter referred to as the "Secretary") is hereby authorized to take appropriate action in the public interest toward the establishment of the national seashore set forth in section 2 of this Act.

SEC. 2. (a) The area comprising that portion of the land and waters located on Point Reyes Peninsula, Marin County, California, which shall be known as the Point Reyes National Seashore, is described as follows by reference to that certain boundary map, designated NS-PR-7001, dated June 1, 1960, on file with the Director, National Park Service, Washington, District of Columbia.

Beginning at a point, not monumented, where the boundary line common to Rancho Punta de los Reyes (Sobrante) and Rancho Las Baulines meets the average high tide line of the Pacific Ocean as shown on said boundary map;

Thence southwesterly from said point 1,320 feet offshore on a prolongation of said boundary line common to Rancho Punta de los Reyes (Sobrante) and Rancho Las Baulines;

Thence in a northerly and westerly direction paralleling the average high tide line of the shore of the Pacific Ocean; along Drakes Bay, and around Point Reyes;

Thence generally northerly and around Tomales Point, offshore a distance of 1,320 feet from average high tide line;

Thence southeasterly along a line 1,320 feet offshore and parallel to the average high tide line along the west shore of Bodega Bay and Tomales Bay to the intersection of this line with a prolongation of the most northerly tangent of the boundary of Tomales Bay State Park;

Thence south 54 degrees 32 minutes west 1,320 feet along the prolongation of said tangent of Tomales Bay State Park boundary to the average high tide line on the shore of Tomales Bay;

Thence following the boundary of Tomales Bay State Park in a southerly direction to a point lying 105.4 feet north 41 degrees east of an unimproved road heading westerly and northerly from Pierce Point Road;

Thence south 41 degrees west 105.4 feet to a point on the north right-of-way of said unimproved road;

Thence southeasterly along the north right-of-way of said unimproved road and Pierce Point Road to a point at the southwest corner of Tomales Bay State Park at the junction of the Pierce Point Road and Sir Francis Drake Boulevard;

Thence due south to a point on the south right-of-way of said Sir Francis Drake Boulevard;

Thence southeasterly along said south right-of-way approximately 3,100 feet to a point;

Thence approximately south 19 degrees west approximately 300 feet;

Thence south approximately 400 feet;

Thence southwest to the most northerly corner of the Inverness watershed area;

Thence southerly and easterly along the west property line of the Inverness watershed area approximately 9,040 feet to a point near the

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intersection of this property line with an unimproved road as shown on said boundary map;

Thence southerly along existing property lines that roughly follow said unimproved road to its intersection with Drakes Summit Road and to a point on the north right-of-way of Drakes Summit Road;

Thence easterly approximately 1,000 feet along the north right-of-way of said Drakes Summit Road to a point which is a property line corner at the intersection with an unimproved road to the south;

Thence southerly and easterly and then northerly, as shown approximately on said boundary map, along existing property lines to a point on the south right-of-way of the Bear Valley Road, approximately 1,500 feet southeast of its intersection with Sir Francis Drake Boulevard;

Thence easterly and southerly along said south right-of-way of Bear Valley Road to a point on a property line approximately 1,000 feet west of the intersection of Bear Valley Road and Sir Francis Drake Boulevard in the village of Olema;

Thence south approximately 1,700 feet to the northwest corner of property now owned by Helen U. and Mary S. Shafter;

Thence southwest and southeast along the west boundary of said Shafter property to the southwest corner of said Shafter property;

Thence approximately south 30 degrees east on a course approximately 1,700 feet to a point;

Thence approximately south 10 degrees east on a course to the centerline of Olema Creek;

Thence generally southeasterly up the centerline of Olema Creek to a point on the west right-of-way line of State Route Numbered 1;

Thence southeasterly along westerly right-of-way line to State Highway Numbered 1 to a point where a prolongation of the boundary line common to Rancho Punta de los Reyes (Sobrante) and Rancho Las Baulines would intersect right-of-way line of State Highway Numbered 1;

Thence southwesterly to and along said south boundary line of Rancho Punta de los Reyes (Sobrante) approximately 2,900 feet to a property corner;

Thence approximately south 38 degrees east approximately 1,500 feet to the centerline of Pine Gulch Creek;

Thence down the centerline of Pine Gulch Creek approximately 400 feet to the intersection with a side creek flowing from the west;

Thence up said side creek to its intersection with said south boundary line of Rancho Punta de los Reyes (Sobrante);

Thence southwest along said south boundary line of Rancho Punta de los Reyes to the point of beginning, containing approximately 53,000 acres. Notwithstanding the foregoing description, the Secretary is authorized to include within the Point Reyes National Seashore the entire tract of land owned by the Vedanta Society of Northern California west of the centerline of Olema Creek, in order to avoid a severance of said tract.

(b) The area referred to in subsection (a) shall include also a right-of-way, to be selected by the Secretary, of not more than 400 feet in width to the aforesaid tract from the intersection of Sir Francis Drake Boulevard and Haggerty Gulch.

SEC. 3. (a) Except as provided in section 4, the Secretary is authorized to acquire, and it is the intent of Congress that he shall acquire as rapidly as appropriated funds become available for this purpose or as such acquisition can be accomplished by donation or with donated funds or by transfer, exchange, or otherwise the lands, waters, and other property, and improvements thereon and any interest therein, within the areas described in section 2 of this Act or which lie within

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the boundaries of the seashore as established under section 5 of this Act (hereinafter referred to as "such area"). Any property, or interest therein, owned by a State or political subdivision thereof may be acquired only with the concurrence of such owner. Notwithstanding any other provision of law, any Federal property located within such area may, with the concurrence of the agency having custody thereof, be transferred without consideration to the administrative jurisdiction of the Secretary for use by him in carrying out the provisions of this Act. In exercising his authority to acquire property in accordance with the provisions of this subsection, the Secretary may enter into contracts requiring the expenditure, when appropriated, of funds authorized by section 8 of this Act, but the liability of the United States under any such contract shall be contingent on the appropriation of funds sufficient to fulfill the obligations thereby incurred.

(b) The Secretary is authorized to pay for any acquisitions which he makes by purchase under this Act their fair market value, as determined by the Secretary, who may in his discretion base his determination on an independent appraisal obtained by him.

(c) In exercising his authority to acquire property by exchange, the Secretary may accept title to any non-Federal property located within such area and convey to the grantor of such property any federally owned property under the jurisdiction of the Secretary within California and adjacent States, notwithstanding any other provision of law. The properties so exchanged shall be approximately equal in fair market value, provided that the Secretary may accept cash from or pay cash to the grantor in such an exchange in order to equalize the values of the properties exchanged.

SEC. 4. No parcel of more than five hundred acres within the zone of approximately twenty-six thousand acres depicted on map numbered NS–PR–7002, dated August 15, 1961, on file with the director, National Park Service, Washington, District of Columbia, exclusive of that land required to provide access for purposes of the national seashore, shall be acquired without the consent of the owner so long as it remains in its natural state, or is used exclusively for ranching and dairying purposes including housing directly incident thereto. The term "ranching and dairying purposes", as used herein, means such ranching and dairying, primarily for the production of food, as is presently practiced in the area. "Ranching and dairying purposes."

In acquiring access roads within the pastoral zone, the Secretary shall give due consideration to existing ranching and dairying uses and shall not unnecessarily interfere with or damage such use.

SEC. 5. (a) As soon as practicable after the date of enactment of this Act and following the acquisition by the Secretary of an acreage in the area described in section 2 of this Act, that is in the opinion of the Secretary efficiently administrable to carry out the purposes of this Act, the Secretary shall establish Point Reyes National Seashore by the publication of notice thereof in the Federal Register. Publication in F. R.

(b) Such notice referred to in subsection (a) of this section shall contain a detailed description of the boundaries of the seashore which shall encompass an area as nearly as practicable identical to the area described in section 2 of this Act. The Secretary shall forthwith after the date of publication of such notice in the Federal Register (1) send a copy of such notice, together with a map showing such boundaries, by registered or certified mail to the Governor of the State and to the governing body of each of the political subdivisions involved; (2) cause a copy of such notice and map to be published in one or more newspapers which circulate in each of the localities; and (3) cause a certified copy of such notice, a copy of such map, and a copy of this Act to be recorded at the registry of deeds for the county involved. Notification of Governor, etc.

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76 STAT. 541.

SEC. 6. (a) Any owner or owners (hereinafter in this subsection referred to as "owner") of improved property on the date of its acquisition by the Secretary may, as a condition to such acquisition, retain the right of use and occupancy of the improved property for noncommercial residential purposes for a term of fifty years. The Secretary shall pay to the owner the fair market value of the property on the date of such acquisition less the fair market value on such date of the right retained by the owner.

"Improved property."

(b) As used in this Act, the term "improved property" shall mean a private noncommercial dwelling, including the land on which it is situated, whose construction was begun before September 1, 1959, and structures accessory thereto (hereinafter in this subsection referred to as "dwelling"), together with such amount and locus of the property adjoining and in the same ownership as such dwelling as the Secretary designates to be reasonably necessary for the enjoyment of such dwelling for the sole purpose of noncommercial residential use and occupancy. In making such designation the Secretary shall take into account the manner of noncommercial residential use and occupancy in which the dwelling and such adjoining property has usually been enjoyed by its owner or occupant.

SEC. 7. (a) Except as otherwise provided in this Act, the property acquired by the Secretary under this Act shall be administered by the Secretary, subject to the provisions of the Act entitled "An Act to establish a National Park Service, and for other purposes", approved August 25, 1916 (39 Stat. 535), as amended and supplemented, and in accordance with other laws of general application relating to the national park system as defined by the Act of August 8, 1953 (67 Stat. 496), except that authority otherwise available to the Secretary for the conservation and management of natural resources may be utilized to the extent he finds such authority will further the purposes of this Act.

16 USC 1.

16 USC 1a.

(b) The Secretary may permit hunting and fishing on lands and waters under his jurisdiction within the seashore in such areas and under such regulations as he may prescribe during open seasons prescribed by applicable local, State, and Federal law. The Secretary shall consult with officials of the State of California and any political subdivision thereof who have jurisdiction of hunting and fishing prior to the issuance of any such regulations, and the Secretary is authorized to enter into cooperative agreements with such officials regarding such hunting and fishing as he may deem desirable.

Appropriation.

SEC. 8. There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act, except that no more than $14,000,000 shall be appropriated for the acquisition of land and waters and improvements thereon, and interests therein, and incidental costs relating thereto, in accordance with the provisions of this Act.

Approved September 13, 1962.

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APPENDIX D: RARE, THREATENED, OR ENDANGERED PLANTS AND ANIMALS OF GGNRA AND POINT REYES NATIONAL SEASHORE

Table D-1: Candidate Plants Within the Area of GGNRA and Point Reyes National Seashore

Scientific Name	Common Name
GGNRA	
Arabis biepharophylla	Coast rockcress
Arctostaphylos hookeri ssp. franciscana	*Laural Hill manzanita
Arctostaphylos hookeri ssp. montana	Mt. Tamalpais manzanita
Arctostaphylos hookeri ssp. ravenii	Raven's manzanita (listed as endangered 10/26/79)
Arctostaphylos virgata	Bolinas manzanita
Ceanothus masonii	*Mason's California lilac
Cicuta bolandari	Suisun water hemlock
Cirsium hydrophilum var. vaseyi	Mt. Tamalpais thistle
Clarkia franciscana	*Presidio clarkia
Dichondra donnelliana	Coast dichondra
Eriogonum caninum	*Tiburon buckwheat
Erysimum franciscanum var. franciscanum	*San Francisco wallflower
Gutierrezia californica	San Joaquin matchweed
Hesperolinon congestum	*Marin dwarf flax
Hystrix californica	California bottlebrush grass
Microseris decipiens	*Santa Cruz microseris
Orthocarpus floribundus	San Francisco owlclover
Pityopus californicus	Pityopus
Plagiobothrys diffusus	San Francisco popcorn-flower
Pleuropogon hooverianus	*Hoover's semaphore grass
Sidalcea hickmanii ssp. viridus	Marin mallow
Streptanthus batrachopus	Tamalpais jewelflower
Streptanthus glandulosus var. pulchellus	Marin jewelflower
Tanacetum camphoratum	Dune tansy
Trifolium amoenum	*Two-fork clover

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Scientific Name	Common Name
Point Reyes	
Agrostis aristiglumis	Awned bent-grass
Agrostis blasdalei var. marinensis	*Marin bent-grass
Alopecurus aequalis var. sonomensis	Sonoma foxtail
Arabis biepharophylla	Coast rockcress
Arctostaphylos pacifica	*Pacific manzanita
Arctostaphylos virgata	Bolinas manzanita
Blennosperma nanum var. robustum	*Point Reyes blennosperma
Campanula californica	*Swamp harebell
Castilleja leschkeana	*Point Reyes Indian paintbrush
Ceanothus gloriosus var. porrectus	Mount Vision ceanothus
Chorizanthe valida	*Sonoma spineflower
Cicuta bolandari	Suisun water hemlock
Cordylanthus maritimus ssp. palustris	Point Reyes bird's-beak
Delphinium bakeri	*Baker's larkspur
Hystrix californica	California bottlebrush grass
Limnanthes douglasii var. sulphurea	Yellow meadowfoam
Orthocarpus floribundus	San Francisco owlclover
Polygonum marinense	Marin knotweed
Rhynchospora californica	*California beaked-rush
Tanacetum camphoratum	Dune tansy
Trifolium amoenum	*Two-fork clover

*Formerly proposed for endangered status.

Table D-2: List of Endangered, Threatened, and Candidate Wildlife Species Within GGNRA and Point Reyes National Seashore

Scientific Name	Common Name	Status
GGNRA		
Falco peregrinus anatum	American peregrine falcon	E
Grapholitha edwardsiana	San Francisco true lupine moth	PT
Laterallus jamaicensis coturnilus	California black rail	C
Pelecanus occidentalis californicus	California brown pelican	E
Rallus longirostris obsoletus	California clapper rail	E
Syncaris pacifica	California freshwater shrimp	C**
Point Reyes		
Coclus globosus	Globose dune beetle	PT
Falco peregrinus anatum	American peregrine falcon	E
Helminthoglypta arrosa miwoka	Dented peninsula snail	C*
Helminthoglypta nickliniana awania	Nicklin's peninsula snail	C**
Laterallus jamaicensis coturnilus	California black rail	C
Pelecanus occidentalis californicus	California brown pelican	E
Rallus longirostris obsoletus	California clapper rail	E

E = Endangered
PT = Proposed Threatened
C = Candidate

* Formerly proposed for endangered status
** Formerly proposed for threatened status

United States Department of the Interior
NATIONAL PARK SERVICE
DENVER SERVICE CENTER
755 Parfet Street
P.O. Box 25287
Denver, Colorado 80225

IN REPLY REFER TO:
N3615-DSC-SPE

8 NOV 1979

Memorandum

To: Assistant Manager, Pacific Northwest/Western Team, DSC
Attention: Nancy Fries

From: Chief, Environmental Investigations Unit, DSC

Subject: Calculated concentrations of exhaust emission in the vicinity of the Limontour Road, Point Reyes, GGNRA

The Environmental Investigations Unit, Special Programs Division, DSC, was asked to provide an assessment of the air quality impact from vehicular emissions to be expected as a result of traffic increases in GGNRA; such assessment to be used in developing the area's general management plan. It was decided in discussions between Nancy Fries (TWE) and Wayne Hamilton (SPE) that a "worst case" analysis be undertaken. Depending upon the outcome (calculated concentrations in relation to applicable air quality standards) it could then be decided whether or not other cases should be examined as well. This "worst case" analysis, prepared by Dr. Wayne Hamilton, is presented as follows:

METHOD: Limontour Road in Point Reyes National Seashore was selected for analysis because it passes through a corridor (600 feet wide) separating mandatory Class I wilderness areas. Such areas are now protected against significant deterioration of air quality by the Clean Air Act Amendments.

A half-mile, twisting segment of the road which climbs a 19 percent grade, where traffic conforms closely to the posted 15 mph speed limit, was selected for analysis according to line-source gaussian plume modeling theory. The basic equation is:

$$\bar{C} = \frac{2q}{\sqrt{2\pi}\, u\, \sigma_z\, (x)}\, e^{-\frac{h^2}{2\sigma_z^2}} \qquad (1)$$

where:

$\bar{C}$ = acreage concentration at distance x ($\mu g\ m^{-3}$)

q = emission rate ($\mu g\ m^{-1} sec^{-1}$)

$\bar{u}$ = wind velocity ($m\ sec^{-1}$)

σ_z = vertical dispersion parameter (m)

x = horizontal distance from highway to receptor (m)

z = height of receptor above surrounding terrain (m)

h = height of highway above surrounding terrain (m)

Equation (1) applies to the case where wind direction is perpendicular to the highway. Other things being equal, the calculated concentrations for a case where winds blow at approximately 45 degrees to the road centerline will be approximately one half those for a perpendicular wind situation. This applies to the case under investigation.

Emission rate, q, is a function of traffic volume (V_t, veh hr^{-1}) and the average emission factor ($\bar{E}$, g veh $^{-1}$mi $^{-1}$),

$$q = 1.726 \times 10^{-1} \bar{E}\ V_t \qquad (2)$$

The constant is for conversion to metric units.

Emission factors for carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO_x), particulates (TSP), and sulfur oxides (SO_x) have been derived from Table D.71 in EPA suppl. No. 5., 2nd edition for 1978 and 1990. They are tabulated below.

Table I

Year	CO	HC	NO_x	SO_x	TSP (all g/mi)
1978	42.7	6.6	4.3	0.21	0.51
1990	11.3	1.9	2.0	0.19	0.40

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The above conclusion is based on the assumption that current (and future) air quality is not degraded by other sources to the extent that the input from vehicular emissions might be significant from an additive standpoint. Baseline data are essential to answer this important question.

Should you have further questions or require additional assistance, refer them to Dr. Wayne Hamilton on extension 6070.

Alan Carter
for Larry A. May

cc:
WR-RD, Mr. Chapman
WR-PS, Mr. Kilgore
WASO-492, Ms. Brown

Table I: Carbon Monoxide

day/year	Traffic (vehicles) peak day (12-hr.)	peak hour	peak 8-hour	Emission factor (g/mi) average speed	10 mph	Peak hour CO($\mu g/m^3$) total use	rec. use	peak rec. use	Peak 8-hour CO ($\mu g/m^3$) total use	rec. use
weekday 1976	17,500	2,150	11,000	22*	50	9700	900	2700	1400	407
weekend 1976	17,500	2,125	13,000	22*	50	9600	8400	8400	1600	1200
weekday 1986	30,700	3,165	21,680	7.6**	16.6	4730	3600	3600	940	560
weekend 1986	37,905	5,135	29,220	7.6**	16.6	7600	7200	7200	1270	1130

* - For 29 m.p.h. median measured
** - For 28 m.p.h. estimate

Table II: Hydrocarbons

day/year	Peak 3-hr. 6-9 a.m. HC ($\mu g/m^3$)* total use	rec. use
weekday 1976	390	40
weekend 1976	250	120
weekday 1986	180	50
weekend 1986	150	100

*Emissions are 2.3 x 1-hour values, 1.5 m/sec. wind

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The pertinent national ambient air quality standards for CO and HC are as follows:

Table III: NAAQS Standards

Pollutant	Interval	Concentration ($\mu g/m^3$)
CO	1-hour	40,000
CO	8-hour	10,000
HC	3-hour (6-9 a.m.)	160

Examination of the tables shows that CO and HC standards were not exceeded in 1976 by emissions from Recreation Area-related traffic, and no exceedences are indicated for 1986 traffic due to recreation traffic.

Total vehicle use (which includes commuter traffic over which GGNRA has no control) led to calculated excessive concentrations of HC on peak weekends and weekdays in 1976 and on peak weekdays in 1986. The Recreation Area-related contribution in these cases is 10 percent, 48 percent and 28 percent respectively.

The Bay Area Air Pollution Control District Air Quality Maintenance Plan, Tech. Memo 3, discussion of past and present air quality (March, 1977) states that ozone and carbon monoxide concentrations have decreased since the mid-to-late 1960s. Highest concentrations and incidents of exceedence are more common in the south-bay area, near San Jose. Thus contributions from recreation traffic along Marina Boulevard near GGNRA are not seen as a major current nor future air quality factor in the Bay Area.

If you have questions on this analysis, please contact Wayne L. Hamilton at x6070.

Howard J. Daigles

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APPENDIX F:
WATER DEMAND DATA

In order to determine whether the available water supply is adequate for the drinking and sanitary requirements of visitors, water demand was estimated for the following facilities and uses. The figures represent the amounts of water in gallons that one person will use during a day or overnight visit to the park. These amounts per person when multiplied by the peak project visitation levels of the facilities equal the total amount of water that will be necessary.

Hostel	60 gallons per person
Group camping	20 gallons per person
Hike-in camping	10 gallons per person
Walk-in camping	20 gallons per person
Day use (Marin Headlands, Angel Island, Mount Tamalpais)	10 gallons per person
Day use (Olema Valley, Point Reyes	5 gallons per person

Irrigation water demand was estimated by assuming that up to one-half inch of water per week will be required for 6 months each year with rain and fog decreasing or eliminating the need for irrigation much of the rest of the year.

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Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

MEMORANDUM OF AGREEMENT

WHEREAS, the National Park Service (NPS), Western Region, proposes to approve and implement a General Management Plan and Environmental Analysis for the Golden Gate National Recreation Area, Point Reyes National Seashore, Fort Point National Historic Site and Muir Woods National Monument; and,

WHEREAS, NPS, in consultation with the California State Historic Preservation Officer (SHPO), has determined that this undertaking, as proposed, may have an adverse effect on the cultural properties located within the Recreation Area, Seashore, Historic Site and National Monument which are included in and eligible for the National Register of Historic Places; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320) and Section 2(b) of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," and Section I.A. of the Programmatic Memorandum of Agreement between NPS, the Advisory Council on Historic Preservation Officers, ratified by the Chairman December 19, 1979, NPS has requested the comments of the Council; and,

NOW, THEREFORE it is mutually agreed that the undertaking will be carried out in accordance with attached proposal.

Robert Barrey Sept (date) 1980
Executive Director
Advisory Council on Historic Preservation

Richard W. Smith (date) 9-15-80
Chairman
Advisory Council on Historic Preservation

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PROPOSAL
for
MEMORANDUM OF AGREEMENT

PARK GOLDEN GATE NATIONAL RECREATION AREA

PLAN GENERAL MANAGEMENT PLAN/ENVIRONMENTAL ANALYSIS

JULY 7, 1980

CONSULTATION HISTORY

Letters to the State Historic Preservation Officer: May 23, 1979; September 20, 1979; March 26, 1980 and July 2, 1980.

Letters from the State Historic Preservation Officer: November 30, 1979 and June 19, 1980.

Letters to the Advisory Council on Historic Preservation: August 24, 1979; June 6, 1980.

Letters from the Advisory Council on Historic Preservation: September 18, 1979; June 26, 1980.

On June 9, 1980, the Western Region, National Park Service received approval to implement the Programmatic Memorandum of Agreement for basic planning documents. The Agreement between the Advisory Council on Historic Preservation, National Conference of State Historic Preservation Officers and the National Park Service is in accordance with the Procedures of the Advisory Council, 36 CFR 800.

PROPOSAL

The National Park Service proposes to approve and implement a General Management Plan and Environmental Analysis for the Golden Gate National Recreation Area, Point Reyes National Seashore and Fort Point National Historic Site, Muir Woods National Monument the later areas which are also administered by Golden Gate.

It was determined during the consultation process, described above, that the following appropriate actions will be taken to avoid or satisfactorily mitigate any adverse effects which may occur arising from the implementation of undertakings in the Plan. These conditions are:

CONDITIONS

1. Implementing actions involving historic structures and lands involving preservation, maintenance, rehabilitation, restoration, adaptive use, and stabilization of cultural resources shall meet appropriate Standards, Guidlines, Policies and Procedures including:

   a. Secretary of the Interior, for the Rehabilitation of Historic Buildings and Historic Preservation Projects.

   b. National Park Service, Management Policies for Historic Preservation, Cultural Resource Management Guidelines, and the Western Regions Procedures for Archeological Clearances.

c. For undertakings involving a complex of historic structures, Design Criteria considering the specific elements of significance of the complex and items a & b, will be prepared.

2. To assure that the use of historic structures, facilities and grounds by public organizations, non-profit organizations, foundations and commercial firms/utility companies is in accordance with Item One, the groups will be advised well in advance that conformance is required. All permits, leases, agreements issued by the Service will reflect this responsibility.

3. The National Park Service shall review and maintain adequate documentation evidencing the individual implementation actions are consistent with the approved Plan and Cultural Resource Standards, Guidelines, Policies and Procedures.

   An Assessment of Actions Having An Effect on Cultural Resources will be used to document the review. The Assessment will be reviewed by professional cultural resource personnel in the Western Regional Office. When a proposed action is questionable or not in concurrence with appropriate standards, Section One above, and the proposal is not altered to conformance, the assessment form with all documentation of the review and proposed undertaking will be provided the State Historic Preservation Officer for review and comment.

4. Should new undertakings be advance which are not encompassed by the General Management Plan, should major revisions occur, or if proposed actions by the Plan prove not to be feasible, the State Historic Preservation Officer will be afforded an opportunity to comment in accordance with the Procedures of the Advisory Council on Historic Preservation, 36 CFR 800.

5. The State Historic Preservation Officer or the Advisory Council on Historic Preservation independently or upon notification reserve the right to object in a timely manner to any implementing action that may be adverse to cultural resources.

If you concur with the above conditions for the proposed Memorandum of Agreement, please sign in the space provided below and return the letter to this Office. A copy of the letter is enclosed for your files.

Sincerely yours,

Howard H. Chapman

Howard H. Chapman,
Regional Director,
Western Region

In Duplicate

I concur with the above statement of conditions which will be included in the Memorandum of Agreement on the General Management Plan, Golden Gate National Recreation Area.

Kenneth McEllon — 7/7/80

State Historic Preservation Officer — Date

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B I B L I O G R A P H Y

GOLDEN GATE RECREATIONAL TRAVEL STUDY

1975 Staff Report 1: Auto Travel in Golden Gate National Recreation Area Travel Study Area. Berkeley: Metropolitan Transportation Commission.

1975 Staff Report 2: 1974 Data Report. Berkeley: Metropolitan Transportation Commission.

1976 Staff Report 3: Summer 1975 Findings. Berkeley: Metropolitan Transportation Commission.

U.S. DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

1975 Preliminary Information Base GGNRA/North and Analysis, 2 vols. Prepared by the SWA Group, Sausalito, California. Golden Gate National Recreation Area, Fort Mason, California.

1975 Preliminary Information Base GGNRA/South and Analysis, 2 vols. Prepared by Royston, Hanamoto, Beck & Abey, Mill Valley, California. Golden Gate National Recreation Area, Fort Mason, California.

1976 "Quantification of Potential Visitor Use Under Park Alternatives." Prepared by Royston, Hanamoto, Beck & Abey, Mill Valley, California. Golden Gate National Recreation Area, Fort Mason, California.

1978 "Planning Position Papers." Golden Gate National Recreation Area, Fort Mason, California.

1979 "Historic Resource Study, Alcatraz Island, Golden Gate National Recreation Area," by Erwin N. Thompson. Golden Gate National Recreation Area, Fort Mason, California.

1979 "Historic Resource Study, Seacoast Fortifications of San Francisco Harbor, Golden Gate National Recreation Area," by Erwin N. Thompson. Golden Gate National Recreation Area, Fort Mason, California.

1979 "Historic Resource Study, The Bay Area Community: A Civil History of Golden Gate National Recreation Area and Point Reyes National Seashore," by Anna Coxe Toogood. Golden Gate National Recreation Area, Fort Mason, California.

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PLANNING TEAM

PRINCIPALS

Rolf Diamant	Landscape Architect GGNRA
Nancy Fries	Ecologist Denver Service Center
Ruth Kilday	Advisory Commission Liaison GGNRA
Greg Moore	Park Planner GGNRA
Larry Morrison	Graphics Specialist Denver Service Center
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Gail Slemmer	Editor Denver Service Center
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Roger Kelly	Archeologist NPS Western Regional Office
Erwin Thompson	Historian Denver Service Center
Anna Toogood	Historian Denver Service Center

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CONSULTING SERVICES

Royston, Hanamoto, Beck & Abey	Mill Valley
The SWA Group	Sausalito

The following individuals contributed significantly to the development of this plan as members of the Golden Gate National Recreation Area Citizen's Advisory Commission

Ernest Ayala
Richard Bartke
Fred Blumberg
Frank Boerger
Daphne Green
John Jacobs
Peter Haas, Sr.
Gimmy Park Li
Joseph Mendoza
Amy Meyer
John Mitchell
Merritt Robinson
Jack Spring
Bill Thomas
Joseph Williams
Edgar Wayburn

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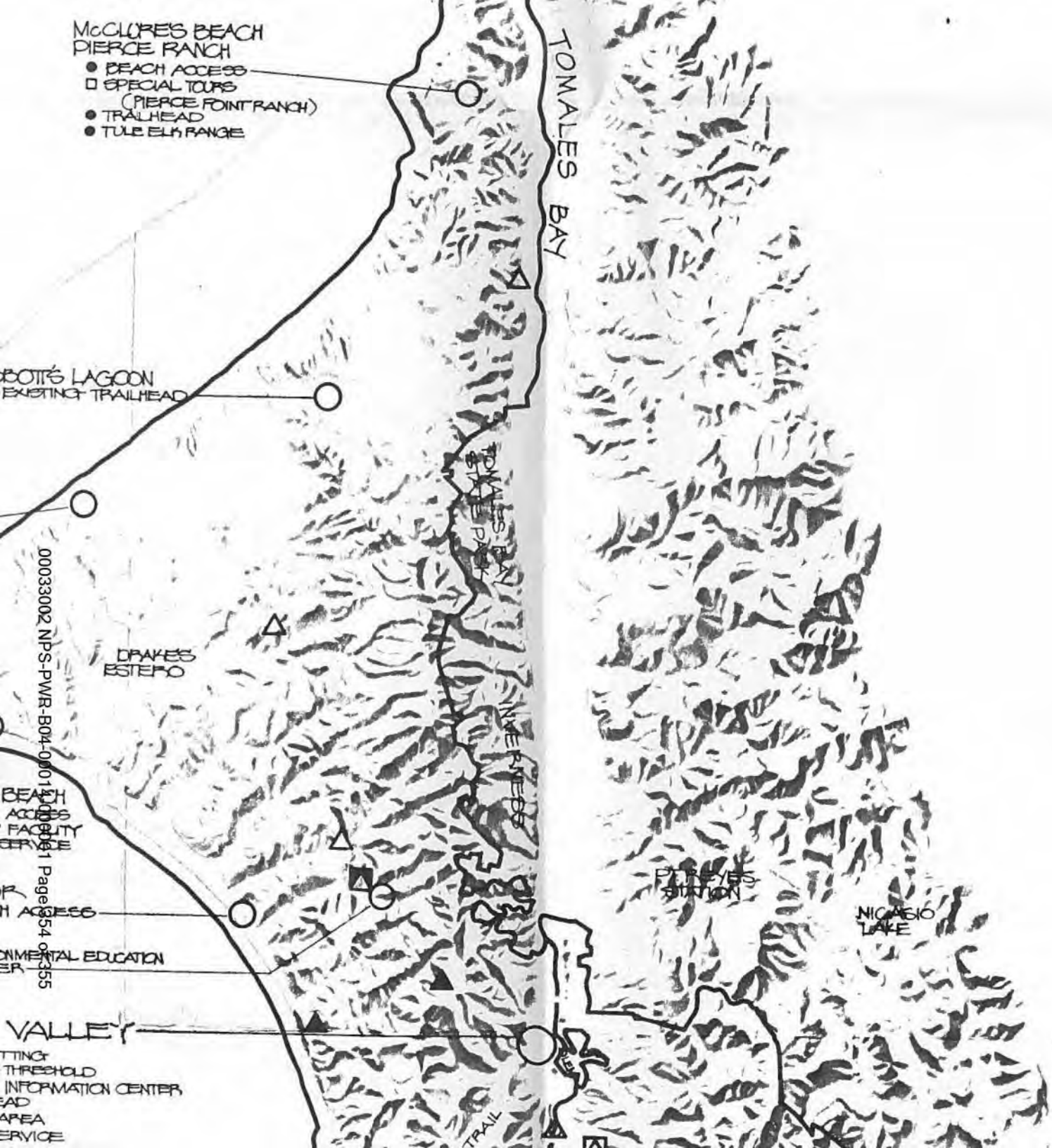
As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

Publication services were provided by the graphics staff of the Denver Service Center. NPS NPS 1439A

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980—677-120/49

A full sheet copy of the General Development Map for the PORE/GOGA GMP EIS was included in the response.

Digital versions of the full sheet maps are not available. Scans of the Point Reyes Section and the legend of the General Development Map are included here.



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GENERAL DEVELOPMENT

NATIONAL RECREATION AREA
REYES NATIONAL SEASHORE

641 | 20079A
DSC | JUL 80

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ALEXANDRA KRUSE

#2

General Management Plan Update

Concepts Newsletter 2003

In the National Park Service (NPS) planning process, we are required to assess a range of management strategies. Each one of these is built around an underlying *concept* that describes a possible direction for the future. These concepts were derived from public input. Five concepts — one no-action and four action concepts — have been translated into specific actions by the application of *management zones* over the parks.

These are preliminary ideas for the General Management Plan (GMP). Each action concept consists of a map and a description of intent along with future actions. This is the first time they have been seen by you, the public. The concepts and management zones may contain some inconsistencies, specific treatments may not be explained, and/or ideas may not be fully developed. This information is preliminary, and we need your input to fully refine future alternatives and management zones.

Please review the following preliminary management zones and concepts, and check to see if your ideas are reflected. If not, we need to know what we missed so that we can make sure our management zones and alternatives are comprehensive and will allow us to explore the widest possible range of options. (Keep in mind that in a GMP the level of detail will remain fairly broad. For example, the GMP may identify the appropriateness of certain activities such as hiking or camping in general areas of the park but may not identify specific locations or routes).

It is possible that you may like some but not all elements of one concept, or that you may like a concept but disagree with the way we have translated it by the application of management zones. Maybe you have an entirely different vision that would address Point Reyes issues. We need to know the reasons for your likes and dislikes. With your comments we can reevaluate the number and scope of the management zones and concepts and modify them as necessary. This is the kind of feedback that will help us formulate the best possible future for the parks.

Don L. Neubacher
Superintendent
Point Reyes National Seashore

The National Park Service Mission

The mission of the National Park Service, as defined by Congress in 1916, is "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."
(1916 Organic Act)

SUSAN VAN DER WAL

Please help us update the future of lands under the care of Point Reyes National Seashore. Please review the concepts on the following pages and share with us your thoughts on these preliminary ideas. See back page on how to submit comments.

Zoning: The Foundation of Park Management

Management zoning is a planning tool that helps to define appropriate resource condition, compatible use, and appropriate facilities. Most of the National Seashore is zoned under natural or cultural heritage zoning. Each of these two zones is made up of subzones that further specify management prescriptions. There are two other zoning classifications of lesser prevalence: the development zone and special use zone. A brief overview of each type of zoning is listed below.

NATURAL HERITAGE ZONES

Wilderness

Wilderness zoning is managed for preserving wilderness values, biological diversity, and ecological integrity. Visitors would have opportunities to be immersed in nature without intrusions. In areas federally designated as wilderness, access by foot or by horse is permitted, providing opportunities for solitude.

Natural

Natural zoning acts as a transitional zone between wilderness and developed zones. It connects developed sites via multi-use access corridors. Natural resources and processes would remain as undisturbed as possible, with minimal development including restrooms and trail access. There is a lower expectation of solitude and potentially more impact from civilization in this zone.

Reserves

Reserves are pristine areas with access limited, to protect areas of biological significance. Passive and low-impact visitor activities are permitted within reserves. Park staff and partners conduct research and monitor resources to maintain the reserves' biological integrity.

Marine Protected Areas

A marine protected area is any area of the marine environment that provides increased protection for part or all of the natural and cultural resources therein.

CULTURAL HERITAGE ZONES

Cultural Landscapes Zone

The land in this zone is altered from its natural state for the purpose of preserving the historic agricultural scene. This zone preserves working agricultural landscapes as part of Point Reyes National Seashore and the northern district of Golden Gate National Recreation Area. Comprised of dairy and beef cattle ranches and fences, views in this zone are pastoral in nature.

Historic Sites

Historic resources in this zone are actively managed and preserved to maintain their significance. Many of the structures would be adaptively managed, and some modification would occur to accommodate visitor use. Sites like the historic Lighthouse and Pierce Ranch allow visitors to experience the past through park programming and self-guided trails. Most sites are easy to reach, offer interpretation of the resources, and often have amenities/ facilities such as picnic tables, restrooms and parking.

Archeological Zone

This zone, which has a concentration of archeological sites, is designed to protect evidence of past human use including sacred sites of the Coast Miwok. Sites would not be marked, to prevent disturbance, and sacred sites could be accessed only with an appropriate authority. Visitor use in this zone would be limited to activities that do not impact archeological resources.

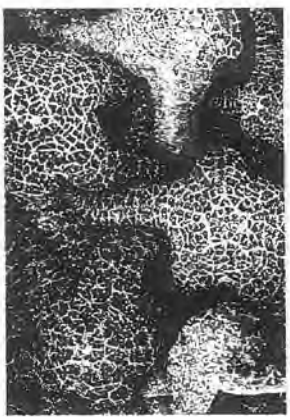
Development Zone

In areas designated as a development zone the natural environment is often modified to accommodate visitor and park operation needs. Roads, visitor centers, parking, and other facilities provide access and services but limit opportunities for solitude.

Special Uses

Special use zoning is found in only a few areas managed by Point Reyes National Seashore. Areas in this zone are impacted as permitted in special use agreements. The land in these areas is often open to the public, but noise and visual intrusions are prevalent. Also, public lands managed by others, such as state parks, are designated as special use areas and have specific management and visitor use guidelines.

Use these descriptions to evaluate the five concepts in the following pages.



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The Concepts

CONCEPT 1: CONTINUING CURRENT MANAGEMENT / THE NO-ACTION CONCEPT

Overview

The no-action concept represents the existing conditions at the park if current management actions and zoning continue. National Park Service staff would continue to manage the parks as directed in the current General Management Plan (1980). For the foreseeable future, there would be no major change in management direction. The parks would continue to be an active partner in a regional conservation strategy that would include other agencies and community organizations. Facilities and resource programs would continue as they have. This concept provides a baseline for evaluating changes and impacts in the other concepts.

Cultural Resources Protection

The cultural resource program would continue to focus on protection of archeological sites and preservation of historic landscapes and structures. As funding is obtained, many of the parks' 297 historic structures would be stabilized and preserved. Archeological sites would be reviewed and stabilized for long-term preservation. The "Cultural Landscape Zone" currently comprising 13 dairy and beef ranches would continue in operation. Leases would be renewed and continued under existing agreements. In areas where sensitive resources exist, measures would be taken to protect natural and other cultural features.

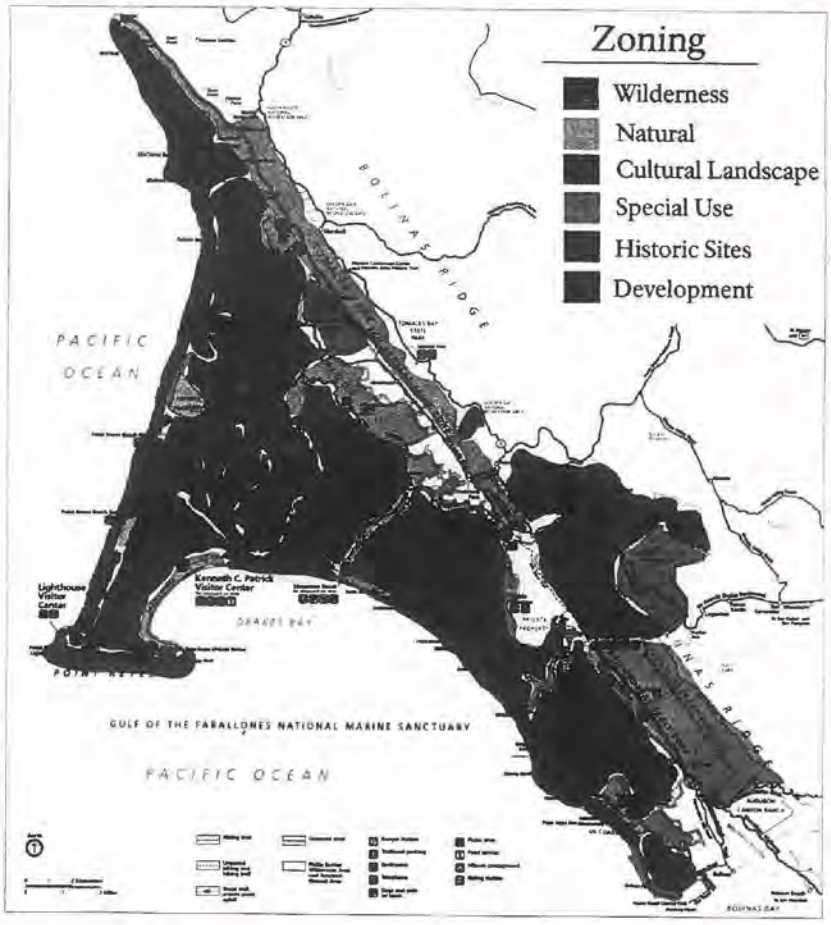
Natural Areas, Wilderness and Resource Management

The natural resource program would continue to focus on preserving and restoring ecosystems and applied research efforts. With more than half the National Seashore set aside as wilderness or natural areas, resource management activities would continue to focus on inventory and long-term monitoring of plant and animal species. Habitat restoration would also continue as a major focus. Creeks that have impeded fish passage/migration would be restored; wetland areas that are degraded would be protected. Invasive species would be removed from sensitive areas. Threatened and endangered species would be closely monitored and protected.

Visitor Opportunities and Experiences

Visitors to the parks would continue to have many diverse opportunities. The spectrum would continue to include passive recreation like bird watching and wildlife viewing to more active opportunities like backcountry hiking and camping. The Seashore would continue to maintain and operate three visitor centers, four backcountry campgrounds, its system of trails and access to beaches and boating. Exhibits and educational waysides throughout the park would continue to offer opportunities for education. Ranger-led talks and walks would continue at current levels. Exhibits, films and waysides would be updated and replaced to keep them relevant to visitors as funding becomes available. Relevant resource education would be available for students and visitors.

Below: Concept 1 map



CONCEPT 2: SPECIAL EMPHASIS ON PRESERVATION AND RESTORATION OF NATURAL RESOURCES

BRUCE HARKWORTH

Overview

Under this concept, park management would be focused on the preservation of native species and natural processes and the restoration of biodiversity. Wilderness and natural zoning would be expanded to enhance the natural qualities of the park. Changes in land use would increase scenic qualities and expand habitat for native species. As a result, the cultural landscape zone would be reduced through time. Ranches with significant historical integrity would continue to be preserved. Visitor experience would shift to activities with low environmental impacts as wilderness and natural zones expand. The trend throughout the Seashore would be toward fewer buildings and facilities.

Cultural Resources Management

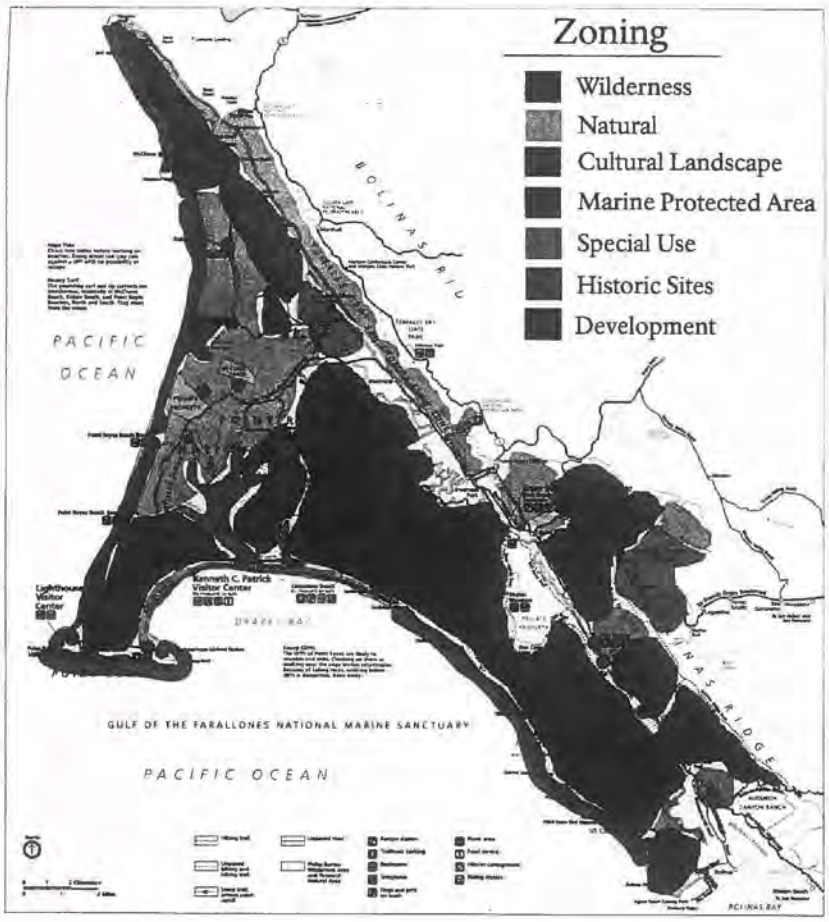
Under this option, cultural resources would be managed to preserve the most historically significant sites and structures. Historic structures would be maintained to the best possible level of protection. At a minimum, all statewide and nationally significant sites would be preserved for public enjoyment. Beef and dairy operations would continue until original permittees discontinue ranching activities. Archeological sites would be documented and protected. Sacred and endangered archeological sites would also receive priority and be protected and maintained.

Natural Areas, Wilderness and Resource Management

Resource preservation and restoration would be the overriding consideration in the parks. Under this concept, park managers would expand wilderness and natural areas and give greater focus to ecosystem preservation and restoration. To improve ecological integrity, invasive exotic species removal efforts would be expanded. Scientific research and species monitoring would be expanded to gather more baseline data on ecosystem health and population trends. Marine protected areas and research facilities could be created (in cooperation with California Department of Fish & Game) to better understand and preserve the ocean environment that surrounds the park.

Visitor Opportunities and Experiences

Under this concept, there would be more opportunities for solitude and improved wildlife viewing and vistas. The visitor opportunities would focus on low-impact activities. Some backcountry camping areas would be altered to promote wilderness camping, and the trail system would be expanded. Beach access, picnic areas and all visitor center operations would remain open, consistent with current management; however, new exhibits, education programs and waysides would focus on wilderness, resource science and stewardship themes. The winter shuttle operations would continue.



At left: Concept 2 map

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CONCEPT 3: ENHANCED PARK VALUES BY BALANCING CULTURAL AND NATURAL RESOURCES PRESERVATION

BRUCE LARNOWORTH

NATIONAL PARK SERVICE

Overview

Only minor zoning changes from Concept 1 would occur under this concept. A few areas zoned as cultural landscape would be reclassified as natural areas, protecting sensitive natural resources, while two historic ranching districts would be established to preserve working agricultural landscapes. Throughout the parks, natural resource monitoring, and restoration efforts would be expanded to protect the parks' ecological resources. Some access corridors into the wilderness zone would be removed, dispersing visitor use and increasing wilderness values. Only minor additional park facilities would be built if existing structures were not available.

Cultural Resources Management

The parks' historic resources would receive the same level of protection as they have under the current management. The cultural resource program would continue to focus on protection of archeological sites and the preservation of historic landscapes and structures. Under this concept, a special archeological zone would be established to protect the sacred sites and cultural identity of the Coast Miwok people. Ranching would be continued and promoted to preserve historic cultural landscapes. In areas of sensitive natural resources ranching would be excluded.

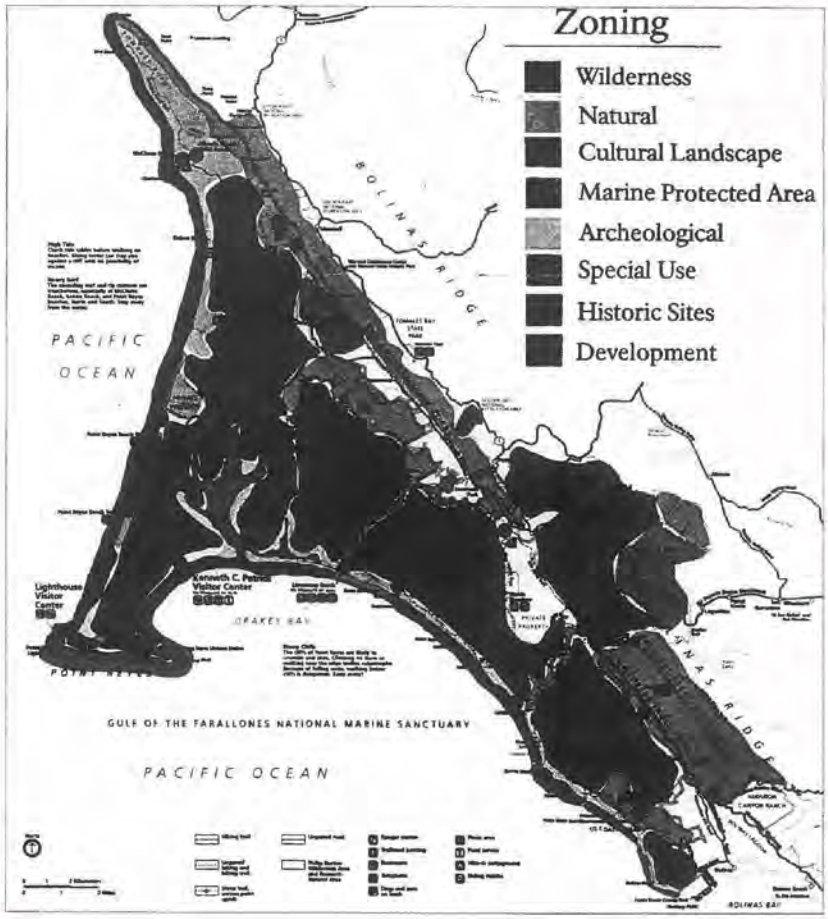
Natural Areas, Wilderness and Resource Management

Under this concept, a variety of actions would be conducted to help preserve park natural resources. National Park Service staff would continue exotic species removal. Ecosystem restoration would be a major focus. Scientific research and species monitoring would be expanded to gather more baseline data on ecosystem health and population trends. Marine protected areas and research facilities could be created (in cooperation with California Department of Fish & Game) to better understand and preserve the ocean environment that surrounds the park.

Visitor Opportunities and Experiences

Changes in zoning would create a diversity of activities that are presently nonexistent. A backcountry camping zone for low-density, low-impact camping would be opened. Elsewhere in the parks, new group and individual camps would open and expand access. In the front country, all opportunities and access currently available would be maintained. Improvements at trail heads, a safe bike lane, a developed drive-in campground and roadside improvements could be potentially added. The winter shuttle operations would continue.

Below: Concept 3 map



CONCEPT 4: EMPHASIS ON IMPROVED VISITOR EXPERIENCE, EDUCATION, AND ACCESS

Overview

This concept would improve visitor experiences by providing more opportunities to enjoy and learn in the parks. The parks would be managed to provide a wider range of visitor experiences and would reach out to a greater diversity of visitor groups of all ages, abilities, and economic and ethnic groups. Natural and cultural resources would be managed to allow additional recreation while protecting resources. The focus would be on providing low-impact outdoor recreation activities.

Cultural Resources Management

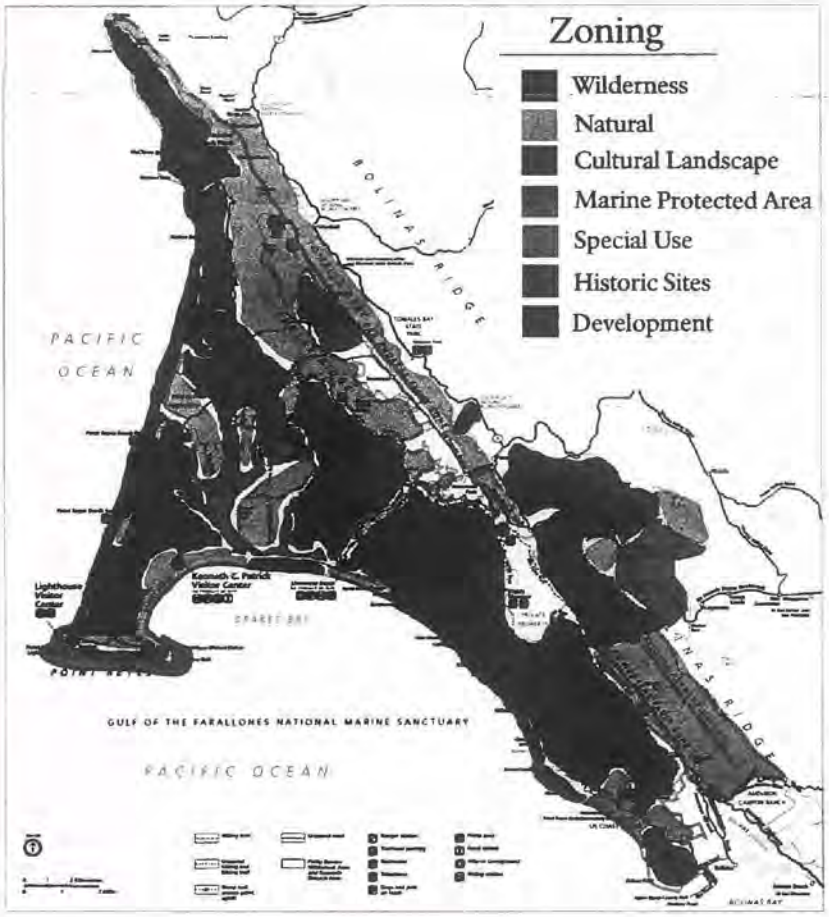
The cultural resource program would continue to focus on protection of archeological sites and the preservation of historic landscapes and structures. Some minor rezoning in ranching areas would occur to protect sensitive habitat and coastal areas.

Natural Areas, Wilderness and Resource Management

Providing visitors with a healthy ecosystem, to improve visitor experience and educational opportunities, would be a goal of resource managers. Exotic species removal, habitat restoration projects and scientific research would be conducted. Marine protected areas and research facilities could be created (in cooperation with California Department of Fish & Game) to better understand and preserve the ocean environment that surrounds the park.

Visitor Opportunities and Experiences

Whether visitors are looking for solitude and wilderness, a scenic drive, or an opportunity to understand the Seashore's resources, a variety of experiences would be offered. Educational offerings would be expanded for school groups and the public through science-based programs at an ocean life education center and throughout the parks. Front-country access and experiences would be improved by managing views and improving road and trailhead conditions. Camping opportunities would be expanded to include a developed campground, new walk-in sites and a wilderness camping zone for dispersed low-impact camping. New trails would also be added to the backcountry, while visitor services would be expanded in the front country. Visitor centers with improved exhibits would operate with extended summer hours. Exhibits would be updated with new multimedia technology. The winter shuttle operations could expand beyond current operations.



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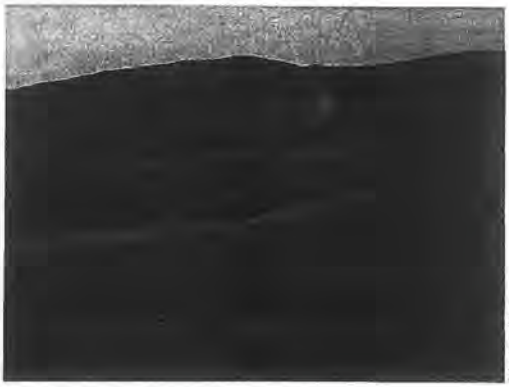
CONCEPT 5: ENHANCING CULTURAL LANDSCAPE PRESERVATION THROUGH SUSTAINABLE AGRICULTURE

Overview

The parks' 297 historic structures, and archeological resources would be protected with a special emphasis on preserving working agricultural landscapes. Under this concept there would be a net gain in agricultural lands though some grazing exclusions would be employed, protecting sensitive natural and cultural resources. Natural resource monitoring and restoration efforts would be continued, to protect the parks' ecological resources. To improve visitor experience, low impact recreational opportunities such as trails would be expanded, while new park facilities would only be built when absolutely necessary.

EDWARD GUNY



EDWARD VAN DER WAL

Cultural Resource Management

To enhance working agricultural landscapes, and the pastoral scene, ranching and grazing would be expanded to preserve the agricultural character of Point Reyes National Seashore and the northern district of Golden Gate National Recreation Area. An archeological zone would be established to protect the sacred sites and cultural identity of the Coast Miwok people.

Natural Areas, Wilderness and Resource Management

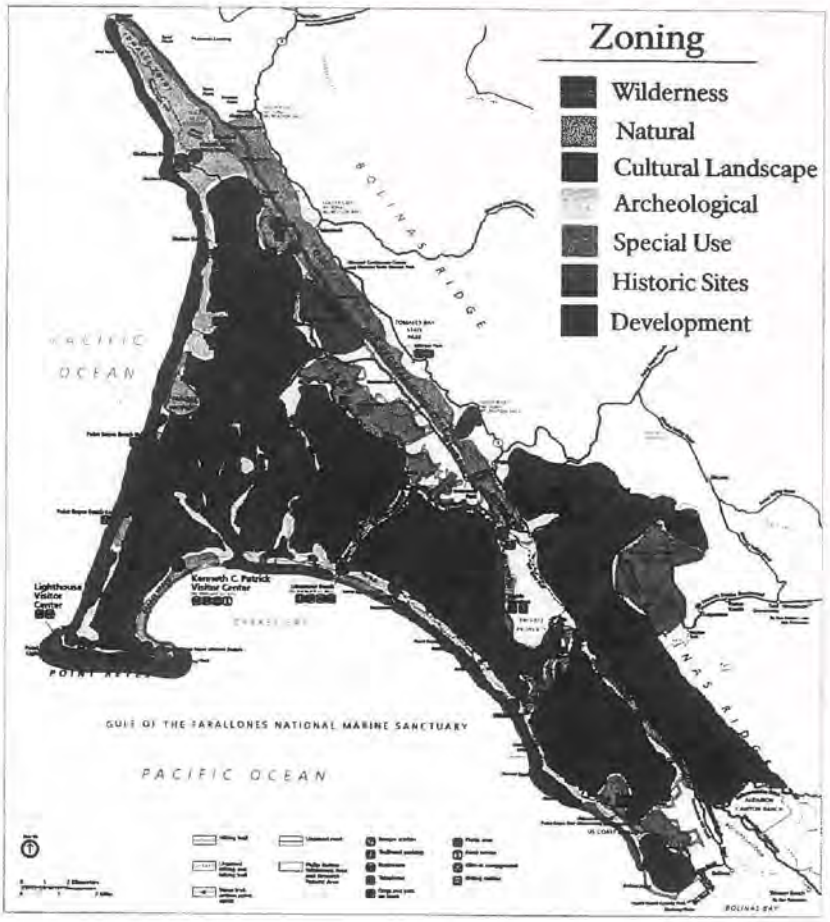
As in Concept 1, the natural resource program would continue to focus on restoring species and ecosystems, inventorying and monitoring, and applied research efforts throughout the parks. Federally designated wilderness would not be altered, providing habitat for much of the flora and fauna of the two parks.

Visitor Opportunities and Experiences

The majority of visitor opportunities and experiences would remain consistent with existing management; however, there would be an added emphasis on the human history of the Point Reyes area. New trails would be opened linking areas of cultural significance. Beach access and picnic areas would remain open. Through partnerships, two new education centers would be opened, one focusing on sustainable agriculture and the other on Native American history and heritage. The winter shuttle operations would continue.

BRUCE LAPRAWSKI

Below: Concept 5 map



NEXT STEPS IN THE PLANNING PROCESS

- Prepare and publish for distribution and public comment the draft GMP/EIS (Winter 2005).
- Receive public comment on draft and incorporate into final plan (Winter 2006).

Stay Informed and Involved

Join our mailing list and send us your comments. You'll be notified of any future meetings and receive any future documents for review.

PLANNING STUDIES CURRENTLY UNDER WAY

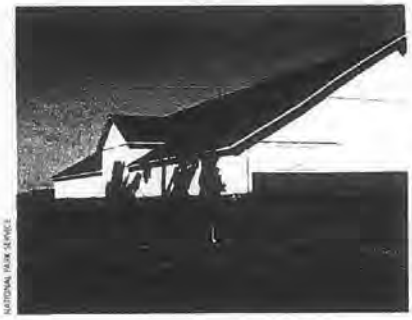
The following studies are providing background information to assist park management with the updating of the General Management Plan.

Completed as of publication date for this Newsletter:

- Trail Inventory and Condition Assessment
- Comprehensive Interpretive Plan
- Transportation Management Study
- Transit Analysis for Point Reyes National Seashore
- GIS Vegetation & Wetland Delineation Map
- Threatened and Endangered Species Evaluation and Mapping

Still under way:

- Cultural Landscape Report
- Administrative History
- Historic Resource Study of Tomales Bay
- Fire Management Plan
- Archeological Overview and Assessment[1]
- Cultural Evaluation Study for Tocaloma
- National Register Nominations for Olema Valley and Point Reyes Ranches as well as Radio Site



Point Reyes National Seashore Facts

- **NATURAL FEATURES**
  - 80 miles of coastline
  - 26 threatened and endangered species
  - over 900 species of flowering plants
  - over 490 species of birds recorded
  - 50 species of mammals
  - 28 species of reptiles and amphibians
  - 32,000 acres of wilderness
- **CULTURAL AND HISTORIC FEATURES**
  - 297 historic structures
  - over 120 known archeological sites
  - 500,000 objects and archival materials
- **INFRASTRUCTURE**
  - 4 backcountry campgrounds
  - 17 water systems
  - 147 miles of trails
  - 100 miles of roads
  - over 2.5 million annual visitors

Submit your comments to us by January 31, 2004 — via mail or email at ann_nelson@nps.gov.

United States Department of the Interior
National Park Service
Point Reyes National Seashore
Point Reyes Station, CA 94956

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Harbor Seal Monitoring

San Francisco Bay Area

Annual Report
National Park Service
2006

Prepared by:

Jeannine Manna, Dale Roberts, Dave Press, and Sarah Allen

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Acknowledgements

We thank all the volunteers who hiked many miles through fog, rain, and wind to survey harbor seals, including Jane Adams, Frank Binney, Judy Bourke, Tara Bushore, Elissa Chasen, Kate Carolan, Ruth Catlin, Michele Conrad, Ed Downing, Nina Downing, Richard Ferris, Wayne H. Lynn Harrison, Holter, Katie Kirk, Peter Krag, Joan Lamphier, Dal Leite, Elizabeth Leite, Dick Lingelser, Katie Kirk, Joanne Lasnier, Eric Olsen, Marsha Maslan, Cristina Mun, , Emma Moore, Paul Moschetti, Susan Pender, Judy Rodoni, Bob Siegel, Elizabeth Sojourner, Susan Van Der Wal, Michael Vanvelkenburg, Ed Vermeulen, Sue Waber, Elizabeth Wheeler, Amy Whelan, Rick Whitney, and many more.

We also thank the regional group of volunteers associated with various collaborative groups, including Norton Bell, Joelle Buffa, Sandra Bush, Michelle Cooper, Steven Durkin, Molly Engelbrecht, Mary Follis, Chris Hellwig, Mary Ellen King, Sarah Lenz, Joanne Mohr, Joe Mortenson, Bonnie Platos, Alan Schreiber, Jackie Sones, Sage Tezak, Bob Wilson and other agencies and organizations including the Farallones Marine Sanctuary Association, Gulf of the Farallones National Marine Sanctuary, the Friends of Slavianka, The Fitzgerald Marine Reserve, the Marine Mammal Center, U.S. Fish and Wildlife Service, and the San Francisco State University Harbor Seal Project for contributing numbers to the region-wide surveys.

In addition, we are grateful to the Park Rangers at Point Reyes for transporting volunteers by boat to sand bars in Tomales Bay, and to Christie and Steve Anastasia, Ben Becker, Bill Merkle, Marcus Koenen, and Dawn Adams for their programmatic support. We are also thankful to Kristen Truchinski for updating the regional survey data. Finally, we are grateful for the generous contributions from the Point Reyes National Seashore Association, the Cox Family Fund, the San Francisco Bay Area Inventory and Monitoring Program, and the Marin Conservation Corps/Americorps Program.

Volunteer training at Double Point.

Introduction

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped in the San Francisco Bay Area, California. Within the San Francisco Bay Area, the population at Point Reyes represents the largest concentration of harbor seals in the State of California, other than the Channel Islands, accounting for 20% of the mainland breeding population (Lowry and Carretta 2003). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt, feed, and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999, Allen et al. 2004, Vanderhoof and Allen 2005). The objectives of monitoring are to 1) detect changes in population numbers, 2) detect changes in reproductive success, and 3) identify anthropogenic or environmental factors that might affect population status and trends. The monitoring objectives and protocol are described in detail in Hester et al. (draft protocol). The information presented here is a summary of the data collected in Point Reyes National Seashore and Golden Gate National Recreation Area during the 2006 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort including adjacent areas, (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in conjunction with other agencies and organizations for 2006, are also presented.

Methods

Study Area

The study area extends from Tomales Point south to San Francisco Bay. The Point Reyes peninsula extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N) and is referred collectively as the Point Reyes sites. Point Bonita, in the Marin Headlands, is the southern most seal haul out site within the study area and is located at the mouth of San Francisco Bay in Golden Gate National Recreation Area. Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, Bolinas Lagoon, and San Francisco Bay. The Point Reyes National Seashore (PORE), Golden Gate National Recreation Area (GOGA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline.

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). Coastal locations regularly surveyed included Tomales Point, Point Reyes Headland, Duxbury Reef, Double Point, and Point Bonita; estuarine locations surveyed included Tomales Bay, Drakes and Limantour Esteros, and Bolinas Lagoon (Figure 1).

Regional survey sites included colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark's Slough), Sonoma County (Sea Ranch, South Sonoma sites, Fort Ross, and Jenner) and San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach (Figure 1).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons, which run from March 1st to May 30th and June 1st to July 31st, respectively.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during two in-class sessions and four field sessions. Many of the volunteers were previously trained and seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each Point Reyes site a minimum of once per week, twice during the peak of the breeding and molting seasons, weather and logistics permitting. Point Bonita was also surveyed according to the same schedule. The Point Reyes Headland and the regional survey sites were surveyed once every two weeks on concurrent weekends. Surveys occurred primarily during low to medium tides, the time when the maximum numbers of seals haul out in the San Francisco Bay region (Fancher 1979, Allen et al. 1982).

Harbor seals at Tomales Bay.

Survey periods were designed to last approximately two hours, with counts occurring at half-hour intervals, depending on location. Each sub-site was surveyed separately, and then summed to give a total for the site at each time interval. All sub-sites were visible from one location with the exception of Tomales Point and Bolinas Lagoon. For each of these sites, each sub-site was counted from two to four times per survey, due to driving or hiking distance between the sub-sites.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two age classes were lumped together. Pups were the young of the year and after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only between March and June 1. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

All actual and potential disturbances to harbor seals were recorded during surveys from the period of March 1st to July 31st. The total number of surveys where disturbances were recorded was 221 (Table 1). Observers recorded the time and the source of the disturbance. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water, or unknown. In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time when the seals rehauled was also recorded. In some cases, an unknown disturbance and unknown response was recorded if the disturbance occurred before the survey had started, and so the nature and extent of the disturbance was not directly observed. The rate of disturbances was calculated based on the number of disturbances per survey period (survey period was usually 2 hours but may have varied by ½ hour). In future reports, disturbance rate will be calculated based on the number of disturbances per survey hour, in order to compare to other disturbance studies.

Regional surveys occurred every two weeks March through July on weekends, Friday – Sunday that had low tides around mid-day. All of the PORE and GOGA sites, as well as the San Francisco Bay and Sonoma sites, were surveyed during these weekends. Participants in the region-wide surveys included the GFNMS and FMSA, San Francisco State University, US Fish and Wildlife Service, Stewards of Slavianka, a non-profit conservation group based in Sonoma County, the Marine Mammal Center and Fitzgerald Marine Reserve.

Results and Discussion

Overall

In 2006, volunteers completed 221 surveys at sites in Marin County at PORE and GOGA between March 1st and July 31st. The combined maximum pup count total for all sites during the breeding season was 1,056 pups (Table 1). The maximum pup count total for just PORE sites, excluding Point Bonita pup numbers in order to compare to previous years, was 1,042 (Table 2). The 2006 pup count is only 6% lower than 2005. Pup numbers appeared to decrease since 2004, and 2006 was the lowest pup count recorded since 1998; however, we did not test for statistical significance (Figure 2). Drakes Estero and Double Point continue to show the highest numbers of pups, together producing 56% of the pups seen for 2006 at PORE and GOGA (Table 1; Figure 3).

The first pup observed in 2006 was on March 9 compared to March 6 in 2005. There is no apparent trend in the date of first pup observed between 2000 and 2006 or in location (Table 4).

The decline in the overall number of pups produced in 2006 compared to the previous five years may be related to changes in marine conditions. Upwelling was much reduced in 2006 and similar to 2005, resulting in reduced krill, which in turn may have affected food availability for harbor seals.

Many, but not all, haul out sites experienced a decline in pup numbers. Pup numbers at Tomales Bay decreased 43% compared to 2005 and were much lower when compared to the mean over the past 4 years. The maximum pup count for Tomales Bay in 2006 fell well below the range of one standard deviation from the five-year mean (Figure 5). Bolinas Lagoon and Drakes Estero, though, both had an increase in pup numbers in 2006, most likely resulting from the decrease in pups at Double Point. Similar fluctuations between these sites have been seen in previous years, such as in 2003 when a northern elephant seal (*Mirounga angustirostris*) disrupted the colony at Double Point resulting in an increase in the number of pups at Drakes Estero and Bolinas Lagoon (Figure 4).

The maximum total count of all seals during the molt season for all sites at PORE and GOGA was 4,709 seals (Table 1). For just PORE sites, the maximum count was 4,560. This count is 6% higher than in 2005 (Table 2). The 2006 molt count total was the highest in the past nine years except for in 2004 when the count was 5,633 (Figure 6). Seals from Drakes Estero and Double Point accounted for 49% of the maximum molt count for PORE and GOGA combined (Table 1; Figure 7).

At PORE, surveyors recorded 135 disturbances between March 1st and July 31st. 120 of these were actual disturbances (disturbances that resulted in a seal response), while 15 were potential disturbances (4% of all disturbances). Of these potential disturbances, 47% (7) were human, 20% (3) were clammers, 20% (3) were motorboats, and 13%(2) were barking dogs. The average rate of actual disturbances per survey in 2006 for PORE sites was 0.76 disturbances per survey. This can be compared to 0.54 disturbances per survey in 2005. Tomales Bay and Tomales Point colonies had the most significant increase in disturbances when compared to previous years (Figure 9). Bolinas Lagoon had the highest rate of disturbance (1.3 disturbances per survey), followed by Tomales

Bay (1.2 disturbances per survey; Figure 8). In 2005, Drakes Estero had the highest rate of disturbance, 1.03 disturbances per survey (Figure 9). Forty-three percent (52) of all disturbances in 2006 resulted in seals flushing into the water.

Twenty-one percent of the actual disturbances in 2006 were caused by humans (Figure 10). Other identifiable disturbances were from non-motorboats (13%), motor boats (11%), and birds (10%). Nineteen percent of disturbances were from unknown sources. These percentages were similar to disturbance data collected from 2002-2005. There was an increase in 2006 in disturbances from motorboats and vehicles and a decrease in disturbances from aircrafts compared to 2005. This decrease is related to a decline in disturbances from "ultralights," low flying aircrafts, in 2006. No aircraft disturbances from 2006 were from "ultralights." Sources of disturbance that produced an increase in the "other" category included construction noise at a residence near Bolinas Lagoon and coyotes on the sandbars at Drakes Estero (Table 3).

There were no observed major mortality events in 2006. Pup numbers declined at Double Point after rebounding from a northern elephant seal disturbance in 2002-2003. The decline in numbers at Double Point mid-season were not explained from field surveys; however, law enforcement rangers reported that a person was rescued by helicopter adjacent to Double Point during the time that the seal numbers declined. Tomales Bay and Bolinas Lagoon pup numbers were the only sites found to have maximum counts significantly different then their average range when compared to the past 5 years.

Two harbor seals pups were picked up by park visitors at Point Reyes in 2006, mistaking the pups for being abandoned. Both pups were picked up from McClurres Beach, one on 4/13/06 and the other on 4/19/06. The pups were taken to the Marine Mammal Center for care. The Marine Mammal Center also released 3 harbor seal pups at Point Reyes at Chimney Rock, one on 7/1/06 and 2 on 6/03/06.

Pup nursing at Point Reyes.

Summary by site

Bolinas Lagoon

29 surveys were completed at Bolinas Lagoon between March 1st and July 31st. Bolinas Lagoon had a high pup count of 174 the week of May 8th, and a peak molt count of 448 the week of July 10th (Table 1). Due to Bolinas Lagoon's close proximity to a highway, the seals are very exposed to humans and traffic and had the highest rate of disturbance this year, 1.3 disturbances per survey (Figure 8). Forty-six percent (17) of disturbances were caused by humans. On more than one occasion, humans were seen walking on the mudflats where seals haul out and one time four children were seen running along the mudflats chasing seals into the water. Twenty-two percent (8) of disturbances were caused by birds. Two of these were from large flocks of Brown Pelicans (*Pelecanus occidentalis*). Bolinas Lagoon had a maximum Brown Pelican count of 1,350 in 2006 which is more than double the number seen in 2005 when the max count was 553. Sixteen percent of disturbances were from vehicles, all being motorcycles. There was construction going on at a nearby residence causing a few of the disturbances early in the season. Although this site had the highest level of disturbance, maximum pup and molt counts did not seem to be affected.

Double Point

30 surveys were completed at Double Point between March 1st and July 31st. Double Point had a high pup count of 247 the week of April 17th, and a peak molt count of 1,086 the week of July 3rd(Table 1). Double Point had one of the lowest disturbance rates, 0.33 disturbances per survey (Figure 8). The remoteness of this site coupled with being surrounded by high cliffs reduces the exposure to human disturbances and may prevent surveyors from identifying the natural sources for disturbance. 40% of the disturbances were from unknown causes and the other few were from aircrafts and motorboats far offshore. The peak pup count in 2006 is one week earlier than all previous years at Double Point, and likely the colony experienced a major disturbance related to a helicopter rescue at the fourth week of April, resulting in seals moving to Bolinas Lagoon (which was much higher in 2006) and Drakes Estero. Unfortunately, no observers were present to document the likely disturbance.

Drakes Estero

33 surveys were completed at Drakes Estero between March 1st and July 31st. Drakes Estero had a high pup count of 347 the week of May 1st, and a peak molt count of 1,228 the week of July 3rd (Table 1). Drakes Estero had the highest pup and molt numbers, and one of the highest levels of disturbance, 0.97 disturbances per survey (Figure 8). Park regulations allow kayaks and canoes back in Drakes Estero after July 1st. After that date 50% of disturbances were a result of these non-motorboats. Prior to July 1st most disturbances were of unknown cause, 47%. Surveyors documented a bobcat and a coyote disturbing seals on sandbars in Drakes Estero. Other sources included low flying large birds such as turkey vultures, hikers and clam diggers on Limantour and Drakes Beaches, and kayaks after July at the end of the seasonal closure.

Duxbury Reef

25 surveys were completed at Duxbury Reef between March 1st and July 31st. Duxbury Reef had a high pup count of 17 the week of May 15th, and a peak molt count of 75 the

week of July 24th (Table 1). Duxbury Reef had one of the lowest rates of disturbance, 0.12 disturbances per survey (Figure 8). The only recorded disturbance that resulted in seals flushing into the water was when two dogs ran out to the haul out site chasing all the seals into the water.

Point Bonita

44 surveys were conducted at Point Bonita. Point Bonita was added to the study area in 2005. The high pup count was14 which is much higher than the previous year's data and the maximum molt count was 149 (Tables 1). Disturbance data was compiled at GOGA and will be analyzed in future reports.

Point Reyes Headland

17 surveys were completed at Point Reyes Headland (PRH) between March 1st and July 31st. PRH had a high pup count of 44 the week of May 8th and a peak molt count of 462 the week of July 17th (Table 1). PRH had the lowest rate of disturbance, 0.06 with only one disturbance recorded, the source of which was a researcher (Figure 8). This haul out site is a primary colony for northern elephant seals. The peak count for northern elephant seals between March 1st and July 31st was 896 the second week of May, which coincides with the peak molt period for elephant seals (PRNS, unpubl. data). The headland is often enshrouded in fog, and consequently, surveys are limited.

Tomales Bay

22 surveys were completed at Tomales Bay (TB) between March 1st and July 31st. Tomales Bay had a high pup count of 108 during the week of May 1st, and a peak molt count of 681 the week of July 17th (Table 1). The disturbance rate doubled in the past year from 0.6 disturbances per survey in 2005 to 1.2 disturbances per survey in 2006 which is significantly greater than the average range of disturbances over the past 4 years (Figure 8; Figure 9). This site also had a significant decrease in pup numbers as well (Figure 5). 38% of disturbances were from motorboats, and represents the most motorboat incidences seen over the season. 23% of the disturbances were from non-motorboats. Other disturbance sources include clammers, aircrafts, and birds.

Tomales Point

21 surveys were completed at Tomales Point (TP) between March 1st and July 31st. Tomales Point had a high pup count of 105 the week of April 17th, and a peak molt count of 580 the week of July 5th (Table 1). The disturbance rate was 0.62 disturbances per survey (Figure 8). 54% of these disturbances were caused by humans, either hikers on the beach or abalone divers. The rate of disturbance continues to increase at Tomales Point, this year being significantly higher than the average range of previous years (Figure 9). The point is often enshrouded in fog, and consequently, surveys are limited.

Regional Sites

Twelve regional surveys were completed, starting on March 4, and ending July 29, at 22 locations. The seasonal peak for pups was during the week of May 6 and the peak for molting seals was during the week of July 15. The maximum number of seals during the breeding season was 5,101 and the average was 3209.2. The maximum number of seals during the molt was 5,285, with an average of 4,152.8 (Table 5). Point Reyes had the highest concentration of seals with Double Point and Drakes Estero accounting for 35%

of adults during the breeding season, 46% of pups produced, and 37% of molting seals. The maximum count of pups was 1,157 and the first pups were identified at Double Point on March 4th. Of the 22 areas surveyed simultaneously, only 3 produced >100 pups (Tomales Point, Drakes Estero, and Double Point). Within San Francisco Bay, Castro Rocks accounted for the majority of seals, followed by Mowry Slough, a reversal of last year's surveys. Sonoma County coast haul out sites were composed of a number of small sites with larger concentrations at Sea Ranch and Jenner. San Mateo County coast sites were also composed of a number of small sites adding up to larger concentrations at Pebble Beach and Fitzgerald Marine Reserve. No seals were counted during surveys at Bean Hollow during the entire season. Cowell Ranch Beach and Fitzgerald Marine Reserve accounted for most of the seals counted in the county, but few pups were recorded there (45).

Disturbances during surveys ranged from a male northern elephant seal attacking harbor seals at Jenner to people on foot, tide pooling at Point Bonita. Seals at Double Point were disturbed by a helicopter during a cliff rescue of a park visitor, resulting in reduced pupping at this site compared to the previous year. The primary sources for disturbance at San Francisco Bay were loud vehicles on the Richmond San Rafael Bridge at Castro Rocks, aircraft and motor boats at Yerba Buena Island.

Collaboration

Point Reyes National Seashore and Golden Gate National Recreation Area collaborated with multiple government agencies, non-profit organizations and individuals on projects related to the harbor seal population of central California. The parks collaborated with NOAA on a Tomales Bay stewardship program called SEALS. Park rangers ferried docents on boats out onto the mud flats in Tomales Bay to educate visitors and clam diggers about seals twice during the pupping season. The parks also collaborated with the Marine Mammal Center on a study of harbor seal health that will be initiated in 2007 at Tomales and San Francisco Bays.

Harbor seals on floats in Tomales Bay.

Summary

Compared to 2005, the total pup numbers at PORE and GOGA were lower in 2006 and the molt numbers were higher. The numbers for both seasons were comparable to previous years and within the normal range of variation, but the maximum pup count for 2006 was the lowest recorded since 1998. The pup counts at PORE sites appear to be decreasing since 2004; however, we did not test the statistical significance of this decline. The molt counts for 2006 were the highest recorded in the last nine years other than in 2004. The rate of disturbances per survey on the weekends at PORE sites have increased since 2005. Disturbances were site specific; however, humans on foot and boaters remain the two most frequent sources of human related disturbance across all sites.

Harbor seal haul out at Tomales Point

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Table 1. Summary data of harbor seal colonies for the 2006 season. All reported numbers reflect the maximum number seen during a single census over the entire season, March 1 to July 31. Max # Breed = adults, immatures and pups during the breeding season, March 1 to May 31. Max # Molt =all age classes during the molting season, June 1 to July 30. The percent of red seals is a percentage of the maximum total number of seals recorded at each site the day the red seal count was at a maximum. The number of surveys and disturbances are from March 1 to July 31, only disturbances that caused a response were used.

Site	Max # Breed	Max # Pups	Max #Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Bolinas Lagoon	361	174	448	Weekday: 18 Weekend: 11	Weekday: 9 Weekend: 28	14	6 %	4	4
Double Point	579	247	1086	Weekday: 19 Weekend: 11	Weekday: 6 Weekend: 4	5	.6 %	3	3
Drakes Estero	784	347	1228	Weekday: 18 Weekend: 15	Weekday: 22 Weekend: 10	13	1.5 %	3	3
Duxbury Reef	72	17	75	Weekday: 17 Weekend: 8	Weekday: 1 Weekend: 2	0	0 %	0	1
Point Reyes Headlands	129	44	462	Weekday: 15 Weekend: 2	Weekday: 1 Weekend: 0	1	1.4 %	0	1
Tomales Bay	503	108	681	Weekday: 8 Weekend: 14	Weekday: 10 Weekend: 16	12	2.9 %	2	1
Tomales Point	362	105	580	Weekday: 9 Weekend: 12	Weekday: 6 Weekend: 5	5	.9 %	0	1
Point Bonita	114	14	149	Weekday: 34 Weekend: 10	Weekday: 45 Weekend: 7	3	2.5 %	1	0
2006 Total:	**2,904**	**1,056**	**4,709**	**221**	**172**	**53**		**13**	**14**

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Table 2. Summary of survey data for 1997-2006, combining all sites at Point Reyes (excluding Point Bonita for comparison between years). Maximum # of Breed and Molt, and Average # Breed include all age classes. Number of surveys and disturbances are the number completed or recorded from the start of the year (Jan 01 to July 31).

YEAR	Max # Breed	Average Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Disturbances Per Survey
1997	3,268	1,830.50 SE = 379 N =4	983	NA	Weekday: 44 Weekend: 29 Total: 73	Weekday: 9 Weekend: 37 Total: 46	0.2 1.3
1998	2,481	1,744.60 SE = 122.5 N = 8	528	3,070	Weekday: 79 Weekend: 64 Total: 143	Weekday: 24 Weekend: 46 Total: 70	0.3 0.7
1999	3,325	1,779.90 SE = 173.5 N = 10	1,068	2,863	Weekday: 139 Weekend: 69 Total: 208	Weekday: 71 Weekend: 54 Total: 125	0.5 0.8
2000	3,506	2,511.10 SE = 224.4 N = 7	1,342	3,108	Weekday: 106 Weekend: 91 Total: 197	Weekday: 78 Weekend: 116 Total: 194	0.7 1.3
2001	3,485	2,218.80 SE = 244.8 N = 4	1,247	3,769	Weekday: 112 Weekend: 119 Total: 231	Weekday: 57 Weekend: 107 Total: 164	0.5 0.9
2002	4,180	2651.3 SE = 119.7 N = 8	1193	4297	Weekday: 123 Weekend: 144 Total: 267	Weekday: 67 Weekend: 102 Total: 169	0.5 0.7
2003	3820	2280 SE = 303.9 N = 9	1117	4534	Weekday: 172 Weekend: 115 Total: 287	Weekday: 86 Weekend: 83 Total: 169	0.5 0.7
2004	4534	2518.3 SE = 348.6 N = 10	1267	5633	Weekday: 161 Weekend: 97 Total: 258	Weekday: 52 Weekend: 53 Total: 105	0.3 0.5
2005	2,733	2182.3 SE = 195.1 N= 11	1,109	4,283	Weekday: 166 Weekend: 78 Total: 244	Weekday: 80 Weekend: 29 Total: 109	0.5 0.4
2006	2,790	2316.8 SE = 225 N= 12	1,042	4,560	Weekday: 130 Weekend: 76 Total: 206	Weekday: 56 Weekend: 66 Total: 122	0.5 0.9

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Table 3. Causes for disturbance during 2002-2006 for Point Reyes sites; percent is of total actual disturbances from March 1st to July 31st.

Year	Type of Disturbance								
	Motor boat	Non-motor boat	Vehicle	Dog	Aircrafts	Human pedestrian	Bird	Unknown	Other
2002	13%	16%	6%	0.50%	11%	24%	6%	21%	2%
2003	13%	20%	2%	0%	9%	21%	7%	23%	6%
2004	5%	10%	8%	2%	3%	39%	7%	25%	2%
2005	8%	13%	1%	0%	15%	25%	9%	23%	6%
2006	11%	13%	5%	1%	7%	21%	10%	19%	13%

Table 4. Date of first pup by year at Point Reyes, including all sites.

Year	Date
2000	14-Mar
2001	16-Mar
2002	3-Mar
2003	27-Mar
2004	20-Mar
2005	6-Mar
2006	9-Mar

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Table 5. Regional surveys of harbor seals in central California, March 1 through July 31 2006. Twelve surveys were scheduled, 7 during the breeding season and 5 during the molt, but some sites could not be surveyed all dates because of logistics or weather. ND=nod data.

Location	Breeding Season				Molt Season		
	Average	SE	Total* Max	Pup* Max	Average	SE	Total Max
Sonoma County							
Sonoma Coast	140.50	93.96	248	71	239.50	47.59	302
Fort Ross	49.00	28.93	97	14	ND		
Jenner	78.80	62.77	179	30	294.50	174.66	418
Marin County							
Tomales Bay	418.25	64.05	503	88	584.25	97.60	681
Tomales Point	264.13	123.02	462	105	399.00	153.85	540
Point Reyes Headland	85.63	64.39	219	35	363.75	134.74	462
Drakes Estero/Limantour	657.50	240.81	1002	288	850.25	132.70	975
Double Point	506.50	123.05	723	237	680.25	231.76	904
Duxbury Reef	43.25	16.88	73	17	35.75	29.08	75
Bolinas Lagoon	189.50	66.65	286	82	360.00	111.30	448
Point Bonita	46.25	35.50	106	13	77.75	32.44	119
San Francisco Bay							
Alcatraz	4.17	1.94	6	0	1.00	ND	1
Castro Rocks	202.40	94.46	339	37			
YBI	61.50	10.71	81	4	140.33	64.08	190
Newark Slough	18.20	14.70	38	11	2.25	4.50	9
Mowry Slough	112.00	74.38	229	58	124.25	30.70	161
San Mateo County							
Point San Pedro	15.00		15	0	ND		
Cowell Ranch	73.60	27.37	112	20	ND		
Pescadero	28.80	21.99	55	6	ND		
Pebble Beach	59.20	15.59	82	25	ND		
Bean Hollow	0.00	0.00	0	0	ND		
Fitzgerald Marine Reserve	155.00	81.96	246	16	ND		
ALL SITES	3209.17		5101	1157	4152.83		5285

*Based on the total for a single day.

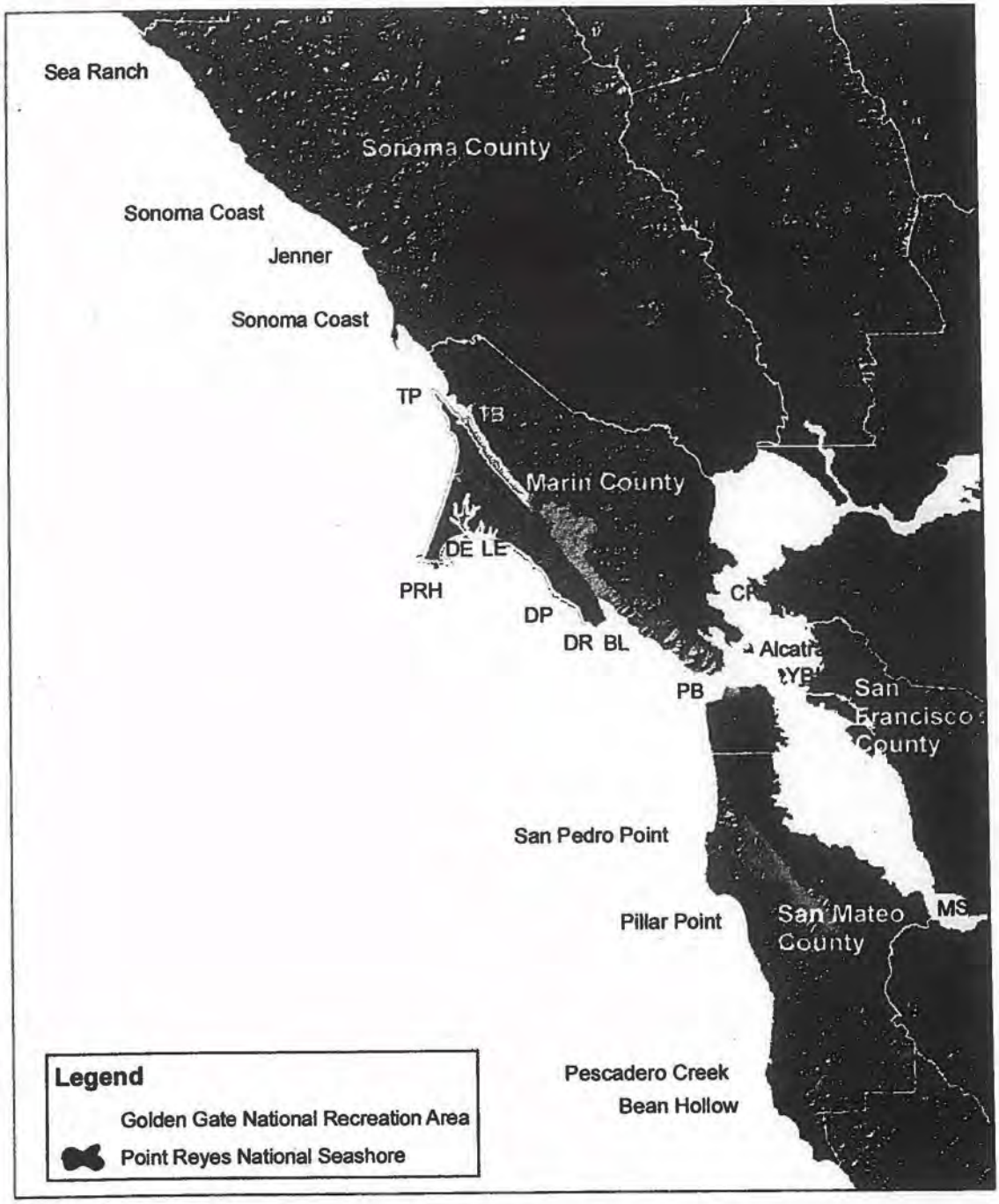


Figure 1. Harbor seal haul out sites in Marin County and San Francisco Bay, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Figure 2. Total Pup Counts at PORE (excluding Point Bonita) from 1997-2006 seasons. See text for methods.

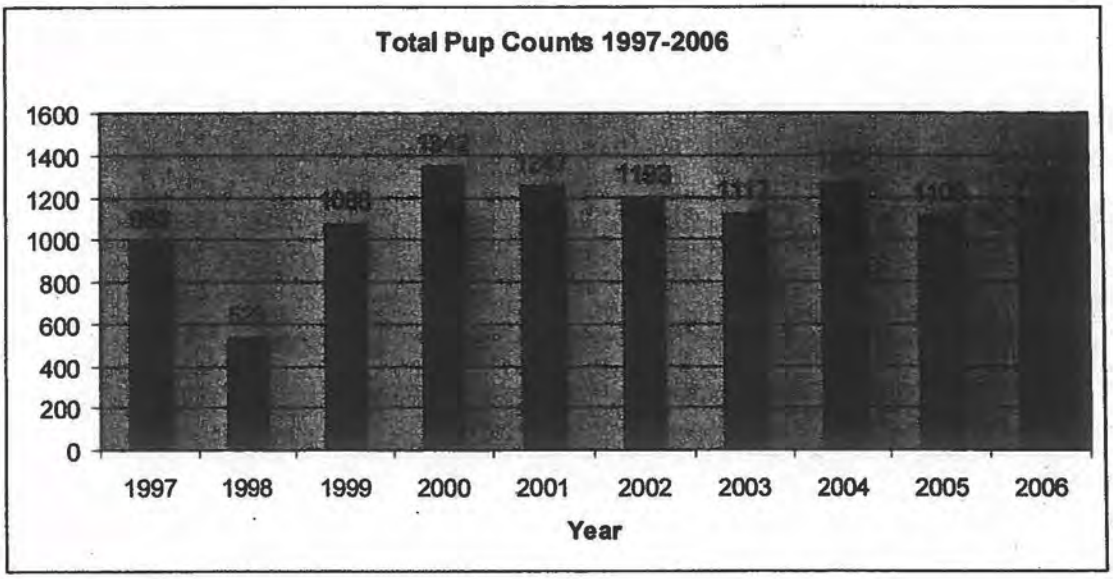


Figure 3. Maximum pup counts by site at PORE and GOGA during the 2006 season. See text for methods.

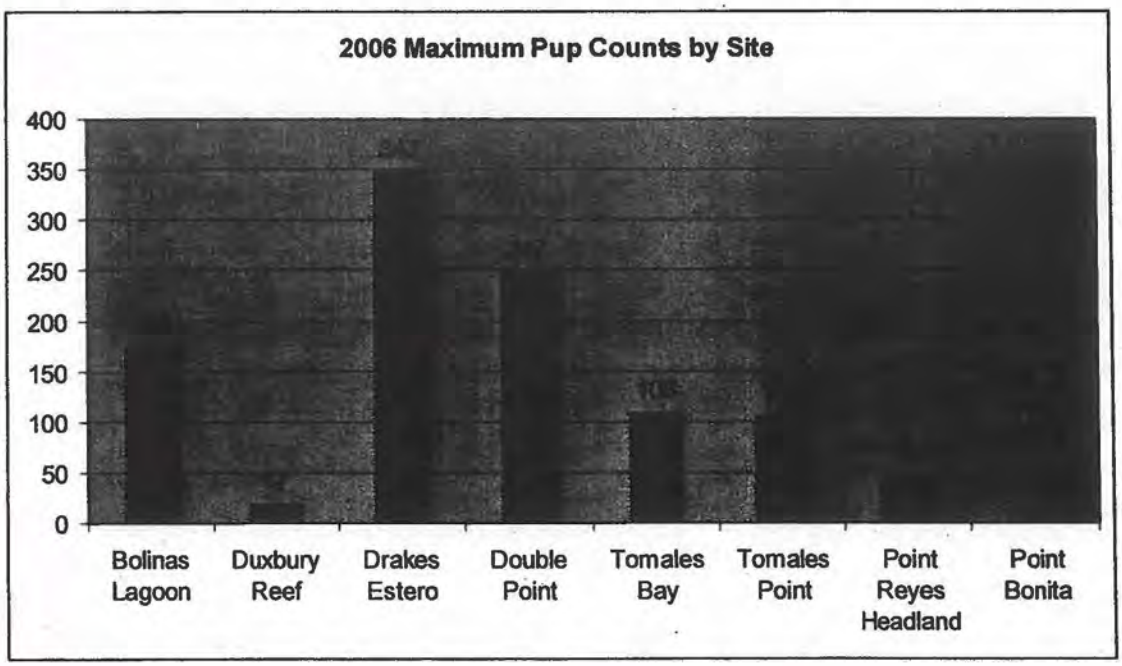


Figure 4. Maximum pup counts by site at PORE, 2002-2006 seasons. See text for methods.

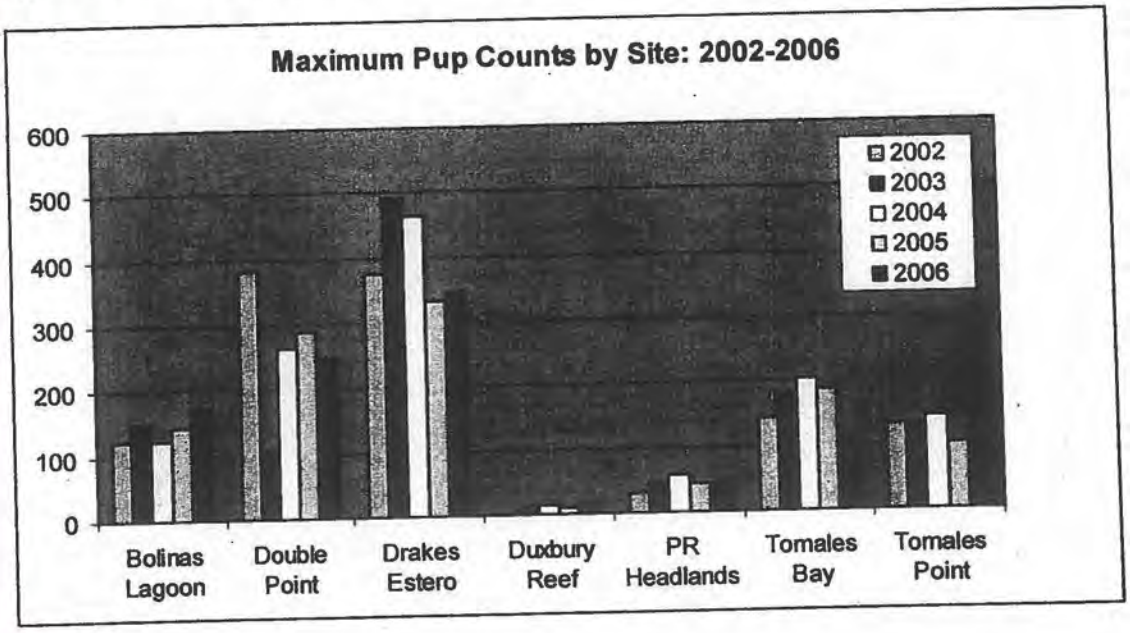


Figure 5. Maximum pup counts for Tomales Bay 2002-2006 showing a range of (mean ± one standard deviation). See text for methods.

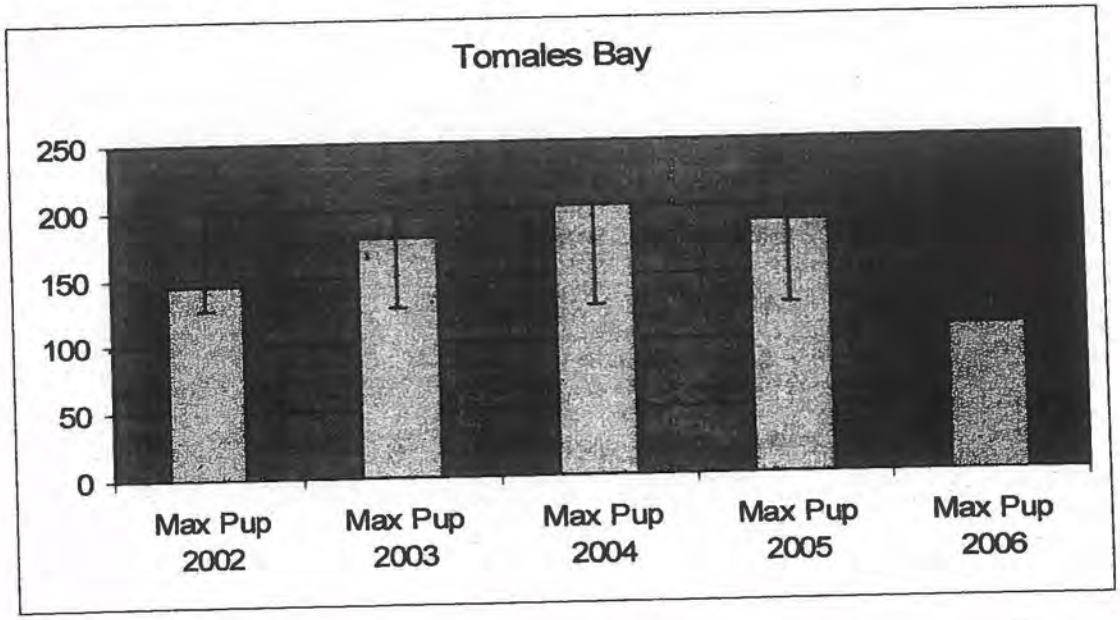


Figure 6. Total molt counts for PORE (excluding Point Bonita) from 1998-2006 seasons. See text for methods.

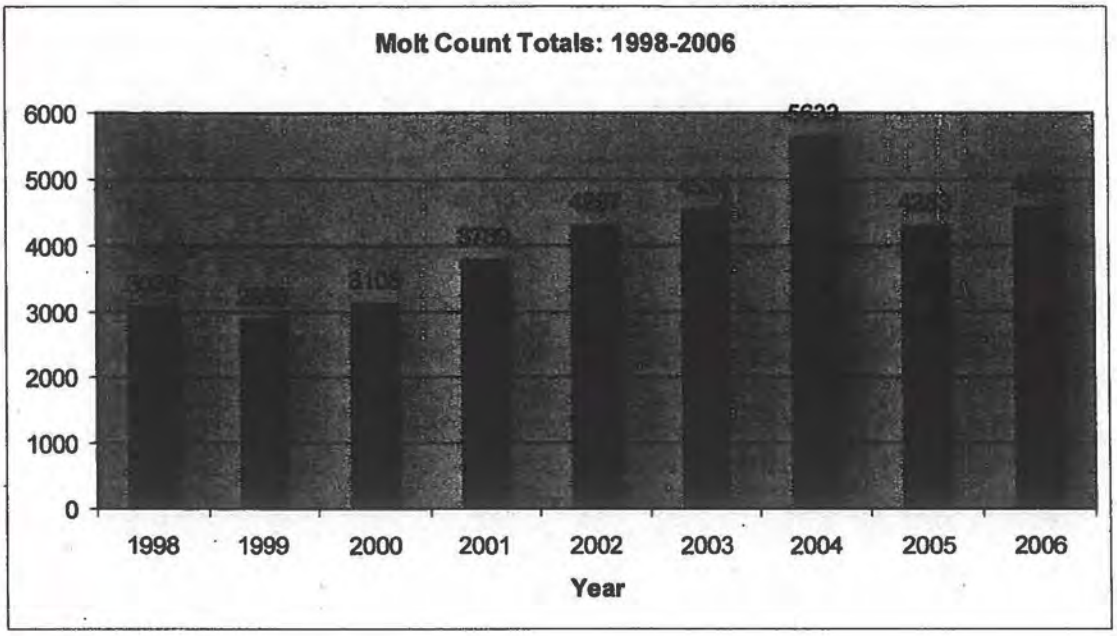


Figure 7. Maximum molt counts by site for PORE and GOGA during the 2006 season. See text for methods.

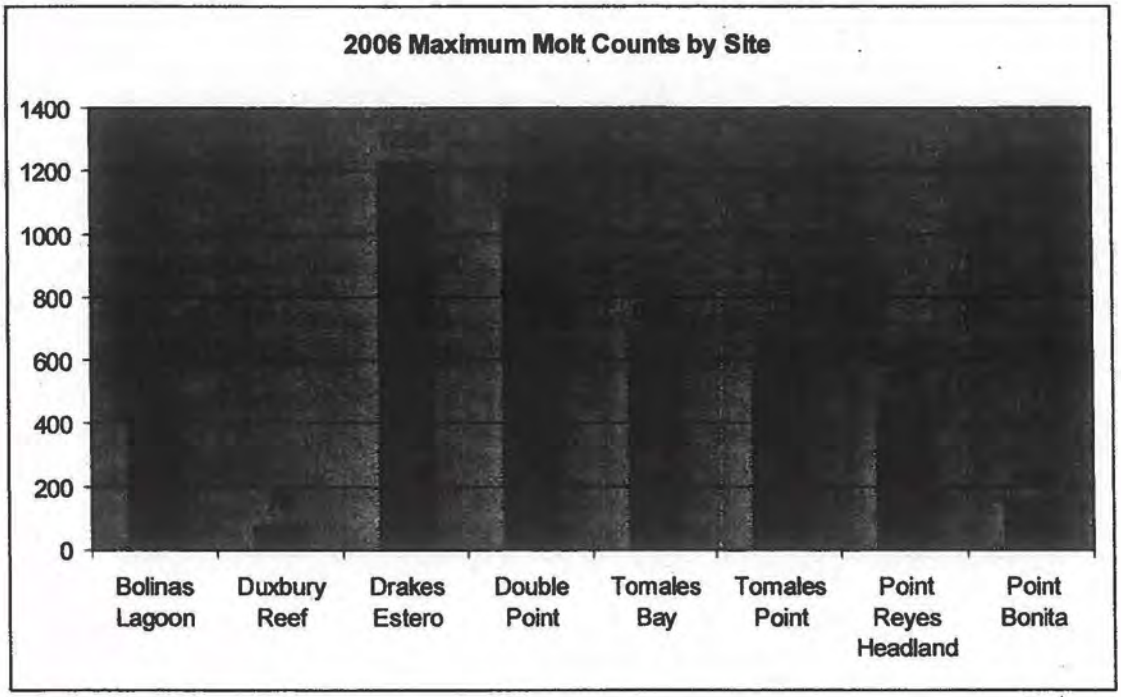


Figure 8. Average number of disturbances per survey, by site at Point Reyes, 2006. See text for methods.

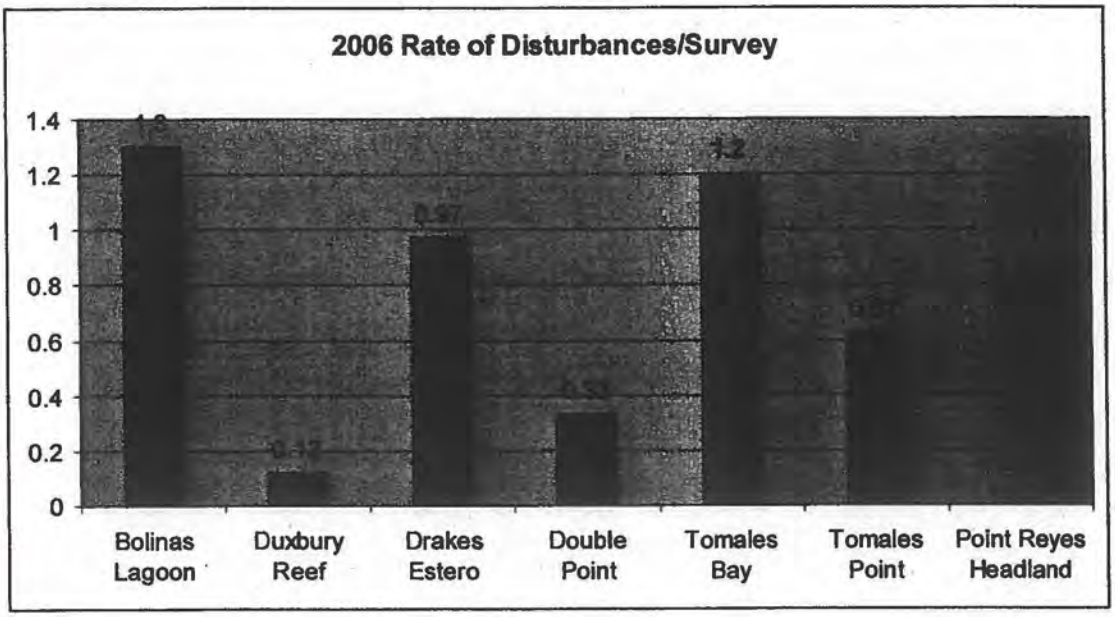


Figure 9. Average number of disturbances per survey, by site at Point Reyes for 2003-2006. See text for methods.

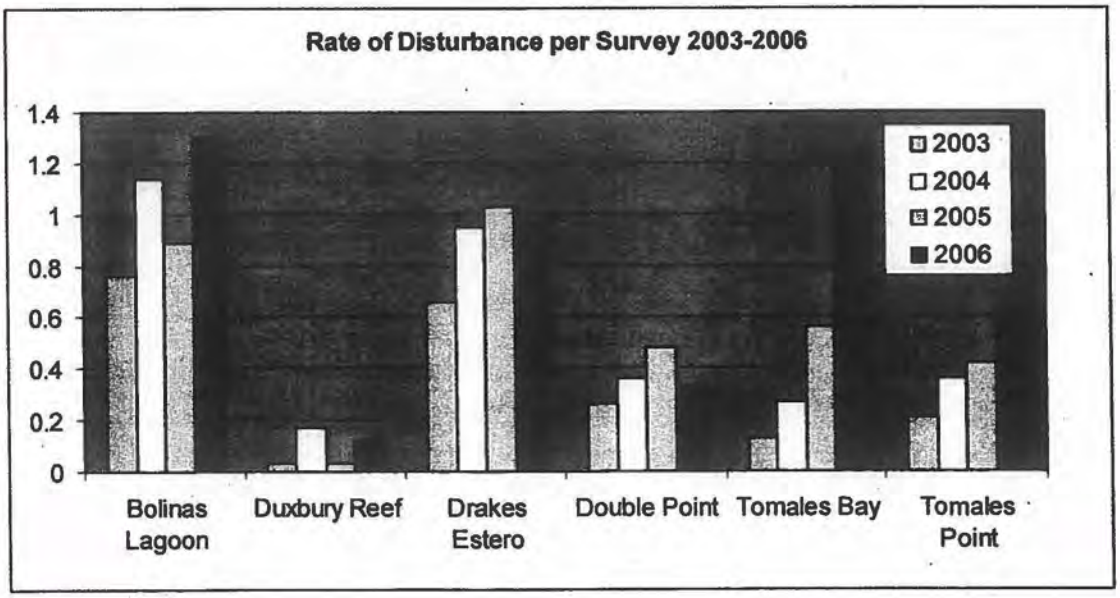
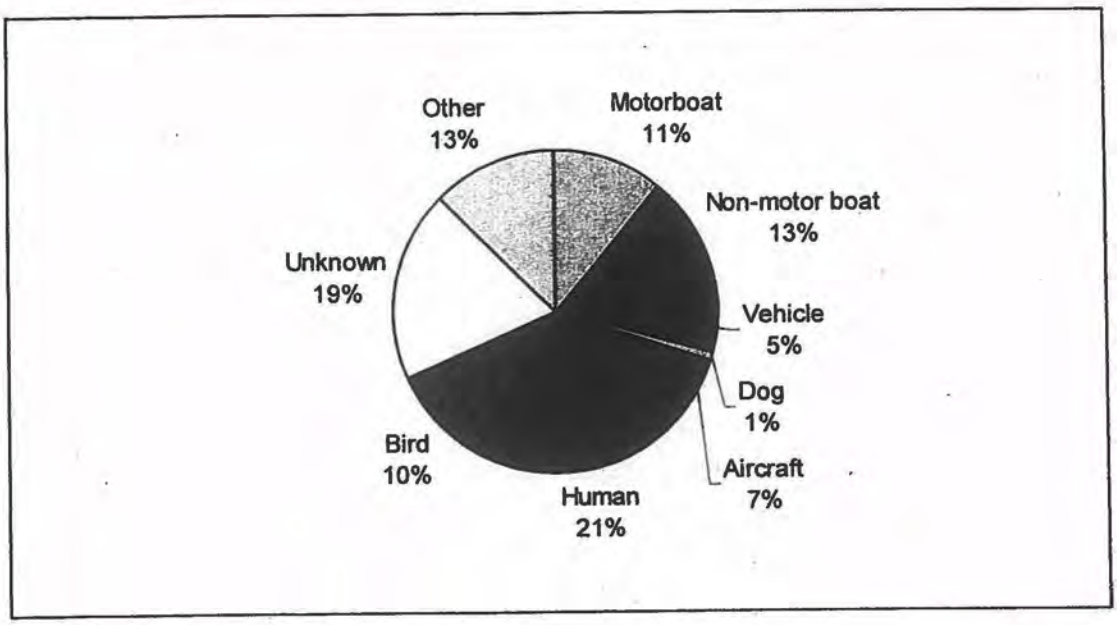


Figure 10. Causes for disturbance by percent for all of Point Reyes sites in 2006.



Volunteer training at Drakes Estero.

#5

NOAA Technical Memorandum
NOS MEMD 6

MOVEMENT AND ACTIVITY PATTERNS OF HARBOR SEALS (PHOCA VITULINA) FROM THE DRAKES ESTERO POPULATION, CALIFORNIA, 1985-86

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Washington, D.C.
August 1987

UNITED STATES DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration / National Ocean Service

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Office of Ocean and Coastal Resource Management
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REPORT TO
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

NOAA TECHNICAL MEMORANDA SERIES NOS/MEMD

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INTRODUCTION

Harbor seal colonies in the Point Reyes area, Marin County, contribute about 20% of the mainland California breeding population (Allen and Huber 1984, Hanan et al. 1986) and consequently deserve attention when devising regional management policies. Estimates for the size of the state and Point Reyes populations are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. Consequently, estimates are rough, and are likely low. In addition, it is difficult to relate numbers among seasons. This problem is not unique to the Point Reyes population.

Several researchers have addressed the problem using marked animals and have derived correction factors with varying attendance patterns based on location, time of day, and season of year (Brow.. and Mate 1981, Pitcher and McAllister 1981, Stewart and Yochem 1983, and Sullivan 1979). Stewart and Yochem (1983) for the Channel Islands and Sullivan (1979) for Humboldt Bay, California, found that seals spent about 40% of each day hauled out. Stewart and Yochem (1983) determined that marked seals hauled out on 65% of the days in May, 58% in June, and 35% from October through December. Pitcher and McAllister (1981) estimated that seals in Alaska hauled out on 50% of the days in June and 41% in August, and Herder (1986) found that seals in the Klamath River area hauled out on average 56% of the days in April and 64% in May.

These researchers determined that the differences between total number hauled out and the estimated population were a function of variations in

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daily haul-out patterns as well as movements to other areas. Brown and Mate (1983) determined that dispersal accounted for seasonal changes in the number of seals hauled out in Oregon. Movements appeared to be associated with seasonal changes in reproductive status and in response to feeding strategies (Brown and Mate 1983, Herder 1986). Seals at the Klamath River, California, moved locally to alternate haul out sites year round and dispersed long distances in winter months (Herder 1986). With the exception of one inter-island movement, Stewart and Yochem (1983) found seal movements were local, leading them to conclude that reduced hauling frequency accounted for the decline in seal numbers during the fall and winter months.

In the Point Reyes area we determined previously that seals displayed diurnal and seasonal variation in haul-out patterns (Allen and Huber 1983, 1984). Diurnal and tidal effects on seal haul-out behavior varied within an optimum range with most seal hauled out from mid-day to late afternoon at low to medium tides, depending on the physical attributes of each location. The diurnal pattern was similar to that of the southern Channel Islands (Stewart 1984), Mowry Slough in San Francisco Bay (Fancher 1979), Southeast Farallon Island (Ainley et al. 1977), and Bolinas Lagoon (Allen et al. 1985). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods. Maximum numbers reached 2449 in May and 2502 in June 1983-84. During the fall and winter, the maximum number of seals was around 1000 animals. It appeared that seals were either moving to other haul-out sites outside of Point Reyes in the winter, or spending more time at sea.

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Information on seasonal activity patterns and fall/winter movements would be invaluable for any long-term management program for seals in the Point Reyes area, and, in conjunction with results accumulated elsewhere (Stewart and Yochem 1983; Herder 1986), could provide more accurate estimates of the California harbor seal population.

In an effort to identify movement and seasonal activity patterns, we undertook a radio-tagging program of harbor seals in Point Reyes. We chose this method based on the successful results obtained from radio-telemetry studies by Brown and Mate (1983), Herder (1986), Pitcher and McAllister (1983), and Stewart and Yochem (1983). Our main objectives were to determine 1) if the apparent decline in seal numbers during the winter months was a function of dispersal and seasonal movements, or a reduction in the frequency of the haul-out pattern, 2) the destination of departing animals, 3) daily and seasonal variability in haul-out behavior, and 4) if gender accounted for variations in the above.

STUDY AREA AND METHODS

Drakes Estero is an estuary where seals haul out on tidal mud flats exposed at low, medium, and medium-high tides, as well as on the tip of Limantour Beach exposed at all tide levels. This location is one of the main breeding areas in the Point Reyes area (Figure 1). Significantly more seals were present during the spring and summer than during fall or winter; however, in contrast to the two other important areas, Tomales Point and Double Point, seals were present in substantial numbers year round (Allen and Huber 1983, 1984). A maximum of 122 pups was counted in May 1983, accounting for 19% (122/656) of the total numbers of seals present. Twenty-three percent (122/527) of all pups in the Point Reyes area occurred at Drakes Estero in 1983.

We chose to tag seals at Drakes Estero because of its significance to the Point Reyes population, because seals there exhibited the seasonal and diurnal activity patterns characteristic of seals elsewhere in the area, and because the capture technique we wished to use was only possible in an estuarine environment.

Over a two-day period (July 31 - August 1) in 1985, we successfully captured about 60 seals and affixed radio transmitters to 17 (nine males and eight females). Our intention was to obtain a sample size of 10 females and 10 males, rather than to randomly capture and tag whatever seals happened to be caught; therefore, we released unmolted and immature seals. Personnel from the Point Reyes National Seashore, the Point Reyes/Farallon Islands National Marine Sanctuary, the National Marine Fisheries Service, the California Department of Fish and Game, the Oregon

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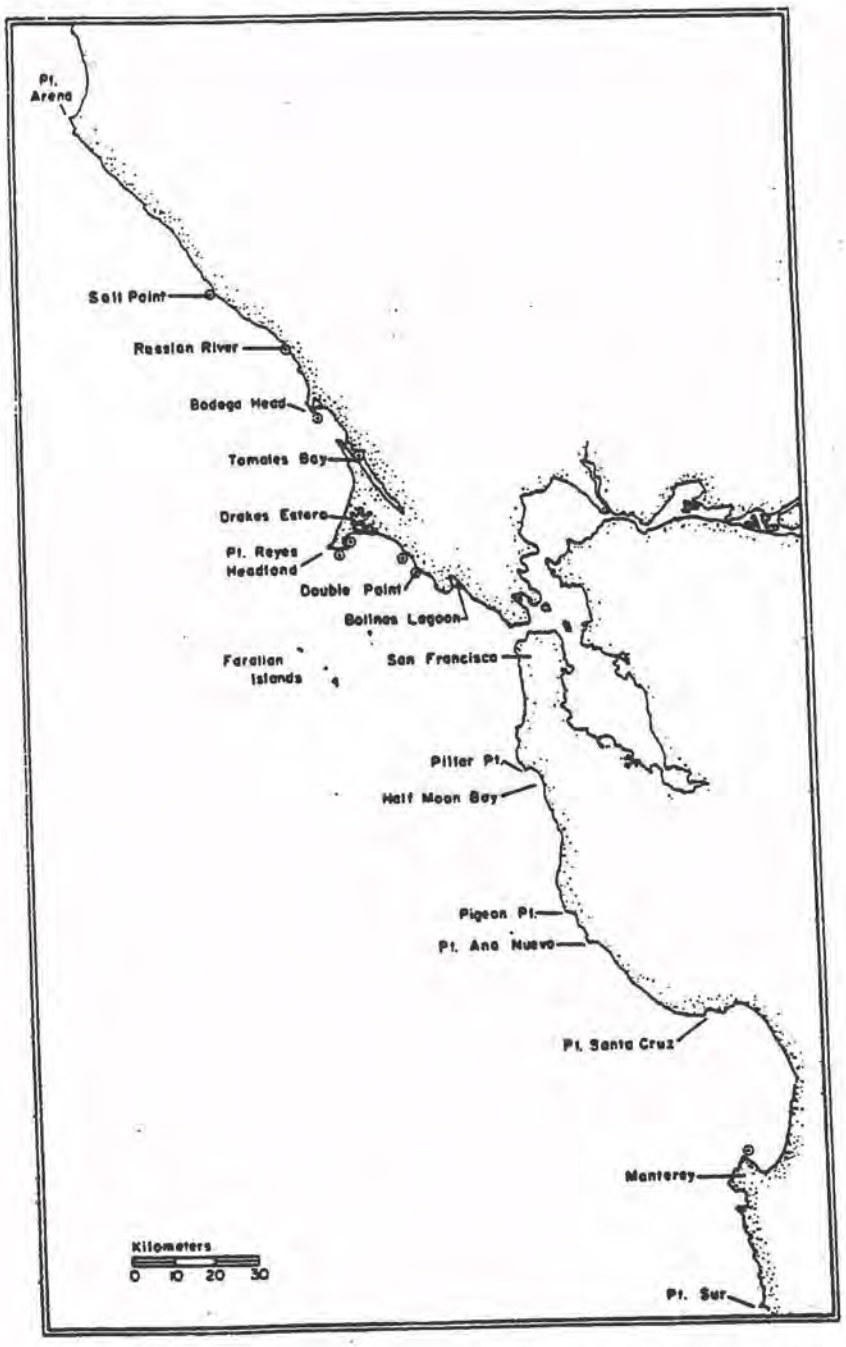

FIGURE 1. Capture site and locations of movement of harbor seals in California, 1985-1986.

Department of Fish and Wildlife, and the Point Reyes Bird Observatory assisted in the capture. We captured seals in a 60-fathom long gill net, with 8-inch mesh, set off the haul-out site and then pulled ashore. Two power boats were used to deploy the net adjacent to the haul-out site. The lead boat carried the net on a platform set above the transom. This boat approached the hauled out seals as rapidly as possible, set the net as the seals entered the water, and then landed on the far side of the haul-out beach. The second boat retrieved the other end of the net and landed. A third boat carried supplies and additional personnel for handling the seals. This method of capture was successfully developed and used in Washington and Oregon for capturing harbor seals in estuaries and enabled the researcher to capture a large number of seals over a short period of time, thereby minimizing the duration of disturbance days to the herd (Beach et al. 1985).

Captured seals were removed from the large net and individually placed in small hoop nets. This temporarily restrained the animals before they were tagged and reduced aggressive interactions between seals, thus reducing injury. Seventeen people were involved in handling the seals. One person recorded data, three weighed seals, two monitored the condition of seals retained in hoop nets, two marked seals with flipper-tags, two to three restrained seals being tagged, one attached the radio transmitter, and one supplied the equipment (tags, resin, etc.). All 17 people were needed to pull the net ashore and place seals in hoop nets.

Captured seals were weighed, measured (length and girth), sexed, flipper-tagged, dye-marked, and radio-tagged. The average time required to

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accomplish this was 15-20 minutes per seal. When the tide level began to flood the haul-out site, any remaining seals were transferred by boat to the mainland for processing. Red Woolite sheep dye which lasts for about three months was used to mark each seal for easy visual resighting. Fourteen seals were flipper-tagged with lime green "Riese" cattle ear tags supplied by NMFS. Two neoprene patches with an individual number code and a color code for gender were glued with "Lock-tight" super glue to the fur between the shoulder blades to provide an additional visual mark. A radio transmitter manufactured by Advanced Telemetry Systems, Inc. (Bethel, Minnesota) was glued to the fur on the back of the seal's head with "Devcon" 5-minute epoxy (for attachment procedures see Beach et al. 1985). By attaching the radio tag to the head of the seal we were able to locate seals when they were in the water. Radio transmitters were 9 x 3 x 3 cm, weighed 60 gms, had a 13-inch flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute.

We monitored seals with an automated recording station and aerial surveys. The automated recording station was established on a bluff overlooking Drakes Estero and consisted of an "Esterline Angus" 20-channel strip chart recorder, a programmable scanning receiver, a 12-volt marine battery, and a "Yagi" antenna. The station recorded seals within a two-mile radius on a 24-hour basis. Each frequency was monitored by the scanning receiver for 32 seconds and was scanned five to six times per hour. A seal was considered hauled out if it was recorded with two strong pen marks in a row within a half-hour period; a seal was considered in the

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vicinity but in the water if a strong pen mark in conjunction with two weak marks within a half-hour was recorded. We manually checked frequencies to determine if radio interference from the nearby radio communication facilities (U. S. Coast Guard Station and RCA Gobal Communications Center) triggered pens and found that interference did not hinder distinguishing whether a seal was hauled out. Radio interference on one frequency prevented our distinguishing whether one animal was in the water but did not hinder our distinguishing when it was hauled out; interpretation was not impaired for the other frequencies. A test transmitter was placed near the remote station to verify that the receiving system was functioning properly. The remote receiving station was in operation from July 31 through September 5, and from October 25 through December 31, 1985; and from January 1 through February 16, and February 21 through April 30, 1986.

We checked and maintained the remote station almost daily in August and semi-weekly for the rest of the study period. During visits we scanned all frequencies and checked for signal drift. Each signal was checked for a period of five to ten minutes to detect seals in the water. We based this scan period from averaging dive times of tagged seals during the first month of the project ($\bar{x}$ = 3 min, range = 5 sec - 9 min 45 sec, SD = 2 min, n = 76). We made visual searches for marked animals to check for transmitter loss or failure.

We also conducted all-day censuses at Drakes Estero to compare the diurnal haul-out pattern of the herd with those of individually marked seals. For both summer and winter, individual patterns were similar to those of the herd (Table 1). Consequently, we were confident in making

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Table 1. Diurnal haul-out pattern of the herd in comparison to that of radio-tagged seals at Drakes Estero during the summer and winter seasons; herd = total number of seals hauled out, tagged = total number of tagged seals hauled out, and proportion = the proportion of tagged seals hauled out to the total number of resident, tagged seals.

	TIME (PST)									
	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600
SUMMER										
Aug 6										
Herd	453	397	429	462	365	259	81	36	17	21
Tagged	8	8	8	9	7	7	3	3	0	0
Proportion	0.6	0.6	0.6	0.6	0.5	0.5	0.2	0.2	0	0
Aug 13										
Herd	387	378	325	94	24	106	89	173	192	70
Tagged	5	7	7	5	3	3	4	4	5	2
Proportion	0.5	0.7	0.7	0.5	0.3	0.3	0.4	0.4	0.5	0.2
Aug 20										
Herd	389	427	261	372	316	51	1	0	0	6
Tagged	8	8	5	9	8	4	0	0	0	0
Proportion	0.8	0.8	0.5	0.9	0.8	0.4	0	0	0	0
Aug 27										
Herd	257	241	174	56	60	72	211	248	265	157
Tagged	3	3	4	2	2	3	8	8	9	9
Proportion	0.3	0.3	0.4	0.2	0.2	0.3	0.8	0.8	0.9	0.9
Sep 3										
Total	100	230	355	252	210	48	0	0	3	24
Tagged	3	4	4	5	5	2	0	0	1	2
Proportion	0.3	0.4	0.4	0.6	0.6	0.2	0	0	0.1	0.2
WINTER										
Jan 1										
Herd	190	266	404	467	467	497	192	70	66	0
Tagged	4	4	7	8	8	8	3	1	1	0
Proportion	0.5	0.5	0.9	1.0	1.0	1.0	0.4	0.1	0.1	0
Jan 7										
Herd	0	0	0	0	157	329	419	497	498	506
Tagged	0	0	0	0	5	6	7	7	7	7
Proportion	0	0	0	0	0.7	0.9	1.0	1.0	1.0	1.0
Jan 15										
Herd	309	364	413	456	462	451	229	110	RAIN	
Tagged	3	3	4	4	5	6	5	4	0	
Proportion	0.4	0.4	0.6	0.6	0.7	0.9	1.0	0.6	0	
Jan 20										
Herd	0	0	14	124	310	372	464	476	467	445
Tagged	0	0	0	2	4	4	5	5	4	4
Proportion	0	0	0	0.3	0.6	0.6	0.7	0.7	0.5	0.6
Jan 18										
Herd		212	210	165	79	64	100	100	110	110
Tagged		4	4	3	3	3	3	3	3	4
Proportion		0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.6

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assumptions regarding herd behavior from data derived from monitoring individuals at Drakes Estero until the spring (after the month of March) when two transmitters that were still functioning were too few to make valuable comparisons. During the all-day censuses we also verified the accuracy of the equipment in distinguishing the presence or absence of seals and whether they were hauled out or in the water.

To locate dispersing seals we attempted to make weekly aerial surveys along the California coast from Monterey Bay to the California/Oregon border. Seals were monitored with a scanning receiver and two wing-mounted, two-element antennae from Telonics (Mesa, Arizona), and frequencies chosen were continuously scanned for three seconds each. When a seal was located, activity, time, and location were recorded. Most flights ranged from Point Arena south to Half Moon Bay and into San Francisco Bay. The flights varied depending on which animals we were trying to locate. We scheduled flights on days when tides were low to medium to maximize numbers of seals hauled out.

DATA ANALYSIS

We defined seals as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" as those which departed in the fall but returned during the following breeding season, and "transients" as those present at Drakes Estero during the capture but which resided away from Drakes Estero during the rest of the study period. Seal behavior at Drakes Estero was classified as either 1) hauled out, 2) in the water, or 3) absent. All information recorded on the Esterline Angus strip charts

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was transferred to the "DBase III" database system. The "SPSS statistical program for micro-computers" was used for all analyses. Analyses presented here are exploratory and primarily descriptive since this is the first of a two-year study. Averages are expressed with $\pm$ standard error. We chose August and December data to illustrate some of the seasonal differences in haul-out behavior.

RESULTS

We captured and radio-tagged 17 seals (eight females, nine males) and flipper-tagged two additional males (Table 2). On average, males weighed 27.5 kg more, and were 10.2 cm longer than females. On the day after capture, all but two of the radio-tagged seals were hauled out again at Drakes Estero, and on the third day after capture all but one seal was hauled out. All but two transmitters (88%) remained attached to seals for a minimum of five months, nine (53%) for seven months, six (35%) for eight months, and one for nine months (Table 3). We were able to locate regularly, either visually or with a receiver, all but one animal through April 1986.

MOVEMENTS

All radio and flipper tagged seals were resighted at Drakes Estero at least once during the study period. Two seals with transmitters that ceased functioning within the first month of study were excluded from all analyses; the two animals involved remained at Drakes for the entire year. Radio-tagged seals moved both north and south of the capture site;

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Table 2. Standard measurements of harbor seals tagged at Drakes Estero, August 1985. (RT = Radio Tag, FT = Flipper Tag.)

Radio Tag	Age	Sex	Length(cm)	Girth(cm)	Weight(kg)	Comments
RT024	AD	F	146	98	63.5	
RT033	AD	F	138	95	56.7	
RT092	AD	F	148	96	55.8	
RT234	AD	F	147	120	86.2	
RT313	AD	F	145	103	63.5	
RT415	AD	F	131	94	50.0	
RT491	AD	F	121	94	56.7	
RT710	AD	F	138	96	63.5	
RT047	AD	M	150	108	74.8	
RT084	AD	M	154	112	93.0	Old shark bite
RT124	AD	M	148	125	77.1	
RT176	AD	M	148	118	84.4	
RT256	AD	M	146	105	74.8	Old shark bite
RT272	AD	M	167	117	90.7	
RT435	AD	M	168	106	79.4	
RT753	AD	M	147	118	90.0	
RT974	AD	M	163	114	90.7	
FT212	AD	M	155	111	90.7	
FT222	AD	M	144	107	77.1	
FT220	AD	M	150	-	83.9	
--	AD	M	173	117	102.0	
Total Average			149 ± 3	108 ± 2	77 ± 3	
Average for Females			139 ± 3	100 ± 3	62 ± 4	
Average for Males			155 ± 3	113 ± 2	86 ± 2	

Table 3. Minimum estimated length of time transmitters were functional, and date/place seal last located visually or audibly with a receiver.

Seal	Date Last Recorded	Date Last Observed/Recorded	Location[a]	Minimum length of Attachment(days)
024	Nov/12/85	Apr/29/86	DE	101
033	Mar/3/86	Jul/10/86	DE	240
047	Mar/12/86	Jul/10/86	DE	221
084	Mar/27/86	Jul/10/86	DE	236
092	Mar/19/86	Jul/3/86	DE	228
124	Mar/6/86	Jul/ /86	DE	236
176	Jan/8/86	Jan/8/86	DE	158
234	Jan/24/86	Jul/10/86	DE	174
256	Aug/9/85	Jul/21/86	DE	7
272	Aug/28/85	Jul/10/86	DE	26
313	Dec/19/85	May/22/86	DE	138
415	Apr/18/86	Apr/18/86	RR	258
435	Jan/1/86	Jul/3/86	DE	151
491	Dec/19/85	May/10/86	DP	138
710	Mar/19/86	Jul/23/86	DE	228
753	May/3/86	Jul/10/86	DE	273
974	Apr/16/86	Jul/3/86	DE	256

[a] DE = Drakes Estero, DP = Double Point, RR = Russian River.

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movements were within 0.8 km of the shoreline (Table 4, Figure 1). Five seals (33%) were recorded exclusively at Drakes Estero, six others (40%) on a total of two haul-out sites, and four (27%) on three haul-out sites (Table 5).

We classified eight radio-tagged seals (53%) as residents (five males, three females). Of these, three were located once in the water near another, nearby, haul-out site and one (a female) traveled greater than 25 km. We classified four seals (27%) as breeders (three females, one male); all of which traveled greater than 25 km away from Drakes Estero. We classified two females and one male as transients (20%), and these moved both locally and further than 25 km (Table 5).

Long-range movements of greater than 25 km were recorded for 6 of 15 seals. Although females traveled longer distances than males, both sexes moved about the same number of times (Table 5). One female moved north to the Klamath River (480 km) and one traveled south to Monterey Bay (210 km) for the winter months. Both were observed (without transmitter) at Drakes Estero in April 1986. The seal at Monterey Bay was observed on almost a weekly basis hauled out in front of Hopkins Marine Station from mid August to mid-March (Alan Baldridge, Hopkins Marine Station, CA; C. Deutsch, Univ. of Calif., Santa Cruz, CA, pers. comm.). Five seals traveled to nearby haul-out sites at Point Reyes; three to the Tomales Bay haul out site and two to the Double Point haul-out site. Seals were also recorded in the water near the Point Reyes Headland, Wildcat Beach, Bolinas Point, and Drakes Bay near the fish docks.

More movements both local and long distance (20) were recorded during

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Table 4. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys. Behavior is classified as A = active/swimming, I = inactive/hauled out.

FLIGHT DATE/PLAN		SEAL BY RADIO FREQUENCY NUMBER												
		024	033	047	084	092	124	176	234	313	415	435	491	710	753	974
1985																
Aug	9 1	DE/I				DE/I	PRH/A			DE/I			DE/I	DE/I		DE/I
	15 1								DE/I	TB/A						TB/I
	29 1						DP/I	DE/I	DE/I	TB/I		DE/I		DE/I		TB/I
Sep	12 1		DE/I	PRH/A		MB/I										
	13 2												DP/I			
	19 1				DE/A			DE/A	DE/I			DE/I	DP/A	DE/I	DE/I	TB/I
	26 1		DE/I	DE/I	DE/I		DP/I			TB/A			PRH/A	TB/A		TB/I
Oct	4 1				DE/I		DP/A	DB/A	DE/I	TB/I	SR/I		DP/A		DE/I	
	10 3	KR/A	DB/A	DE/A	DE/I									DE/A		
	22 1					MB/I										
	23 2											DB/A			DE/A	TB/I
	28 1									BH/A		BP/A			DB/A	BH/A
	31 1			DE/A	DE/A			DE/I		TB/A		DE/I		DE/I		TB/I
Nov	8 1		DE/I	DP/A	DE/I			DE/I				DE/I		DE/I	DE/I	TB/I
	21 1		DE/I	DE/I	DE/I			DE/I		SP/I					DE/I	
	26 1				DE/I											
Dec	10 equipment failure															
	19 1						DP/I			SP/I	RR/I		DP/I			TB/I
											RR/I					TB/A
Feb	7 1			PRH/A										DE/A	DE/I	TB/I
	27 1			PRH/A							RR/I			DE/I	DE/I	
Mar	20 1		DE/I		DE/I										DE/I	
	23 2		DE/I		DE/I	MB/I					RR/I				DE/I	TB/I
	25 1		DE/I								RR/I				DE/I	TB/I
Apr	2 1										RR/I				DE/I	DE/I
	18 1														DE/I	
May	9 1															

Locations with distances (km) from capture site:

DE = Drakes Estero	0	BP = Bolinas Point	20
DB = Drakes Bay	<10	BH = Bodega Head	40
DP = Double Point	16	MB = Monterey Bay	210
KR = Klamath River	480	RR = Russian River	55
SP = Salt Point	65	TB = Tomales Bay	48
SR = Sea Ranch	85	PRH = Pt Reyes Head	12

Flight Plan:

Half Moon Bay to Pt. Arena	= 1
Drakes Estero to Monterey Bay	= 2
San Francisco to Klamath R.	= 3

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Table 5. Distance of movement and locations of individual seals.

Seal	No. of moves	Average distance (km)	Locations[a]	Number of Locations
Females:				
024	2	480 ± 0	KR DE	2
033	-0-	-	DE	1
092	2	210 ± 0	MB DE	2
234	-0-	-	DE	1
313	3	47 ± 11	TB SP DE	3
415	2	58 ± 28	SR RR	3
491	3	24 ± 4	DP PRH DP	3
710	2	48 ± 0	TB DE	2
Totals	14	128 ± 43		
Males:				
047	4	12 ± 0	PRH DE PRH DE	2
084	-0-	-	DE	1
124	4	18 ± 0	PRH DP BE DP	3
176	-0-	-	DE	1
435	2	20 ± 0	BP DE	2
753	-0-	-	DE	1
974	2	48 ± 0	TB DE	2
Totals	12	26 ± 4		

[a] BP = Bolinas Point, DE = Drakes Estero, DP = Double Point, KR = Klamath River, MB = Monterey Bay, PRH = Point Reyes Headlands, RR = Russian River, SP = Salt Point, SR = Sea Ranch, TB = Tomales Bay.

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the fall (August-October) than during the winter (November-February) or the spring (March-April), i.e. eight versus six movements, respectively. Most long distance movements were made by breeders during the fall and the spring when seals were departing to wintering sites after the molt and returning for the breeding season (Table 6). One transient seal that traveled 85 km did not return to Drakes during the breeding season.

ACTIVITY PATTERNS

Resident seals exhibited distinct seasonal and circadian trends in haul-out behavior at Drakes Estero. Resident seals were hauled out an average of 0.92 $\pm$ 0.03 of the days from August through October but only 0.77 $\pm$ 0.04 of days from November through February (Tables 7, 8) ($p = .0081$, $n = 8$, Wilcoxon matched-pairs sign-rank test). The change in number of days that seals were hauled out in winter was more pronounced for females than males but sample sizes were too small to test for significance. If one looks at the individual patterns, there is variation, but the trends are similar. The proportion of tagged seals hauled out per day relative to the total number of tagged resident seals was also greater for August through November than from December through March (Table 9).

When resident seals were not hauled out, they were in the water in the vicinity of the haul out or they were absent from Drakes Estero. The length of absences averaged 1.4 to 1.9 consecutive days for over six months; the longest absence was 10 days (Table 10). Length of absences was similar for females and males.

When seals were present in Drakes Estero, the haul-out was strongly

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Table 6. Movements of resident, breeding, and transient seals by season.[a]

	Resident	Breeder	Transient	Totals
Number of seals	8	4	3	15
Number moves <25 km	11	3	7	21
Number moves >25 km	2	9	2	13
Number of moves by season:				
Aug-Oct				
<25 km	6	2	5	13
>25 km	2	4	1	7
Nov-Feb				
<25 km	5	1	-0-	6
>25 km	-0-	1	1	2
March				
<25 km	-0-	-0-	2	2
>25 km	-0-	4	-0-	4

[a] Local movements not recorded after March because transmitters ceased functioning.

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Table 7. Proportion of days resident seals were hauled out at Drakes Estero during the fall and winter and March, based on number of days monitored. Only resident seals included.

	SEAL BY RADIO FREQUENCY								AVERAGE		
SEASON	033	234	710	047	084	176	435	753	Female	Male	Total
Fall (Aug-Oct)	0.9	0.9	0.9	1.0	0.8	1.0	1.0	1.0	0.9±0.0	0.9±0.0	0.9±0.0
Winter (Nov-Feb)	0.7	0.6	0.7	0.7	0.8	0.9	0.8	0.9	0.7±0.1	0.8±0.0	0.8±0.
Spring (March)	0.7	-	0.6	0.5	0.7	-	-	0.9	0.7±0.5	0.7±0.1	0.7±0.

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Table 8. Proportion of days per month each seal was hauled out at Drakes Estero.

	MONTH							
Seal	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Females:								
RT033	0.9	1.0	1.0	0.9	0.7	0.8	0.6	0.7
RT234	0.9	0.6	0.9	0.5	0.5	0.7	*	
RT491	0.5	0.4	**					
RT710	0.9	0.8	0.9	0.5	0.9	0.7	0.6	0.6
Males:								
RT047	0.9	1.0	1.0	0.9	0.8	0.7	0.3	0.5
RT084	0.8	0.8	0.6	0.8	0.9	0.8	0.7	0.6
RT176	1.0	1.0	1.0	0.8	0.9	**		
RT272	0.8	*						
RT435	0.9	1.0	1.0	0.9	0.8	*		
RT753	0.9	1.0	1.0	0.9	0.9	0.8	0.9	0.9
Total Average	0.9	0.8	0.9	0.8	0.8	0.7	0.6	0.7
SE	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
n	10	9	8	8	8	6	5	5
Female Average	0.8	0.7	0.9	0.6	0.7	0.7	0.6	0.7
SE	0.1	0.1	0.1	0.1	0.1	0.0	0.5	0.5
n	4	4	3	3	3	3	2	2
Male Average	0.9	0.9	0.9	0.8	0.9	0.8	0.6	0.7
SE	0.0	0.1	0.1	0.1	0.0	0.0	0.2	0.1
n	6	5	5	5	5	3	3	3

* Transmitter ceased functioning.
** Seal no longer present at Drakes Estero.

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Table 9. Proportion of resident radio-tagged seals hauled out each day (seals with transmitters that are no longer functional, breeders, and transients are excluded).

	MONTH							
Date	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1		0.9		1.0	0.6	0.7	1.0	1.0
2	0.9	0.9		1.0	0.4	-	0.6	1.0
3	1.0	0.9		1.0	0.9	0.6	0.6	0.8
4	0.7	0.9		0.9	1.0	0.4	0.8	1.0
5	0.7	0.8		1.0	1.0	1.0	0.8	1.0
6	0.7			1.0	0.9	1.0	1.0	1.0
7	0.9			1.0	0.7	0.9	0.8	0.2
8	0.8			0.6	1.0	1.0	0.2	0.4
9	0.9			0.9	1.0	0.7	0.8	0
10	0.4			0.6	0.9	0.7	0.8	0
11	0.3			0.8	0.4	0.6	0.8	0
12	0.6			0.8	-	0.6	0	1.0
13	0.8			0.5	0.7	0.7	0.6	0.8
14	0.9			0.5	1.0	0.3	0.2	1.0
15	0.9			0.6	1.0	0.9	0.6	1.0
16	0.8			0.8	1.0	0.4	1.0	0.8
17	0.9			0.8	1.0	0.7		0.8
18	1.0			0.9	1.0	0.9		0.8
19	1.0			1.0	0.9	0.4		0.8
20	1.0			0.9	1.0	0.7		0.5
21	1.0				0.7	0.7	0.8	1.0
22	1.0				0.9	0.6	0.6	
23	1.0				1.0	0.7	0.4	
24	1.0				0.6	0.7	0.4	
25	1.0		0.9		0.6	0.3	0.6	
26	1.0		0.9		0.5	0.6	0.8	
27	0.8		0.9		0.2	0.6	0.6	
28	0.9		0.9		0.2	0.7	0.2	
29	0.9		0.9		0	-		
30	1.0		0.9	0.4	0.5	0.7		
$\bar{x}$	0.9	0.9	0.9	0.8	0.7	0.6	0.6	0.7
SE	0.0	0.0	0	0.0	0.1	0.0	0.1	0.1
Adjusted figures including breeders and transients:								
$\bar{x}$	0.6	0.5	0.5	0.4	0.4	0.3	0.2	0.3
SE	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.1

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Table 10. Average length of time resident seals were absent from Drakes Estero, measured in consecutive days. Seals were neither in the vicinity in the water nor hauled out. Insufficient data were available for September and October. Averages and modes for days absent are presented for seal and for each month.

	AVERAGE BY MONTH						AVERAGE ALL MONTHS				
Seal	Aug	Nov	Dec	Jan	Feb	Mar	$\bar{x}$	SE	mode	range	n
033	1	1	2	1	2	1	1.4	0.2	1	1-3	19
234	1	2	3	0	*		2.6	0.8	1	1-10	10
710	2	1	0	1	0	2	1.4	0.3	1	1-3	6
047	1	1	2	1	2	*	1.5	0.3	1	1-4	13
084	2	0	1	1	2	1	1.3	0.2	1	1-3	14
176	0	0	1	*			1.0	0	1	1	2
435	1	0	1	*			1.0	0	1	1	5
Average days by month (all seals combined):											
$\bar{x}$	1.5	1.4	1.9	1.0	1.8	1.4					
SE	0.3	0.3	0.6	0.0	0.5	0.2					
mode	1	1	1	1	1	1					
range	1-3	1-4	1-10	1	1-4	1-2					
n	10	9	16	13	13	8					

* Transmitter ceased functioning.

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diurnal in all months monitored, and most hauled out during mid-day regardless of season. The proportion of tagged seals hauled out over a 24-hr period was largest 0800 to 1400 hr in August, and 1000 to 1600 hr in December (Table 11). On average, seals hauled out for a total of seven hours per day; however, seals would often haul-out more than once per day. The duration of a single hauling bout averaged 4.8 to 5.6 hrs (Table 12). The averages for hours-per-day and length-of-hauling-bout were not significantly different between August and December (hour, $p = .88$; length, $p = .84$; Wilcoxon matched-pairs sign-ranks test, $m = 3$, $n = 5$). Our sample was too small to test for differences between males and females; however, in December two pregnant females (RT234 and RT710) that gave birth in April spent fewer hours on shore per day than males. Individuals hauled out for up to 34 hrs in August, but never more than 17 hrs in December. The average number of hauling bouts per day was similar in August ($\bar{x} = 1.6 \pm 0.05$) and December ($\bar{x} = 1.4 \pm = 0.05$) and for both sexes (females in August, $\bar{x} = 1.7 \pm = 0.08$, and December, $\bar{x} = 1.4 \pm 0.09$; males in August, $\bar{x} = 1.5 \pm 0.06$; and December, $\bar{x} = 1.4 \pm 0.07$) and ranged between one and four. Ninety-five percent of the 372 hauling bouts in August, and 96% of the 212 in December were 12 hrs or less; 20% of the hauling bouts were less than two hrs in both August and December.

The length of a hauling bout was affected by the time of initiation in August such that seals that first hauled out between 0500 and 0900 hr were on shore longer than seals that initiated a haul-out between 0900 and 2400 hr; in December, though, time of initiation did not appear to influence length of bout (Table 13). Though seals initiated a hauling bout

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Table 11. The proportion of resident seals hauled out per day during two-hour intervals.

Hours	August			December		
	$\bar{x}$	SE	n	$\bar{x}$	SE	n
0000–2000	0.1	0.0	30	0.1	0.0	28
0200–0400	0.1	0.0	30	0.1	0.0	28
0400–0600	0.2	0.0	30	0.2	0.1	28
0600–0800	0.5	0.1	30	0.2	0.1	28
0800–1000	0.7	0.1	30	0.3	0.1	28
1000–1200	0.7	0.1	30	0.5	0.1	28
1200–1400	0.6	0.0	30	0.6	0.1	28
1400–1600	0.5	0.1	30	0.5	0.1	28
1600–1800	0.5	0.0	30	0.5	0.1	28
1800–2000	0.3	0.1	30	0.3	0.1	28
2000–2200	0.2	0.0	30	0.2	0.0	28
2200–2400	0.1	0.0	30	0.2	0.0	28

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Table 12. Average number of hours per day and the average duration of haul-out bouts presented for individuals and by season.

	FEMALES			MALES					
	033	234	710	047	084	176	435	753	ALL SEALS
AUGUST:									
Hours/Day									
$\bar{x}$	6.7	8.0	7.1	7.2	7.8	7.6	7.6	7.8	7.5
SE	0.6	0.7	0.7	0.8	0.9	0.8	0.7	0.7	0.2
Median	6.5	8.2	6.5	6.3	8.0	7.5	7.5	7.0	7.0
Range	1-13	1-20	1-17	1-19	1-19	1-19	1-16	1-17	1-20
n	28	27	27	28	24	30	27	28	219
Length of Bout									
$\bar{x}$	4.7	5.4	4.6	6.5	6.3	6.9	6.0	5.5	4.8
SE	0.7	0.7	0.4	1.1	0.9	1.1	0.8	0.7	0.2
Median	4.2	5.0	4.0	4.8	5.0	7.0	5.0	5.0	0.4
Range	1-13	1-20	1-10	1-28	1-19	1-34	1-16	1-17	1-34
n	38	49	52	32	35	40	40	53	339
DECEMBER:									
Hours/Day									
$\bar{x}$	7.0	5.3	5.5	7.8	7.6	8.1	8.1	8.0	7.3
SE	0.8	1.2	0.8	0.6	0.5	0.6	0.6	0.7	0.3
Median	6.0	4.0	5.0	9.0	7.8	7.8	8.0	8.3	7.5
Range	1-15	1-16	1-14	1-13	1-13	1-13	1-16	1-15	1-16
n	19	11	21	26	22	22	23	26	170
Length of Bout									
$\bar{x}$	4.8	4.5	5.0	6.8	7.0	6.7	7.1	5.5	5.6
SE	0.6	1.3	0.8	0.8	0.6	0.9	0.6	0.7	0.2
Median	5.0	2.5	4.5	7.5	7.5	7.3	7.8	5.5	5.5
Range	1-8	1-16	1-14	1-17	1-13	1-13	1-13	1-12	1-17
n	19	11	24	28	27	30	29	40	208

[a] Season is represented by data from one month.

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Table 13. Length of haul-out in relationship to time of initiation.

	August					December				
Hours	n	$\bar{x}$	SE	$\tilde{x}$	Range	n	$\bar{x}$	SE	$\tilde{x}$	Range
0100-0500	32	6.88	.89	5.25	1-19	12	5.38	1.14	3.75	1-13
0500-0700	74	7.09	.65	6.0	1-34	33	5.30	.58	5.5	1-13
0700-0900	86	5.63	.39	5.5	1-26	29	6.65	.76	7.0	1-16
0900-1100	47	3.39	.34	3.0	1-12	36	6.96	.49	7.5	1-13
1100-1300	33	3.39	.47	2.5	1-9	44	5.71	.42	6.0	1-13
1300-1500	44	3.74	.39	3.5	1-13	19	5.26	.79	5.0	1-13
1500-1700	28	3.41	.39	3.5	1-8	14	4.89	1.4	2.0	1-17
1700-1900	20	2.83	.77	1.5	1-16	5	5.0	1.49	4.0	1-10
1900-2400	25	1.94	.44	1.0	1-12	20	3.98	.71	2.75	1-12

at all hours of the day most initiations occurred during daylight hours between 0400 and 1600 hr for August and between 0600 and 1400 hr for December (Table 14). The pattern was similar for both males and females.

DISCUSSION

Results from one survey year indicate that the decline in seal numbers during the winter months is related to both a seasonal movement away from Drakes Estero and a reduction in the number of days spent hauled out for the remaining animals. Among radio-tagged animals, equal numbers remained in and moved away from Drakes Estero; departees were composed of more females than males. Similar to results in Alaska (Pitcher and McAllister 1981) and on San Nicolas Island (Stewart and Yochem 1983), we found a high level of site fidelity, with seals using no more than three sites. Exclusive use of one haul-out site has also been noted in other studies (Boulva and McLaren 1979, Herder 1986, Stewart and Yochem 1983). In contrast to seals at the Klamath River (Herder 1986), most movements of seals from Drakes Estero occurred from August to October; however, we have no data for the period from April to June when Klamath seals exhibited the greatest local movement. We found, as did Herder (1986), that females made more long distant moves than males. Immature seals may travel greater distances than adult animals, as suggested by Pitcher and McAllister (1981), but we have no information on this.

In general, we observed that if a seal moved to a location greater than

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Table 14. Frequency of initiation of haul-out bouts in relationship to time of day by season for females, males, and all seals.

	August 1985 n = 28d			December 1985 n = 30d		
Time	Female	Male	Total	Female	Male	Total
0000-0200	2	5	7	4	6	10
0200-0400	3	7	10	4	1	5
0400-0600	24	17	41	8	10	18
0600-0800	35	72	107	8	21	29
0800-1000	24	36	60	7	23	30
1000-1200	10	17	27	11	39	50
1200-1400	10	30	40	10	22	32
1400-1600	13	24	37	3	7	10
1600-1800	10	18	28	5	13	18
1800-2000	8	9	17	2	8	10
2000-2200	9	2	11	2	3	5
2200-2400	4	1	5	3	3	6

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25 km away from the capture site, it remained there for an extended time rather than continuing to travel. The majority of these long-range movements occurred after the molt and prior to the breeding season. The movements were to well established haul-out sites in estuaries (Tomales Bay), at river mouths (Klamath and Russian rivers), and at coastal sites (Double Point, Hopkins Marine Station).

The localities at which seals relocated may be preferred winter foraging areas. However, because migrant seals were highly individual in the distance of their movement and their final destination, we suggest that seals were not responding to a single prey situation as was noted in winter movements of seals in Oregon and Washington. Instead, individuals may be expressing a preference for location based on past experience, including foraging success (Beach et al. 1985, Brown and Mate 1983).

The observed movements indicate that Drakes Estero is an important breeding area for seals between Monterey Bay and the Klamath River, an overall distance of 690 km. The three seals which did not return to Drakes Estero in the following breeding season may visit Drakes Estero only during the molt, or use it only as a secondary haul-out site as did one transient which visited Drakes Estero twice after capture but resided at Double Point through the breeding season. The movements also indicate that there is substantial mixing among harbor seal colonies along the central and northern California coast, and that seals in central and northern California may represent a subpopulation of harbor seals in California. Herder (1986) and Brown and Mate (1983) also found movement of seals between colonies in the Klamath River and Alsea Bay, Oregon,and between

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seals in Oregon and Washington.

All recorded foraging activities and movements of seals in the Point Reyes area appeared to be limited to within 0.8 km of shore. Though pelagic movements of harbor seals have been recorded by others (Pitcher and McAllister 1981, Spaulding 1964, Stewart and Yochem 1983, Wahl 1977), our results suggest nearshore feeding and migration are more typical than offshore.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals in the fall than the winter months. Our figures on the proportion of days per month spent hauled out and on the proportion of radio-tagged seals hauled out per month were substantially higher than those derived by both Stewart and Yochem (1983) and Pitcher and MacAllister (1979); if we include in our analyses animals that departed from Drakes Estero, our figures would be similar (see Table 9 for adjusted figures). We eliminated these animals from analyses, though, since the location of the departed animals had been ascertained, thereby allowing for more accurate assessments of time spent ashore for seals in the immediate vicinity.

When hauled out, the number of hours per day that seals spent on shore was similar for fall and winter, as was the haul-out time interval. This suggests that despite high tides during the day in winter, with winter storms accentuating high tides, seals were regular in the length of time they hauled out, but not in the number of days hauled out. Both Sullivan (1979) and Stewart and Yochem (1983) observed a higher average time per day that seals were hauled out, 44% and 39%, respectively, than we found for

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seals at Drakes Estero (29%). Differences may be attributed to stronger tidal influences at Drakes Estero or to exposure to disturbance from humans; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human distubance. Seals at Drakes Estero may, therefore, be forced to spend more time in the water. Females may haul-out for shorter periods both in number of days and number of hours per day than males in the winter (see also Stewart and Yochem 1983). The small differences between means coupled with the small sample of animals result in insignificant differences at this time. Pregnant females may require more time feeding than males.

The strong diurnal haul-out pattern documented at Drakes Estero previously (Allen and Huber 1983), and shown by innumerable other researchers (Boulva and McLaren 1979, Fancher 1979, and Stewart and Yochem 1983), was further confirmed in this study. Though seals hauled out at all hours of a day, peak abundance, based on the proportion of tagged animals, occurred mid-day. Stewart and Yochem (1983) determined that time of initiation of a haul-out bout did not influence the length of the bout; however, we found that in August, seals hauled out for longer periods when bouts were initiated between 0100 and 0900 hr than for other time periods during the day or night. In December, time of day did not appear to influence the length of bout during daylight hours but did during the night. Differences may be attributed to changes in day length, and/or frequency of human disturbance at Drakes Estero.

Absences of resident seals from Drakes Estero, averaged about one day suggesting that absentees were foraging fairly close by; the local movement

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patterns observed during aerial surveys also support this conclusion.

SUMMARY

1. Evidence from movement patterns indicates that Drakes Estero is a focal breeding area for seals ranging as far south as Monterey Bay and as far north as the Klamath River, and therefore, that northern and central California may represent a subpopulation of harbor seals in California. It is also likely that some mixing between seals from Oregon and this subpopulation occurs (Herder 1986).

2. A larger proportion of tagged seals hauled out on a daily basis in August (92%) than in December (77%), and this difference appeared to be more pronounced for females than for males.

3. The largest proportion of seals were hauled out between 0400 and 1600 hr in August and this represented between 53% and 71% of the estimated number of seals in the area.

4. Seasonal changes in abundance are a function of the movement of seals away from Drakes Estero and of a decrease in the number of days that seals spent hauled out in the winter.

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MOVEMENT AND ACTIVITY PATTERNS OF HARBOR SEALS AT DRAKES ESTERO, CALIFORNIA, 1986-87

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INTRODUCTION

Harbor seal colonies in Point Reyes, Marin County, represent about 20% of the mainland population during the breeding season (Allen and Huber 1984, Hanan et al. 1986), and consequently, deserve attention when devising regional management policies. Estimates for the size of the state and Point Reyes populations are based on direct ground and aerial counts, without corrections for the number of seals hauled out on a given day relative to the total number of seals present in the area. As a result, estimates are likely low and one cannot relate numbers among seasons. Several researchers have addressed the problem using radio tagged animals and have derived correction factors with varying attendance patterns based on location, time of day, and season of year (Brown and Mate 1981, Pitcher and McAllister 1981 and Yochem et al. 1987). These researchers determined that the differences between total number hauled out and the estimates of abundance were a function of variations in daily haul-out patterns as well as movements to other areas.

In the Point Reyes area we determined previously that seals displayed diurnal and seasonal variation in haul-out patterns (Allen and Huber 1983, 1984). Seals were seasonally most abundant during the spring and summer, coincident with the breeding and molt periods. We determined in 1985-86 with the aid of radio-telemetry that seasonal variation was a function of seals both moving to other haul-out sites outside of Point Reyes and hauling out on fewer days during the winter months (Allen et al. 1986). A larger proportion of seals hauled out on a daily basis in August than in December, and this difference appeared to be more pronounced for females than for males. We have no comparable data for the breeding season, though, because transmitters were shed one month prior to the breeding season in 1986. As a consequence, there is a gap in our data set for a significant period in the seals' annual cycle. Evidence from movement patterns of radio tagged seals also suggests that Drakes Estero is a focal breeding area for seals ranging as far south as Monterey Bay and as far north as the Klamath River and that female seals are more likely to migrate than males.

Our objectives for the second year of study using radio-telemetry were to 1) compare daily and seasonal variability in haul-out behavior between the two years, 2) determine the destination of departing animals with particular emphasis on adult female seals, and 3) determine the haul-out pattern during the breeding season and premolt period. We also wanted to track movements of weaned pups since this age group is being affected by the halibut gill net fishery. In 1983-84 an estimated 383 (SE 194) harbor seals were incidentally taken in gill nets from Bodega Bay to Half Moon Bay; most of these were immature seals (D.

Hanan, California Department of Fish and Game, pers. commun.).

Information on seasonal activity patterns and fall/winter movements would be valuable for any long-term management program for seals in the Point Reyes area, and, in conjunction with results accumulated elsewhere (Stewart and Yochem 1983; Herder 1986), could provide more accurate estimates of the California harbor seal population.

STUDY AREA AND METHODS

Harbor seals haul out in Drakes Estero year round at a number of locations including numerous tidal mud flats that are exposed at low, medium and medium-high tide levels and Limantour Spit which is exposed at all tide levels. We chose to capture and tag seals at Drakes Estero because it is one of the largest breeding areas in Point Reyes and because the capture technique we wished to use was only possible in an estuarine environment. Other estuaries in Point Reyes (Bolinas Lagoon and Tomales Bay) are exposed to substantial levels of human disturbance (Allen et al. 1985, Allen and Huber 1984), and consequently, movement and activity patterns would likely be significantly altered there.

Over a two day period in 1986 (July 21 and 22), we sucessfully captured about 35 animals and affixed transmitters to 22 . On March 9 and 11 of 1987, we captured about 90 animals and affixed transmitters to 12 seals. During both capture periods, we caught seals in a 130 m long gill net, with 8-inch mesh, set off the haul-out site and then pulled ashore. Two power boats were used to deploy the net adjacent to the haul-out site. This method of capture was successfully used in 1985 without incident at Drakes Estero and enabled us to capture a large number of seals over a short period of time, thereby minimizing the duration of disturbance days to the herd (Beach et al. 1985). As was observed in 1985, some seals departed from Drakes Estero during the days of capture, but no seals departed permanently from the estero during the following week. Consequently, we do not believe that the capture technique disrupted the normal activity patterns of the seals.

Eighteen to twenty people were involved in the capture including personnel from the Point Reyes National Seashore, the Gulf of the Farallones National Marine Sanctuary, the National Marine Fisheries Service, the California Department of Fish and Game, the Oregon Department of Fish and Wildlife, the Washington Department of Fish and Game, and the Point Reyes Bird Observatory. In addition, a veterinarian monitored the condition of restrained seals and any seal deemed stressed was immediately released. The veterinarian also collected nasal and oral mucosa from animals in 1986 and these samples were transferred to the

Center for Disease Control in Atlanta, Georgia for biological analysis. Prior to this capture period several dead adult harbor seals had washed up on beaches at nearby Double Point and at Drakes Estero, and a bacterial agent was the suspected cause of death. We took the opportunity of having live animals in hand to determine if disease was present in this local population.

Captured seals were weighed, measured (length and girth), sexed, flipper-tagged, patch-tagged, and radio-tagged. We double flipper-tagged seals with lime green "Allflex" cattle ear tags manufactured by Veterinarian Supplies instead of the "Riese" tags used in 1985. The "Allflex" tags had larger numbers which could be easily read in the field. We attached an international orange colored vinyl strip with 3" numbers to each flipper tag which further aided in individual identification. Two neoprene patches with an individual number or symbol code were glued with "lock-tight" super glue to the fur between the should blades to provide an additional visual mark. A radio transmitter manufactured by Advanced Telemetry Systems, Inc (Bethel, Minnesota) was glued to the fur on the back of the seal's head with "Devcon" 5-minute epoxy. Radio transmitters were 9x3x3 cm, weighed 60 gms, had a 13-inch flexible antenna, and a life expectancy of 300 days. Each transmitter had a frequency within the range of 164-165 Mhz, transmitting 55 pulses per minute.

We monitored seals with an automated recording station and aerial surveys, following the procedures used in 1985. The receiving station established at Drakes Estero recorded seals within a three-mile radius on a 24-hour basis. A seal was considered hauled out if it was recorded with three consecutive strong pen markes within a 1 hour period; a seal was considered in the vicinity but in the water if a strong pen mark in conjunction with three weak marks was recorded within a one hour period. We manually checked frequencies to determine if radio interference from the nearby radio communication facilities (U. S. Coast Guard and RCA Global Communications Center) triggered pens and found that interference did not hinder distinguishing whether seals were hauled out. Radio interference on several frequencies, though, prevented our distinguishing whether animals were in the water, and so we did not analyze strip chart data for the presence of seals in the vicinity. In addition, female seals with very young pups (less than 5 d) on occasion would rest in shallow water rolling and submerging the transmitter antenna. As a result, the strip chart recorder indicated that the animal was not hauled out. Females with pups also would on occasion "bottle" in the water giving a strong regular signal indicating that the seal was hauled out. Consequently, haul-out times in our analysis may be biased for this period for female animals.

A test transmitter was placed in a PVC pipe at seal "head lift" level (12" above the ground) on the haul out site to verify that the receiving system was functioning

properly and to determine when the haul-out site was exposed during tidal cycles and available to seals.

The remote receiving station was in operation continuously from 23 July 1986 through 30 June 1987 except for intermittant periods when equipment malfunctioned. We checked and maintained the remote station a minimum of two times per week, and during the 1987 breeding season, we were present almost daily. During visits we scanned all frequencies and checked for signal drift. Each signal was checked for a period of five to ten minutes to detect seals in the water. We made visual searches for marked animals to check for flipper tag and transmitter loss. At this time we also collected behavioral information on females and pups and on spatial distribution within the estero.

To locate dispersing seals we attempted to make semi-weekly aerial surveys along the cental and northern California coast. The length of flight depended on our success in locating all animals. Seals were monitored by two people using scanning receivers and frequencies chosen were continuously scanned for three seconds each. Typically, the plane would begin searching at Drakes Estero and then travel north to a designated distance and then fly south of Drakes Estero. In this manner, the coastline was covered two times by two people in order to maximize detection. When a seal was located, activity, time, and location were recorded. Most flights ranged from Point Arena south to Half Moon Bay and into San Francisco Bay. We scheduled flights on days when tides were low to medium to maximize numbers of seals hauled out.

We made weekly ground searches in addition to aerial flights to locate animals absent from Drakes Estero. From this we were able to identify feeding areas and to determine if seals temporarily relocated at other local haul-out sites. We monitored six seals for a 24 hr period on June 1, 1987, locating and recording activities every 15 min. From this information, we wished to verify accuracy of the remote receiving station and to identify local feeding areas.

DATA TREATMENT

We categorized seals captured in July 1986 by the amount of time and the time of year that they were present at Drakes Estero. We defined seals as "resident" if they remained at Drakes Estero for most or all of the study period, "breeders" if they departed in the fall but returned during the following breeding season, and "transients" if they were present at Drakes Estero during the capture but resided away from Drakes Estero during the rest of the study period. Movements greater than 25 km were defined as long distant and less than 25 km as local.

Seal behavior at Drakes Estero was classified as either hauled out or absent and descriptive statistics for all lengths are calculated for each animal by season. We chose August, December, and April-May-June data to illustrate the

seasonal differences in haul-out behavior and compared these results with those collected in 1985. When comparing time of haul out initiation and the length of haul-out-bout, we classified initiation into four categories (0100-0400 hr, 0500-01200 hr, 1300-1700 hr and 1700-2400 hr) and classified length of haul-out-bout into four categories (1-4, 5-8, 8-12, > 12).

We estimated the absolute abundance of seals using Drakes Estero in March 1987 with a modified Lincoln-Peterson Index mark-recapture model (Seber 1982). For this analysis, we only included seals marked in March 1987 in order to avoid sample bias of sex and age class representation. We calculated 16 estimates but selected an estimate prior to the onset of the pupping season in order to avoid violation of the assumption of a closed population.

All information recorded on the strip chart recorder was transferred to the "DBase III+" database system. The "SPSS" statistical program for micro-computers was used for most analyses. Analyses presented here are primarily descriptive but we intend to provide more detailed analyses in our final report.

RESULTS

We captured 30 seals in July 1986, and of these we radio tagged 22 (10 adult females, 5 adult males, and 5 immatures of both sexes), and flipper tagged an additional eight animals (5 adult males, 2 adult females and one immature) (Table 1). In March 1987, we captured and marked an additional 65 seals. Of these, we radio tagged 12 (10 adult pregnant females and 2 adult males), flipper tagged 50 seals of all age classes (22 immatures, 17 adult females and 11 adult males), and marked three seals with neoprene patches. We released many seals because of time constraints of marking animals (Table 2). On average, males weighed 8 kg more than females in July 1987 (Table 3). Though females in 1986 weighed about the same as those in 1987, males on average weighed 11 kg less in 1987. Both males and females weighed substantially more in March 1987; the weight gain in females may be explained in part by pregnancy.

All but three transmitters (86%) attached in July 1986 remained attached to seals for a minimum of five months, 15 (68%) for six months, eight (36%) for eight months, and three (14%) for ten months (Table 4). All but one transmitter attached in March 1987 remained attached until the molt in June. Of the seals radio tagged in July 1986, we were able to locate, either visually or aurally, all but three seals through March 1987. Two of these three were immature and one was an adult female (RT119) whose transmitter ceased functioning 10 d after attachment. All seals radio tagged in March 1987 were located regularly until transmitters were shed in June.

We noted a marked increase in the number of seals with fresh shark bites in the fall of 1986 compared to previous years. Three flipper tagged seals (including RT119) and five non-tagged seals had fresh shark bites in September. It is possible that the three missing seals may have been killed by sharks. The shark wound on RT119 raked the entire lower left side of her body, and after October, we no longer observed her at Drakes Estero. The other two tagged seals had minor bites (less than 1 foot across) and these scars healed within four months.

For both capture periods we used an "Allflex" cattle ear tag because the numbers were large and easily distinguished in the field. Unfortunately, these tags were easily shed and so resighting information on flipper tagged seals after about four months was unreliable. In contrast, the "Riese" tags attached in 1985 were still seen on seals as of July 1987.

MOVEMENTS

All radio tagged seals captured in July 1986 were resighted at Drakes Estero several times during the study period, and we were able to monitor the movements of most seals through February 1987. Three seals were excluded from

analysis of movement patterns. The transmiiter on RT119 ceased functioning within one month and two others (RT325, RT279) could not be located after September, having either died, moved outside the range of the aerial surveys, or lost their transmitters.

As was observed in 1985, seals moved both north and south of the capture site; however, in contrast to the previous year, only four radio tagged seals (21%) traveled more than 25 km from Drakes Estero and only two (both females) relocated permanently at other sites during winter months (Tables 5 & 6). Eleven seals (58%) were recorded hauled out exclusively at Drakes Estero, seven others (37%) on two haul out sites, and only one on three haul out sites.

We classified seventeen seals (90%) as residents of Drakes Estero; however, four of these were also recorded hauled out at Point Reyes Headland (PRH). Eight other resident seals were recorded at least once in the water around PRH. Two resident seals traveled distances greater than 25 km during the winter months but returned within a month to Drakes Estero . We classified only two female seals (RT137 and RT306) as breeders, both of which traveled greater than 25 km away from Drakes Estero. No radio tagged seals were classified as transients.

Long-range movements of greater than 25 km were recorded for four of 19 seals (3 females and 1 male). One female (RT137) resided throughout the winter months at Pescadero State Beach (south 106 km) and returned to Drakes Estero the following spring. RT305 moved locally and to Tomales Bay (north 48 km) during the winter months and also returned to Drakes Estero the following spring. One female (RT246) traveled north to Tomales Bay in October but returned to Drakes Estero by the beginning of November. One male (RT504) traveled north to Stone Lagoon, Humbolt County (410 km) in early November but returned to Drakes Estero by November 28. Our sample size was too small for comparing differences of movement between sex or age groups.

Short-range movements of less than 25 km occurred regularly throughout the study period. Most of these movements were to PRH, though seals were also recorded feeding in Drakes Bay both north and south of Drakes Estero.

One male and one female seal radio tagged in March 1987 relocated away from Drakes Estero. RT060 traveled to Bolinas Lagoon (25 km south) in early April and returned in early May. RT432 divided her time equally between Drakes Estero and PRH until April 20 when she returned to Drakes Estero and gave birth on April 22. She remained at Drakes Estero continuously until she weaned her pup on May 18 at which time she returned to PRH. Until she shed her transmitter in June, she continued to spend equal amounts of time at PRH and Drakes Estero. All other radio tagged seals were recorded at least once in the water around PRH but none hauled out there. In addition, flipper tagged seals were recorded at Double Point, Bolinas Lagoon, and PRH between March 30 and July 30.

ACTIVITY PATTERNS

Seals exhibited distinct seasonal and circadian trends in haul out behavior at Drakes Estero as was observed in 1985. Adult seals were hauled out an average of 90% of the total number of days monitored in July and 81% in August but only 74% in December (Tables 7 and 8). The difference between the months July and December is significant ($p = .02$, $n = 17$, Wilcoxon matched-pairs sign-rank test) but between August and December is not significant ($p = 0.5$, $n = 17$, Wilcoxon matched-pairs sign-rank test).. In March and April just prior to the breeding season, the percentage of days hauled per month was also low, and then during May, the percentage increased again to 92% ($p = .002$, $n = 14$, Wilcoxon matched-pairs sign-rank test). Immature seals hauled out on fewer days than adults ; however, the sample size was too small to make meaningful comparisons. The change in the number of days that seals were hauled out in winter was the similar for females and males.

The average percentage of tagged seals hauled out per day relative to the total number of tagged seals was also greater for July, May and June than for December, March, and April (Table 9). The percentage for August was low compared to that of 1985; however, if immatures are excluded from the analysis, the percentage increases to 76%. Immature seals appeared to haul out on fewer days in August than adults.

When resident seals were not hauled out, they were either in the water in the vicinity of the haul out or were absent from Drakes Estero. The length of time that seals were absent averaged 1.0 to 2.5 consecutive days per month; the longest absence was seven days (Table 10). The average number of trips per month per seal was greatest for December (4.8 trips) and least for May (1.0 trips). The percentage of seals that went on trips per month was least in May and greatest in August (Table 10). Immature seals appeared to take more trips ($\bar{x} = 4.3$; 22 of 60 trips) than adults in August; however, the length of trips was the same. In many cases when seals were absent for more than 3 d, we were able to locate them hauled out at PRH.

When seals were present in Drakes Estero, the haul out pattern was strongly diurnal for all months monitored as was noted in 1985. The percentage of tagged seals hauled out over a 24-hr period was largest between 0500 and 1600 hr for all months; the percentages hauled per hour, however, varied between months (Figure 2). Greater than 50% of tagged seals hauled out in May and June between 0500 and 1400 hr. In December, percentages were fairly uniform throught all daylight hrs. These results are similar to those calculated for 1985.

On average, seals hauled out for a total of seven hours per day in August, December and March, and nine hours per day in April, May and June. In July, during the peak molt period, seals hauled out 11 hours per day (Table 11). Seals

hauled out for significantly longer hours per day during the pupping season ($p = .002$, $n = 13$, Wilcoxon matched pairs signed-rank test; comparing March and May). There appeared to be no difference in the total number of hours hauled per day between males and females or between adults and immatures for all months.

The average number of haul-out-bouts per day was 1.5 ($n = 194$, SE = .05) for August, and 1.4 ($n = 166$, SE = .04) for December. During the breeding season, seals averaged 2.4 haul-out-bouts per day ($n = 139$, SE = .06) between the median birthing and the median weaning dates, but only 1.5 per day ($n = 142$, SE = .06) in April two weeks prior to the mean birthing date.

Most haul-out-bouts averaged about five hours except in July, and 20% of all haul-out bouts were 2 hrs or less, regardless of month (Table 11). Though seals initiated haul-out-bouts at all hours of the day, most initiations occurred during daylight hours before 1200 hr (Figures 3 and 4). In July, April and May, however, many initiations occurred between 0100 and 0400 hr. This difference may be explained in part by females hauling out to nurse pups.

The length of haul-out-bout was affected by the time of initiation for all months tested such that seals that first hauled out between 0100 and 1200 hr were on shore longer than seals that initiated a haul-out-bout between 1200 and 2400 hr (July: $X^2 = 80.9$, $df = 9$, $p < .001$; August: $X^2 = 59.3$, $df = 9$, $p < .001$; December: $X^2 = 69.8$, $df = 9$, $p < .001$; May: $X^2 = 80.2$, $df = 9$, $p < .001$: June: $X^2 = 58.4$, $df = 9$, $p < .001$). For all months, more than 80% of the haul-out-bouts lasting for more than 12 hr occurred between 0100 and 1200 hr and less than 10% occurred after 1700 hr.

On June 1 and 2 1987, we monitored six radio tagged seals (4 females, 2 males) for 24 hrs from 0900-0900 hr, locating and recording activities every 15 min. The average number of hours hauled was 9.4 (SE = 2.6); however, the range in hours was from 1.25 to 18.5. Three seals hauled out two times during this 24 hr period, two three times, and one once. The seal that hauled for 18.5 hr was the only one to haul out at night, and coincidently this seal had just returned from hauling out for several days at PRH. Because seals could haul out at Limantour Spit at all tide levels, tide did not appear to influence the haul out pattern. When tidal mud bars were awash with rising tides, seals moved to the Spit.

During the 24 hr period, we were able to locate continuously all but one seal. Four seals traveled both north and south of the estero but stayed within a 5 mi radius of the estero, one seal never left the estero, and one seal traveled north out of range for 9.5 hrs. All seals spent a considerable amount of time in the channel of the estero or near the mouth, presumably feeding. Sunrise was at about 6:00 hr on June 2, and two seals promptly hauled out along with several non-tagged seals. By 8:00 hr, two more tagged seals hauled out, and the seal that remained all

night had again retreated to the water. At the time of my departure (9:00 hr), five seals were in the identical locations as recorded at 9:00 hr the previous day; four were hauled out at Limantour Spit and two were in the water at the mouth of the estero.

From a sample of 16 days between March 16 and April 15, we selected an estimate of abundance of 949 seals (95% confidence interval: LL 692 and UL 1206) using Drakes Estero (Figure 5). On sample day 4 (March 24), we sighted 30 marked animals hauled out among a herd of 441 seals. On sample day 6, the first pup was observed at Drakes Estero. From that date on, the assumption of a closed population was violated and estimates and confidence intervals fluctuated considerably.

BREEDING SEASON

Twenty of 28 adult female seals tagged in March of 1987 were seen at least once with pups. In addition, five of ten female seals tagged in July 1986, were seen with pups. We were able to monitor closely 15 tagged seals throughout this season. The median pupping date for these seals was April 23, and by April 28, 80% of the females had given birth (range: April 16 to April 30). The median weaning date was May 25, and by May 28, 80% of the pups had been weaned (range: May 14 to May 30). The average number of days that females were seen with pups was 30.9 (SE = 0.6, n = 15) (Table 13). Of the radio tagged seals, only one (RT821) was observed separated from a pup; 24 days after giving birth, she was seen without pup and searching throughout the estero for two hrs. On two subsequent days, she was observed searching intermittantly. All other females were seen in constant attendance with pups until the date of weaning. Weaning appeared to be abrupt. Characteristically, females departed for a minimum of one day from the estero after weaning, and one female (RT432) relocated to PRH.

For the first two weeks after giving birth, females stayed exclusively within the estero, but after that time, they began to depart for an increasing number of hours during the night. Whether pups accompanied females on these excursions is not known.

For the first two weeks with pup, females hauled out for an average total of 13.3 hrs per day (SE = 0.8, n = 10), and for the first couple of days after birth, females often hauled out for more than 20 hrs. Unexpectedly, males also hauled out for long hours between the median birthing date of April 23 and the median weaning date of May 25 ($\bar{x}$ = 13.1, SE = 2.4, n = 3). For two weeks after pups were weaned, the average total number of hours hauled was 8.0 (SE = 0.7, n = 8) for females (from estimated weaning date to 14 d) and 6.2 (SE = 0.9, n = 4) for males (for period May 12 to May 27). Since mating occurs in the water, it is not surprising that males would spend less time hauled out during the weaning

period; however, the difference between the sexes is not significant ($p = 0.27$, $n = 12$, Fisher's Exact Test).

DISCUSSION

Results from the second survey year again indicate that the decline in seal numbers during winter months is related to both seasonal movement away from Drakes Estero and a reduction in the number of days that resident seals spent hauled out. Movements of greater than 25 km were much more pronounced in 1985 than in 1986, and instead, many of the seals that remained at Drakes Estero often relocated for brief periods at Point Reyes Headland. The observed differences between years may be attributed to different individual preferences, to greater local food availability, or to some unknown factor. Similar to results in Alaska (Picther and McAllister 1981) and on San Nicolas Island in California (Yochem et al. 1987), we found a high level of site fidelity, with seals using no more than three sites. All movements were to well established haul out sites in estuaries (Tomales Bay and Bolinas Lagoon), and at coastal sites (Pescadero, Double Point, and PRH). In contrast to 1985, long range movements occurred during all months except during the height of the breeding season.

Herder (1986) observed that seals at the Klamath River, California, exhibited the greatest local movement during the period April to June. Our results indicate that more local movement occurred prior to the median birthing date and after the median weaning date, but virtually no movement occurred between those dates. Two of 12 seals (one adult male and one adult female) radio tagged in March 1987, relocated to other haul-out sites prior to the breeding season, but both returned within five days of the median birthing date.

Immature seals did not appear to travel greater distances than adult animals, as suggested by Pitcher and McAllister (1981); however, our sample size is small. One immature seal rarely departed from the Estero, one relocated intermittantly at PRH, and one traveled both to Duxbury Reef and to Tomales Bay.

The observed movements indicate that Drakes Estero is an important breeding area for seals ranging south to Pescadero and north to Stone Lagoon, an overall distance of 516 km. This range is similar to that documented in 1985. Movements also indicate that there is substantial mixing among harbor seal colonies both locally and greater than 25 km. Herder (1986) and Brown and Mate (1983) also recorded movements of seals between colonies in the Klamath River and Alsea Bay, Oregon, and between seals in Oregon and Washington.

In general, movements appear to be motivated by a group preference for breeding at Drakes Estero, but by an individual preference for feeding areas. As noted in 1985, migrant seals were highly individual in distance of movement and final destination. Individual preference may be influenced by past experience and current food availability. Seals do not appear to be responding to a single prey

situation as was noted in winter movements of seals in Oregon and Wasington (Beach et al. 1985, Brown and Mate 1983), but instead, individuals may be expressing a preference for location based on past experience, including foraging success. The fact that two seals traveled great distances (and presumably expended considerable energy) but promptly returned, suggests that past experience may have movtivated the initial movement, but that current food availability influenced where seals ultimately spent the greater proportion of their time during the winter months.

Seals that remained at Drakes Estero were hauled out on more days and in higher proportions of total animals during the molt (June, July, and early August) and the breeding season (April and May) than in December or March. As observed in 1985, the average percentage of all radio tagged seals hauled out on any given day per month was substantially higher than figures derived by both Yochem et al. (1987) and Pitcher and MacAllister (1981). The difference is partly explained by the months chosen for analysis; nonetheless, our December figure of 63% is still higher than that estimated by Yochem et al. (1987). These differences also may be attributed to the larger number of immature animals tagged in their sample versus the larger number of adult animals tagged in our sample. The percentage of days per month that immature seals were hauled out in our study was similar to figures derived by Yochem et al. (1987). A study designed to accomodate these biases would greatly improve estimates.

When hauled out, the total number of hours per day that seals spent on shore was similar for all months except during the breeding and molt periods. Stewart and Yochem (1983) observed a higher average time per day that seals were hauled out, 39%, than we found for seals at Drakes Estero (29%: 7 of 24 hrs for most months). Differences may be attributed to more exposure to disturbance from humans; though Limantour Spit is exposed at all tide levels, seals there are more frequently subjected to human disturbance. Though we expected pregnant females to require more time feeding than males, the percentage of days hauled out in March and April and the total number of hours per day hauled were not significantly different between the sexes.

The strong diurnal haul out pattern documented at Drakes Estero previously (Allen and Huber 1983), and shown by many other researchers (e.g. Boulva and McLaren 1979, Fancher 1979, and Stewart and Yochem 1983), was further confirmed in this year of study. Though seals hauled out at all hours of a day, peak abundance, based on the percentage of tagged seals, occurred from early morning to mid-day. Peak abundance for the year occurred in June between 0500 and 1400 hr. This represented between 60% and 73% of the estimated number of seals in the area.

Yochem et al. (1987) found that 7 of 17 seals preferred hauling out at night and suggested that this behavior could influence estimates of abundance. We identified 4 of 21

seals (3 pups and 1 adult female) in August and 4 of 15 (2 pups and 2 adult females) in December that preferred hauling out at night. In May, higher percentages of seals hauled out at night, but in most cases, these were females with pups that also hauled out for extended periods during daylight hours. Stewart and Yochem (1983) determined that time of initiation of a haul-out-bout did not influence the length of the bout; however, we found that during all months, seals hauled out for longer periods when bouts were initiated between 0100 and 1200 hr than for other time periods during day or night.

Absences of resident seals from Drakes Esetro averaged from one to two days suggesting absentees were foraging close by; local movement patterns observed during aerial and ground surveys also support this conclusion. This pattern of local movement was the same for all months and for both years. Immatures appeared to take more trips than adults in August, but we have no comparable data for other months. Once female seals had given birth in 1987, they were present daily in Drakes Estero until pups were weaned.

Attendance patterns indicate that seals spend between 50 and 70% of the time engaged in foraging activities and that most seals forage at night. All recorded foraging activities and movements of seals during aerial surveys appeared to be limited to within 0.8 km of shore. Though offshore movements of greater than 10 km by harbor seals have been recorded by others (Pitcher and McAllister 1981, Spaulding 1964, Wahl 1977), our results suggest nearshore feeding is more typical.

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Table 1. Standard measurements of harbor seals tagged at Drakes Estero, July 1986.

FLIPPER TAG	RADIO TAG	AGE	SEX	LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)	COMMENTS
302	224	PUP	F	88	69	20.4	
304	419	AD	M	146	106	70.3	
306	281	PUP	M	96	74	22.7	
308		AD	M	149	-	67.6	
310	306	1YR	F	107	83	31.8	
312	137	AD	F	140	104	63.5	Not pregnant
313		AD	F	130	103	65.8	
316	529	AD	F	141	104	65.8	
317		1YR	F	116	81	35.8	
320		AD	M	145	105	73.5	
322	342	AD	M	163	111	81.6	
324	198	AD	M	158	-	88.5	
326	540	PUP	F	95	73	19.5	
328	616	AD	F	162	-	90.3	Pregnant
330	590	AD	M	138	104	68.5	
332		AD	M	142	106	81.6	
334		AD	M	170	115	77.6	
335		AD	M	148	112	78.9	Pregnant
338	482	AD	F	139	105	64.4	
340		AD	F	145	104	64.4	
341	645	AD	F	133	105	70.3	Shark scar/Preg
344	246	AD	F	138	101	55.3	Pregnant
346	504	AD	M	143	106	70.3	Shark scar
348	444	AD	M	140	107	74.8	
350	325	1YR	F	114	82	36.3	
352	119	AD	F	145	101	63.5	
354	362	AD	F	134	98	59.8	Not pregnant
355	467	AD	F	143	103	69.4	Pregnant
357	160	AD	F	146	99	70.3	Pregnant
359	267	AD	M	149	104	71.7	Shark scar

Table 2. Standard measurements of harbor seals tagged at Drakes Estero, March 1987.

FLIPPER TAG	RADIO TAG	AGE	YEAR	SEX	LENGTH	GIRTH	WEIGHT (kg)	RECAPTURE	COMMENTS
–				F	132	105	–		
–		J		F	126	99	–		
–		J		F	118	86	40.8		
363		J		F	–	–	–		
371		J		F	–	–	–		
373		J		F	–	–	–		
386		J	1	F	99	77	30.8		
430		J	1	F	111	83	28.6		
434		J	1	F	103	75	38.6	X540	
436		J	1	F	115	85	40.8		
438		J	1	F	109	80	33.1		
440		J	1	F	107	90	33.1		
443		J	1	F	98	82	32.2		
445		J	1	F	98	78	28.6		
447		J	1	F	89	81	34.5		
449		J	1	F	112	80	34.9		
451		J		F	118	86	36.3		
–		J		M	115	87	40.4		
366		J		M	–	–	–		
368		J		M	–	–	–		
412		J	2	M	120	91	40.8		
416		J		M	114	86	32.7		
432		J	1	M	110	80	29.5		
365		A		F	135	115	84.8		Pregnant
374	432	A		F	137	128	112.0		"
378	26	A		F	150	126	104.3		"
380	46	A		F	143	128	106.6		"
384	844	A		F	165	127	109.8		"
387		A		F	138	123	78.9		"
390	92	A		F	143	121	98.4		"
392	116	A		F	143	123	96.2		"
394		A		F	–	–	81.2		?
396	856	A		F	153	–	113.4		Pregnant
398	874	A		F	143	122	94.4		"
400		A		F	136	119	89.4		"
410	622	A		F	159	139	116.6		"
418		A		F	154	121	102.9		"
419		A		F	137	109	70.8		"
421		A		F	143	125	87.1		
424		A		F	149	115	83.0		Not pregnant
428		A		F	150	115	98.4		?
441	822	A		F	151	134	–	X234	Pregnant
453		A		F	156	133	–		?
455		A		F	132	125	–		Pregnant
457		A		F	134	123	–		"
461		A		F	143	124	–		"

463		A	F	139	128	-		?
465		A	F	146	119	-		Pregnant
467		A	F	153	111	-		Not pregnant
471		A	F	146	127	-		Pregnant
475		A	F	124	120	-		"
212		A	M	-	-	-	T212	
221		A	M	-	-	-	T221	
382		A	M	-	-	-		
402	894	A	M	163	126	102.1		
403		A	M	141	115	87.1		
406		A	M	145	110	78.0		
408		A	M	147	118	89.4		
413	60	A	M	174	128	116.6		
426		A	M	149	105	83.5		
459		A	M	153	112	-		
469		A	M	150	123	-		
473		A	M	150	112	-		

Table 3. Average standard measurements of seals tagged in 1986 and 1987; $\bar{x}$ is the average, SE is the standard error, and n is the number of seals.

		LENGTH (cm)	GIRTH (cm)	WEIGHT (kg)
1986				
Adult Males	$\bar{x}$	149.25	107.6	75.41
	SE	2.79	1.18	1.8
	n	12	10	12
Adult Females	$\bar{x}$	141.33	102.46	66.9
	SE	2.38	0.72	2.5
	n	12	11	12
1 Year-Olds	$\bar{x}$	112.3	82.0	34.6
	SE	2.73	0.58	1.4
	n	3	3	3
Pups	$\bar{x}$	93.0	72.0	20.9
	SE	2.52	1.53	1.0
	n	3	3	3
1987				
Adult Males	$\bar{x}$	152.44	116.56	92.8
	SE	3.37	2.59	5.8
	n	9	9	6
Adult Females	$\bar{x}$	144.52	123.08	96.0
	SE	1.76	1.35	3.1
		27	26	18
Immature	$\bar{x}$	110.78	85.06	34.7
	SE	2.52	1.79	1.1
	n	18	18	16

Table 4. Length of attachment of radio transmitters on seals and last date seal was seen or heard.

SEAL	DATE ATTACH	LAST DATE W/XMATR	MIN. LENGTH OF ATTACH.(d)	DATE LAST OBSERVED
1986				
117	7/22/86	7/31/86	10	1/6/87
224	7/21/86	3/20/87	243	3/26/87
419	7/21/86	1/22/87	186	6/29/87
281	7/21/86	9/11/86	53	9/11/86
306	7/21/86	4/6/87	260	4/6/87
137	7/21/86	1/10/87	174	5/22/87
529	7/22/86	2/3/87	197	3/6/87
342	7/22/86	2/1/87	195	2/24/87
198	7/22/86	1/22	185	6/29/87
540	7/22/86	12/19	151	4/2/87
616	7/22/86	1/22	185	6/24/87
590	7/22/86	4/22	275	4/22/87
482	7/22/86	2/3	197	5/12/87
645	7/22/86	1/22	185	6/29/87
246	7/22/86	12/10	142	3/2/87
504	7/22/86	5/17/87	300	6/29/87
444	7/22/86	4/17/87	270	6/27/87
325	7/22/86	9/9/86	51	9/9/86
362	7/22/86	4/2/87	255	6/27/87
467	7/22/86	5/24	307	6/24/87
160	7/22/86	12/22	154	6/29/87
267	7/22/86	5/17/87	300	6/26/87
1987				
432	3/9/87	6/17	101	6/29/87
026	3/9/87	6/17	101	6/29/87
046	3/9/87	4/23	99	6/29/87
844	3/9/87	6/17	101	6/14/87
092	3/9/87	6/25	109	6/29/87
116	3/9/87	6/17	101	6/29/87
856	3/9/87	6/22	106	6/29/87
874	3/9/87	6/20	104	6/29/87
894	3/9/87	6/27	111	6/29/87
821	3/11/87	6/20	102	6/29/87
621	3/9/87	6/16	100	6/29/87
058	3/9/87	6/27	111	6/27/87

Table 5. Distance of movement >25 km and locations of individual seals radio tagged in 1986.

SEAL	#MOVES	AVE. DISTANCE (KM)	LOCATIONS	# LOCATIONS HAULED
137	4	81	PSB/MB/DE	3
161	0	-	DE	1
196	0	-	DE	1
223	0	-	DE	1
246	2	48	TB/DE	2
267	0	-	DE	1
305	3	36	DE/TB	2
343	0	-	DE	1
362	0	-	DE	1
418	0	-	DE	1
445	0	-	DE	1
467	0	-	DE	1
482	0	-	DE	1
504	2	410	SL/DE	2
531*	0	-	DE	2
540*	0	-	DE	2
590*	0	-	DE	2
616*	0	-	DE	2
644	0	-	DE	1

* These seals were frequently hauled out at PRH.

Table 6. Location and behavior of seals that traveled from Drakes Estero recorded during aerial surveys. Behavior is classified as A = active/swimming; I = inactive/hauled out.

Seal	7/29	7/30	8/31	9/5	9/9	9/21	9/22	9/30	10/13	10/14	10/30	11/10	11/28	12/10	1/8	2/7	2/23	3/24	4/6	5/18
137	D	D	D		DB/I		PSB/I	MB/C	MB/C	MB/C			PSB/C	PSB/C	PSB/C					
161	D	D			D	D		D			D	D	D	D						
196	D	D			D			D		D	D	D	D	D	D					
223		D	D		0	D		D			D		D	D	D	D				
246	D	D	D		D			D		TB/C	D			D						
267	D	D	D		D	D		D		D	D	D	D	D	D	D	D	D	D	
279					DB/I															
305	D		DR/I		TB/C	TB/C				0	TB/C	TB/C			D				D	
325	D	D			DB/I															
343	D	D			D			D		D	D			PRH/I	PRH/I					
362	D	D	D		D			D		D	D	D	D	D	D	D		D	D	
418	D	D			D					D	D	D	D	D	D					
445	D	D	D		D			D		D	D	D		D	D			D	D	
467	D	D	D			D		D		D	D	D		D	D	D		D		
482	D	D	D		D			D		D	D		D	D	D					
504	D	D			PRH/I			D		D	D	SL/C	D	D	D			D	D	
531	D	D			D			D		D	D	D	D	D	PRH/C	D			D	
540	D	D			PRH/I						D		D	D	D					
590	D	D			D			D		D	D			D	D		PRH/C	D	PRH/C	
616					D	PRH/I		D		D	D	D	PRH/I	PRH/I	D					
644	D	D	D		DB/I			D		D	D	D		D	D					
092																			BL/C	D
060																				PRH/C
431																		CR/I		
046																		PRH/I		
874																				

Locations with distances (km) from capture site:

BL	= Bolinas, Marin County	25
D	= Drakes Estero, Marin County	0
DB	= Drakes Bay, Marin County	<10
DR	= Duxbury Reef, Marin County	22
MB	= Muir Beach, Marin County	38
PRH	= Point Reyes Headland, Marin County	12
PSB	= Pescadero State Beach, San Mateo County	106
SL	= Stone Lagoon/Prairie Creek, Humboldt County	410
TB	= Tomales Bay, Marin County	48

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Table 7. Percentage of days present per month for sex and age classes; $\bar{x}$ is the mean percentage, SE is the standard error, and n is the number of seals.

	July	Aug	Dec	Mar	Apr	May	June
Females							
$\bar{x}$	85.6	84.8	70.43	64.2	63.8	91.3	86.6
SE	7.05	7.5	5.6	5.2	12.6	4.7	6.6
n	10	9	7	12	11	10	9
Males							
$\bar{x}$	96.9	76.0	78.4	72.7	62.3	94.0	83.0
SE	3.2	8.8	5.6	11.3	18.7	2.9	17.0
n	7	7	7	6	6	4	2
Immatures							
$\bar{x}$	57.6	38.8	52.5				
SE	18.1	7.7	13.5				
n	5	5	2				
Total Adults							
$\bar{x}$	90.2	80.7	74.4	67.0	63.3	92.1	85.9
SE	4.6	5.6	4.0	5.0	6.7	3.4	5.8
n	17	15	14	18	17	14	11

Table 8. Percentage of days per month each radio tagged seal hauled out at Drakes Estero.

SEAL	JULY	AUG	DEC	MAR	APR	MAY	JUN
Females							
117	78	*					
137	67	23	0	*			
161	100	100	83	*			
246	100	100	0	*			
362	100	94	90	79			
467	100	97	79	50	83	100	*
482	100	90	59	*			
531	100	84	72	*			
616	33	36	48	*			
644	78	77	62	*			
Males							
196	100	94	93				
267	100	77	97	96	100	95	*
343	100	48	62	*			
418	100	86	86	*			
444	100	94	83	79	71		
503	100	94	62	58	93	95	*
590	78	39	66	25	10	*	*
Immatures							
224	11	52	66	29	*		
279	44	42	*				
305	100	58	0	0			
325	100	19	*				
540	33	23	39	*			
Females							
024				83	60	100	94
043				61	58	-	
090				52	47	93	88
116				39	67	97	88
432				35	50	50	35
620				61	53	93	94
821				62	67	93	90
843				78	67	93	100
856				87	87	97	100
871				83	63	97	90
Males							
058				78	0	86	66
893				100	100	100	100

* Transmitter ceased functioning.

Table 9. Average percentage of radio tagged seals hauled out per day by month relative to the total number of radio tagged seals (seals relocated at other haul out sites at distances greater than 25 km not included); $\bar{x}$ is the average, SE is the standard error, and n is the number of days monitored per month.

	MONTH						
No. Seals	JUL 22	AUG 21	DEC 19	MAR 19	APR 17	MAY 14	JUN 11
$\bar{x}$	82.8	66.9	63.0	64.3	68.2	91.7	86.9
SE	1.6	2.1	2.3	1.7	2.9	2.4	1.9
n	9	31	28	23	20	27	20

Table 10. Length of time seals were absent from Drakes Estero, excluding seals that relocated to other haul outs; seal in the number of seals monitored per month, nl is the total number of trips recorded per month, n2 is the number of seals that took trips each month, $\bar{x}$ days is the average length in days of trips, $\bar{x}$ trips is the average number of trips per month, and SE is the standard error for each.

	1986			MONTH		1987	
	JUL	AUG	DEC	MAR	APR	MAY	JUN
Seal	21	20	15	15	13	11	10
nl	13	60	53	30	27	2	7
$\bar{x}$ days/mo	1.8	2.5	1.4	2.2	1.4	1.0	2.0
SE	0.3	0.3	0.1	0.9	0.1	0.0	0.5
mode	1	1	1	1	1	1	1
range	1-5	1-7	1-13	1-7	1-3	1	1-4
$\bar{x}$ trips/mo	1.9	3.5	4.8	3.0	2.7	1.0	1.8
SE	0.3	0.5	0.9	0.4	0.4	0.0	0.8
range	1-3	1-9	1-11	1-5	1-5	1	1-4
n2	7	17	11	10	10	2	4
% Seals to take trips	33	85	73	67	77	18	40

Table 11. Average number of total hours per day seals were hauled out at Drakes Estero by month and by sex and age class; n is the number of seals.

		1986			MONTH		1987	
		JUL	AUG	DEC	MAR	APR	MAY	JUN
TOTAL HOURS								
All seals	$\bar{x}$	11.2	7.6	7.2	7.7	8.9	9.7	9.5
	SE	.4	.3	.3	.4	.4	.6	.4
	n	21	10	16	10	15	14	11
	range	1-22						1-19
Adult female	$\bar{x}$	10.4	6.9	6.6	7.1	8.7	9.9	9.5
	SE	.6	.4	.5	.3	.4	.7	.4
	n	11	7	7	12	11	10	9
Adult male	$\bar{x}$	12.5	8.1	7.9	8.5	9.7	9.2	9.5
	SE	.6	.4	.4	.5	1.1	1.5	1.0
	n	5	7	7	6	4	4	2
Immature	$\bar{x}$	10.5	6.8	7.2	--	--	--	--
	SE	.8	.3	1.0				
	n	5	5	2				
LENGTH OF BOUT								
All seals	$\bar{x}$	7.9	5.5	5.7	--	5.25	4.5	5.8
	SE	.4	.2	.3		.2	.2	.3
	range	1-37	1-18	1-20		1-34	1-19	1-21

Table 12. Birthing and weaning dates of pregnant females radio and flipper tagged in July 1986 and March 1987.

SEAL	ESTIMATED BIRTHDAY	ESTIMATED WEAN DAY	#DAYS W/PUP
RADIO-TAGGED			
024	4/28	5/26	30
090	4/30	5/28	29
116	4/28	5/28	31
432	4/22	5/18	27
467	4/27	5/30	39
621	4/26	5/29	34
821	4/26	5/19	24
843	4/23	5/22	30
856	4/21	5/23	33
871	4/23	5/25	33
FLIPPER-TAGGED			
X043*	4/22	5/27	33
T365	4/16	5/14	29
T465	4/19	5/21	33
T454	4/28	5/25	28
X645*	4/30	5/30	31

* Radio tag had ceased functioning.

FIGURE 1. Capture site and locations of movement of harbor seals in California, 1986-87.

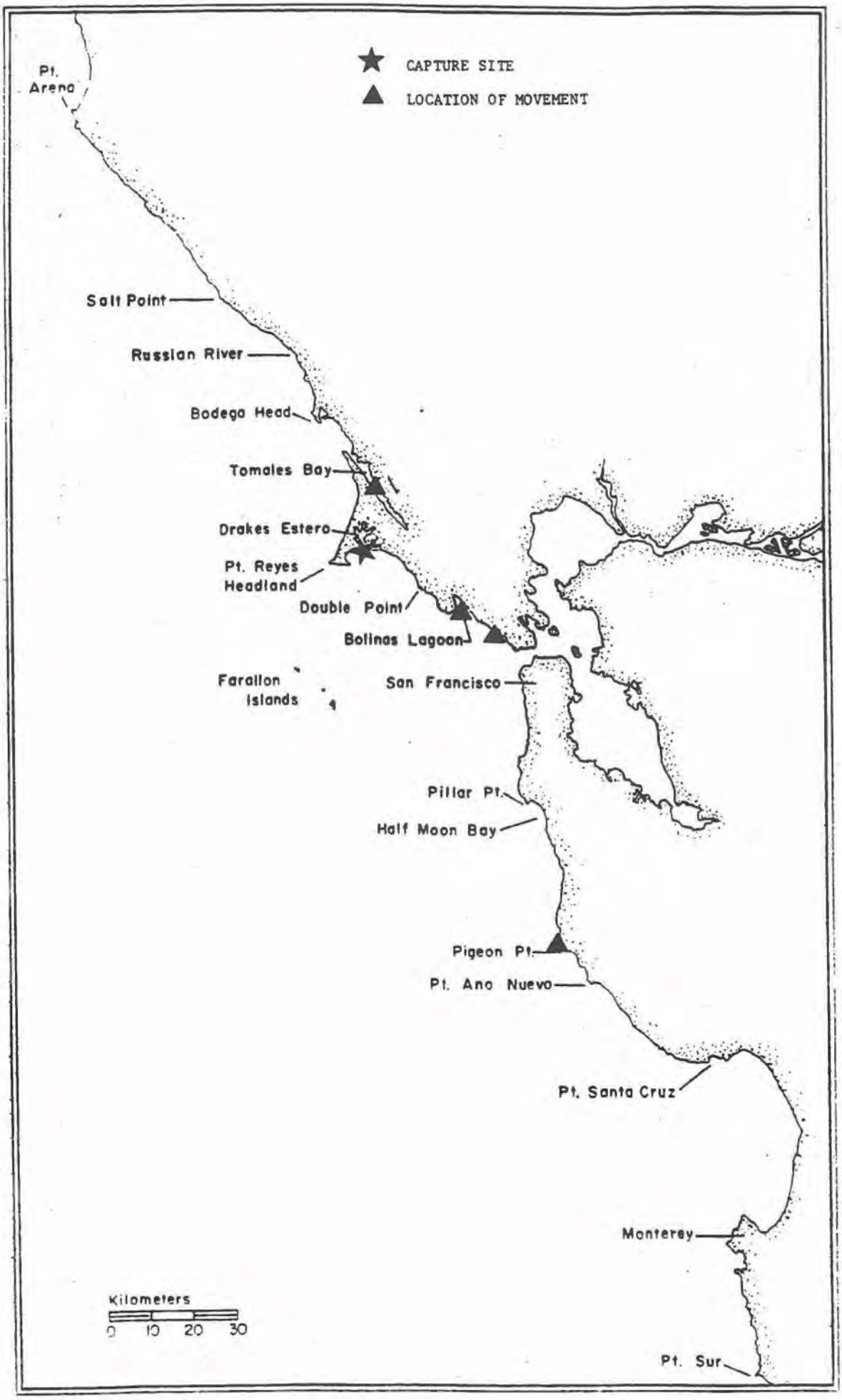

CAPTURE SITE
LOCATION OF MOVEMENT
Pt. Arena
Salt Point
Russian River
Bodega Head
Tomales Bay
Drakes Estero
Pt. Reyes Headland
Double Point
Bolinas Lagoon
Farallon Islands
San Francisco
Pillar Pt.
Half Moon Bay
Pigeon Pt.
Pt. Ano Nuevo
Pt. Santa Cruz
Monterey
Pt. Sur
Kilometers
0 10 20 30

Figure 2. Percentage of radio tagged seals hauled out by hour of day.

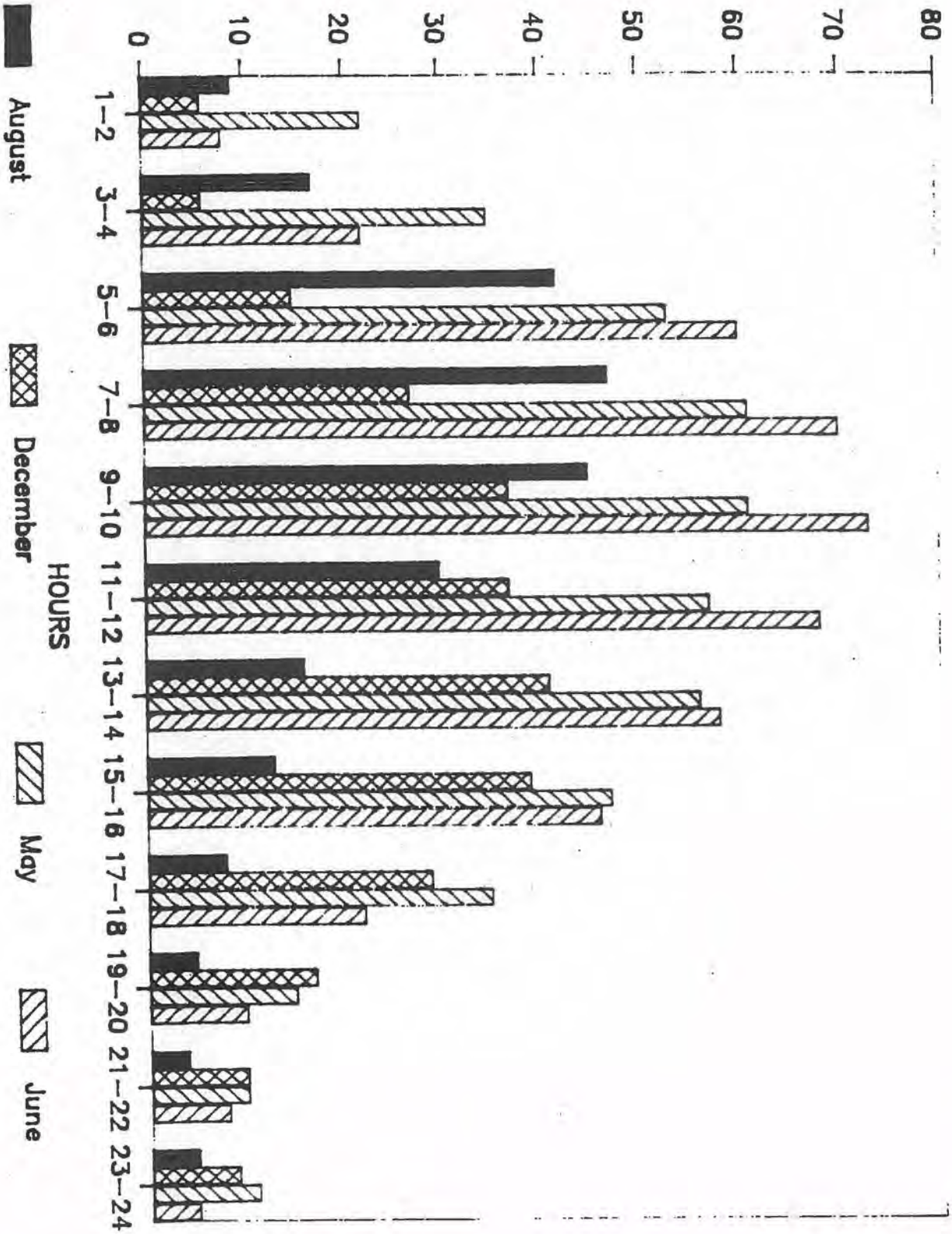

PERCENTAGE SEALS HAULED
0
10
20
30
40
50
60
70
80
1–2
3–4
5–6
7–8
9–10
11–12
13–14
15–16
17–18
19–20
21–22
23–24
HOURS
August
December
May
June

FIGURE 3. Initiation of haul-out-bouts by hour of day for the months July, August, and December.

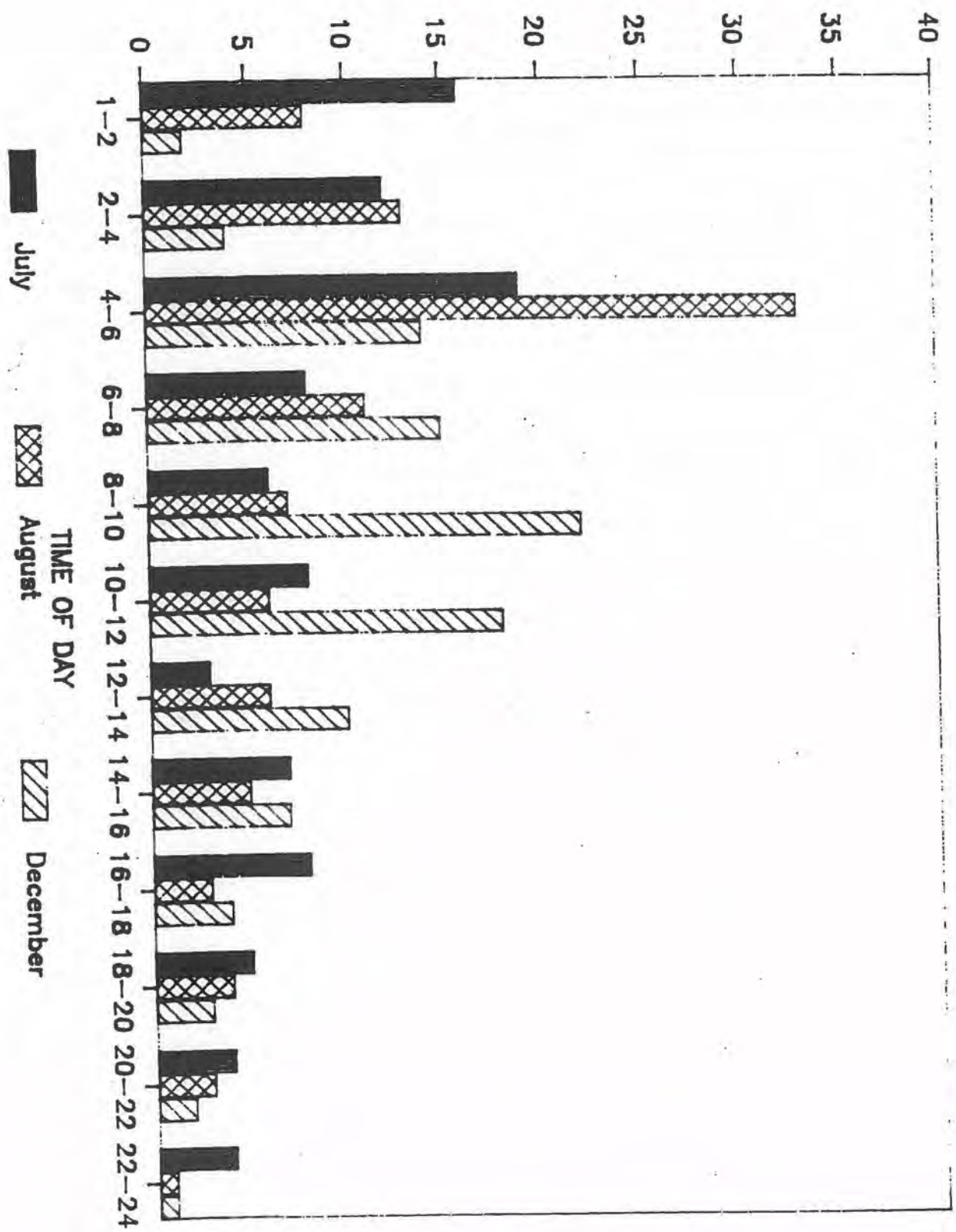

PERCENTAGE OF INITIATIONS
0
5
10
15
20
25
30
35
40
1–2
2–4
4–6
6–8
8–10
10–12
12–14
14–16
16–18
18–20
20–22
22–24
TIME OF DAY
July
August
December

Figure 4. Initiation of haul-out-bouts by hour of day for the months April, May, and June.

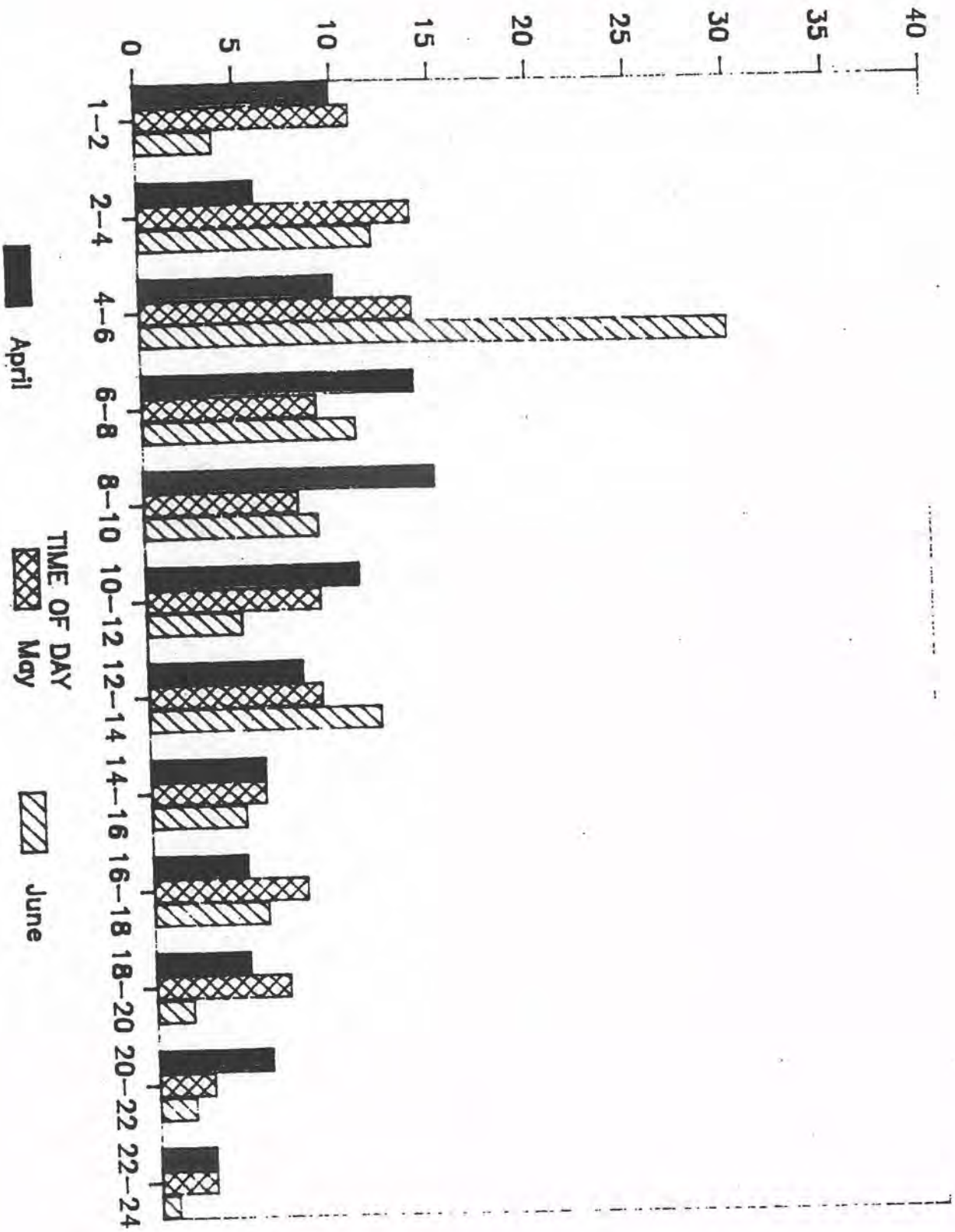
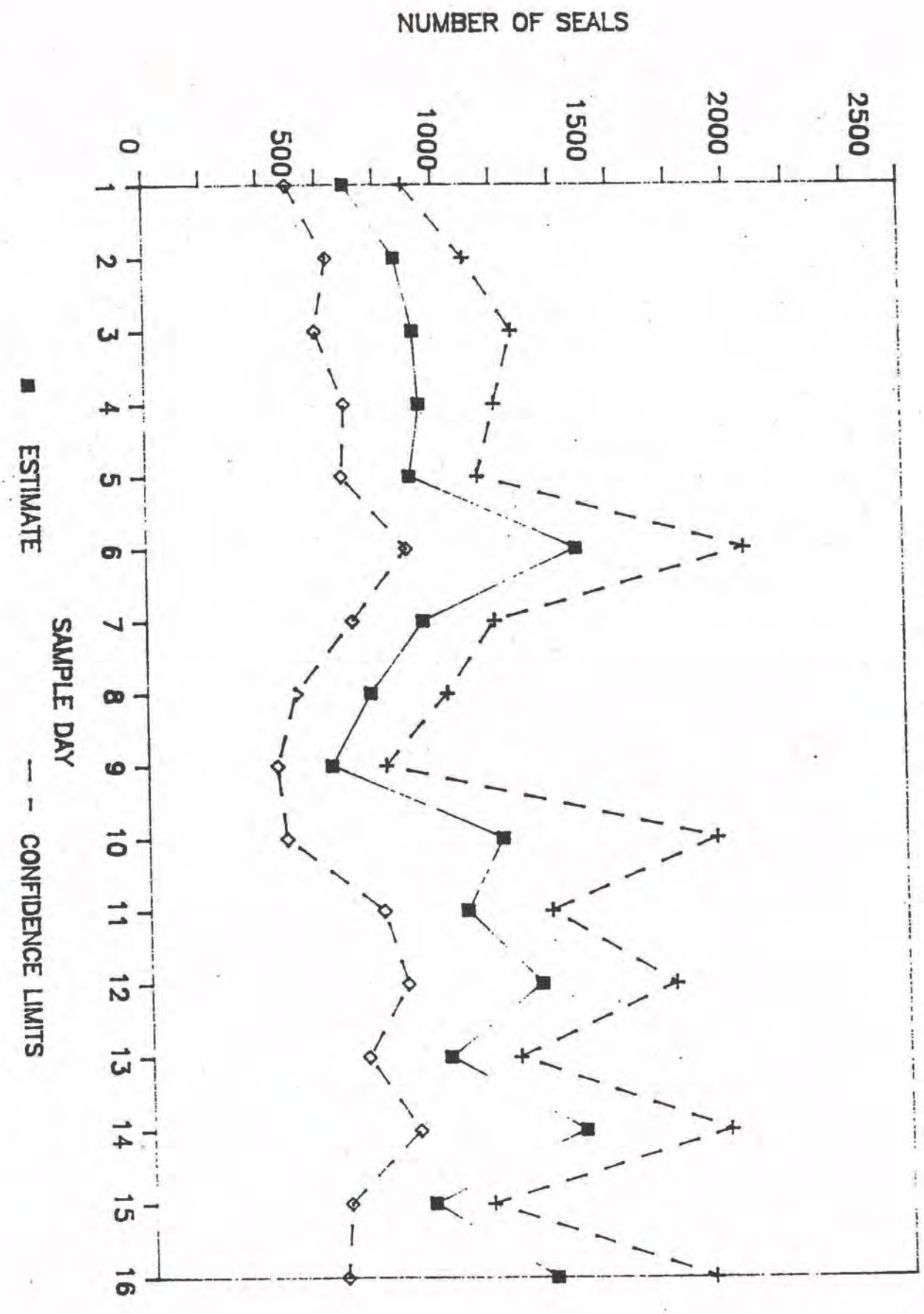
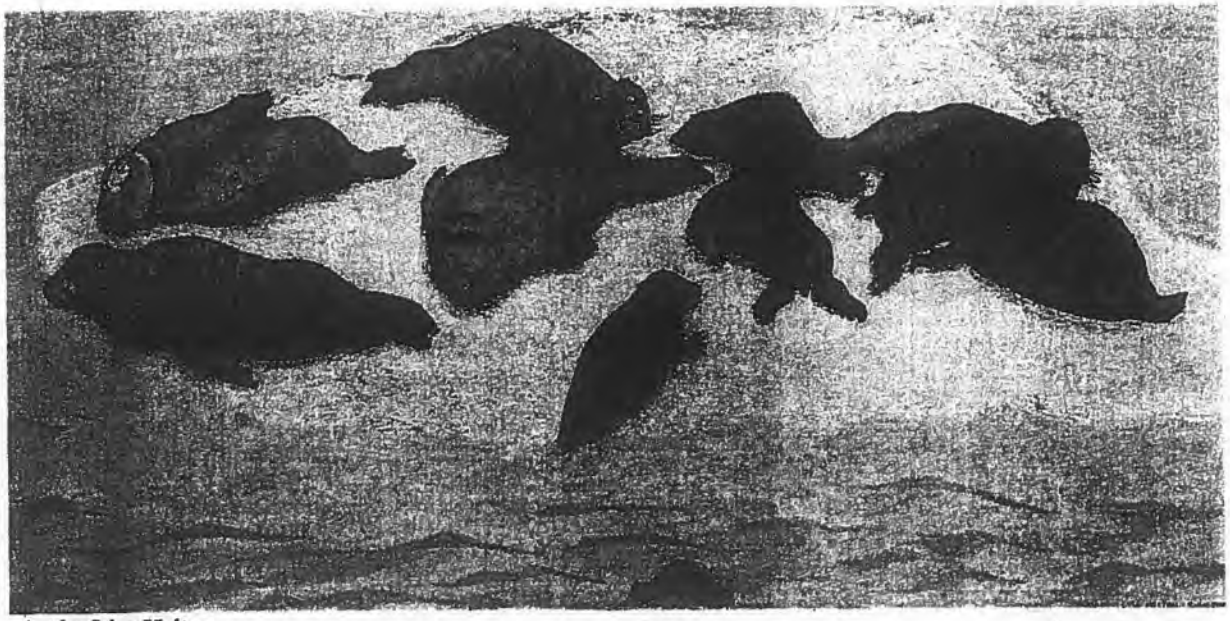

PERCENTAGE OF INITIATIONS
0
5
10
15
20
25
30
35
40
1–2
2–4
4–6
6–8
8–10
10–12
12–14
14–16
16–18
18–20
20–22
22–24
TIME OF DAY
April
May
June

Figure 5. Estimate of absolute abundance of seals at Drakes Estero in March 1987.


NUMBER OF SEALS
2500
2000
1500
1000
500
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
SAMPLE DAY
■ ESTIMATE
+ - - CONFIDENCE LIMITS



Art by Lisa Halton

LONG-TERM MONITORING OF HARBOR SEALS AT POINT REYES, CALIFORNIA

5-YEAR ANNUAL REPORT 1997-2001

Prepared by:
Sarah Allen
Sue Waber
Wayne Holter
David Press

Point Reyes National Seashore

2004

Introduction

Harbor seals are the dominant and only resident pinniped at Point Reyes, California. The Point Reyes population also represents the largest concentration of harbor seals in the State of California other than the Channel Islands, accounting for 20% of the mainland breeding population (Sydeman and Allen 1999). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent habitat for seals to rest, molt and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999) in order to 1) detect changes in population numbers, 2) detect changes in reproductive success and 3) identify anthropogenic or environmental factors that might affect population status. In the past, significant increases in the population of harbor seals at Point Reyes have been documented at most colonies, except at Tomales Bay where there was substantial human activity (Allen et al. 1989, Allen and King 1993) and at Point Reyes Headland where northern elephant seals are expanding (Sydeman and Allen 1999).

The information presented here is an update on the status and trend of the harbor seal population at Point Reyes. It represents a five-year summary of data collected prior to, during and three years following the 1998 El Nino Southern Oscillation (ENSO) event. We have also included two years of information from adjacent areas (San Francisco Bay and Sonoma County) where surveys were conducted in conjunction with other agencies and organizations as part of a region-wide survey effort.

Methods

Study Area

The Point Reyes coastline extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N). Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PRNS), Golden Gate National Recreation Area (GGNRA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline. In addition to the protection afforded by these agencies, Bird Rock, Point Reyes Headland, and Double Point were designated by the California Department of Fish and Game and the California Water Resources Control Board as Areas of Special Biological Significance because of their unique biological attributes and now reclassified as State Water Quality Protection Areas in 2003 (Chan 1979; SWQPA).

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987).

Data are presented as maximum for the seasons, both breeding and molt. Summary statistics, including means and standard errors, are also provided for the breeding season 1997-2001 and the molt season 2000-2001.

All actual and potential disturbances to harbor seals were recorded. Actual disturbance was defined as any activity that resulted in behavior change by the seals such as moving towards or entering the water. Potential disturbance was defined as an activity that occurred within a ¼ mile area that had the potential to alter the behavior of the seals. For example, a plane flying below 1000 feet had the potential to disturb seals. Observers recorded the time, source of the disturbance, and the distance of the source from the seals. Distance measurement was not estimated consistently between sites or observers, and consequently was dropped from analyses. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water or unknown (Allen et al. 1985). In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time and location of where the seals rehauled were also recorded. In some cases, an unknown response was recorded if the disturbance occurred before the survey was started, and so the extent of the disturbance was not directly observed. An example would be a tight group of seals seen in the water off the haul out site and many fresh seal tracks on the haul out site.

Surveys in 1998 and 1999 incorporated seal numbers from a larger scale harbor seal census for the San Francisco Bay area and adjacent waters. Other regional haul out sites were Jenner, the Sonoma coastline, Sea Ranch, the San Mateo coastline, South Bean Hollow, the Fitzgerald Marine Reserve, the Richmond Bridge, Yerba Buena Island, and Mowry Slough (Figure 1b). Participants in the region-wide survey included the Gulf of the Farallones National Marine Sanctuary Association, San Francisco State University, and Stewards of Slavianka, a non-profit conservation group based in Sonoma County. Additionally, a region-wide aerial survey was conducted in May 1999 by NPS biologists on an airplane provided by the California Department of Transportation. Photographs (8x10" color prints) were taken of each site, and biologists from San Francisco State University counted seals from photographs.

Results

Overview

The population trend in harbor seals at Point Reyes appears stable between 1997 and 2001. Annual maximum counts for the breeding season ranged between 2,481 and 3,506, and annual average counts ranged from 1,744.6 and 2,511.1 (range of SE = 122.5 to 379.0; Table 1a-g). The lower numbers for maximum totals and annual averages were associated with the 1998 ENSO. The difference in the adult/immature population of harbor seals, excluding Duxbury Reef, was minimal between 1997 and 2001 (Lambda = +0.06) but the difference between the pup numbers was notable (Lambda = +0.27; Table 1a). The maximum numbers of adult/immature seals and pups were higher in 1997 and 2001 than those observed in 1998 (1998 Lambda = -0.46 and 2001 Lambda = +1.36). Pup and adult numbers were lower at all haul out sites in 1998. Maximum counts for the

Sources for disturbance varied by year at Double Point (Table 5b). Overall, people on foot were the primary known source for disturbances (19%), although unknown sources disturbed seals (29%). Commercial fishing boats have increasingly disturbed seals over the past 3 years (13%) and an aggressive male northern elephant seal was the primary source for disturbance in 2001 (10%). When seals were disturbed at Double Point they were more likely to flush into the water, flushing > 50% of the times disturbed, regardless of year (Table 5c).

Drakes and Limantour Esteros

Drakes and Limantour Esteros consist of a number of tidal sandbars. This location is one of the primary pupping sites at Point Reyes. Seals were surveyed at Drakes and Limantour Esteros from 26 to 45 times per year between 1997-2001 (Table 6a). The highest total number of seals occurred between the first and second week of May (Figure 4). The maximum pup counts consistently occurred between the third week of April and the first week of May (Figure 5). The maximum counts during the molting season ranged between 817 and 1292 and occurred between mid June and mid July (Figure 4).

Seals at Drakes and Limantour Esteros were disturbed more than at any other haul out location at Point Reyes, averaging from 1.0-1.3 disturbances per survey between 1997 and 2001 (Table 6a-d). Weekday disturbances reached as high as 1.5 disturbances per day in 2000 but usually were around 0.9 disturbances per day; this contrasts to the regional maximum of 0.7. The hourly average number of disturbances was 0.8 (SD = 0.4, n = 18) in 2000 and 0.5 in 2001 (SD = 0.7, n = 21; Table 6d).

People on foot were the primary source for disturbance (47%), although unknown sources also disturbed seals (19%), as did birds (12%; Table 6b). Kayaks and motorboats are restricted in Drakes Estero during the breeding season and likely this explains the low rate of disturbance from these sources. When seals were disturbed at Drakes and Limantour Esteros, they were more likely to flush into the water, flushing > 50% of the times disturbed, regardless of year (Table 6c).

Tomales Point

Tomales Point consists of several subsites extending along the shoreline extending to Bird Rock. Tomales Point is one of the more difficult sites to survey because of distance to travel and weather. The area is consistently foggy during the spring and summer. Seals were surveyed at Tomales Point from 9 to 34 times per year between 1997-2001 (Table 7a). There was no consistency between years when the maximum adult/immature count occurred (Figure 6). The maximum pup counts occurred between the third week of April and the third week of May, except in 1997; however, the numbers ranged widely between 74 in 1998 to 194 in 2001 (Figure 7). The wide swing in numbers is likely related to both disturbance and seals shifting between nearby Tomales Bay, which also demonstrated coincidental swings in numbers. Seasonal molt counts are unreliable and spotty due to weather.

Bolinas Lagoon

The Bolinas Lagoon location consists of several tidal sand bars. Seals were surveyed at Bolinas Lagoon from 3 to 35 times per year between 1997-2001 (Table 9a). The maximum counts at Bolinas were distributed throughout the breeding season in contrast to other colonies, but during the molt season a distinct peak occurred during the first two weeks of July, ranging from 267 to 401 (Figure 10). The maximum pup counts consistently occurred between the first and second week of May, excluding 1997, and ranged from 51 to 123 (Figure11). This colony is the only one that appears to be growing; pup production more than doubled in three years between 1999 and 2001. As with all sites, pup production was down during 1998, and numbers of seals hauled out were also reduced.

Seals at Bolinas Lagoon were disturbed moderately in comparison to other haul out sites at Point Reyes, averaging from 0 to 1.1 disturbances per survey between 1997 and 2001 (Table 9a-d). Weekend and weekday disturbances varied from year to year. The hourly average number of disturbances on weekends was 0.3 (SD = 0.4, n = 9) in 2000 and 0.6 in 2001 (SD = 0.5, n = 18; Tables 9d). The NOAA SEALS program reduced disturbance by recreationists with an onsite education program starting in 1997.

Kayaks were the primary source for disturbance (24%), although unknown sources also disturbed seals (24%), as did birds (18%; Table 9b). When seals were disturbed at Bolinas Lagoon, they were more likely to flush into the water, flushing > 50% of the times disturbed, most years (Table 9c).

Duxbury Reef

Duxbury Reef was added as a survey site in 1999. This site is adjacent to Bolinas Lagoon and often serves as an alternate site to those in the Lagoon. Seals were surveyed from 8 to 32 times between 1999 and 2001 (Tables 10a). Annual maximum ranged from 71 to112 (Figure 12) including from 10 to 20 pups during the breeding season (Figure 13). We had insufficient data during the molt until 2001 when the maximum count was 99 (Figure 12).

Seals were rarely disturbed at Duxbury Reef, likely due to the difficulty of accessing the site except at very low tides. Humans on foot were the primary source for disturbance (88%; Table 10b). During the weekends, disturbances averaged 0.3 per hour (SD = 0.8, n = 7) in 2000 and 0.4 per hour (SD = 1.1, n = 17) in 2001 (Table 10d).

Point Reyes Headland

Point Reyes Headland location consists of a series of pocket beaches that is used also by a large northern elephant seal colony. As with Tomales Point, surveys at Point Reyes Headland were limited due to weather conditions. Annual surveys ranged between 7 and

72, SA = 7, PUP = 7, UNK = 5), and of those identified to sex, the majority was males (33%; M = 30, F = 17, UNK = 44). Tissues were collected from several fresh dead or dying seals by the TMMC. A fibrinous hemorrhagic pneumonia with marked bacterial colonization was evident in all of the fresh specimens. The lesions resembled that of acute *Pasteurella* pneumonia in cattle, which is often predisposed by viral infection (L. Lowenstine, U.C. Davis, pers. com.). Nineteen live harbor seals were subsequently captured at Point Reyes Headland and blood was taken for further analyses. Preliminary findings indicate the presence of antibodies to a previously unidentified virus (F. Gulland, pers. com.).

In 2000, another unusual stranding event occurred at Point Reyes, and was investigated by the stranding network including TMMC, Museum of Vertebrate Zoology Berkeley and the National Park Service. The epicenter of this event was Tomales Point haul out sites where around 25 dead seals were found. Tissues, blood and urine were collected from five very fresh specimens. All seals tested negative for biotoxins or morbillivirus. *Pseudomonas* bacteria were found in all specimens, and an unidentified virus was found in one very fresh (<2 hrs dead) specimen. Preliminary evidence indicated that seals died acutely, since blubber layers were normal; lymph nodes were engorged with fluid (F. Gulland, Marine Mammal Center, unpubl. data).

Discussion

Harbor seals in central California represent a significant proportion of the state population. Surveys of harbor seals in the San Francisco Bay Area and adjacent waters in 1998 and 1999 reveal that large numbers of harbor seals are concentrated in north-central California, particularly at Point Reyes. Double Point and Drakes/Limantour Esteros account for more than 50% of total seals in Point Reyes counted during both the breeding and molt seasons. The pups produced at these two sites accounted for more than 55% of the total pups produced at Point Reyes annually. Substantial numbers of seals also haul out in small groups along the Sonoma and San Mateo counties' coastline and in San Francisco Bay.

Surveys conducted at Point Reyes between 1997 and 2001 showed annual differences, likely related to the 1998 El Nino event. However, trends may also reflect increased effort between years as the volunteer monitoring program was fully implemented. In addition, there was not consistent effort between weekend and weekday surveys. This is important in analyzing the disturbance data, since we would expect more disturbances on weekends when recreational use is higher.

Nonetheless, significantly fewer seals were breeding in 1998 than 1997 (-24%). Pup production was also lower, (-46%). Factors potentially influencing the breeding population at Point Reyes between 1997 and 1998 were the harbor seal die off during and after the breeding season of 1997 and the 1998 El Nino event. The 1999 number of seals breeding was substantially higher than that of 1998 but only slightly higher than the 1997 breeding season. Pup production was also elevated from 1998 by 49%, but only by 8% from the 1997 season. El Nino effects were also documented in other pinnipeds in

Acknowledgments

We gratefully acknowledge the generous contributions from the California Department of Transportation, Canon USA, Inc. and the Point Reyes National Seashore Association.

We especially want to thank the many volunteers who hiked so many miles despite wind, rain and fog to survey seals throughout Point Reyes, including Therese Ambrosi-Smith, Sharon Alexander, Julie Batsel, Jeff Benjamin, Kathryn Ann Biglow, Jenner Brahic, Brooks-An Brazil, Jason Buckner, Jennipher Carpenter, Judith Coburn, Alison DeLauer, Michele Diamond, Susan Farrar, Carlin Finke, Sally Gale, Marco GiGuere, Jessica Grant, Joel Grapentine, Sterling Hada, Lisa Halton, Eliot Hayne, Christian Helwig, Alan and Isabel Hubbard, Nikole Kimes, Tim Lamarre, Casey Lion, Trish and Jay Mahoney, Stanley Mandell, Joy Maulitz, Laura May, Brenda McLaughlin, Harmony McPherson, Paul Moschetti, Mary Beth Mudgett, David O'Toole, Susan Pender, Bert Pittari, Alan and Martha Proctor, Sheri Rice, Janet Robbins, Maria Saxton, Anna Schopp, Mike Seely, Brian Somerday, Kim Tingstrom, Angelica Tercero, Ed Vermeulen, Lucian Wernick, Amy Whelan, Alianora Walker, Donna Werra, Lisa Wertz, Jeffry Wilkinson, Pat Zuccaro.

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We also thank the volunteers and students of other agencies and organizations including the Farallones Marine Sanctuary Association, the Friends of Slavianka, the Fitzgerald Marine Reserve and the San Francisco State University Harbor Seal Project for contributing numbers for the region-wide surveys. Finally, Leslie Grella contributed enormously to this long-term study with her humor and passion and will be sorely missed.

and abundance of common seals, *Phoca vitulina*, in Orkney. Unpubl. Ph.D. Dissert., Univ. of Aberdeen, England. 167pp.

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Figure 1b. Harbor seal haul out sites in central California.

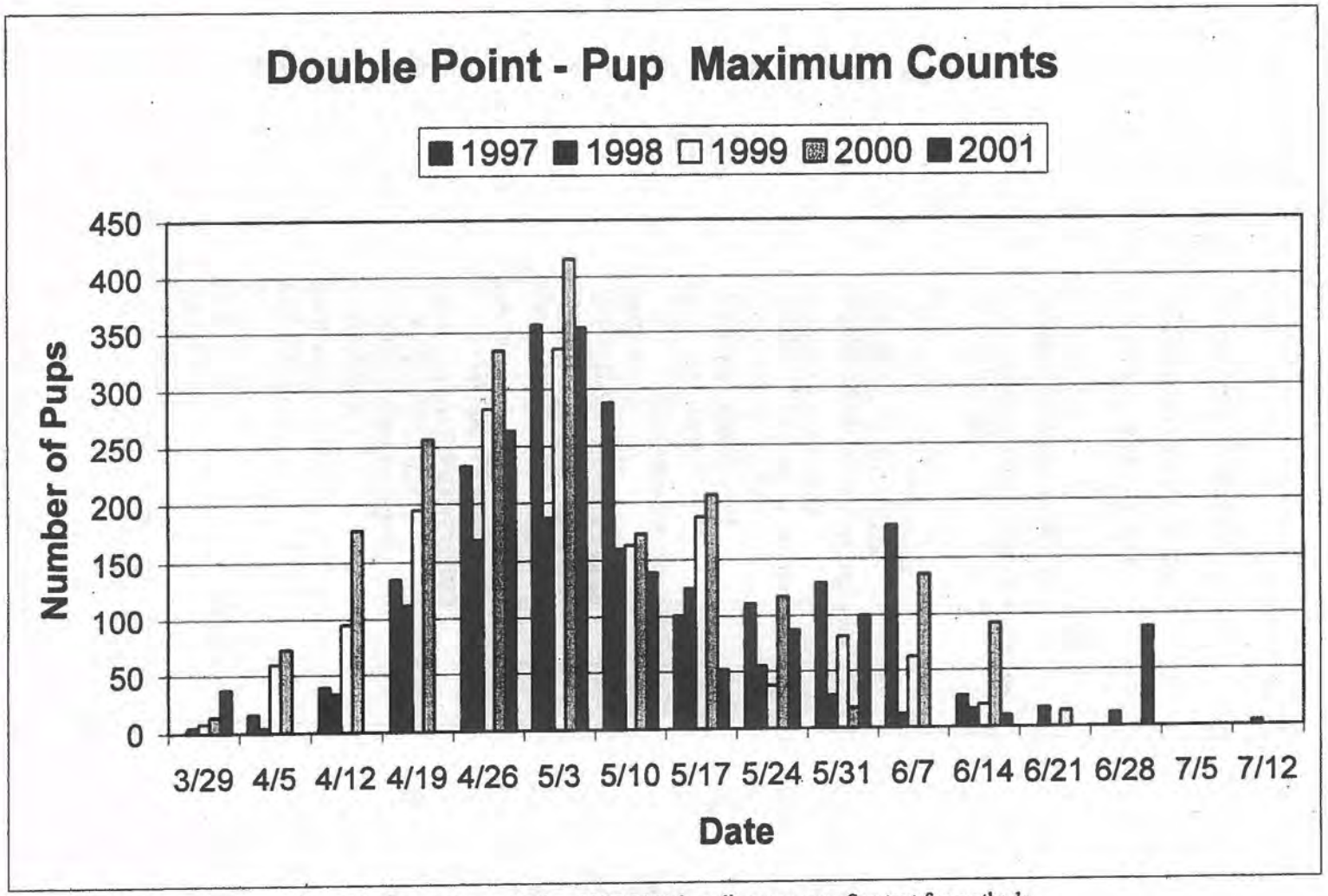

Figure 3. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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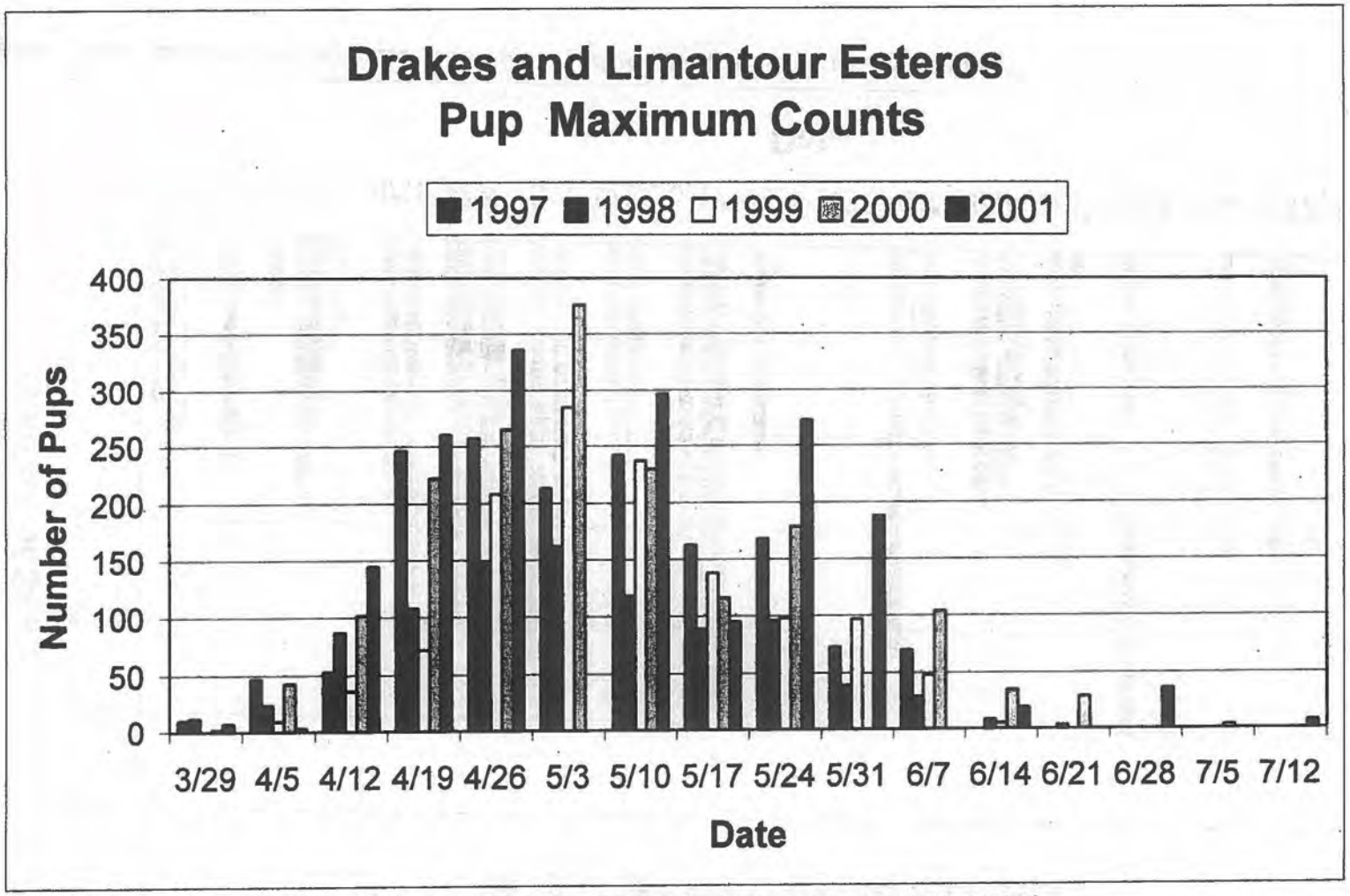

Figure 5. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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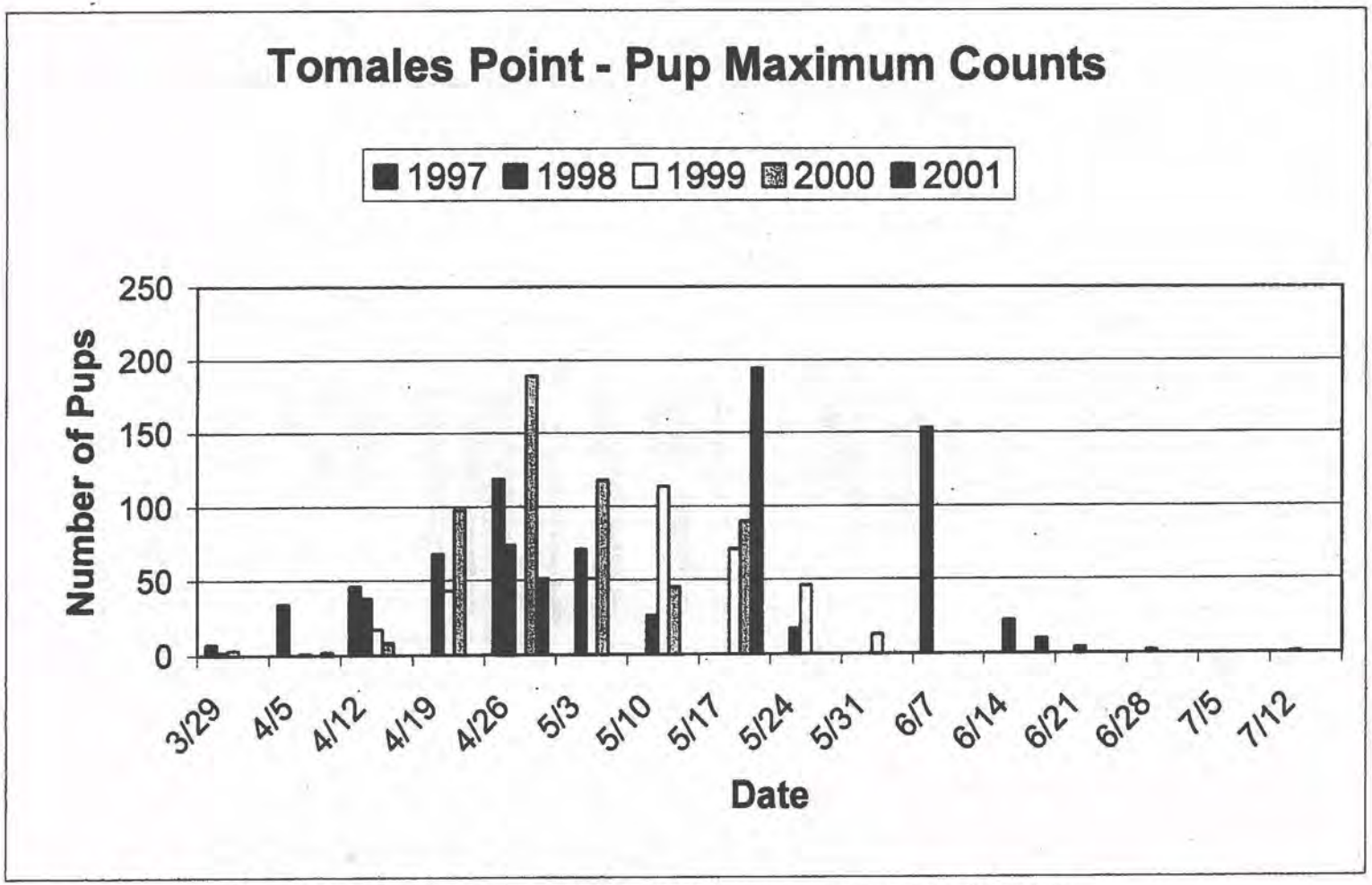

Figure 7. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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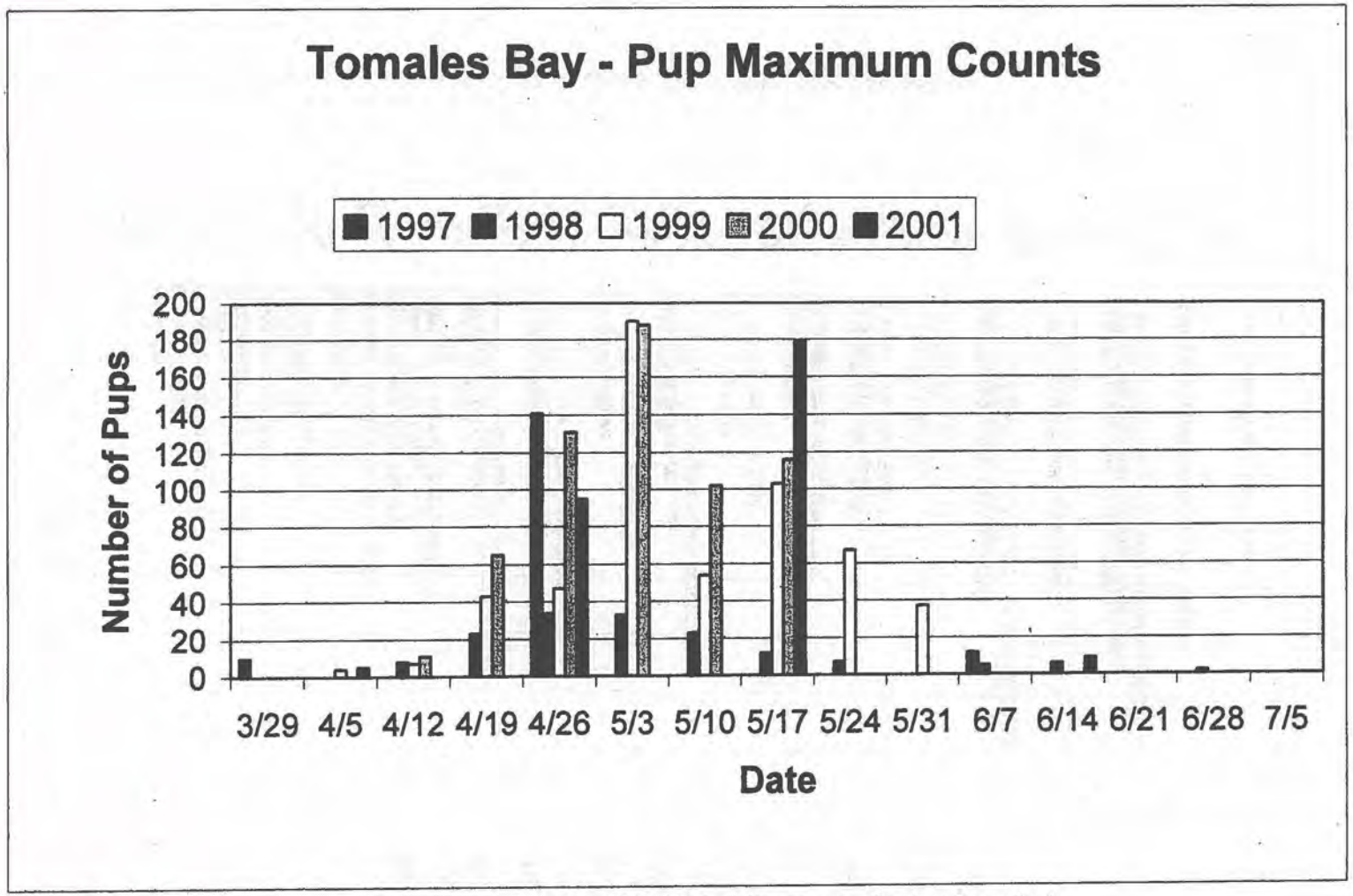

Figure 9. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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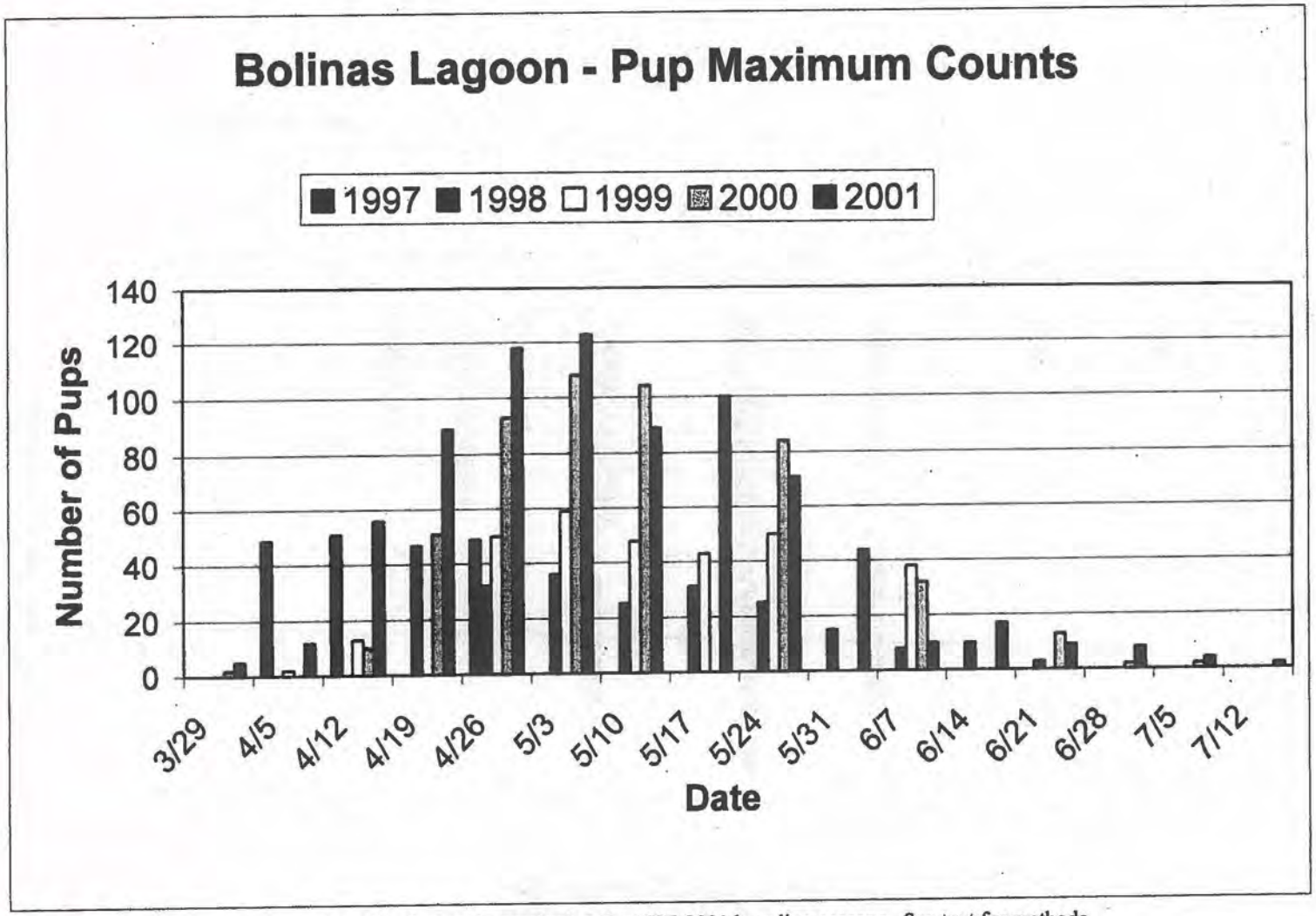

Figure 11. Weekly maximum number of harbor seal pups during the 1997-2001 breeding seasons. See text for methods.

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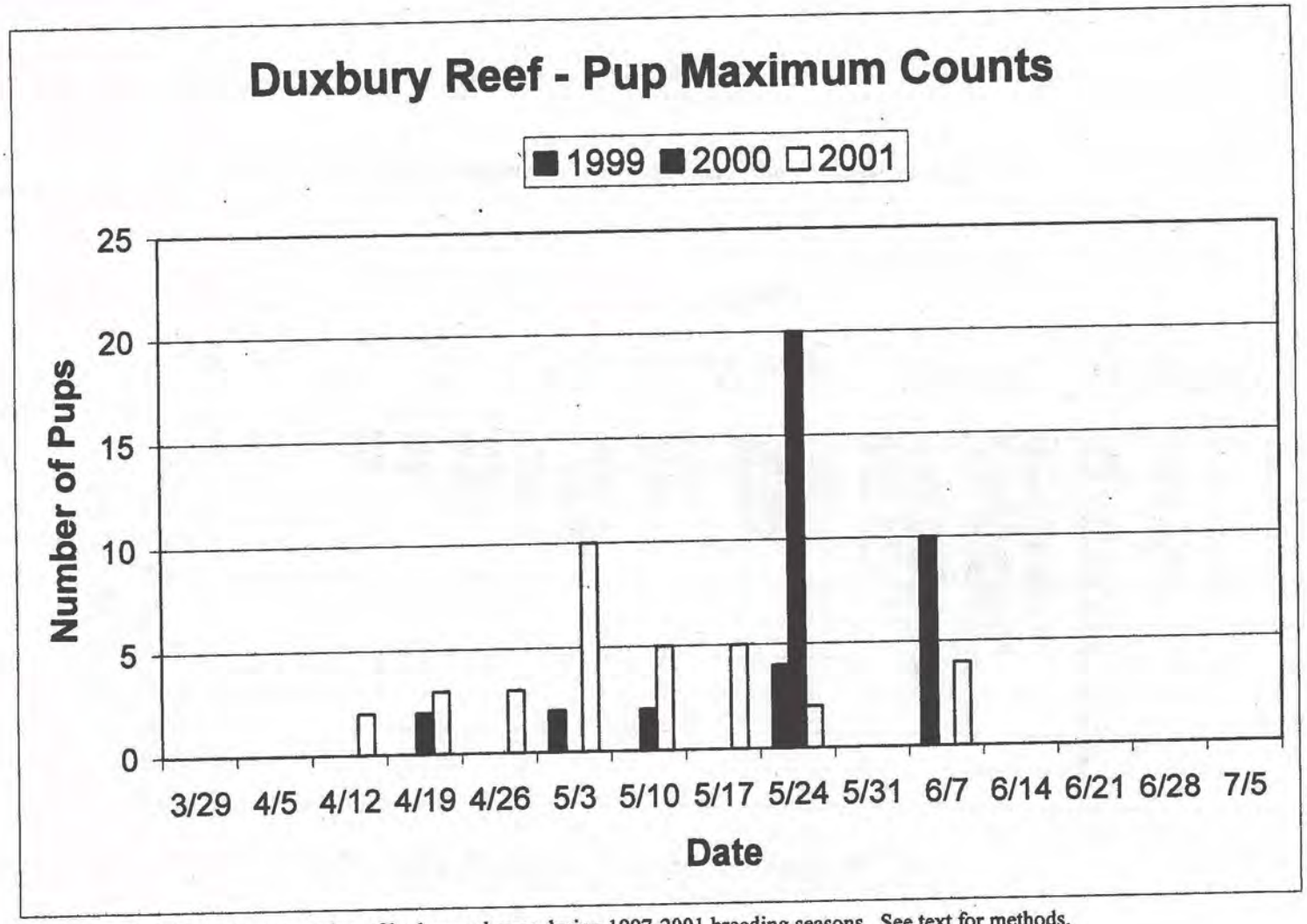

Figure 13. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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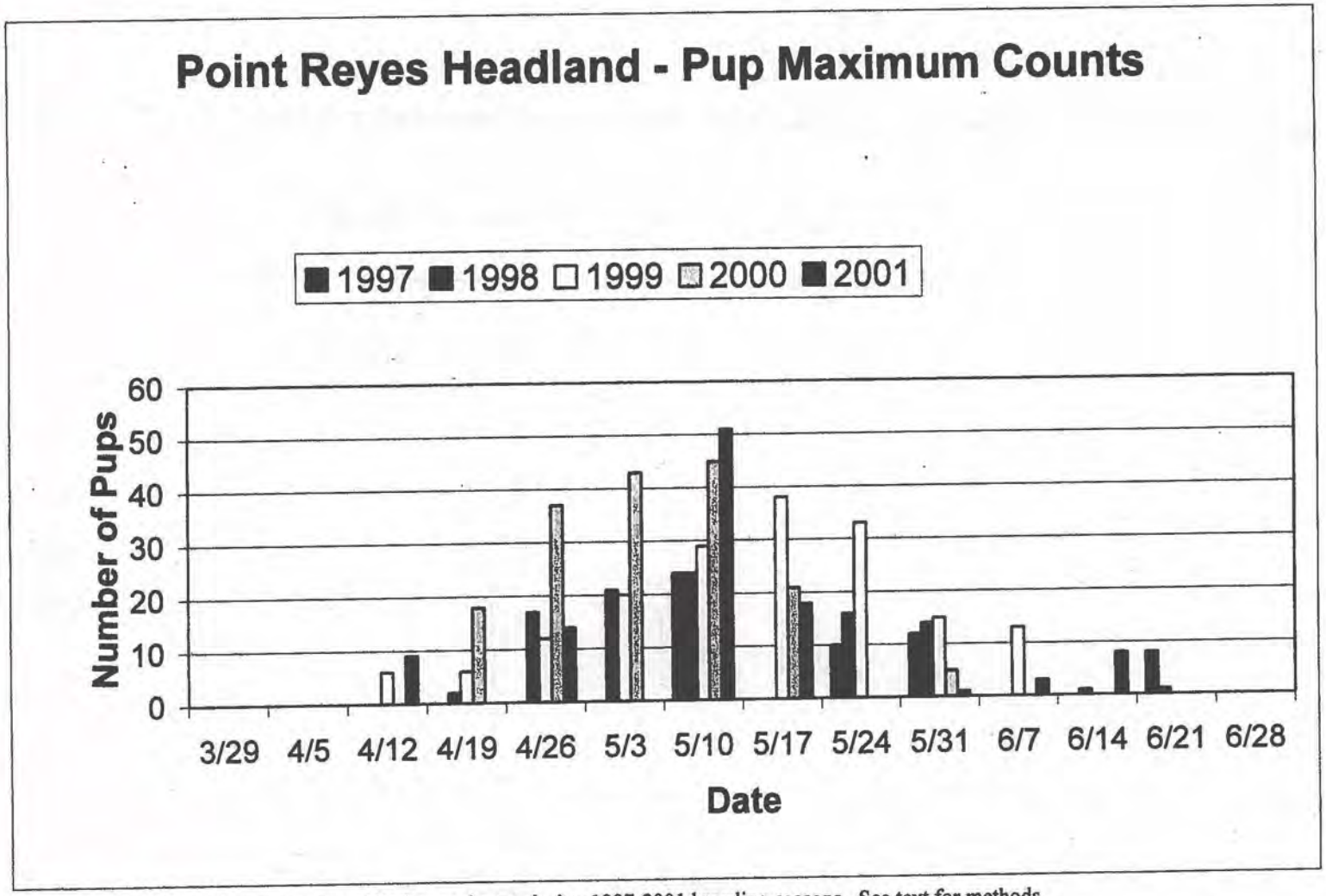

Figure 15. Weekly maximum number of harbor seal pups during 1997-2001 breeding seasons. See text for methods.

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Table 1a. Summary of the survey data for the1997-2001 seasons, combining all sites at Point Reyes. Maximum # of Breed and Molt, and Average Breed include all age classes.

YEAR	Max # Breed	Average Breed	Max # Pups	Max # Molt	#Surveys	# Disturbances	Disturbances Per Survey	Dead Pups
1997	3,268	1,830.5 SE = 379 N =4	983	NA	Weekday: 44 Weekend: 29 Total: 73	Weekday: 9 Weekend: 37 Total: 46	0.2 1.3	7
1998	2,481	1,744.6 SE = 122.5 N = 8	528	3,070	Weekday: 79 Weekend: 64 Total: 143	Weekday: 24 Weekend: 46 Total: 70	0.3 0.7	15
1999	3,325	1,779.9 SE = 173.5 N = 10	1,068	2,863	Weekday: 139 Weekend: 69 Total: 208	Weekday: 71 Weekend: 54 Total: 125	0.5 0.8	9
2000	3,506	2,511.1 SE = 224.4 N = 7	1,342	3,108	Weekday: 106 Weekend: 91 Total: 197	Weekday: 78 Weekend: 116 Total: 194	0.7 1.3	11
2001	3,485	2,218.8 SE = 244.8 N= 4	1,247	3,769	Weekday: 112 Weekend: 119 Total: 231	Weekday: 57 Weekend: 107 Total: 164	0.5 0.9	7

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Table 1c. Survey summary data for 1997. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt =all age classes during the molting season, June 15 to July 15. NA = data not available.

	Max # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	854	357	NA	Weekday: 12 Weekend: 7	Weekday: 4 Weekend: 6	11	1.3%	3	3
Drakes Estero & Limantour	1111	257	NA	Weekday: 10 Weekend: 16	Weekday: 3 Weekend: 30	13	1.2%	3	1
Tomales Point	420	153	NA	Weekday: 8 Weekend: 1	Weekday: 2 Weekend: 1	3	0.7%	2	1
Tomales Bay	530	141	NA	Weekday: 8 Weekend: 1	Weekday: 0 Weekend: 0	14	2.6%	0	1
Bolinas Lagoon	212	51	NA	Weekday: 1 Weekend: 2	Weekday: 0 Weekend: 0	5	2.4%	0	1
Point Reyes Headland	141	24	466	Weekday: 5 Weekend: 2	Weekday: 0 Weekend: 0	0	0%	NA	0
1997 Total	3268	983	NA	73	46	-	-	-	-

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Table 1e. Summary data for 1999 season. All reported numbers reflect the maximum number seen during a single census over the entire season. The percent of red seals is a percentage of the maximum total number of seals during the breeding season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max #Molt =all age classes during the molting season, June15 to July 15.

	Max # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Double Point	890	335	486	Weekday: 23 Weekend: 13	Weekday: 11 Weekend: 10	11	1.2%	4	5
Drakes Estero & Limantour	922	285	817	Weekday: 26 Weekend: 19	Weekday: 24 Weekend: 35	27	2.9%	4	2
Tomales Point	430	151	460	Weekday: 19 Weekend: 15	Weekday: 5 Weekend: 0	10	2.3%	3	1
Tomales Bay	625	190	347	Weekday: 19 Weekend: 15	Weekday: 11 Weekend: 4	17	2.7%	1	1
Bolinas Lagoon	192	59	322	Weekday: 18 Weekend: 2	Weekday: 18 Weekend: 4	7	3.6%	0	0
Duxbury Reef	98	10	NA	Weekday: 7 Weekend: 1	Weekday: 0 Weekend: 1	1	1.0%	0	0
Point Reyes Headland	168	38	431	Weekday: 27 Weekend: 4	Weekday: 2 Weekend: 0	2	1.2%	0	0
1999 Total	3325	1068	2863	208	125	-	-	-	-

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Table 1g. Summary data for 2001. The maximum numbers were seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers with 2 or more years of experience. Avg # Breed= adults, immatures and pups during the breeding season, March 15 to June 15, recorded by observers of all experience levels. Max # Molt =all age classes during the molting season, June 15 to July 15, recorded by observers with two or more years of experience. Avg # Molt = all age classes during the molting season, June 15 to July 15, recorded by all observers. se=Standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Red Seals	Shark Bites	Dead Pups
Double Point	867	536.20 se 42.12	354	1145	553.12 se 112.83	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	8	3	4
Drakes Estero & Limantour	1023	594.73 se 44.86	336	1292	727.00 se 90.13	Weekday: 22 Weekend: 21	Weekday: 20 Weekend: 22	18	2	1
Tomales Point	487	196.25 se 28.98	194	221	329.14 se 31.06	Weekday: 14 Weekend: 18	Weekday: 6 Weekend: 17	1	0	0
Tomales Bay	611	353.38 se 26.96	179	316	176.57 se 31.81	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	12	0	1
Bolinas Lagoon	295	197.90 se 14.12	123	401	307.57 se 29.58	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	9	2	1
Duxbury Reef	71	32.85 se 4.91	10	99	37.50 se 15.63	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	2	0	0
Point Reyes Headland	131	88.22 se 10.6	51	295	238.00 se 31.67	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	2	0	0
2000 Total	3485	-	1247	3769	-	231	164	-	-	-

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Table 2c. Sources of potential and actual disturbances during the 1999 field seasons.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
Double Point	6	-	-	-	3	5	2	3	2	21
Drakes Estero & Limantour	1	5	-	-	5	23	11	11	3	59
Tomales Point	1	-	-	-	-	2	1	-	1	5
Tomales Bay	7	-	-	1	-	2	2	2	1	15
Bolinas Lagoon	-	2	-	3	1	3	6	6	-	21
Duxbury Reef	-	-	-	-	-	1	-	-	-	1
Point Reyes Headland	2	-	-	-	-	-	-	-	-	2
Total	17	7	0	4	9	36	22	22	7	124

Table 2d. Sources of potential and actual disturbances during the 2000 field season.

	Motor boat	Non-motor boat	Clammer	Plane	Human	Bird	Unknown	Other	Total
Double Point	4	-	-	7	12	6	18	4	51
Drakes Estero & Limantour	-	6	2	9	30	13	19	2	81
Tomales Point	8	-	-	4	6	-	4	1	23
Tomales Bay	15	2	6	1	-	-	-		24
Bolinas Lagoon	-	5	-	-	-	3	3	-	11
Duxbury Reef	-	1	-	-	1	-	-	-	2
Point Reyes Headland	-	-	-	1	-	-	1	-	2
Total	27	14	8	22	49	22	45	7	194

Table 3a. Summary of seal responses to disturbances during 1997. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	2	-	7	1	70%
Drakes Estero &Limantour	9	-	24	-	73%
Tomales Point	-	-	3	-	100%
Tomales Bay	-	-	-	-	0%
Bolinas Lagoon	-	-	-	-	0%
Point Reyes Headland	-	-	-	-	0%
Total	11	0	34	1	74%

Table 3b. . Summary of seal responses to disturbances during 1998. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	1	2	3	-	50%
Drakes Estero & Limantour	11	6	15	-	47%
Tomales Point	1	1	7	-	78%
Tomales Bay	8	5	5	-	28%
Bolinas Lagoon	3	1	-	1	0%
Point Reyes Headland	-	-	-	-	0%
Total	24	15	30	1	43%

Table 3e. Summary of seal responses to disturbances during 2001. See methods for definition of seal responses. Percent is the percentage of times the animals flushed into water for each site.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
Double Point	1	1	18	2	82%
Drakes Estero & Limantour	7	1	24	3	69%
Tomales Point	1	-	6	13	30%
Tomales Bay	4	2	11	3	55%
Bolinas Lagoon	5	1	31	-	84%
Duxbury Reef	-	-	3	3	50%
Point Reyes Headlands	1	-	-	-	0%
Total	19	5	93	24	66%

Table 5a. Summary data for Double Point, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg. # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	854	NA	357	NA	NA	Weekday: 12 Weekend: 7	Weekday: 4 Weekend: 6	11	1.3%	3	3
1998	708	NA	187	722	NA	Weekday: 18 Weekend: 12	Weekday: 1 Weekday: 5	6	0.8%	6	6
1999	890	NA	335	486	NA	Weekday: 23 Weekend: 13	Weekday: 11 Weekend: 10	11	1.2%	4	5
2000	960	507.70 se 40.24	416	853	657.28 se 57.39	Weekday: 24 Weekend: 28	Weekday: 12 Weekend: 39	5	0.5%	4	5
2001	867	536.20 se 42.12	354	1145	553.12 se 112.83	Weekday: 22 Weekend: 18	Weekday: 12 Weekend: 13	8	0.9%	3	4

Table 5b. Sources of potential and actual disturbances at Double Point during 1997 through 2001. NA= data not available.

	Motor boat	Non-motor boat	Elephant seal	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	1	-	NA	1	-	1	2	5	-	**10**
1998	-	-	NA	-	1	-	3	2	-	**6**
1999	6	-	NA	-	3	5	2	3	2	**21**
2000	4	-	1	-	7	12	6	18	3	**51**
2001	3	-	11	-	1	3	1	4	2	**25**

Table 8c. Summary of seal responses to disturbances at Tomales Bay during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey and the response level is unknown. See methods on definition of seal responses.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	-	-	0%
1998	8	5	5	-	28%
1999	2	5	3	1	27%
2000	4	1	9	3	53%
2001	4	2	11	3	55%

Table 8d. Summary of the average numbers of disturbances per hour observed at Tomales Bay during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 12 Weekend: 13	Weekday: 5 Weekend: 19	42.0 43.8	0.12 0.43	0.24 0.56
2001	Weekday: 15 Weekend: 19	Weekday: 3 Weekend: 26	13.3 20.3	0.23 1.28	0.41 2.52

Table 7c. Summary of seal responses to disturbances at Tomales Point during 1997 through 2001. Unknown is a disturbance which occurred prior to a survey, and the response level is unknown.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	-	-	3	-	100%
1998	1	1	7	-	78%
1999	-	-	3	1	75%
2000	3	3	3	10	16%
2001	1	-	6	13	30%

Table 7d. Summary of the average number of disturbances per hour observed at Tomales Point during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 14: Weekend: 13	Weekday: 12 Weekend: 11	46.5 43.8	0.26 0.25	0.43 0.24
2001	Weekday: 14 Weekend: 18	Weekday: 6 Weekend: 17	34.0 41.5	0.18 0.41	0.34 0.43

Table 6c. Summary of seal responses to disturbances at Drakes Estero and Limantour Estero during 1997 through 2001. Unknown is a disturbance which occurred prior to survey, and the response level is unknown.

	Head Alert	Flush	Flush Water	Unknown	% Flush Water
1997	9	-	24	-	73%
1998	11	6	15	-	47%
1999	19	4	31	1	56%
2000	15	4	38	13	54%
2001	7	1	24	3	69%

Table 6d. Summary of the average numbers of disturbances per hour observed at Drakes Estero and Limantour Estero during 2000 and 2001. The number of hours of direct observation represents the total amount of time when researchers were observing the animals. The number of disturbances represents the total of all the potential and actual disturbances.

	# Surveys	# Disturbances	#Hours of Direct observation	Average # of Disturbances per Hour	Standard Deviation
2000	Weekday: 27	Weekday: 43	53.5	0.80	1.04
	Weekend: 18	Weekend: 38	45.3	0.83	0.42
2001	Weekday: 22	Weekday: 20	41.5	0.48	0.61
	Weekend: 21	Weekend: 22	45.0	0.49	0.71

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Table 9a. Summary data for Bolinas Lagoon, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	212	NA	51	NA	NA	Weekday: 1 Weekend: 2	Weekday: 0 Weekend: 0	5	2.4%	0	1
1998	143	NA	47	267	NA	Weekday: 12 Weekend: 0	Weekday: 5 Weekend: 0	8	5.6%	2	1
1999	192	NA	59	322	NA	Weekday: 18 Weekend: 2	Weekday: 18 Weekend: 4	7	3.6%	0	0
2000	273	163.10 SE 31.41	108	388	352.66 SE 35.48	Weekday: 6 Weekend: 9	Weekday: 4 Weekend: 7	9	3.3%	1	2
2001	295	197.90 SE 14.12	123	401	307.57 SE 29.58	Weekday: 17 Weekend: 18	Weekday: 14 Weekend: 24	9	3.1%	2	1

Table 9b. Sources of potential and actual disturbances at Bolinas Lagoon during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	0
1998	-	-	3	-	-	1	1	-	-	5
1999	-	2	-	-	1	4	6	6	3	22
2000	-	5	-	-	-	-	3	3	-	11
2001	-	12	-	1	1	6	4	13	2	39

Table 10a. Summary data for Duxbury Reef, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1999	98	NA	10	NA	NA	Weekday: 7 Weekend: 1	Weekday: 0 Weekend: 1	1	1%	0	0
2000	112	31.66 se 12.01	20	10	5 se 5.05	Weekday: 4 Weekend: 7	Weekday: 0 Weekend: 2	2	1.8%	0	0
2001	71	32.85 se 4.91	10	99	37.50 se 15.63	Weekday: 15 Weekend: 17	Weekday: 2 Weekend: 4	2	2.8%	0	0

Table 10b. Sources of potential and actual disturbances at Duxbury Reef during 1999 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other
1999	-	-	-	-	-	1	-	-	1
2000	-	1	-	-	-	1	-	-	2
2001	-	-	-	-	-	6	-	-	6

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Table 11a. Summary data for Point Reyes Headland, 1997 through 2001. The reported numbers reflect the maximum number seen during a single census. The percent of red seals is the percentage of the maximum total number of seals. The number of disturbances is the total number for the whole season. Max# breed = adults, immatures and pups during the breeding season, March 15 to June 15. Max # Molt = all age classes during the molting season, June 15 to July 15. NA= data not available and se = standard error.

	Max # Breed	Avg # Breed	Max # Pups	Max # Molt	Avg # Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
1997	141	NA	24	466	NA	Weekday: 5 Weekend: 2	Weekday: 0 Weekend: 0	0	0	NA	0
1998	150	NA	24	282	NA	Weekday: 13 Weekend: 4	Weekday: 0 Weekend: 0	4	2.7%	1	3
1999	168	NA	38	431	NA	Weekday: 27 Weekend: 4	Weekday: 2 Weekend: 0	2	1.2%	0	0
2000	149	113.62 se 14.84	45	276	179.25 se 36.81	Weekday: 19 Weekend: 3	Weekday: 2 Weekend: 0	2	1.3%	0	1
2001	131	88.22 se 10.64	51	295	238.00 se 31.67	Weekday: 7 Weekend: 8	Weekday: 0 Weekend: 1	2	1.5%	0	0

Table 11b. Sources of potential and actual disturbances at Point Reyes Headland during 1997 through 2001.

	Motor boat	Non-motor boat	Car	Dog	Plane	Human	Bird	Unknown	Other	Total
1997	-	-	-	-	-	-	-	-	-	**0**
1998	-	-	-	-	-	-	-	-	-	**0**
1999	2	-	-	-	-	-	-	-	-	**2**
2000	-	-	-	-	1	-	-	1	-	**2**
2001	-	-	-	-	1	-	-	-	-	**1**

Table 12a. Harbor seal census summary for the San Francisco Bay Area during the 1998 breeding season. NA = data not available.

Date	Location	Total Count	Pups
4/19/98	Jenner	140	5
	Tomales Bay	135	10
	Tomales Point	239	68
	Point Reyes Headlands	49	3
	Drakes/Limantour	499	67
	Double Point	412	71
	Bolinas Lagoon	106	31
	Fitzgerald Marine Reserve	107	7
	San Mateo Co.	65	10
	Sonoma Co.	0	0
	Sea Ranch	108	29
	South Bean Hollow	NA	NA
	Richmond Bridge	NA	NA
	Yerba Buena	NA	NA
	Mowry Slough	NA	NA
	Grand Total	**1,860**	**301**
5/3/98	Jenner	249	12
	Tomales Bay	290	11
	Tomales Point	192	52
	Point Reyes Headlands	62	20
	Drakes/Limantour	583	126
	Double Point	551	160
	Bolinas Lagoon	88	0
	Fitzgerald Marine Reserve	NA	NA
	San Mateo Co.	155	25
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	68	7
	Richmond Bridge	NA	NA
	Yerba Buena	NA	NA
	Mowry Slough	NA	NA
	Grand Total	**2,238**	**413**
5/6/98	Jenner	NA	NA
	Tomales Bay	290	30
	Tomales Point	437	48
	Point Reyes Headlands	102	18
	Drakes/Limantour	661	192
	Double Point	708	144
	Bolinas Lagoon	113	36
	Fitzgerald Marine Reserve	NA	NA
	San Mateo Co.	NA	NA
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	61	7
	Richmond Bridge	113	8
	Yerba Buena	110	2
	Mowry Slough	NA	NA
	Grand Total	**2,595**	**485**
5/30/98	Jenner	NA	NA
	Tomales Bay	218	14
	Tomales Point	214	17
	Point Reyes Headlands	113	14
	Drakes/Limantour	429	96
	Double Point	585	13
	Bolinas Lagoon	120	25
	Fitzgerald Marine Reserve	217	6
	San Mateo Co.	NA	NA
	Sonoma Co.	183	16
	Sea Ranch	NA	NA
	South Bean Hollow	68	10
	Richmond Bridge	121	4
	Yerba Buena	129	4
	Mowry Slough	10	0
	Grand Total	**2,407**	**219**
6/28/98	Jenner	NA	NA
	Tomales Bay	218	2
	Tomales Point	504	2
	Point Reyes Headlands	282	1
	Drakes/Limantour	932	3
	Double Point	573	12
	Bolinas Lagoon	151	3
	Fitzgerald Marine Reserve	102	2
	San Mateo Co.	134	27
	Sonoma Co.	NA	NA
	Sea Ranch	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	89	1
	Yerba Buena	122	0
	Mowry Slough	128	0
	Grand Total	**3,235**	**53**

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Table 12b. (Page 2 of 3) Harbor seal census summary for the San Francisco Bay Area during the 1999 breeding and molt seasons.

Date	Location	Total Count	Pups
5/30/99	Tomales Bay	214	35
	Tomales Point	63	13
	Point Reyes Headlands	88	15
	Drakes/Limantour	293	45
	Double Point	411	81
	Bolinas Lagoon	164	50
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	127	5
	Yerba Buena	110	0
	Mowry Slough	55	7
	Grand Total	**1525**	**251**
6/6/99	Tomales Bay	192	NA
	Tomales Point	147	NA
	Point Reyes Headlands	73	13
	Drakes/Limantour	297	31
	Double Point	428	62
	Duxbury Reef	98	10
	Bolinas Lagoon	142	38
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	139	7
	Yerba Buena	144	1
	Mowry Slough	92	8
	Grand Total	**1752**	**170**

Date	Locations	Total Count	Pups
6/30/99	Tomales Bay	347	0
	Tomales Point	209	0
	Point Reyes Headlands	FOG	FOG
	Drakes/Limantour	624	0
	Double Point	483	0
	Bolinas Lagoon	NA	NA
	San Mateo Co.	NA	NA
	Russian River	NA	NA
	South Bean Hollow	NA	NA
	Richmond Bridge	117	2
	Yerba Buena	181	2
	Mowry Slough	203	0
	Grand Total	**2164**	**4**
7/17/99	Tomales Bay	319	-
	Tomales Point	460	-
	Point Reyes Headlands	431	-
	Drakes/Limantour	995	-
	Double Point	300	-
	Duxbury Reef	NA	-
	Bolinas Lagoon	288	-
	San Mateo Co.	NA	-
	Russian River	NA	-
	South Bean Hollow	NA	-
	Richmond Bridge	83	2
	Yerba Buena	NA	NA
	Mowry Slough	135	0
	Grand Total	**3011**	**2**

Table 12b. continued next page

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Harbor Seal Monitoring at

Point Reyes National Seashore
and
Golden Gate National Recreation Area

Annual Report 2005

Prepared by:

Melanie Vanderhoof and Sarah Allen

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Introduction

Harbor seals (*Phoca vitulina richardii*) are the dominant and only year round resident pinniped at Point Reyes, California. The Point Reyes seal population represents the largest concentration of harbor seals in the State of California, other than the Channel Islands, accounting for 20% of the mainland breeding population (Lowry and Carretta 2003). Much of the Point Reyes coastal zone remains fairly pristine and provides excellent marine and terrestrial habitat for seals to rest, molt feed and breed where human encroachment is minimal.

Long-term monitoring studies of harbor seals have been conducted at selected colonies at Point Reyes since 1976 (Allen et al. 1989, Sydeman and Allen 1999, Allen et al. 2004). The objectives of monitoring are to 1) detect changes in population numbers, 2) detect changes in reproductive success and 3) identify anthropogenic or environmental factors that might affect population status and trends. The monitoring objectives and protocol are described in detail in Hester et al. (draft report). The information presented here is a summary of the data collected during the 2005 breeding and molting seasons, March-July. Summary data collected as part of a region-wide survey effort including adjacent areas (San Francisco Bay, San Mateo County and Sonoma County) where NPS surveys were conducted in 2005 in conjunction with other agencies and organizations are also presented.

Methods

Study Area

The Point Reyes peninsula extends from Tomales Bay (Lat. 38° 30'N) south to Bolinas Lagoon (Lat. 37° 30'N) and are referred collectively as the Point Reyes sites. Point Bonita in the Marin Headlands is the southern most seal haul out site within the study area, and along with Alcatraz collectively form the Golden Gate NRA sites. Coastal embayments include Tomales Bay, Drakes Estero and Limantour Estero, and Bolinas Lagoon. The Point Reyes National Seashore (PORE), Golden Gate National Recreation Area (GOGA), Gulf of the Farallones National Marine Sanctuary (GFNMS), and the Marin County Department of Parks and Recreation share jurisdiction over segments of this coastline.

The topographic diversity of this coastal zone provides a broad range of substrates upon which harbor seals haul out. These include tidal mud flats, offshore and onshore rocky tidal ledges, and sandy beaches. "Haul out site" is defined as a terrestrial location where seals aggregate for periods of rest, birthing, and suckling of young (Harvey 1987, Thompson 1987). Coastal locations regularly surveyed included Tomales Point, Point Reyes Headland, Duxbury Reef, Double Point and Point Bonita; estuarine locations surveyed included Tomales Bay, Drakes and Limantour Esteros complex, and Bolinas Lagoon (Figure 1).

Regional survey sites included colonies in San Francisco Bay (Alcatraz, Mowry Slough, Castro Rocks, Yerba Buena Island, and Newark's Slough), in Sonoma County (Sea Ranch, South Sonoma sites and Jenner) and in San Mateo County (Fitzgerald Marine Reserve, Pescadero, Pebble Beach, Point San Pedro, Bean Hollow, and Cowell Ranch Beach).

Surveys

Harbor seal surveys were conducted during the breeding and molting seasons which run from the March 1 to May 30 and June 1 to July 31, respectively.

National Park Service (NPS) biologists trained volunteers to conduct surveys of harbor seals during two in-class sessions and four field sessions. Many of the volunteers were trained and seasoned, having surveyed seals in previous years. Volunteers and park biologists surveyed each Point Reyes site a minimum of twice per week, weather and logistics permitting. Point Bonita was also surveyed twice per week. The Point Reyes Headland and the regional survey sites were surveyed once every two weeks on concurrent weekends. Surveys occurred primarily during low to medium tides, the time when the maximum number of seals haul out in the San Francisco Bay region (Fancher 1979, Allen et al. 1982).

Survey periods were designed to last approximately two hours, with counts occurring every half-hour to one hour, depending on location. Each sub-site was surveyed separately, and then summed to give a total for each site. All sub-sites were visible from one location with the exception of Tomales Point, Tomales Bay and Bolinas Lagoon. For each of these sites, each sub-site was counted from two to four times per survey.

For each sub-site, the observer recorded the total number of adult/immature seals, pups, dead pups, red-pelaged seals, and any fresh shark bitten animals present. Because of the difficulty in distinguishing adult from immature seals, these two age classes were lumped together. Pups were the young of the year and after weaning, were difficult to distinguish from yearling seals. Consequently, pup numbers were reliable only between March and June 1. Red pelage results from the deposition of iron oxide precipitates on the hair shaft and usually extends from the head down to the shoulder (Allen et al. 1993).

All actual and potential disturbances to harbor seals were recorded during a period from March 1 through July 20. The analysis of disturbance data was truncated and does not account for disturbance data collected during the entire molt season. The total number of disturbance survey days was 226 (Table 1). Observers recorded the time and the source of the disturbance. The seals' response to a disturbance was classified as no response, head alert, flush, flush into water or unknown. In the case of a flush or flush into water, the observer noted the number of seals that flushed, the number of pups that were left alone, and the number of seals that remained in place. After a flush into water, the time and location of where the seals rehauled were also recorded. In some cases, an unknown disturbance and unknown response was recorded if the disturbance occurred before the survey was started, and so the nature and extent of the disturbance was not directly

observed. The rate of disturbances was calculated based on the number of disturbances per survey period (survey period was usually 2 hours but may have varied by ½ hour). In future reports, disturbance rate will be calculated based on the number of disturbances per survey hour, in order to compare to other disturbance studies.

Regional surveys occurred every two weeks March – July on weekends, Friday – Sunday that had low tides during the morning or mid-day. All of the Point Reyes and Golden gate sites, as well as the San Francisco Bay and Sonoma sites, were surveyed during these weekends. Participants in the region-wide surveys included the GFNMS and FMSA, San Francisco State University, and Stewards of Slavianka, a non-profit conservation group based in Sonoma County.

Results and Discussion

Overall

In 2005, volunteers completed 244 surveys at sites in Marin County at PORE and GOGA between March 1 and July 30. The combined maximum pup counts for all sites during the breeding season was 1,115 pups. This is 13% lower than 2004, but comparable to previous years (Figure 2). Pup numbers, combining all sites, appear to have stabilized since approximately 2000. Drakes Estero and Double Point together produced 56% of the pups (Figure 3). Pup numbers at Double Point have continued to rebound from 2003, when the presence of a northern elephant seal (*Mirounga angustirostris*) reduced the number of seals at Double Point. Numbers were similar at most sites in the past several years, except at Drakes Estero, which has seen a decrease in pup numbers since the 2003 season, as pup numbers rebound at Double Point and when a coyote was seen preying on newborn pups in 2004 at Drakes Estero (Figure 4).

Date of first pup was observed in 2005 was March 6 compared to March 20 in 2004. There was no apparent trend in the date of first pup observed between 2000 and 2005 (Table 4).

The maximum molt count for all of the Point Reyes sites was 4,380 seals. This count is 23% lower than in 2004, but comparable to counts from 2001-2003 (Table 2; Figure 5). Seals from Drakes Estero and Double Point made up 55% of the maximum molt count (Table 1; Figure 6). The maximum molt counts recorded for Tomales Bay and Tomales Point in the 2005 season were low compared to previous years. The constant presence of fog during the peak molt period at Tomales Point reduced the number of surveys completed during this time.

Surveyors recorded 120 disturbances between March 1 and July 20. 107 of these were actual disturbances, while 13 were potential disturbances. The potential disturbances represented 11% of all disturbances. Of these, 39% (5) were motor boats, and 31% (4) were humans. The disturbance data was analyzed using only the disturbances where a reaction by the seals was recorded (107). The average rate of disturbances per survey in 2005 was 0.54. This can be compared to 0.58 disturbances per survey in 2003 and 0.48

disturbances per survey in 2004. Drakes Estero, while having the highest pup and molt numbers, also had the highest rate of disturbance, 1.03 disturbances per survey (Figure 7). Fifty-two percent of the disturbances resulted in seals flushing into the water.

Twenty-four percent of the disturbances were of unknown cause (Figure 9). The largest identifiable causes were humans on foot (22.7%), non-motor boats (16.4%), and aircraft, (14.6%). These major causes are similar to disturbance data collected from 2002-2004 (Table 3). Both motor and non-motor boat disturbances have decreased slightly. Aircraft increased from an average of 5.6% in 2003 and 2004, to 14.6% (Table 3). This increase may be linked to a rising popularity of "ultralights" which have been observed flying low, especially over Tomales Point. Also notable is the reduction in disturbance from dogs. This may be the result of current enforcement of restrictions regarding where dogs are allowed in the park.

There were no major mortality events this year. The Marine Mammal Center reported that harbor seal rescues, primarily of weaned pups, were within the range of normal variability (Marine Mammal Center, pers. comm.). In 2004, surveyors observed coyotes preying on harbor seals in Drakes Estero; however, coyote predation of pups was not directly observed in 2005. On one survey at Drakes Estero, a bobcat was reported on the tidal sandbars where seals haul out but no predation was observed.

During the 2005 season, National Oceanic and Atmospheric Administration (NOAA) reported reduced upwelling and warmer than usual water temperatures for northern California, Oregon and Washington (2005 www.noaa.gov general website). Unusual, warm water species observed at Point Reyes during 2005 included: the Humboldt squid (*Dosidicus gigas),* a Brown Booby (*Sula leucogaster*) and the California grunion (*Leuresthes tenuis*). The reduced upwelling resulted in reduced algal and krill populations, which may have impacted food availability for harbor seals. During the 1998 El Nino event, when upwelling did not occur, there was a dramatic reduction in the number of seals pupping and hauling out in the Point Reyes area (Sydeman and Allen 1999). Such a dramatic reduction was not observed during the 2005 season.

Summary by site

Bolinas Lagoon

46 surveys were completed at Bolinas Lagoon between March 1 and July 31. Bolinas Lagoon had a high pup count of 143 the week of April 18, and a peak molt count of 449 the week of July 4 (Table 1). It had the second highest rate of disturbance, 0.82 disturbances per hour (Figure 7). Humans were the main cause of disturbance, making up 47.1% of the recorded disturbances. Bolinas Lagoon was one of the top sites for disturbances in 2003 and 2004, as well (Figure 8).

Double Point

32 surveys were completed at Double Point between March 1 and July 31. Double Point had a high pup count of 291 the week of April 25, and a peak molt count of 1,126 the week of July 4. Double Point had a disturbance rate of 0.48 disturbances per survey.

78.6% of the disturbances were of unknown cause. The remoteness of this site coupled with being surrounded by high cliffs reduces the exposure to human disturbances and may prevent surveyors from identifying the natural sources for disturbance.

Drakes Estero

37 surveys were completed at Drakes Estero between March 1 and July 31 2005. Drakes Estero had a high pup count of 332 the week of May 2, and a peak molt count of 1,261 the week of July 4. Besides having the largest pup and molt numbers, Drakes Estero had the greatest rate of disturbances observed, with a disturbance rate of 1.03 disturbances per survey. Causes for disturbance at Drakes Estero were variable. Birds (22.2%) were the most frequent cause, followed by non-motor boats (19.4%), humans (16.7%), and aircraft (16.7%).

Duxbury Reef

38 surveys were completed at Duxbury Reef between March 1 and July 31. Duxbury Reef had a high pup count of 10 the week of May 9, and a high adult count of 93 the week of May 9. Disturbance was low at Duxbury Reef. The rate of disturbance was 0.03 disturbances per survey this year.

Point Bonita

28 surveys were conducted at Point Bonita. Point Bonita was added to the annual survey locations initially in 2004; however, logistics were not finalized until the 2005 season. Few pups were counted at this site (6); however, the maximum count of seals during the breeding and molt seasons was around 100-130 seals (Tables 1 and 2).
Humans on foot were the major source of disturbance (Table 1).

Point Reyes Headland

Eight surveys were completed at Point Reyes Headland (PRH) between March 1 and July 30 2005. PRH had a high pup count of 44 the week of April 25 and a peak molt count of 456 the week of July 4. Disturbances are low at PRH and no disturbances were recorded in 2005. This haul out site is a primary haul out site for northern elephant seals. The peak count for northern elephant seals between March 15 and July 15 was 1,436 seals on April 29, which coincides with the molt period for elephant seals. Fog limited the number of surveys at PRH.

Tomales Bay

28 surveys were completed at Tomales Bay between March 1 and July 30. Tomales Bay had a high pup count of 188 the week of May 9, and a peak molt count of 549 the week of June 20. The disturbance rate more than doubled in the past year from 0.27 disturbances per hour in 2004 to 0.6 disturbances per hour in 2005. The largest source of disturbances was motor boats, 42.8%. The motor boats were usually clam diggers traveling from the mainland to the sandbars (Mary Ellen King, pers. comm.). Clammers, once on the sandbars and on foot, did not appear to be a source of disturbance. There were no recorded instances of clammers on foot disturbing the seals during the 2005 season.

Tomales Point

26 surveys were completed at Tomales Point between March 1 and July 30. Tomales Point had a high pup count of 101 the week of April 25, and a peak molt count of 378 the week of June 27. The disturbance rate was 0.42 disturbances per survey and the primary source of disturbances was aircraft, which made up 36.4% of the disturbances. Abalone divers are also assumed to be a primary disturbance source at Tomales Point. Often they were present upon arrival of surveyors, and so we were unable to determine the extent of their impact. Abalone collecting season begins in April and overlaps with part of the harbor seal breeding season.

Regional Sites

11 regional surveys were completed, starting on March 4, and ending July 29, at 20 locations. The seasonal peak for pups was during the week of April 30th and the peak for molting seals was during the week of July 10. The maximum number of seals during the breeding season was 3,306 and the average was 2689. The maximum number of seals during the molt was 4,691, with an average of 4,106 (Table 5). Point Reyes had the highest concentration of seals with Double Point and Drakes Estero accounting for 45% of adults during the breeding season, 49% of pups produced, and 50% of molting seals. The maximum count of pups was 1,272 and the first pups were identified at Castro Rocks and Fitzgerald Marine Reserve on March 6th. Of the 20 areas surveyed, only six produced >100 pups (Tomales Bay, Tomales Point, Drakes Estero, Double Point, Bolinas Lagoon, and Mowry Slough). Within San Francisco Bay, Mowry Slough accounted for the majority of seals, followed by Castro Rocks. Sonoma County coast haul out sites were composed of a number of small sites with larger concentrations at Sea Ranch and Jenner. San Mateo County coast sites were also composed of a number of small sites adding up to larger concentrations at Pebble Beach and Fitzgerald Marine Reserve. Only four seals were counted during one survey at Bean Hollow during the entire season. Cowell Ranch Beach and Fitzgerald Marine Reserve accounted for most of the seals counted in the county, but few pups were recorded there.

Disturbances during surveys ranged from northern elephant seal attacking harbor seals at Jenner to people on foot, tide pooling at Point Bonita. The primary sources for disturbance at San Francisco Bay were vehicles at Castro Rocks, aircraft and motor boats at Yerba Buena Island and no disturbances were noted at Mowry Slough.

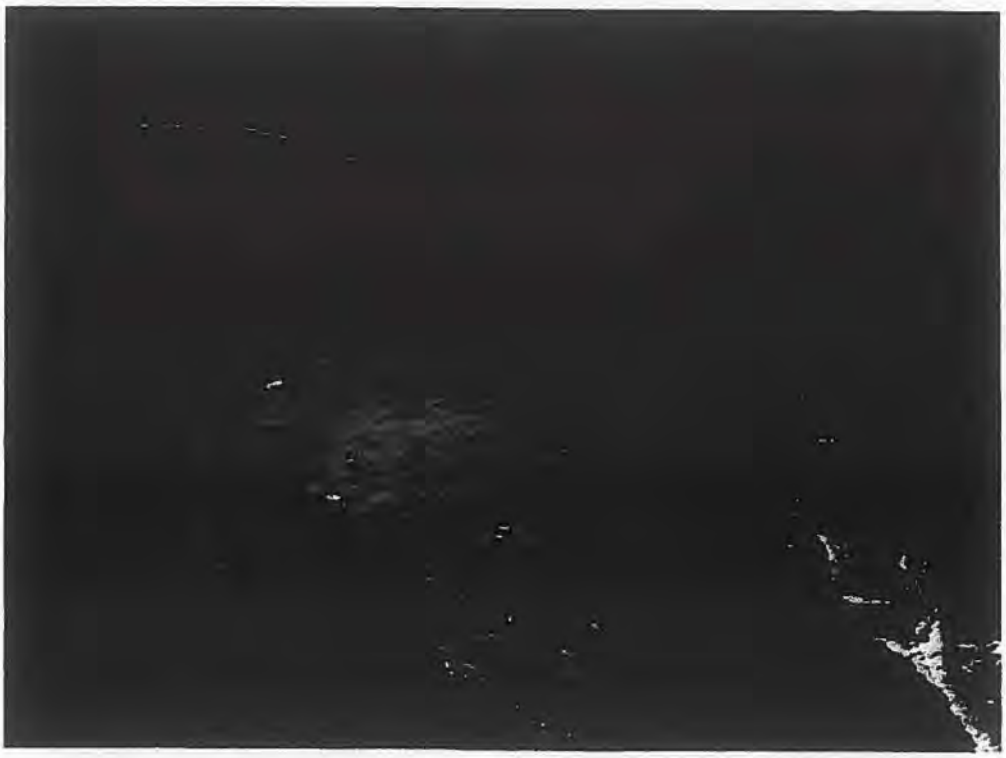
Collaboration

Point Reyes National Seashore and Golden Gate National Recreation Area collaborated with multiple government agencies and non-profits on projects related to the harbor seal population. The parks collaborated with NOAA on a Tomales Bay stewardship program called SEALS. Park rangers ferried docents on boats out onto the mud flats in Tomales Bay to educate visitors and clam diggers about seals on week ends during low tides. The National Marine Fisheries Service (NMFS) conducted an aerial survey of harbor seal haul out sites along the California Coast, on the 24th and 25th of June 2005. NMFS counted 3,826 harbor seals from Point Reyes to Point Bonita, and 621 harbor seals were counted in San Francisco Bay (Lowry et al., draft report). Regional surveys were conducted in

collaboration with Stewards of Slavianka, Bodega Bay Marine Lab, GFNMS, San Francisco State University, the California Department of Transportation, Joe Mortenson and Mary Ellen King. The Marine Mammal Center released rehabilitated pinnipeds at Chimney Rock at PRNS. We also collaborated with the San Francisco State University study on sightings of satellite and radio tagged seals observed at PRNS. One satellite tagged adult female successfully raised a pup at Double Point in 2005.

Summary

Counts of pups and molting seals at the PORE and GOGA sites were lower in 2005 than the 2004 season. They are comparable to previous years and within the normal range of variation, but the maximum pup count for 2005 was the lowest recorded since 1999, and the peak molt count was the lowest since 2001. The number of disturbances recorded by surveyors remains similar to previous years and no trends are detected. Disturbances were site specific; however, hikers and boaters remain the two most frequent sources of disturbance across all sites.



Harbor seal haul out at Point Reyes Headland.

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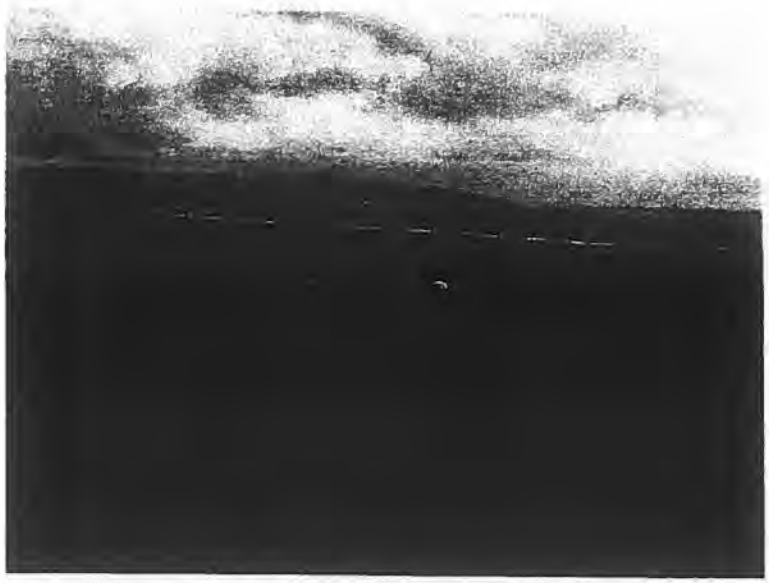

Volunteer training at Drakes Estero.

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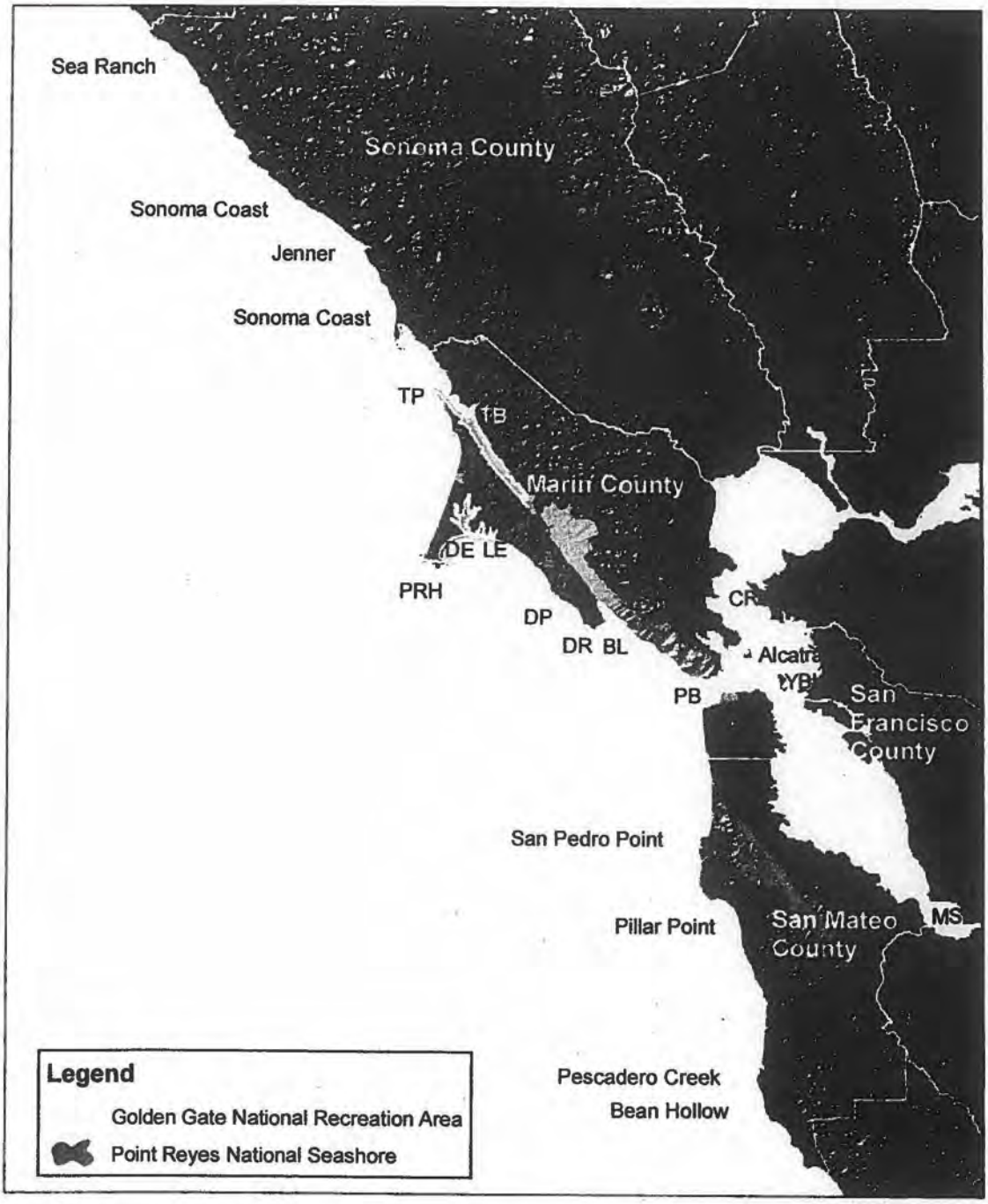

Figure 1. Harbor seal haul out sites in Marin County and San Francisco Bay, California. Map does not present all of the regional survey locations included in Sonoma and San Mateo counties. TB=Tomales Bay, TP=Tomales Point, DE=Drakes Estero, PRH=Point Reyes Headland, LE=Limantour Estero, DP=Double Point, DR=Duxbury Reef, BL=Bolinas lagoon, PB=Point Bonita, CR=Castro Rocks, YBI=Yerba Buena Island, MS=Mowry Slough.

Table 1. Summary data of harbor seal colonies for the 2005 season. All reported numbers reflect the maximum number seen during a single census over the entire season. Max # Breed = adults, immatures and pups during the breeding season, March 1 to May 31. Max # Molt =all age classes during the molting season, June 1 to July 30. The percent of red seals is a percentage of the maximum total number of seals during the molt season of each site. The number of surveys and disturbances are from March 15 to July 30.

Site	Max # Breed	Max # Pups	Max #Molt	# Surveys	# Disturbances	Reds	% Reds	Shark Bites	Dead Pups
Bolinas Lagoon	318	143	449	Weekday: 29 Weekend: 9	Weekday: 29 Weekend: 2	10	2.5%	2	1
Double Point	639	291	1126	Weekday: 20 Weekend: 9	Weekday: 13 Weekend: 1	8	1.1%	2	5
Drakes Estero	754	332	1261	Weekday: 23 Weekend: 12	Weekday: 22 Weekend: 14	15	1.4%	2	2
Duxbury Reef	93	10	64	Weekday: 29 Weekend: 8	Weekday: 1 Weekend: 0	1	1.1%	0	0
Point Reyes Headlands	84	44	456	Weekday: 8 Weekend: 0	Weekday: 0 Weekend: 0	2	1.6%	0	0
Tomales Bay	532	188	549	Weekday: 13 Weekend: 12	Weekday: 9 Weekend: 5	13	1.9%	0	0
Tomales Point	313	101	378	Weekday: 16 Weekend: 10	Weekday: 5 Weekend: 6	14	3.7%	0	1
Point Bonita	133	6	97	28	---	3	3.1%	0	1
2005 Total:	**2,866**	**1,115**	**4,380**	**226**	**107**				

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Table 2. Summary of survey data for 1997-2005, combining all sites at Point Reyes (excluding Point Bonita for comparison between years). Maximum # of Breed and Molt, and Average # Breed include all age classes. Number of surveys and disturbances are the number completed or recorded in the entire year.

YEAR	Max # Breed	Average # Breed	Max # Pups	Max # Molt	# Surveys	# Disturbances	Disturbances Per Survey
1997	3,268	1,830.50	983	NA	Weekday: 44	Weekday: 9	0.2
		SE = 379			Weekend: 29	Weekend: 37	1.3
		N =4			Total: 73	Total: 46	
1998	2,481	1,744.60	528	3,070	Weekday: 79	Weekday: 24	0.3
		SE = 122.5			Weekend: 64	Weekend: 46	0.7
		N = 8			Total: 143	Total: 70	
1999	3,325	1,779.90	1,068	2,863	Weekday: 139	Weekday: 71	0.5
		SE = 173.5			Weekend: 69	Weekend: 54	0.8
		N = 10			Total: 208	Total: 125	
2000	3,506	2,511.10	1,342	3,108	Weekday: 106	Weekday: 78	0.7
		SE = 224.4			Weekend: 91	Weekend: 116	1.3
		N = 7			Total: 197	Total: 194	
2001	3,485	2,218.80	1,247	3,769	Weekday: 112	Weekday: 57	0.5
		SE = 244.8			Weekend: 119	Weekend: 107	0.9
		N = 4			Total: 231	Total: 164	
2002	4,180	2651.3	1193	4297	Weekday: 123	Weekday: 67	0.5
		SE = 119.7			Weekend: 144	Weekend: 102	0.7
		N = 8			Total: 267	Total: 169	
2003	3820	2280	1117	4534	Weekday: 172	Weekday: 86	0.5
		SE = 303.9			Weekend: 115	Weekend: 83	0.7
		N = 9			Total: 287	Total: 169	
2004	4534	2518.3	1267	5633	Weekday: 161	Weekday: 52	0.3
		SE = 348.6			Weekend: 97	Weekend: 53	0.5
		N = 10			Total: 258	Total: 105	
2005	2,733	2182.3	1,109	4,283	Weekday: 166	Weekday: 80	0.5
		SE = 195.1			Weekend: 78	Weekend: 29	0.4
		N= 11			Total: 244	Total: 109	

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Table 3. Causes for disturbance during 2002-2005 for Point Reyes sites; percent is of total disturbances for a given year.

Year	Type of Disturbance								
	Motor boat	Non-motor boat	Vehicle	Dog	Aircrafts	Human pedestrian	Bird	Unknown	Other
2002	13%	16%	6%	0.5%	11%	24%	6%	21%	2%
2003	13%	20%	2%	0%	9%	21%	7%	23%	6%
2004	5%	10%	8%	2%	3%	39%	7%	25%	2%
2005	8%	13%	1%	0%	15%	25%	9%	23%	6%

Table 4. Date of first pup by year at Point Reyes, including all sites.

Year	Date
2000	14 March
2001	16 March
2002	03 March
2003	27 March
2004	20 March
2005	06 March

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Table 5. Regional surveys of harbor seals in central California, March through July 2005. Eleven surveys were conducted, 7 during the breeding season and 4 during the molt.

Location	Breeding Season				Molt Season		
	Average	SE	Total* Max	Pup* Max	Average	SE	Total Max
Sonoma County							
Sonoma Coast	160.9	62.2	230	56	194.5	37.4	237
Jenner	78.4	73.3	152	7	268.5	--	285
Marin County							
Tomales Bay	331.0	24.3	532	188	358.5	53.9	549
Tomales Point	161.8	18.1	313	101	255.5	40.9	378
Point Reyes Headland	63.4	8.2	84	44	367	45.6	456
Drakes Estero/Limantour	516.8	26.9	754	332	796.8	81.3	1261
Double Point	370.1	27.2	639	291	663.1	80.2	1126
Duxbury Reef	42.4	4.6	93	10	26.5	4.7	64
Bolinas Lagoon	170.7	14.0	318	143	287.5	27.7	449
Point Bonita	60.7	50.4	133	6	76.8	13.2	89
San Francisco Bay							
Castro Rocks	212.8	68.4	339	43	191.25	16.1	213
YBI	91.9	33.0	151	9	158.3	47.6	194
Newark Slough	7.1	4.6	13	5	2.0	2.0	4
Mowry Slough	86.3	34.6	139	108	123.3	60.3	210
San Mateo County							
San Pedro Point	7.6	13.1	37	0	43.5	--	75
Bean Hollow	--	--	0	0	--	--	4
Cowell Ranch Beach	70.7	23.8	114	22	130.5	--	135
Pescadero	18.3	9.3	26	5	34.0	--	48
Pebble Beach	77.0	36.9	149	20	162.5	--	170
Fitzgerald Marine Reserve	152.3	17.6	188	19	147.3	17.2	163
GRAND TOTALS	2,668.7	507.7	3,102	1,272	4,105.8	726.9	4,778

*Based on the total for a single day.

Figure 2. Maximum pup counts at PRNS from 1997-2005. See text for methods.

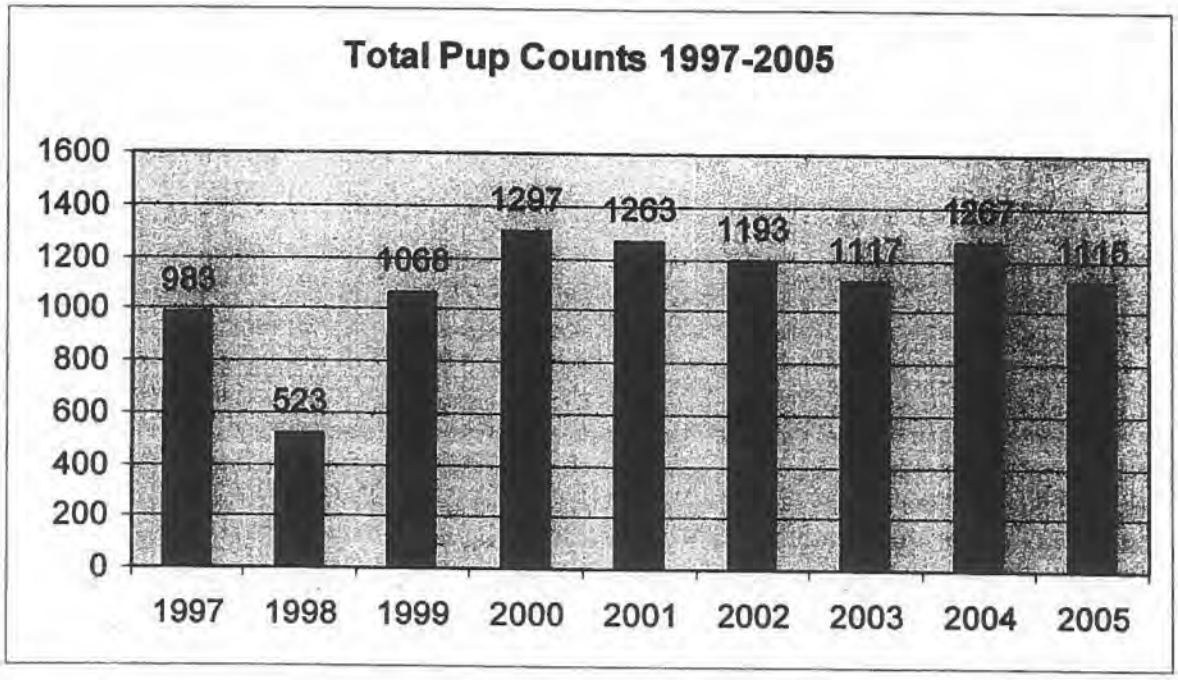


Figure 3. Maximum pup counts by site at PRNS during the 2005 season. See text for methods.

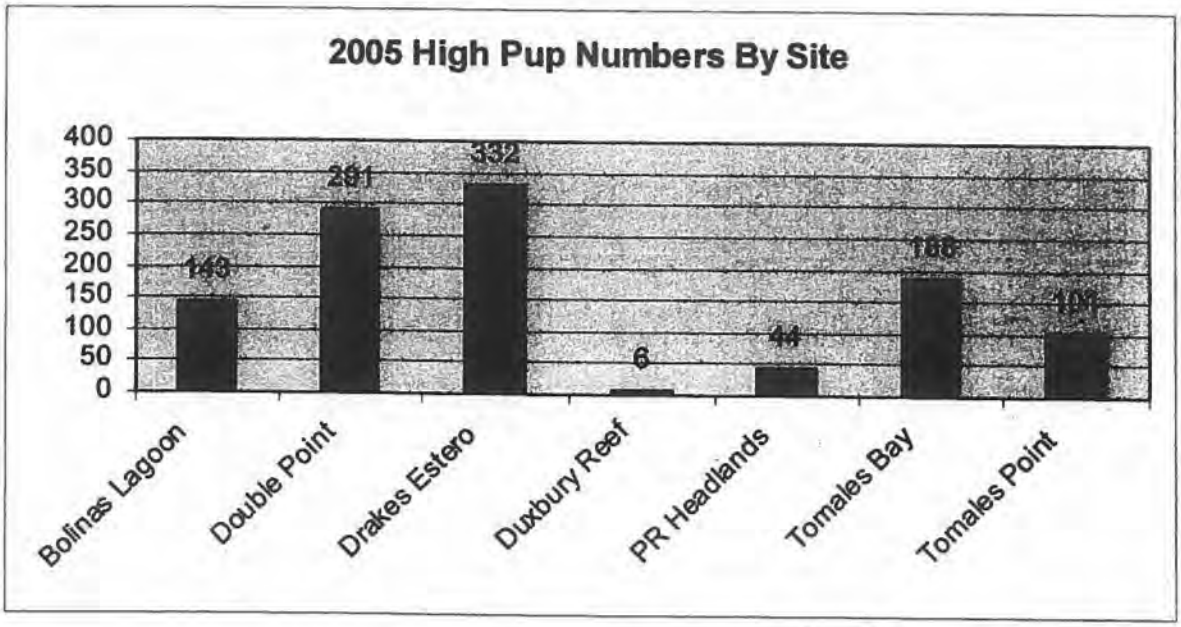


Figure 4. Maximum pup counts by site at Point Reyes, 2002-2005. See text for methods.

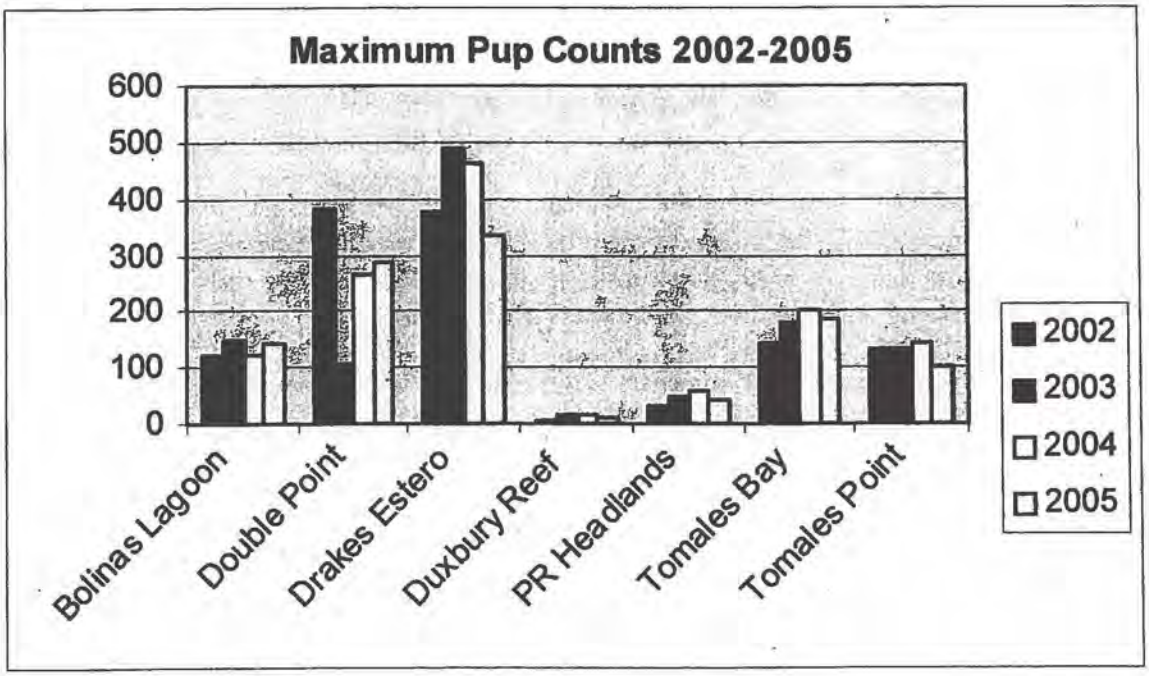


Figure 5. Maximum molt counts for Point Reyes, 1998-2005. See text for methods.

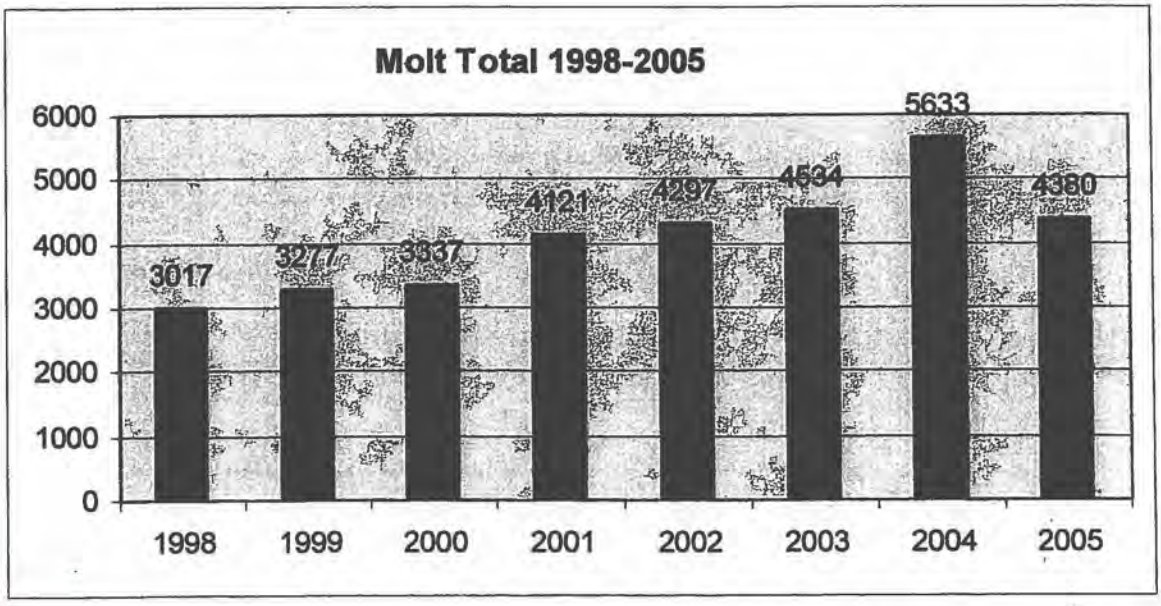


Figure 6. Maximum molt counts for the sites at Point Reyes during the 2005 season. See text for methods.

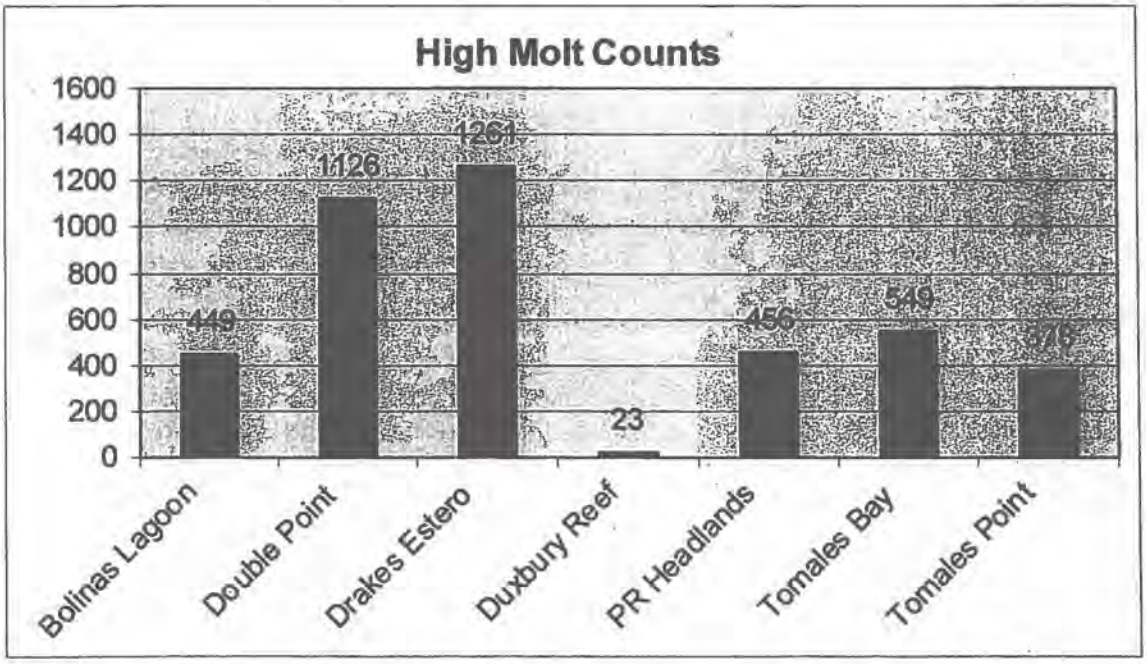


Figure 7. Average number of disturbances per survey, by site at Point Reyes, 2005. See text for methods.

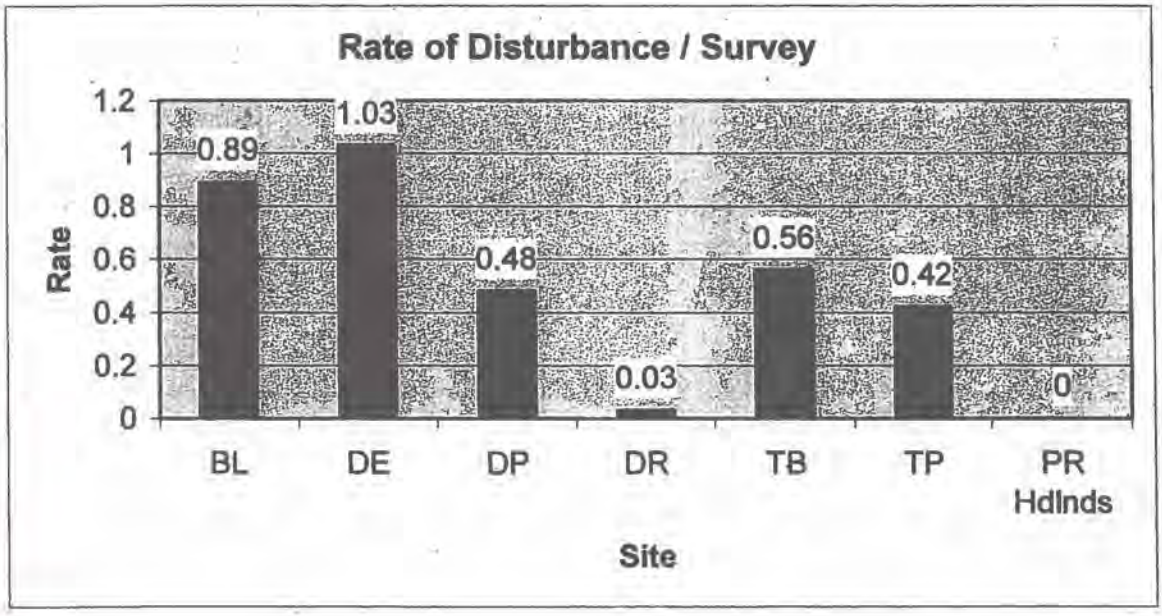


Figure 8. Average number of disturbances per survey, by site at Point Reyes for 2003-2005. See text for methods.

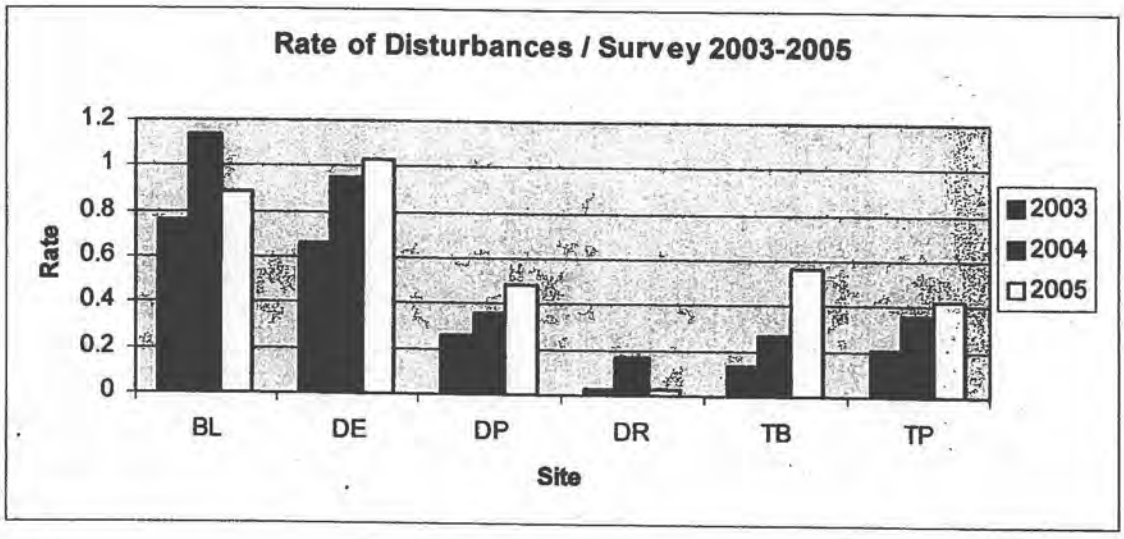
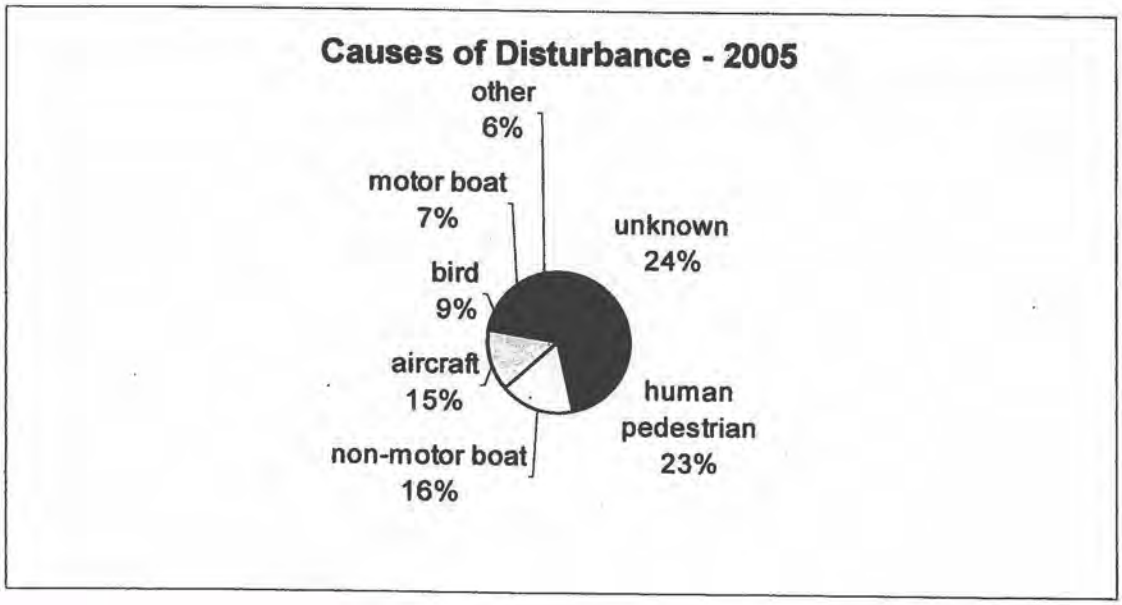


Figure 9. Causes for disturbance by percent for all of Point Reyes sites in 2005.



D5031
XL3019 B,G+L 4425 02106

files #6

Kevin McKay
12/21/2006 07:30 PM
PST

To: Don Neubacher/PORE/NPS@NPS, Colin Smith/PORE/NPS@NPS
cc: Paul Robinson/OAKLAND/NPS@NPS, Gordon White/PORE/NPS@NPS, Gus Conde/PORE/NPS@NPS
Subject: Update on Ranch Employee Housing

Following is a brief update on our inspections conducted December 20, 2006

Gordon White, Gus Conde and I completed follow up inspections of ranch employee housing at G Ranch, Drakes Bay Oyster Company (DBO), B Ranch and L Ranch. A majority of the housing was in good condition with deficiencies noted in the report issued by the Regional Public Health Consultant Paul Robinson addressed or in at least in the process of being addressed.

The housing mentioned in the Email below was included in this Park inspection however it was an initial inspection of the location as the housing was not in use when Paul Robinson and I visited DBO in August. Since the initial contact with Mrs. Porrata we have subsequently learned that the family living in this housing came down with a communicable disease likely related to their occupancy of the residence. The children were sent home from school as a result.

The trailer is in the process of being worked on and improvements have been made since we were initially contacted by Mrs. Porrata. Drakes Bay Oyster reports that they were approached by the occupants and asked to allow them to live in the residence. The occupants volunteered to improve the residence with supplies purchased by DBO and this work is currently in process.

There is another trailer also apparently occupied that requires substantial work. We informed DBO that we would contact Paul Robinson the Regional Public Health Consultant to schedule an inspection of the trailers on the site.

Kevin

Kevin E. McKay
Special Park Uses Coordinator
National Park Service
Point Reyes National Seashore
Point Reyes, CA 94956
(415) 464-5111
Fax (415) 464-5182
----- Forwarded by Kevin McKay/PORE/NPS on 12/21/2006 06:48 PM -----

Colin Smith
11/07/2006 02:56 PM
PST

To: Kevin McKay/PORE/NPS@NPS
cc: Paul Robinson/OAKLAND/NPS@NPS
Subject: Fw: Drakes Estero Oyster Company employee housing complaint

housing issues at Drakes Bay Oysters

Colin

Colin Smith
Chief Ranger
Point Reyes NS
415 464-5175
----- Forwarded by Colin Smith/PORE/NPS on 11/07/2006 02:55 PM -----

Bruce A Dombrowski
11/07/2006 02:21 PM
PST

To: Colin Smith/PORE/NPS@NPS
cc:
Subject: Drakes Estero Oyster Company employee housing complaint

Memo to Chief Ranger Smith :

On 11/07/2006 while on patrol in vicinity of the Drakes Estero Oyster Company I was contacted by Mrs. Rebecca Porrata, a family friend. She is a public health nurse. She told me that she had just been at the former Mark Johnson residence trailer seeing a family, and that the condition of the unit was very bad. She cited examples such as broken plumbing, a non-working bathtub, graffiti on the walls, and possible septic/sanitation hazards. She also stated that small children reside at the residence and that she was extremely concerned. She told me that someone associated with the Oyster Company keeps telling the family that they will fix the place up, but no work has been performed. Rebecca is also worried that the family may lose their jobs at the oyster company over this issue. I told Rebecca that I was unaware that anyone was living in that trailer and I would inform my supervisor of the situation.

Sincerely.

Bruce Dombrowski
USNPS Ranger

Greg Gress
10/13/2006 08:54 AM PDT

To: Don Neubacher/PORE/NPS@NPS
cc: Ernesto O Sanchez/OAKLAND/NPS@NPS
Subject: PORE 02-106 (Drakes Bay Oyster) - Summary of Survey Review by Al Pickrel, CALand Title

Don,

Al Pickrel, Chief Title Officer for Calif. Land Title (415/454-9323), called to report on the results of his review of the differing surveys by Stevens and LaFranchi of the reserved area for Tract 02-106. He also reviewed the grant deed w/reservation and additional docs. from our tract files that have a bearing on the location of the reserved premises.

Al noted what turned out to be a scriveners error in the Stevens' survey -- an erroneous reference to Record of Survey 160. The ROS should be 169. Stevens maintained to Al that it was merely a typographical error and did not change the results of his work. Stevens reported that because the basis of bearing is almost a mile away from the subject property, and that there is an apparent error in ROS 169 (which makes reliance on the basis of bearing problematic in any event), he used evidence on the ground at the subject property to infer the location of the reservation. That evidence includes old fence posts along the SW boundary of the property. Stevens' method is similar to that used by former NPS Realty Specialist Joe Scarborough in 1994 to identify the reservation and permit areas.

All of the pertinent material from our tract files, as well as the two surveys, provide only circumstantial evidence for the exact location of the reservation. One can attempt to make an educated guess as Stevens and Scarborough have, but without an actual field survey of the legal description, the location of the reservation will remain a question.

Please let me know if you want to pursue this further.

Thanks,

Greg

Gregory F. Gress
Chief, Pacific Land Resources Program Center
Pacific West Region, National Park Service
510/817-1414 tel.
510/817-1482 fax
greg_gress@nps.gov

Greg Gress
03/27/2006 10:28 AM

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject: Re: BLM Surveyor

Don,

I spoke with Lance Bishop, the head of the CA-BLM Cadastral Survey, and he said we could send him the conflicting surveys and he'd review and advise us. If you can send me the material, I told Lance I'd forward it to him. He said he should have something for us by the end of next week.

Thanks,

Greg

Gregory F. Gress
Chief, Pacific Land Resources Program Center
Pacific West Region, National Park Service
510/817-1414 tel.
510/817-1482 fax
greg_gress@nps.gov
Don Neubacher

Don Neubacher
03/27/2006 08:40 AM PST

To: Greg Gress/OAKLAND/NPS@NPS
cc:
Subject: BLM Surveyor

Greg, did you have a chance to contact the BLM about two licensed surveys at Drakes Estero being different and what we might want to do about it? Thanks I know you are busy!

Don

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.

#7

Don Neubacher
06/14/2007 04:38 PM PDT

To: Ann Nelson/PORE/NPS@NPS
cc:
Subject: Drakes Bay Oyster Co. debris - Home Bay - south end

For files.

Don Neubacher
Superintendent
Point Reyes National Seashore
Point Reyes Station, CA 94956

415-464-5101 (office)
415-233-0303 (cell)
415-663-8132 (fax)

The National Park Service cares for special places saved by the American people so that all may experience our heritage.
----- Forwarded by Don Neubacher/PORE/NPS on 06/14/2007 04:37 PM -----

Mark Rudo
06/14/2007 03:13 PM PDT

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject: Drakes Bay Oyster Co. debris - Home Bay - south end

Don,

The net bag with sytrofoam inserts, and the plastic lid "spacers" that Peter Van der Naillen and I showed you last week were found on the beach, on the east side of the south end of Home Bay, near archeological site MRN-304, on June 7, 2007.

We spent several hours relocating the archeological site at which time there was a minus tide. For the entire period there were two Drakes Bay Oyster Co. workers on the adjacent mudflat, working the shellfish (clam?) bags. I would estimate that there were about 700+ linear meters of bags lined up in rows, directly on the mud flat. They were all out of the water during the minus tide making them easily seen and accessible.

Mark O. Rudo, Archaeologist
National Park Service, PWR-CR
1111 Jackson Street, Suite 700
Oakland, California USA 94607- 4807

Oakland, (510) 817-1405 • Fax (510) 817-1484
Point Reyes National Seashore, (415) 464-5204

Holly Bundock
07/10/2007 03:30 PM
PDT

To: Jon Jarvis/OAKLAND/NPS@NPS, Don Neubacher/PORE/NPS@NPS, Sue Masica/WASO/NPS@NPS, goodrosen@comcast.net
cc:
Subject: Saturday, July 21

I have had several calls today for a guest list for this event. We have room for 4 - Jon, Don, a solicitor, and either the Director or Deputy.

The Senator has invited Ryan Broderick with Cal Fish and Game and someone from the Cal Coastal Commission, as well as the Marin Supervisors, Mr. Lunny and whomever he wants to invite.

It will be for lunch in a private room either at the Olema Inn or the Station House. A trek to the Estero afterward may be possible.

Holly Bundock
07/24/2007 05:07 PM
PDT

To: John A Dell'Osso/PORE/NPS@NPS, Don Neubacher/PORE/NPS@NPS
cc:
Subject: Re: Fw: questions

FYI
----- Forwarded by Holly Bundock/OAKLAND/NPS on 07/24/2007 05:07 PM -----

Holly Bundock
07/24/2007 05:07 PM
PDT

To: thomasyeatts@gmail.com
cc:
Subject: Re: Fw: questions

Your email has been forwarded to me for a reply. I am the public affairs officer for the NPS in California. Our answers follow your questions below.
Jon Jarvis

Jon Jarvis
07/23/2007 04:10 PM
EDT

To: "Holly Bundock" <Holly_Bundock@nps.gov>
cc:
Subject: Fw: questions

Sent from my BlackBerry Wireless Handheld
Jonathan B. Jarvis
Regional Director
Pacific West Region
510-817-1304 Oakland
206-220-4010 Seattle

----- Original Message -----
From: "Thomas Yeatts" [thomasyeatts@gmail.com]
Sent: 07/23/2007 01:51 PM ÁST
To: Jon Jarvis
Subject: questions

Hi Mr. Jarvis,

I am a reporter with the Point Reyes Light in Point Reyes Station, and I am writing regarding the Lunny family in the Point Reyes National Seashore. The Light has talked to Senator Feinstein's office about the meeting that took place Saturday, and I want to ask you a few questions about the outcome of that meeting. I'd be happy to speak to you by phone, but I've included here the main questions. I am on deadline, if you can call me sometime Monday.

Holly Bundock
07/26/2007 07:01 PM PDT

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject: follow up on my conversation with you

if i have the wrong email, would you forward to her please? thanks
----- Forwarded by Holly Bundock/OAKLAND/NPS on 07/26/2007 07:01 PM -----

Holly Bundock
07/26/2007 06:41 PM PDT

To: Wendy.Freifeld@mail.house.gov
cc:
Subject: follow up on my conversation with you

Wendy - We spoke several weeks ago about the [redacted] operation at Drakes Estero. You had sent in a letter seeking information on the scientific data collected at the Estero and I indicated the information sought was the subject of a FOIA we were in the midst of evaluating.

Last weekend we had a meeting with Mr. [redacted] and other principals. You may have heard about it. The FOIAs were part of that conversation. We are finishing up those responses and expect to have them out to the requesters in the next two weeks. I can send you a copy of the cover letter if you want --- or the attachments, which will be exhaustive, if you want.

I can be reached at 510-817-1320. I'll be out of the office until Aug 6 however Rick Nolan is sitting in for me and will be following up on FOIA issues.

Thank you.

George Turnbull
08/03/2007 01:26 PM PDT

To: Don Neubacher/PORE/NPS@NPS
cc:
Subject:

fyi - let's discuss

----- Forwarded by George Turnbull/OAKLAND/NPS on 08/03/2007 01:26 PM -----

"Kevin Lunny" <kevin@drakesbayoyster.com>
08/03/2007 09:37 AM MST

To "Jon Jarvis" <jon_jarvis@nps.gov>
cc "David M. Weiman" <agresources@erols.com>, "George Turnbull" <George_Turnbull@nps.gov>
Subject

Dear Jon,

This will acknowledge receipt of your letter, undated (A90(PWR-C) which contained a draft SUP.

A quick read indicates that numerous changes have been made to this proposed SUP as compared to the SUP previously submitted.

So that we have a comprehensive understanding of this new proposal, would you please itemize the changes, and provide an explanation for each.

I would like to meet next week to discuss this proposal and therefore need the clarification about the new proposal as soon as possible.

Thank you,

Kevin Lunny
Drakes Bay Oyster Farm

Documents responsive to the October 20, 2011, request from Chairman Issa for documents regarding Drakes Bay Oyster Company

Volume: 00033002_Issa_004

	Document Name	Pages	Document Type	Document Title
1	NPS-PWR-B04-00001-000001	41	COR	FOIA-2007-00420 Activity of Harbor Seals 86-87
2	NPS-PWR-B04-00001-000002	123	COR	FOIA-2007-00420 Drakes Estero Report 2005
3	NPS-PWR-B04-00001-000003	79	COR	FOIA-2007-00420 Harbor Seals Miller Thesis 1976
4	NPS-PWR-B04-00001-000004	42	COR	FOIA-2007-00420 NOAA Technical Memorandum NOS MEMD 6
5	NPS-PWR-B04-00001-000005	85	COR	FOIA-2007-00420 NOAA Technical Memorandum NOS MEMD 7
6	NPS-PWR-B04-00001-000006	77	COR	FOIA-2007-00420 Pinniped Assessment 82-83
7	NPS-PWR-B04-00001-000007	29	COR	FOIA-2007-00420 Pinniped Assessment 83-84
8	NPS-PWR-B04-00001-000008	180	COR	FOIA-2007-00420 Pollution Studies Anima 91
9	NPS-PWR-B04-00001-000009	2	COR	FOIA-2007-00420 Trip Report 4-13-07
10	NPS-PWR-B04-00001-000010	2	COR	FOIA-2007-00420 Trip Report 4-26-07
11	NPS-PWR-B04-00001-000011	42	COR	FOIA-2007-00420 Annual Report 2005 & 2006
12	NPS-PWR-B04-00001-000012	82	COR	FOIA-2007-00420 Long Term Monitoring & 2 Trip Reports
13	NPS-PWR-B04-00002-000001	118	COR	FOIA-2007-00433 Enclosure 1 Environmental Assessment
14	NPS-PWR-B04-00002-000002	9	MAP	FOIA-2007-00433 Enclsoure 2 Environmental Assessment Maps
15	NPS-PWR-B04-00003-000001	44	COR	FOIA-2007-00450 Attachment 1
16	NPS-PWR-B04-00003-000002	12	COR	FOIA-2007-00450 Attachment 2
17	NPS-PWR-B04-00003-000003	6	COR	FOIA-2007-00450 Attachment 3

	Document Name	Pages	Document Type	Document Title
18	NPS-PWR-B04-00003-000004	11	COR	FOIA-2007-00450 Attachment 4
19	NPS-PWR-B04-00004-000001	4	COR	FOIA-2007-00453 Enclosure
20	NPS-PWR-B04-00005-000001	166	COR	FOIA-2007-00469 Enclosure
21	NPS-PWR-B04-00006-000001	44	COR	FOIA-2007-00471 Enclosure
22	NPS-PWR-B04-00007-000001	46	COR	FOIA-2007-00472 Attachment 1
23	NPS-PWR-B04-00007-000002	41	COR	FOIA-2007-00472 Activity of Harbor Seals 86-87
24	NPS-PWR-B04-00007-000003	79	COR	FOIA-2007-00472 Harbor Seals Miller Thesis 1976
25	NPS-PWR-B04-00007-000004	42	COR	FOIA-2007-00472 NOAA Technical Memorandum NOS MEMD 6
26	NPS-PWR-B04-00007-000005	85	COR	FOIA-2007-00472 NOAA Technical Memorandum NOS MEMD 7
27	NPS-PWR-B04-00007-000006	77	COR	FOIA-2007-00472 Pinniped Assessment 82-83
28	NPS-PWR-B04-00007-000007	29	COR	FOIA-2007-00472 Pinniped Assessment 83-84
29	NPS-PWR-B04-00007-000008	42	COR	FOIA-2007-00472 Annual Report 2005 & 2006
30	NPS-PWR-B04-00007-000009	66	COR	FOIA-2007-00472 Long Term Monitoring
31	NPS-PWR-B04-00012-000001	8	COR	FOIA-2007-00496 Enclosures
32	NPS-PWR-B04-00013-000001	239	COR	FOIA-2007-00509 Enclosures
33	NPS-PWR-B04-00014-000001	355	COR	FOIA-2007-00607 Attachment 1
34	NPS-PWR-B04-00014-000002	8	COR	FOIA-2007-00607 Attachment 2
35	NPS-PWR-B04-00014-000003	22	COR	FOIA-2007-00607 Attachment 3
36	NPS-PWR-B04-00014-000004	135	COR	FOIA-2007-00607 Attachment 5
37	NPS-PWR-B04-00014-000005	4	COR	FOIA-2007-00607 Attachment 6

	Document Name	Pages	Document Type	Document Title
38	NPS-PWR-B04-00014-000006	5	COR	FOIA-2007-00607 Attachment 7

Total Pages: 2,481

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

January 3, 2012

Technical Instructions/Information

This production DVD is labeled "00033002_Issa_004" and contains 38 documents consisting of 2,481 pages.

All images on the DVD are in a multi-page PDF format. PDF files can be opened with Adobe Reader.

On the DVD there is a copy of the index for the volume. The following fields are included on the index: document name, page count, document date, document type and document title.

The format of the date field is the four-digit year, two-digit month and two-digit date (YYYYMMDD). If any part of the date is illegible or unknown, there is an X as a placeholder for the digit.

The index lists the abbreviations for the document types. A list of the abbreviations is as follows:

AGN = Agenda
ANL = Analysis
APR = Appraisal
ART = Article - News
AUD = Audit
BRF = Briefing Paper
CAL = Calendar
CON = Contract
COO = Court Decision/Opinion/Order
COR = Correspondence (Memo)
DEC = Declaration
EML = E-mail
GRT = Grant
LEA = Lease
MAP = Map
MOU = Memorandum of Understanding
MTG = Meeting/Minutes
NTE = Notes
NTI = Notice
OTH = Other
PRO = Proposal
REC = Receipt
REG = Regulation
RPT = Report
STA = Statue
STM = Statement
SUB = Subpoena
TES = Testimony
TRA = Transcript
TVO = Travel Voucher/Order

Documents responsive to the October 20, 2011, request from Chairman Issa for documents regarding Point Reyes National Seashore

Volume: 00033002_Issa_001

	Document Name	Pages	Document Date	Document Type	Document Title
1	NPS-PWR-B01-00001-000001	3	20100902	COR	Transmittal Letter One
2	NPS-PWR-B01-00001-000002	286	XXXXXXXX	COR	Released Documents
3	NPS-PWR-B01-00001-000003	8	XXXXXXXX	COR	Harbor Seal Docent Observations at Drakes Estero for 2009 - Initial Document
4	NPS-PWR-B01-00001-000004	2	20101210	COR	Transmittal Letter Two
5	NPS-PWR-B01-00001-000005	15	20091109	COR	Harbor Seal Docent Observations at Drakes Estero for 2009 - Complete Document

Total Pages: 314

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

November 4, 2011

Technical Instructions/Information

This production CD is labeled "00033002_Issa_001" and contains 5 documents consisting of 314 pages.

All images on the CD are in a multi-page PDF format. PDF files can be opened with Adobe Reader.

On the CD-ROM there is a copy of the index for the volume. The following fields are included on the index: document name, page count, document date, document type and document title.

The format of the date field is the four-digit year, two-digit month and two-digit date (YYYYMMDD). If any part of the date is illegible or unknown, there is an X as a placeholder for the digit.

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MOU = Memorandum of Understanding
MTG = Meeting/Minutes
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NTI = Notice
OTH = Other
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United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

NOV 0 4 2011

The Honorable Darrell Issa
Chairman, Committee on Oversight
and Government Reform
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Thank you for your letter dated October 20, 2011, to Secretary Salazar regarding the Draft Environmental Impact Statement (EIS) related to the Drakes Bay Oyster Company in the Point Reyes National Seashore and seeking documents and information related to that matter.

You will be receiving, under separate cover, a letter from Rachel Jacobson, the Acting Assistant Secretary for Fish and Wildlife and Parks, providing information related to the steps the Department is taking to address concerns regarding the science underlying the Draft EIS. That letter offers to brief the Committee, at its convenience, on the process and status of the EIS and the Department's scientific integrity processes. The Department believes that a briefing is the best way to accommodate the Committee's information needs. In a conversation with your staff on Wednesday, November 2, they welcomed the opportunity for that briefing and we look forward to working with your staff to arrange it.

As further indicated in our November 4 conversation with your staff, in order to demonstrate the Department's good faith and commitment to be responsive to the Committee in the short time provided by the letter, the Department is providing today responsive documents that have already been provided to the public in order to minimize the need for processing and review.

First, the Department has acquired from the National Park Service and is providing to the Committee a hard drive (S/N NA0E7R0W) loaded with approximately 300,000 photographs responsive to your request. We ask that, upon completion of your review of the photographs, arrangements can be made for return of the hard drive to the Department. In addition, we are enclosing a disk entitled "00033002_Issa_001" with 314 pages of responsive documents. These photographs and documents, along with other documents related to this issue, are also available online at http://www.nps.gov/pore/parkmgmt/planning_reading_room.htm.

We are hopeful that the briefing for Committee staff will provide an opportunity to continue a productive dialogue on how we might accommodate the Committee's informational needs in a manner that respects the Department's ongoing decision-making process.

We look forward to continuing to work with you on this matter. If you have any questions or need additional assistance, please do not hesitate to contact Jason Buckner at (202) 208-7696 or me at (202) 208-1403.

Sincerely,

Christopher P. Salotti
Legislative Counsel
Office of Congressional
and Legislative Affairs

Enclosures
cc: The Honorable Elijah E. Cummings
Ranking Member

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240
NOV 23 2011

The Honorable Darrell Issa
Chairman, Committee on Oversight
and Government Reform
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This letter transmits additional documents responsive to your October 20, 2011, letter to Secretary Salazar seeking documents and information related to the Drakes Bay Oyster Company.

Enclosed is a CD titled "00033002_Issa_002" that contains 94 documents consisting of 1,269 pages of material that is responsive to your request.

If you have any questions or need additional assistance, please do not hesitate to contact Jason Buckner at (202) 208-7696 or me at (202) 208-1403.

Sincerely,

Christopher P. Salotti
Legislative Counsel
Office of Congressional
and Legislative Affairs

Enclosures

cc: The Honorable Elijah E. Cummings
Ranking Member

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

DEC 0 9 2011

The Honorable Darrell Issa
Chairman, Committee on Oversight
and Government Reform
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This letter transmits additional documents responsive to your October 20, 2011, letter to Secretary Salazar seeking documents and information related to the Drakes Bay Oyster Company.

Enclosed is a CD titled "00033002_Issa_003" that contains 260 documents consisting of 6,457 pages of material that is responsive to your request. These documents were previously produced by the National Park Service in response to requests under the Freedom of Information Act in 2008 and 2009. Some of the documents contain minor redactions to protect personally identifiable information.

If you have any questions or need additional assistance, please do not hesitate to contact Jason Buckner at (202) 208-7696 or me at (202) 208-1403.

Sincerely,

Christopher P. Salotti
Legislative Counsel
Office of Congressional
and Legislative Affairs

Enclosures

cc: The Honorable Elijah E. Cummings
Ranking Member

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

JAN 04 2012

The Honorable Darrell Issa
Chairman, Committee on Oversight
and Government Reform
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This letter transmits additional documents responsive to your October 20, 2011, letter to Secretary Salazar seeking documents and information related to the Drakes Bay Oyster Company.

Enclosed is a DVD titled "00033002_Issa_004" that contains 38 documents consisting of 2,481 pages of material that is responsive to your request. These documents were previously produced by the National Park Service in response to requests under the Freedom of Information Act in 2007. Some of the documents contain minor redactions to protect personally identifiable information.

If you have any questions or need additional assistance, please do not hesitate to contact Jason Buckner at (202) 208-7696 or me at (202) 208-1403.

Sincerely,

Christopher P. Salotti
Legislative Counsel
Office of Congressional
and Legislative Affairs

Enclosures

cc: The Honorable Elijah E. Cummings
Ranking Member

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

JAN 27 2012

The Honorable Darrell Issa
Chairman, Committee on Oversight
and Government Reform
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This letter transmits additional documents responsive to your October 20, 2011, letter to Secretary Salazar seeking documents and information related to the Drakes Bay Oyster Company.

Enclosed is a DVD titled "00033002_Issa_005" that contains 13 documents consisting of 1,455 pages of material that is responsive to your request. These documents were previously produced by the National Park Service in response to requests under the Freedom of Information Act in 2010. Some of the documents contain minor redactions to protect personally identifiable information.

If you have any questions or need additional assistance, please do not hesitate to contact Jason Buckner at (202) 208-7696 or me at (202) 208-1403.

Sincerely,

Christopher P. Salotti
Legislative Counsel
Office of Congressional
and Legislative Affairs

Enclosures

cc: The Honorable Elijah E. Cummings
Ranking Member

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

January 27, 2012

Technical Instructions/Information

This production DVD is labeled "00033002_Issa_005" and contains 13 documents consisting of 1,455 pages.

All images on the DVD are in a multi-page PDF format. PDF files can be opened with Adobe Reader.

On the DVD there is a copy of the index for the volume. The following fields are included on the index: document name, page count, document date, document type and document title.

The format of the date field is the four-digit year, two-digit month and two-digit date (YYYYMMDD). If any part of the date is illegible or unknown, there is an X as a placeholder for the digit.

The index lists the abbreviations for the document types. A list of the abbreviations is as follows:

AGN = Agenda
ANL = Analysis
APR = Appraisal
ART = Article - News
AUD = Audit
BRF = Briefing Paper
CAL = Calendar
CON = Contract
COO = Court Decision/Opinion/Order
COR = Correspondence (Memo)
DEC = Declaration
EML = E-mail
GRT = Grant
LEA = Lease
MAP = Map
MOU = Memorandum of Understanding
MTG = Meeting/Minutes
NTE = Notes
NTI = Notice
OTH = Other
PRO = Proposal
REC = Receipt
REG = Regulation
RPT = Report
STA = Statue
STM = Statement
SUB = Subpoena
TES = Testimony
TRA = Transcript
TVO = Travel Voucher/Order